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# Assessing the Impact of Exogenous Shocks on Production Efficiency in Agri-Startups: A Case Study of Organic Agricultural Cooperatives in Hung Yen, Vietnam

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**Abstract:** The global food system faces significant vulnerabilities due to pandemics, which not only disrupt economies and governmental functions but also threaten food security and public health. Organic farming, particularly within cooperatives, plays a crucial role in promoting sustainable agriculture and enhancing rural development while contributing to ecosystem protection. This study investigates the production efficiency of 306 agricultural cooperatives in Hung Yen Province, Vietnam, before and during the COVID-19 pandemic. The efficiency assessment utilizes the analytic hierarchy process (AHP) model to examine the influence of factors such as the potential of cooperatives, labor resources, production processes, supply chains, and governmental support on the technical efficiency of these cooperatives. The findings indicate that organic cooperatives in Hung Yen maintained production efficiency throughout the pandemic, largely due to the adoption of advanced technologies and active participation in supply chains, which facilitated swift adaptation to new challenges. Among the influencing factors, the internal potential of cooperatives, labor resources, product development processes, and supply chain dynamics were identified as the most significant, whereas governmental support was found to have the least impact (0.07 for the first group, 0.06 for the second, and 0.06 for the third) during the pandemic. Additionally, three key factors—years of operational experience, product diversity, and business procedure support—were determined to have the greatest effect on production efficiency across different cooperative groups in the COVID-19 context. The study underscores the importance of enhancing the intrinsic potential of organic cooperatives to better adapt to rapid changes, thereby supporting rural development and agricultural productivity in the face of economic shocks such as the COVID-19 pandemic.

**Keywords:** Organic agricultural cooperatives; Effectiveness; Exploratory factor analysis; Analytic hierarchy process; Exogenous shocks; COVID-19; Hung Yen Province

## 1. Introduction

Organic agriculture is the current trend in sustainable agriculture and eco-friendly practices. It is essential for rural development and agricultural productivity. Due to the availability of labor and the short marketing circuits, the agribusiness of organic farming is particularly applicable to farms. The novel techniques of organic farming, soil fertility, weed and pest control present several opportunities for agricultural development and extension. To improve their competitiveness, organic agricultural cooperatives organize millions of small-scale farmers to achieve food security using the optimal organizational structure. According to Ferreira et al. (2020), one of these attempts is the development of an agricultural cooperative society that aims to harness and pool the resources of millions of small producers in order to enjoy the advantages of large-scale production. Organizations in the agriculture sector create the system's absorptive, adaptive, and regenerative capacities during the economic shocks. New management techniques, technologies, entrepreneurialism, and other agricultural entities assist farms in achieving organic farming effectiveness. Diverse technical solutions attempt to enhance the functional performance of infrastructure in the agriculture industry. Therefore, an agricultural cooperative is considered as a group of producers who pool their resources in a certain area to facilitate organic production and make better use of these resources (Candemir et al., 2021).

Pandemic risks and economic shocks are increasingly recognized as significant problems not only for industrialized agricultural producers but also for other stakeholders, such as underwriters and insurers, smallholder farmers and vulnerable consumers, governments, the financial sector, distributors, processors, and shippers, and other stakeholders (Martins et al., 2015). The COVID-19 pandemic, considered an economic shock, has rapidly expanded and increased with new strains that have severely impacted the economy of Vietnam and the rest of the world. According to the Food and Agriculture Organization of the United Nations (FAO, 2020), the COVID-19 epidemic has significantly impacted organic agricultural cooperatives by increasing production costs, disrupting agricultural company operations, increasing storage expenses, and delaying distribution owing to the lockdown. In Vietnam, agri-startups like organic agricultural cooperatives suffered significant financial losses due to delays in the supply chain and the sale of commodities to customers. Hung Yen is one of seven provinces and cities in the Northern Key Economic Region and is located in the middle of the Northern Delta in Vietnam. With its advantageous geographical location, Hung Yen has numerous benefits for creating distribution markets that can be utilized to expedite the sustainable growth of the agricultural economy. Organic agricultural production in Hung Yen has achieved great results over the years and is an important industry for the growth of the province. Approximately 80% of the rural population is employed and supported by the agriculture sector (GSO, 2022). Currently, organic agricultural cooperatives in this region are expanding the most in Vietnam, producing highly efficient organic farming and breeding regions, satisfying market demands, and helping increase Hung Yen residents' earnings. However, because of the COVID-19 pandemic, organic agricultural cooperatives encountered numerous challenges, necessitating a reevaluation of their efficiency and the identification of significant factors influencing production activities in order to provide the necessary responses to the crisis.

Considering the aforementioned points, this study analyzes and evaluates the production efficiency of organic agricultural cooperatives before and after COVID-19. The cooperatives were classified into three groups and the first group consists of cooperatives producing non-organic products. The second one consists of individuals producing both organic and non-organic products, while the third one consists of those producing only organic products. The study was conducted in the Hung Yen Province, which is home to the biggest number of organic agricultural cooperatives in Vietnam and is also the province hardest hit by the COVID-19 pandemic. By selecting this study location, the findings are highly representative, which can be extrapolated to other provinces in the interior of Vietnam and other developing nations. By using the exploratory factor analysis (EFA) technique, this study was conducted first to examine factors affecting the organic cooperative’s effectiveness after the COVID-19 pandemic in Hung Yen. This province, which hosts the highest concentration of organic cooperatives in the country, was severely impacted by the pandemic. This topic has not been researched for organic cooperatives in a developing country like Vietnam in the context of an economic shock. In particular, in these countries, organic production in agriculture has just started and organic cooperatives are mostly young with low resilience to economic shocks. Besides, this study also uses the AHP model to determine the weight of factors that affect the organic cooperative’s effectiveness. Although some studies have examined the determinants of the organic cooperative’s effectiveness, none have specifically addressed the post-pandemic period in Hung Yen, nor have they categorized these determinants into comprehensive groups, including the potential of the cooperatives, labor resources, production development process, supply chain and government support. This study shows that the potential of organic cooperatives is the most influential factor. It is recommended that the organic cooperatives be more active and improve their inner potential to adapt to rapid changes after economic shocks like the COVID-19 pandemic.

## 2. Literature Review

Organic farming is a system of agricultural production that allows the production of nutritious and safe food to continue without the use of chemical fertilizers, less tilling, biofertilizers, or environmentally friendly pest control. Organic farming has the ability not only to enhance rural development but also to address the global concerns and needs of modern society regarding food security and safety, as well as the social and environmental role of agricultural systems. Farms face a lack of capital resources, which is remedied by the emergence of cooperatives. A cooperative enables small farms to produce enough to create a profit and maintain their sustainability, allowing them to compete with larger businesses. In this manner, cooperatives assist agricultural management in reducing uncertainty and hazards associated with their operations (Saraban, 2015). According to Chaddad & Cook (2004), cooperatives help members face the limitations of small farming and manage the uncertainty and risks that entail greater access to new technologies, risk diversification due to the members' ability to commercialize with a variety of products and markets, and greater access to information, which leads to better production and marketing decisions. Cooperatives collect information from farmers and serve as a conduit for communicating their ideas and needs to public groups. Neupane et al. (2022) confirmed the expected role of cooperative membership in improving the skill and motivation of farmers through increased accessibility to information, capacity development, access to finance, and access to inputs and services. The increasing number of cooperatives could help smallholder farmers reduce their production costs and increase farm income, thus increasing production efficiency. In addition, Bezus & Bilotkach (2018) confirmed that active organic farmer cooperatives are a relatively recent phenomenon. In spite of market pressure and other factors, the effectiveness of these cooperatives hinges on their adherence to the concept of chemical-free production utilizing simple procedures and ingredients. Moreover, all procedures must be as natural as possible, and cooperatives must be led by the most successful local farmer. To achieve financial success, organic cooperatives must provide members with training, collaborate with expert scientists and marketers, and ensure that cooperative members have positive experience in organic agribusiness and cooperatives (Willer et al., 2019).

The severe COVID-19 global pandemic began in 2019 and resulted in urgent, grave threats to global human health. Small farms saw the most severe effects, as they confronted disruptions in resource supply, labor availability, and extension services. COVID-19-caused restrictions on human migration have resulted in farm labor shortages, particularly among high-value crop and share-cropping farmers (FAO, 2020). COVID-19 poses numerous dangers to the viability of the agriculture industry, which is extremely vulnerable due to the requirement for food supply security. There are numerous secondary negative effects of the COVID-19 epidemic on the global sustainability of agricultural systems. A number of studies have presented an in-depth analysis of some risks for farmers and rural communities (Hossain et al., 2020). The COVID-19 pandemic has an effect on the loss of agricultural products such as fresh vegetables, fruits, and milk. These losses are attributable to restrictions placed by nations on movement and interactions, labor losses, and a decline in demand due to the closure of restaurants, hotels, and so on. As a major threat to the environment, the COVID-19 pandemic is anticipated to negatively affect soils, ecosystems, and the loss of flora and fauna (Huynh et al., 2020), as well as halt the economic development of the agriculture sector due to food export and import halts, the bankruptcy of businesses, loss of income, unemployment, poverty, and inequality. As the pandemic has far-reaching effects on international relations outside of the agriculture sector, including export limitations affecting global agricultural products and food trade as well as access to markets, a pandemic has a significant impact on international relations. As a result of the COVID-19 pandemic, food delivery channels in the majority of the world's nations have been severely disrupted, negatively impacting the most vulnerable populations. During the pandemic, panic buying exacerbated the restricted capacity of stores to promptly replenish supplies in response to the unexpected demand. There were also significant losses of fresh foods such as vegetables, fruits, and dairy products as a result of farmers' or agricultural companies' inability to transport them from production locations to local markets or delivery-related logistical issues. In light of the absorbent, adaptable, and regenerative capacities of agricultural systems, agricultural organizations must make the appropriate recovery measures during this crisis. During a pandemic, strong communities created in rural areas can increase the social resilience capacity of agricultural systems because strong groups can pool their resources, withstand pandemics more readily, and begin rebuilding sooner, while government aid is always delayed. Several cooperative assistance measures were proposed during COVID-19, such as the maintenance of open borders for the trade of products and services, including agricultural inputs, particularly for crucial value chains (FAO, 2020). The government should improve access to digital technology and services and encourage cooperatives to utilize them to limit face-to-face interactions while allowing a wide range of market-oriented services to be provided along the value chain (Scholten et al., 2019).

Several authors have explored the aspects that may lead to the establishment of effective cooperative arrangements. One impact is group size since, according to Menard (2006), increasing the frequency of transactions decreases transaction costs. The greater the frequency of the transaction, the lower the fixed expenses per unit. In a producer group, increasing the number of members can also increase the frequency of transactions. In addition, Milgrom & Roberts (1988) demonstrated that influence costs tend to be higher when group members have a greater stake in the outcome of the decision. However, increasing the size of a group to reduce transaction and influence costs raises internal coordination and administrative expenses. Therefore, producer organizations should cover the costs associated with coordinating farmer actions and organizing production, marketing, and administration. In general, Banaszak (2006) confirmed that leadership can reduce internal coordination costs. A competent central coordinator enables the organization to save money on both the transmission of all transaction information and the cost of making decisions. Several scholars argued that leadership as a form of hierarchy facilitates the coordination of member actions on one of the various equilibria, hence reducing the bargaining costs that players would incur to agree on and implement one of the strategies. In addition, a leader could facilitate the coordination of the players by a simultaneous shift to a more efficient equilibrium, as well as give additional value through reciprocal collaboration (Garnevska et al., 2011). In addition, the selection of members who have previously conducted business together is anticipated to have a good effect on the efficiency of the development of successful producer groups. Similarly, communication structures may facilitate a more effective sharing of information regarding the individuals involved in an engagement. Similar to the leadership factor, communication could raise the observability of others' actions and reduce the attraction of agricultural market cooperation factors. Francesconi et al. (2021) showed that resilience has an impact on the operation of cooperatives by evaluating the agricultural cooperatives in Southeast Africa during the COVID-19 pandemic. The study reveals that the lack of resilience demonstrated by most cooperatives is associated with organizational immaturity, large membership size, elite capture, and limited business orientation resulting from a general lack of managerial capital. Karlı et al. (2006) studied communication effects in public goods experiments that differ solely in pre-game communication. The results indicate that the ability to coordinate behavior throughout the communication phase may contribute to successful cooperation. However, communication success is highly dependent on the communication medium.

Besides, Ararssa (2016) believed that member homogeneity of any kind suggests that members have more interests in common and is a necessary condition for effective collaboration. In a cooperative organization, influence costs are increased by members' competing interests and lobbying efforts to further their own self-interests. Garnevska et al. (2011) confirmed that homogeneous groupings with similar potential power and interests of partners are more likely to attain a higher rate of collaboration. In addition, rivalry with other intermediaries may boost the efficacy of cooperatives' external sales. Competition may destabilize hybrid forms, since parties may be tempted to switch between arrangements, especially when investments in the partnership are only relatively specific (Saraban, 2015). Despite market pressure and other factors, the success of the farmers' cooperative is based on a commitment to chemical-free production, the use of simple practices and ingredients, the permission of allowing farm animals to be animals, the requirement of all processes being as natural as possible, the integration into the supply chain and access to support policies (FAO, 2020).

Several prior studies have utilized the linear regressive model to analyze the effect of factors on the output of farmers and entrepreneurs in agriculture cooperatives. Tuan (2017) utilized the data envelopment analysis (DEA) and stochastic frontier analysis (SFA) models to examine the factors influencing the efficiency of rice production by cooperative farmers in Kien Giang, Vietnam. The production efficiency is positively impacted by membership duration, availability to finance, and annual rice harvest with coefficients of 0.022, 0.006, and 0.199, respectively. Garnevska et al. (2011) employed a qualitative approach to examine the role of factors on the success of cooperatives in Shandong, China. The prosperous growth of these two cooperatives demonstrates their significant impact on both their members and the surrounding rural community. These factors, including a stable legal environment, government support, a committed initiator, education, transparent management, and technical training, may contribute to the success of cooperatives in China. In addition, the binary logit model was used to find the most relevant factors influencing the participation of smallholder farmers in agricultural cooperatives. Age, education, household size, farm activity, farmland size, annual income, attendance at public meetings, access to training, and contact with development agents were identified as the most significant variables that strongly influenced farmers' participation in agricultural cooperatives. Ararssa (2016) also confirmed that the farm activity variable and the farmland size variable have a negative relationship with participation, whereas the remaining variables have a positive relationship with participation.

Similar to Ararssa (2016), Karlı et al. (2006) examined the decisions and views of Southeastern Anatolian farmers on membership in agricultural cooperatives. Using the binary logit model, the factors influencing the chance of joining agricultural cooperatives were identified. The model reveals that the majority of variables, including education, communication, income, farm size, and technology, play significant roles in influencing the chance of admission. Smaller farmers are more likely than affluent farmers to join agricultural cooperatives. Due to the high risks involved with intensive, high-return crops, small farmers may seek to take advantage of the cash on hand, input subsidies, and services offered by agricultural cooperatives. Gross income and social status variables play a significant effect in the farmers' aversion to agricultural cooperatives. Conservative or traditional farmers are less likely than moderate farmers to join agricultural cooperatives. Karlı et al. (2006) stated that direct government agricultural lending programs should primarily be aimed at giving farmers improved access to capital markets and allowing them to allocate capital inputs through the use of modern technology.

Additionally, a few studies have employed the regressive probit model to quantify the impact of factors on the success of agricultural cooperatives (Long & Freese, 2001). The variables indicating whether the members have a commercial relationship before the establishment of the group and if there is a member selection process during the formation of the group have the greatest influence on the likelihood of group success. Both factors are also highly connected. Group size is the third variable with a substantial positive effect on the chance of producer group success. The larger the group, the greater the likelihood of success. The final variable with a positive effect on success is the leadership's effectiveness. As demonstrated by the studied theories, leadership may reduce internal transaction costs, hence increasing the organization's competitiveness. In addition, leadership enhances the likelihood of coordinating members on efficient equilibria and fosters collaboration. In contrast, Toloi et al. (2021) applied the AHP model to identify some factors, i.e., price, reliability, negotiation, and logistics, that influence the quality and production of the soybean supply chain in Mato Grosso. In Vietnam, to evaluate factors affecting the production of farmers in agricultural cooperatives, some studies have used the linear regressive model; however, they only examine impacts before COVID-19. A few studies have used models, such as DEA, SFA, ordinary least squares (OLS), probit, and tobit models, to find factors influencing the efficiency of agricultural cooperatives (Long & Freese, 2001; Tuan, 2017).

Overall, determinants affecting the organic cooperative's effectiveness in the literature include potential of the cooperatives (working years, startup capital, access to credit), labor resources (labor size, leader's strength, selection of members, communication among members, homogeneity, competition, business acquaintance), production development process (diversity of products, organic production, logistics, marketing, strategy, environmentally friendly practices), supply chain (sale, value chain, training, transportation, hi-tech) and government support (business procedure support, capital support, training support, hi-tech support). Besides, some studies have used the linear regressive model to examine the impact of factors on the effectiveness of agricultural cooperatives (linear regressive, binomial logit regression, probit model, logit model, multinomial logit model, AHP model and so on). Although some of these studies have examined the success of agricultural cooperatives, not a single one has focused on the impact of factors on the effectiveness of agricultural cooperatives after an economic shock like the COVID-19 pandemic. This study employs the impact of factors on the production effectiveness of organic agricultural cooperatives in Hung Yen, Vietnam, after COVID-19. In addition, the AHP approach was used to discover the factors that determine the effectiveness of these cooperatives in Hung Yen throughout this period.

## 3. Methodology

### 3.1 Procedure and Sample

From 2018 to 2023, data was collected in two stages (before and after the COVID-19 pandemic). The cooperative selection process primarily focuses on revenue in order to obtain a representative local cooperative sample. Particularly, an initial action involves compiling a comprehensive list of local cooperatives in the region. Subsequently, cooperatives were selected from the aforementioned list. Interviewees were selected from those with the list supplied by local authorities. With the assistance of authorities, interviews with those successful organic cooperatives were also conducted.

In the first step, an electronic questionnaire was created using Google Forms. The link to the questionnaire was then emailed to 20 experts working in the fields of finance, supply chain, marketing, technical support, and experienced producers. This is the pilot survey step to collect comments and complete the final questionnaire, depending on the useful comments of these experts, as shown in Step 2 in Figure 1.

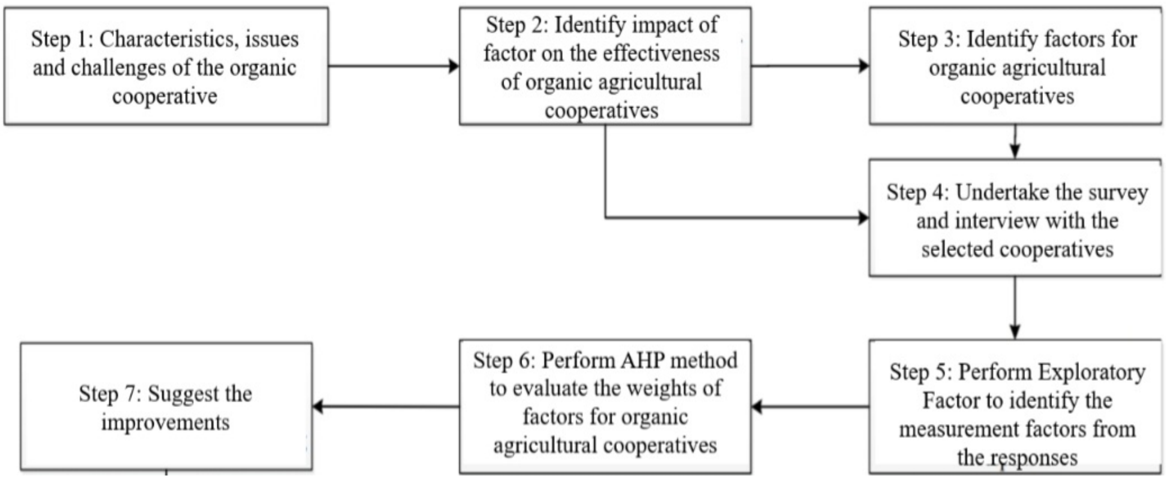


**Figure 1.** Framework of the research method

In the second step, a questionnaire was used to collect data from these potential cooperatives. Face-to-face interviews were conducted to collect information on factors influencing production efficiency in organic agricultural cooperatives amidst exogenous shocks in Hung Yen. Henceforth, 306 useful responses were used as a final sample with 28 questions related to the impact of the production efficiency in organic agricultural cooperatives, as shown in Step 3 in Figure 1. This stage aims to collect information on their development potential, labor resources, production development process, supply chain, and government support. The samples were divided into three groups, with the first group containing cooperatives producing solely non-organic goods (81 cooperatives). The second group includes those producing both non-organic and organic goods (185 cooperatives) and the third group involves those producing solely organic goods (40 cooperatives). Due to the specific production characteristics of Hung Yen, cooperatives often apply diversified production, including the production of organic and non-organic goods. Diversifying production helps these cooperatives to expand their supply to many markets and ensure regular production activities. Therefore, choosing three types of cooperatives is to ensure representativeness of the research sample in Hung Yen, Vietnam.

### 3.2 Research Methods and Measures

In this study, the EFA and the AHP were also used to investigate the impact of factors on the efficiency of the cooperative groups before and after the economic shocks like the COVID-19 pandemic in Hung Yen.

In the first phase, the EFA was first conducted to uncover the underlying structure of the variable set, as shown in Step 4 in Figure 1. EFA is a technique within factor analysis whose overarching goal is to identify the underlying relationships between measured factors affecting the efficiency of the cooperative groups before and after the economic shocks like the COVID-19 pandemic in Hung Yen. The main objective of EFA is to describe the relationship between a set of $k$ (smaller) observable variables and unobservable ones. Criteria in EFA factor analysis include Kaiser-Meyer-Olkin (KMO) coefficient, which is an index used to consider the appropriateness of factor analysis. The KMO value must be from 0.5 or more ($0.5 \leq \text{KMO} \leq 1$) in order for the data to be appropriately used for factor analysis. Five criteria, including the potential of the enterprise, labor resources, production development process, supply chain, and government support, with their corresponding alternatives, were then specified.

**Table 1.** Literature review defining the factors of the AHP model

| Criteria | Factors | Sign | Author |
|---|---|---|---|
| Potential of organic cooperatives (POC) | Working years | POC1 | Barichello (2020), Tuan (2017) |
| | Startup capital | POC2 | Ararssa (2016) |
| | Access to credit | POC3 | Ararssa (2016), Karlı et al. (2006), Tekana & Oladele (2011) |
| | Business Acquaintance | POC4 | Saraban (2015) |
| Labor resource (LR) | Member's selection | LR1 | Garnevska et al. (2011), Hosseini et al. (2014), Saraban (2015) |
| | Leader's strength | LR2 | Banaszak (2006), Garnevska et al. (2011) |
| | Labor size | LR3 | Liu & Zheng (2021) |
| | Homogeneity | LR4 | Ararssa (2016), Banaszak (2006), Garnevska et al. (2011) |
| | Competition | LR5 | Ararssa (2016), Saraban (2015) |
| Product development process (PDP) | Diversity of products | PDP1 | Saraban (2015) |
| | Organic production | PDP2 | Ararssa (2016), Ferreira et al. (2020), Karlı et al. (2006), Saraban (2015) |
| | Logistics | PDP3 | Granemann & Figueiredo (2013), Liu & Zheng (2021) |
| | Marketing | PDP4 | Carauta et al. (2021), Yost et al. (2021) |
| | Strategy | PDP5 | Garnevska et al. (2011) |
| | Environmentally friendly practices | PDP6 | Zhou et al. (2018) |
| Supply chain (SC) | Join the sale | SC1 | Toloi et al. (2021) |
| | Join the value chain | SC2 | Ferreira et al. (2020), Karlı et al. (2006), Saraban (2015) |
| | Join the training | SC3 | Ararssa (2016), Garnevska et al. (2011), Karlı et al. (2006), Saraban (2015) |
| | Join the transport | SC4 | Ferreira et al. (2020), Karlı et al. (2006) |
| | Join the hi-tech | SC5 | Karlı et al. (2006), Saraban (2015) |
| Government support (GS) | Business procedures support | GS1 | Garnevska et al. (2011) |
| | Capital support | GS2 | Bezus & Bilotkach (2018), Garnevska et al. (2011) |
| | Training support | GS3 | Bezus & Bilotkach (2018), Zhou et al. (2018) |
| | Hi-tech support | GS4 | Bezus & Bilotkach (2018), Granemann & Figueiredo (2013) |

In the second phase, the AHP was applied to investigate the impact of a certain variable set on the efficiency of the cooperative groups. The AHP approach was developed by Saaty (1986) and involves three basic steps to (a) structure the criteria into a hierarchic system; (b) use the surveyed data to calculate the pairwise comparison matrices and the relevant statistics (e.g., the eigenvectors, the consistency index and the consistency ratio); and (c) assess the relative importance of each criterion in different hierarchies. The details of those steps can be found in Saaty (1986), Rezaei-Moghaddam & Karami (2008) and Tzouramani et al. (2020), among others. After calculating the relative importance of each criterion to the objective (production efficiency of the cooperative groups), the weighting of each alternative concerning each criterion was set, and the overall weight of each alternative concerning the objective, so-called total weight, was determined, as shown in Step 5 in Figure 1. This calculation process is fully based on a pair-wise comparison matrix and has been commended for its capacity to deconstruct complex problems by breaking them down into smaller pieces (Olson, 1988; Siekelova et al., 2021). The dependent variable is the effectiveness of the organic cooperatives and the independent variables include two groups. The first group is characteristics of cooperatives, such as working years, size, hired labor, and quantity. The second one is the potential of organic cooperatives, labor resources, the product development process, the supply chain, government support (Table 1). Each of these items was measured using a five-point Likert scale (from 1 "strongly disagree" to 5 "strongly agree").

## 4. Results and Discussion

### 4.1 Descriptive Statistics and Findings

Hung Yen has many agricultural cooperatives, with a total capital of about 45,115 million VND (average 253.5 million VND/cooperative) and nearly 8,000 farms. Some typical cooperative models were formed in the implementation of production linkages, such as Hung Dao Cooperative, Nhat Tan Cooperative (Tien Lu district) with Thai Binh Seed Company, Ne Chau Cage Longan Cooperative (Hung Yen City) and VinEco Company, Dong Tao Chicken Cooperative, VietGAP fruit and vegetable cooperative in Hoan Long commune.

**Table 2.** Descriptions of the organic agricultural cooperatives in Hung Yen

| Regions | An Thi | Kim Dong | Phu Cu | Tien Lu | Van Giang | Van Lam | Yen My | Khoai Chau | Average |
|---|---|---|---|---|---|---|---|---|---|
| Observations | 25 | 5 | 11 | 63 | 24 | 10 | 49 | 36 | 225 |
| Working years | 13.56 | 11.4 | 10.09 | 14.76 | 15.83 | 10 | 11 | 14.86 | 13.41 |
| Size (ha) | 3.08 | 0.51 | 1.48 | 2.95 | 3.32 | 1.01 | 1.49 | 1.57 | 2.25 |
| Hired labor (labor) | 96.6 | 32 | 66.6 | 69.66 | 214.54 | 36 | 52.57 | 4.16 | 71.43 |
| Quantity (ton) | 223.134 | 38.4 | 108.8 | 229.51 | 241.02 | 68.95 | 100.40 | 114.44 | 165.65 |

Table 2 shows descriptive statistics for the cooperative farms polled. Cooperatives typically span 13.41 years, with a mean size of 2.25 acres. Each cooperative averages 71 workers and 165.65 metric tons of output each year.

The estimated profit made by the cooperatives across the two time periods is presented in Table 3. After the COVID-19 pandemic, revenue and expenses decreased for all cooperative groups because Hung Yen was under quarantine and the cooperatives were unable to obtain fertilizer, labor, or sell their products to customers.

**Table 3.** Profitability of the organic cooperatives in Hung Yen

| Characteristics | Before COVID-19 | | | After COVID-19 | | |
|---|---|---|---|---|---|---|
| | 1st Group | 2nd Group | 3rd Group | 1st Group | 2nd Group | 3rd Group |
| A. Revenue (1,000 VND) | 3,508130 | 3,396,048 | 2,812,155 | 2,281,531 | 2,845,086 | 32,246,933 |
| B. Production cost (1,000 VND) | 3,226,924 | 3,009,113 | 2,181,270 | 2,141,209 | 2,635,902 | 31,891,264 |
| Seed (1,000d) | 525,500 | 484,875 | 206,750 | 453,333 | 446,086 | 1,159,019 |
| Organic fertilizers | 912,362 | 907,909 | 283,640 | 672,636 | 785,798 | 4,712,783 |
| Organic pesticides | 253,050 | 125,661 | 448,950 | 623,839 | 145,142 | 7,607,038 |
| Land care | 14,750 | 43,697 | 117,000 | 24,100 | 65,371 | 6,278,125 |
| Labor cost | 518,762 | 613,571 | 199,930 | 136,704 | 505,755 | 3,686,413 |
| Harvest cost | 812,500 | 619,076 | 300,000 | 130,104 | 541,783 | 1,062,761 |
| Bank interest | 190,000 | 214,324 | 625,000 | 100,493 | 145,967 | 7,385,125 |
| C. Net profit (A-B) | 281,206 | 386,935 | 630,885 | 140,322 | 209,184 | 355,669 |
| D. Ratio of revenue to cost (A/B) | 1.087 | 1.129 | 1.289 | 1.066 | 1.079 | 1.011 |
| E. Ratio of net profit to revenue (C/A) | 0.080 | 0.114 | 0.224 | 0.062 | 0.074 | 0.011 |

In addition, there is a difference in their net earnings between the two time periods due to a difference in the cost of acquiring inputs. Prior to the COVID-19 pandemic, the three groups' respective net profits are 2.04 times higher (first group), 1.819 times higher (second group), and 1.87 times higher (third group) than the figures after the pandemic. Organic cooperatives in Hung Yen (2nd and 3rd groups) were able to maintain production efficiency despite the pandemic because they routinely used cutting-edge technology and participated in supply chains, which allowed them to quickly adapt to new conditions.

## 4.2 Ranking of Factors Affecting Production Efficiency of Agricultural Cooperatives

4.2.1 EFA results

Calculation results from the Cronbach alpha for five individual components affecting the efficiency of agricultural cooperatives in Hung Yen Province before and after the COVID-19 pandemic were summarized. The result shows that five elements and their scales have Cronbach alpha exceeding 0.5 and the total correlation is more than 3. The Cronbach's alpha values of research concepts are higher than those of observation variables, thus meeting the required quality standards. Consequently, these components were deemed suitable for further testing using EFA. Table 4 shows the EFA results of independent variables.

The EFA method was used to uncover the underlying structure of a relatively large set of variables. EFA analysis for 23 observation variables of five factors that determine the efficiency of agricultural cooperatives shows that five factors were extracted with an initial eigenvalue of 1.352 and an approximate chi-square of 58.93% (>0.5). Besides, the second result of EFA shows that KMO is 0.789 (>0.5) and the Bartlett's test of sphericity is significant ($p < 0.000$). Five factors were extracted with an eigenvalue of 1.221 (>1) and an approximate chi-square of 60.151% (>0.5). Therefore, 23 observation variables with five elements are statistically significant.

**Table 4.** EFA results of independent variables

| Rotated Component Matrix | | | | | |
|---|---|---|---|---|---|
| | Component | | | | |
| | 1 | 2 | 3 | 4 | 5 |
| POC1 | .691 | | | | |
| POC2 | .832 | | | | |
| POC3 | .727 | | | | |
| POC4 | .712 | | | | |
| LR1 | | .788 | | | |
| LR2 | | .633 | | | |
| LR3 | | .770 | | | |
| LR4 | | .820 | | | |
| LR5 | | .763 | | | |
| PDP1 | | | .762 | | |
| PDP2 | | | .761 | | |
| PDP3 | | | .691 | | |
| PDP4 | | | .644 | | |
| PDP5 | | | .657 | | |
| SC1 | | | | .777 | |
| SC2 | | | | .741 | |
| SC3 | | | | .822 | |
| SC4 | | | | .867 | |
| SC5 | | | | .807 | |
| GS1 | | | | | .908 |
| GS2 | | | | | .671 |
| GS3 | | | | | .644 |
| GS4 | | | | | .879 |
| KMO and Bartlett's test | | | | | |
| KMO measure of sampling adequacy | | | | | .789 |
| Bartlett's test of sphericity | | | | Approx. chi-square | 60.151 |
| | | | | df | 190 |
| | | | | Sig. | .000 |

4.2.2 The weights of the chosen criteria to the production efficiency of agricultural cooperatives

The results show that the most influential parameters are potential of organic cooperatives (0.43 with 1$^{st}$ group, 0.49 with 2$^{nd}$ group, 0.46 with 3$^{rd}$ group) and labor resource (0.36 with 1$^{st}$ group, 0.32 with 2$^{nd}$ group, 0.34 with 3$^{rd}$ group), while the least influential is government support (0.07 with 1$^{st}$ group, 0.06 with 2$^{nd}$ group, 0.06 with 3$^{rd}$ group) during COVID-19.

In addition, the potential of organic cooperatives has a significantly increased influence on the efficiency of the third group of cooperatives during COVID-19 (an increase from 0.41 to 0.46). Organic cooperatives that are strongly committed to sustainability often have stronger resilience because their practices are closely aligned with long-term environmental health. These practices can result in lower input costs, e.g., natural fertilizers and renewable energy, which may make the cooperative more resilient to fluctuations in input prices during economic shocks. Those that emphasize sustainability, technology adoption, and strong community ties tend to be more robust during economic challenges (Saraban, 2015). Thus, it may be argued that Hung Yen cooperatives rely more on internal factors (e.g., working years, startup capital, access to credit, business acquaintance, labor resource) than on external supports (e.g., government support, supply chain) for production. Table 5 shows the AHP weight of the key criteria.

**Table 5.** AHP weight of the key criteria

| Criteria | Before COVID-19 | | | After COVID-19 | | |
|---|---|---|---|---|---|---|
| | 1st Group | 2nd Group | 3rd Group | 1st Group | 2nd Group | 3rd Group |
| Potential of organic cooperatives | 0.43 | 0.48 | 0.41 | 0.43 | 0.49 | 0.46 |
| Supply chain | 0.19 | 0.19 | 0.02 | 0.20 | 0.19 | 0.19 |
| Labor resource | 0.36 | 0.33 | 0.37 | 0.36 | 0.32 | 0.34 |
| Government support | 0.07 | 0.06 | 0.07 | 0.07 | 0.06 | 0.06 |
| Product development process | 0.19 | 0.19 | 0.02 | 0.20 | 0.19 | 0.19 |

Individual risk-coping systems are ineffective against systemic shocks, such as the one created by the COVID-19 epidemic and the economic repercussions arising from it. The pandemic control measures associated with a high degree of social isolation from the remainder of society have affected the revenues and independence of small farms. Smallholder farmers rely on cooperatives more than ever to obtain access to markets and integrate into value chains. However, Hung Yen cooperatives continued to prioritize the internal strength of cooperatives over support from social organizations and the government. During the economic crisis, government supports, such as subsidies, grants, or stimulus packages aimed at the agricultural sector, slightly decrease the impact on the effectiveness of cooperatives (with 0.07 before the COVID-19 and 0.06 after the COVID-19) because favorable policies towards organic farming and sustainability being applied before can provide cooperatives with more tools to survive and adapt to economic shocks.

Moreover, strong ties to local communities can provide an economic cushion during a crisis. Local consumers may be more likely to support cooperatives during tough times, recognizing the value they provide to the local economy. Organic cooperatives often benefit from a loyal customer base that prioritizes sustainability and local products. It is evident from these findings that these cooperatives must intensify their efforts to develop partnerships with supply chain companies and government bodies. By taking this action, cooperatives can better plan for and respond to future pandemics and other catastrophic events, such as COVID-19.

4.2.3 Contributions of the indicators on each component

a) The first group of cooperatives

Table 6 shows that under the five criteria, the alternatives most influencing the efficiency of cooperatives producing non-organic goods before the COVID-19 outbreak are working years, homogeneity, logistics, join the sale, and business procedure. However, after the pandemic struck, the factors with the most impact were changed into working years, diversity of product, business procedure support, and joining the value chain. Encouraging the diversification of products that cooperatives sell to the market and constructing a value chain that is compatible with the linkages in the supply chain are also two most essential measures cooperatives can take to better deal with the pandemic's challenges. Moreover, the result shows that the ability of leadership to function, rather than homogeneity, is the most important factor in deciding whether cooperatives can sustain a high level of efficiency after the epidemic. This study's findings are similarly consistent with those of Hosseini et al. (2014), Piñeiro et al. (2021), and Saraban (2015), who found a strong correlation between leader strength and effective cooperative output. Therefore, it is essential that cooperative leaders in Hung Yen regularly develop their knowledge and skills in order to make sound decisions during difficult times.

b) The second group of cooperatives

Prior to COVID-19, it appears that cooperatives were more concerned with working years, labor size, product diversity, joining the sale, and business procedures. However, after the COVID-19 outbreak, cooperatives were more concerned with startup capital, joining the value chain, labor size and diversity of product. It is comprehensible that during the lockdown, capital should be prioritized because it helps to continue the production process and improve the effectiveness of cooperatives (Ararssa, 2016; Bezus & Bilotkach, 2018; Garnevska et al., 2011). In terms of labor size, product diversity should be well managed and conserved because it is one of the most crucial factors for increasing effectiveness in the two time periods (Liu & Zheng, 2021). In addition, Saraban (2015) revealed that for cooperatives in Ardabil, strengthening capital is the most influential factor in rural cooperatives' performance.

In addition, Ararssa (2016) demonstrated that when producers lack capital, they have no choice but to seek funding to assure the continuation of their agricultural activity. Contracting debt to fund production or investing in it through agriculture financing is generally necessary because producers have insufficient cash for the acquisition and payment of inputs and the decision to use the resources is inherent to production activities (Tekana & Oladele, 2011). Due to the high cost of agricultural inputs, loans and bartering are widely employed to purchase them. And it is conceivable that the organic cooperatives in Hung Yen followed a similar pattern, which was implemented in order to continue their production.

**Table 6.** AHP weights of effectiveness indicators

| Indicators | 1st Group | | 2nd Group | | 3rd Group | |
|---|---|---|---|---|---|---|
| | Before COVID-19 | After COVID-19 | Before COVID-19 | After COVID-19 | Before COVID-19 | After COVID-19 |
| **Potential of Organic Cooperatives** | | | | | | |
| Working years | 0.43 | 0.53 | 0.41 | 0.25 | 0.51 | 0.48 |
| Startup capital | 0.31 | 0.22 | 0.32 | 0.36 | 0.25 | 0.27 |
| Access to credit | 0.18 | 0.17 | 0.20 | 0.34 | 0.17 | 0.18 |
| Business acquaintance | 0.07 | 0.08 | 0.07 | 0.04 | 0.07 | 0.07 |
| **Labor Resource** | | | | | | |
| Labor size | 0.18 | 0.25 | 0.36 | 0.40 | 0.26 | 0.25 |
| Leader's strength | 0.21 | 0.28 | 0.31 | 0.33 | 0.28 | 0.28 |
| Member's selection | 0.18 | 0.25 | 0.20 | 0.17 | 0.25 | 0.25 |
| Homogeneity | 0.27 | 0.15 | 0.07 | 0.06 | 0.15 | 0.15 |
| Competition | 0.17 | 0.07 | 0.06 | 0.04 | 0.07 | 0.07 |
| **Product Development Process** | | | | | | |
| Diversity of product | 0.22 | 0.40 | 0.46 | 0.54 | 0.38 | 0.46 |
| Organic production | 0.12 | 0.28 | 0.11 | 0.15 | 0.15 | 0.19 |
| Logistics | 0.23 | 0.19 | 0.12 | 0.14 | 0.14 | 0.16 |
| Marketing | 0.18 | 0.12 | 0.10 | 0.12 | 0.09 | 0.10 |
| Environmentally friendly practices | 0.08 | 0.10 | 0.04 | 0.05 | 0.08 | 0.09 |
| **Supply Chain** | | | | | | |
| Join the sale | 0.49 | 0.38 | 0.41 | 0.32 | 0.40 | 0.37 |
| Join the value chain | 0.22 | 0.42 | 0.30 | 0.38 | 0.26 | 0.27 |
| Join the training | 0.14 | 0.14 | 0.10 | 0.12 | 0.15 | 0.14 |
| Join the transport | 0.08 | 0.14 | 0.13 | 0.14 | 0.12 | 0.11 |
| Join the hi-tech | 0.07 | 0.08 | 0.06 | 0.05 | 0.08 | 0.09 |
| **Government Support** | | | | | | |
| Business procedure support | 0.44 | 0.47 | 0.39 | 0.38 | 0.43 | 0.43 |
| Capital support | 0.30 | 0.28 | 0.30 | 0.66 | 0.26 | 0.23 |
| Training support | 0.17 | 0.18 | 0.16 | 0.15 | 0.20 | 0.23 |
| Hi-tech support | 0.08 | 0.07 | 0.14 | 0.12 | 0.11 | 0.11 |

c) The third group of cooperatives

Table 6 shows that under the five criteria, the alternatives most influencing the efficiency of cooperatives producing organic goods before the COVID-19 outbreak are working years (0.51), joining the sale (0.40), business procedure support (0.43), diversity of product (0.38), and leader's strength (0.28). However, as the pandemic struck, the factors were changed into working years (0.48), diversity of product (0.46), business procedure support (0.43), joining the sale (0.37), and leader's strength (0.28).

Encouraging the diversification of products that cooperatives sell to the market and constructing a value chain that is compatible with the linkages in the supply chain are also two of the most essential measures cooperatives can take to better deal with the pandemic's challenges. This study's findings are similarly consistent with those of Hosseini et al. (2014), Piñeiro et al. (2021), and Saraban (2015), who found a strong correlation between leader strength and effective cooperative output. Therefore, it is essential that cooperative leaders in Hung Yen regularly develop their knowledge and skills in order to make sound decisions during difficult times.

Moreover, business procedure support enabled organic cooperatives to remain flexible, resilient, and adaptive during the COVID-19 pandemic. Through digital transformation, financial planning, health and safety compliance, or innovation in business models, this support allows cooperatives to maintain operations and continue serving their members and customers despite unprecedented challenges. External assistance from governments, non-governmental organizations (NGOs), and cooperative alliances plays a crucial role in ensuring the survival and growth of organic cooperatives during this period. Parallel to that, organic cooperatives that relied on traditional sales channels, such as farmers' markets or physical stores, faced significant challenges during lockdowns, with limited customer access to these channels. Cooperatives with procedures for digital sales and marketing were better prepared to shift to e-commerce. External support in setting up digital infrastructure, such as online platforms for ordering and home delivery, is crucial. Business procedure support from government agencies, NGOs, or cooperative alliances often includes training in digital marketing, e-commerce platforms, and mobile payment systems, helping cooperatives stay connected to consumers.

Besides, the ability of leadership to function, rather than homogeneity, is the most important factor in deciding whether cooperatives can sustain a high level of efficiency after the epidemic. In contrast, despite the onset of the COVID-19 pandemic, the group continued to focus on training management leaders and developing its products, which are the highest quality and healthiest agricultural products in Vietnam. In addition, they need business procedural help because organic products are a new trend in the agricultural sector of Vietnam.

4.2.4 Contributions of the dimensions on the overall effectiveness of organic cooperatives

The AHP approach also allows researchers to examine the weight and rank of each indicator in the overall effectiveness (overall weight) of organic cooperatives. The overall weight was computed as the products of the weights from each level of the hierarchy system (Liang, 2017). The important contribution of all indicators toward the overall measure for effectiveness of organic cooperatives was calculated based on those overall weights. The results are reported in Table 7.

**Table 7.** The overall weight of all indicators toward effectiveness of the organic cooperatives before COVID-19

| Indicators | 1st Group | | 2nd Group | | 3rd Group | |
|---|---|---|---|---|---|---|
| | Before COVID-19 | After COVID-19 | Before COVID-19 | After COVID-19 | Before COVID-19 | After COVID-19 |
| **Potential of Organic Cooperative** | | | | | | |
| Working years | 0.18 | 0.25 | 0.17 | 0.11 | 0.25 | 0.22 |
| Startup capital | 0.13 | 0.11 | 0.13 | 0.15 | 0.12 | 0.12 |
| Access to credit | 0.08 | 0.08 | 0.08 | 0.15 | 0.08 | 0.08 |
| Business acquaintance | 0.03 | 0.04 | 0.03 | 0.02 | 0.03 | 0.03 |
| **Labor Resource** | | | | | | |
| Labor size | 0.06 | 0.05 | 0.07 | 0.08 | 0.05 | 0.05 |
| Leader’s strength | 0.08 | 0.05 | 0.07 | 0.07 | 0.05 | 0.05 |
| Member’s selection | 0.06 | 0.05 | 0.07 | 0.03 | 0.05 | 0.05 |
| Homogeneity | 0.10 | 0.03 | 0.07 | 0.01 | 0.03 | 0.03 |
| Competition | 0.06 | 0.01 | 0.07 | 0.01 | 0.01 | 0.01 |
| **Product Development Process** | | | | | | |
| Diversity of product | 0.04 | 0.08 | 0.09 | 0.11 | 0.07 | 0.09 |
| Organic production | 0.02 | 0.05 | 0.02 | 0.03 | 0.06 | 0.04 |
| Logistics | 0.04 | 0.04 | 0.02 | 0.03 | 0.02 | 0.03 |
| Marketing | 0.03 | 0.02 | 0.02 | 0.02 | 0.01 | 0.02 |
| Environmentally friendly practices | 0.02 | 0.02 | 0.01 | 0.01 | 0.01 | 0.02 |
| **Supply Chain** | | | | | | |
| Join the sale | 0.09 | 0.07 | 0.08 | 0.06 | 0.08 | 0.07 |
| Join the value chain | 0.04 | 0.08 | 0.06 | 0.08 | 0.05 | 0.05 |
| Join the training | 0.03 | 0.03 | 0.02 | 0.02 | 0.03 | 0.03 |
| Join the transport | 0.02 | 0.03 | 0.02 | 0.03 | 0.02 | 0.02 |
| Join the hi-tech | 0.01 | 0.02 | 0.01 | 0.01 | 0.02 | 0.02 |
| **Government Support** | | | | | | |
| Business procedure support | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 |
| Capital support | 0.02 | 0.02 | 0.02 | 0.05 | 0.02 | 0.01 |
| Training support | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Hi-tech support | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |

The results in Table 7 broadly corroborate the previous findings and discussions of this study. Three factors most affect the production efficiency of three cooperative groups in the context of COVID-19, i.e., working years, diversity of product, and startup capital. Specifically, the working years factor has the most influence on the first, second and third groups with 0.25, 0.11 and 0.22, respectively. In particular, consistent with the findings of Barichello (2020) and Tuan (2017), startup year plays a vital role in enhancing the efficiency of all cooperative groups in both given time periods. Cooperatives with more years of operation have accumulated substantial experience in managing market fluctuations, supply chain disruptions, and other challenges. Moreover, this institutional knowledge makes them more adept at crisis management and risk mitigation during economic shocks. Established cooperatives benefit from experience, financial stability, and a strong market presence, making them more resilient in times of crisis. However, they may struggle with agility and innovation. In contrast, younger cooperatives, though less experienced and financially stable, often have greater flexibility and a willingness to innovate, which can be advantageous during times of crisis.

Besides, the second group was particularly concerned about startup capital (0.15) and access to finance (0.15) in the event of COVID-19, without paying much attention to marketing and competition. In addition, the findings demonstrate that the effectiveness of government support was diminished during crises such as COVID-19. According to a number of studies, government policies also impact the effectiveness of cooperatives. For instance, Bezus & Bilotkach (2018) identified in their research that government policy influences the growth of cooperatives. The introduction of the cooperative law (with its more stringent criteria) also accelerates and standardizes the early founding of cooperatives. Cooperatives can only flourish when members strive for the greater good of the community rather than solely for their individual benefit. An intriguing discovery is that government-supported policies, such as business procedure assistance, credit support, training support, and high-tech support, assist cooperatives in overcoming obstacles at the onset of economic crises. However, these supports are less emphasized by organic cooperatives in Hung Yen; hence, the local authorities must consider enhancing the function of these supports in the future.

The result also shows that the factor of joining the value chain has an impact on the effectiveness of the second group with 0.08. During COVID-19, organic cooperatives faced significant disruptions in traditional market access points, such as farmers' markets, restaurants, and physical retail stores. The pandemic forced a rapid shift toward e-commerce, online groceries, and alternative distribution channels. Cooperatives that were already integrated into formal supply chains, especially those connected to supermarkets, online platforms, and delivery services, had a significant advantage. These supply chains enabled cooperatives to maintain access to consumers despite lockdowns and the closure of traditional sales outlets. By being part of a supply chain, cooperatives could connect with distributors, retailers, and e-commerce platforms, ensuring that their products still reached end consumers, often through delivery or pick-up services. Organic cooperatives supplying supermarkets or partnering with online grocery platforms benefited from the surge in online shopping during the pandemic, allowing them to continue selling their products even as other outlets were forced to close.

## 5. Conclusions and Recommendations

Organic farming and cooperatives play a significant role in rural development by promoting sustainable agriculture in developing nations such as Vietnam. Taking advantage of the increased availability of labor and the benefit of short marketing circuits, the efficacy of these cooperatives may be especially significant in areas of family farming. In times of economic upheaval and pandemic risk, such as the COVID-19, however, organic cooperatives may encounter significant obstacles. Following the AHP approaches, this study assesses the efficiency of organic cooperatives in Hung Yen, Vietnam, as well as their determining factors. The findings of this study are highly representative and can be extrapolated to other provinces in the interior of Vietnam and other emerging nations relying on agriculture for economic development in the context of the world moving towards a green economy. By adopting organic practices, these cooperatives help smallholder farmers grow high-quality rice, fruits, and vegetables, which fetch higher prices in both domestic and international markets. They also reduce the reliance on chemical fertilizers and pesticides, improving soil health and reducing water pollution in Hung Yen and other regions in Vietnam. In general, organic cooperatives are vital agents in advancing sustainable agriculture while boosting regional economies. They empower small-scale farmers by giving them access to better resources, markets, and education, ensuring environmental protection and enhancing livelihoods. By creating resilient, sustainable farming communities, organic cooperatives contribute significantly to the long-term development of their regions. The conclusions of this study are as follows:

Firstly, there is a difference in the net earnings between the two time periods due to the different cost of acquiring inputs. Prior to the COVID-19 pandemic, the three groups' respective net profits were higher than the figures after the pandemic. Organic cooperatives in Hung Yen ($2^{nd}$ and $3^{rd}$ groups) were able to maintain production efficiency despite the pandemic because they routinely used cutting-edge technology and participated in supply chains, which allowed them to quickly adapt to new conditions. To enhance organic cooperatives, governments can develop and enforce legal frameworks that promote the formation and functioning of organic cooperatives, including providing legal status and rights to cooperatives, tax relief, and ensuring that cooperatives have representation in agricultural policy decisions.

Secondly, in the context of external shocks such as the COVID-19 pandemic, there are differences between the three groups. For the first group, factors affecting production efficiency are working years, startup capital, and joining the value chain. However, for the second group, factors, such as startup capital, access to credit, and diversity of product, have the most influence. Meanwhile, the factors that have the most influence on the production efficiency of the third group are working years, startup capital, and diversity of product. To create capital for organic cooperatives, governments can establish special funds that provide capital to organic cooperatives. These funds could offer grants, low-interest loans, or equity investments to help cooperatives cover startup costs, purchase equipment, or expand operations.

Thirdly, among the five factors affecting the efficiency of organic cooperatives, this study concludes that the aspects related to the potential of organic cooperatives have the most influence. It means that the organic cooperatives are concerned about achieving good productivity levels at working years, capital, and access to credit as these factors directly affect their efficiency in the organic cooperatives. Besides, the less important indicators include competition, marketing and support from the government. Overall, the government should implement more effective policies for the cooperatives in Hung Yen and Vietnam to help them overcome difficulties caused by the exogenous shocks, including some policies on taxes, credits and compulsory payments, thereby continuously ensuring their sales to improve their production effectiveness to adapt quickly in the outbreak of exogenous shocks like the COVID-19 pandemic.

The reported findings should be viewed in light of some limitations of the investigation, which suggest directions for future research. The effectiveness was evaluated only by organic cooperatives in Hung Yen, Vietnam, which might have led to biased ratings in the COVID-19 pandemic. Nevertheless, in this case, that was not the goal of the research. The results can still be considered valid for the context in which they were studied. However, future studies could incorporate other areas in order to reduce this bias.

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**Data Availability**

The data used to support the findings of this study are available from the corresponding author upon request.

**Conflicts of Interest**

The authors declare no conflict of interest.

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