Article

Agricultural Cooperatives' Sustainability and the Relevance of Start-Up Support Programs: Evidence from Cooperatives' Level in Morocco

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Abstract: The Moroccan agricultural cooperative sector is a key player in self-employment and income generation through territorial anchoring. The government's "MOURAFAKA" program offers support for newly created cooperatives, including strategic diagnosis and training. This paper analyzes the impact of the MOURAFAKA program on the sustainability of agricultural cooperatives in Morocco. Using original data from a survey of 232 cooperatives and a second database of 1131 cooperatives, the study employs a methodology based on survival function analysis and Cox regression. The results show that the MOURAFAKA program improves the sustainability of agricultural cooperatives by strengthening their management, governance, and market access capabilities. The study also highlights the importance of internal factors such as management skills, leadership style, and cooperative size, as well as external factors such as strategic adaptability, in determining the sustainability of agricultural cooperatives. The policy implications of these findings suggest that upstream literacy programs and capacity-building initiatives for cooperative leaders, as well as downstream access to financing, marketing, and practical training, are crucial for ensuring the sustainability of cooperatives.

Keywords: agricultural cooperatives; program "MOURAFAKA"; survival function; Cox regression; Morocco

1. Introduction

The Sustainable Development Goals (SDGs) provide a blueprint for creating a better and more sustainable world for all. The 2030 Agenda for Sustainable Development places a strong emphasis on the integration of cooperative organizational models as a fundamental aspect of sustainable development strategies in developing countries [1,2]. While various instruments can be used to achieve the objectives of this agenda, it is rare to find one that guarantees the convergence of multiple objectives. The cooperative model serves as a powerful lever for promoting decent employment, fostering inclusive growth, reducing poverty and inequality, and preserving the environment, thereby contributing to the achievement of the following SDGs: #1 (no poverty), #2 (zero hunger), #8 (decent work and economic growth), #10 (inequality reduction), and #15 (life on earth).

The longevity and success of the agricultural cooperative sector is closely linked to its adherence to the principles of sustainable development. This includes taking into account economic, social, and environmental factors in decision making and operations. It is essential for these entities to be responsive to changes in the external environment and to actively work towards sustainable practices. Agricultural cooperatives in certain regions of the world, such as Almeria, Spain, have gained market power and formed co-competitive

relationships to reduce costs, while also investing in education and training for farmers and promoting fair income. They are also addressing eco-social challenges such as water management, reducing pesticide use, and implementing waste management and recycling. These actions contribute to the longevity and survival of the cooperatives and align with the principles of sustainable development, including economic stability, social responsibility, and environmental conservation. Additionally, these actions help to achieve sustainable development goals such as decent work and economic growth, responsible consumption and production, and climate action [3].

Sustainable agriculture and agriculture-led sustainability differ in that the former focuses on the economic functioning of agricultural firms such as product innovation, while the latter aims to make agricultural practices economically, ecologically, and socially sustainable and align with changing societal values. Agriculture-led sustainability also facilitates the adaptation and resilience of agricultural firms such as farms and cooperatives. This new trend in the agricultural sector allows for the integration and use of new technologies to increase productivity, expand profits, minimize production costs, and optimize the use of natural resources while also protecting biodiversity. For example, in the production of fruits or vegetables, field monitoring data can aid in determining optimal fertilization, irrigation, and other production processes. Digital technologies such as IoT, big data, and blockchain are also having a positive impact on agricultural firms, allowing for smart management and ensuring sustainability and resilience to environmental changes, including climate change. The digitalization of the agricultural business leads to the sustainability of agricultural cooperatives [4].

Cooperatives play a significant role in ensuring farm economic sustainability and in encouraging the adoption of environmentally sustainable agricultural practices [5]. Cooperatives have a crucial role in the primary industries, such as farming and aquaculture, in preserving and enhancing natural capital which is a critical aspect of Sustainable Development Goals 12–15 [6]. A conceptual framework was proposed by [6] to illustrates how members of cooperatives can take on exciting roles that harness natural capital and how cooperatives can join forces with the financial sector to enlighten and share their expertise on innovative methods for safeguarding and mitigating the risk of depletion of natural capital through cutting-edge farm management techniques and financial instruments.

Morocco has been undergoing a series of economic, social, and institutional reforms to establish a strong foundation for an economy that can create wealth and promote sustainable socioeconomic development. This includes a range of measures to promote self-entrepreneurship, private investment, creativity, and innovation, with a focus on the cooperative sector as a key policy choice for promoting and developing agriculture as a strategic sector [1,2,7–22]. The cooperative fabric in Morocco is dominated by the agricultural sector, with an increase in the number of agricultural cooperatives from 427 in 2009 to 2504 in 2020, including new areas of activity related to local products. The ecosystem of support for agricultural cooperatives includes state actors such as the Ministry of Agriculture, the Ministry of Industry, and the National Initiative for Human Development (INDH) program, which has contributed to revitalizing the cooperative movement through financial support and accompaniment. Additionally, the Green Morocco Plan (2008–2020) places cooperatives at the center of its strategy for the development of the agricultural sector (Office du développement de la coopération (ODCO), 2020).

Agricultural cooperatives play a strategic role in food security and the fight against poverty [23]. Additionally, the sector's mission to contribute to sustainable development through responsible and environmentally friendly production methods [3]. Studies have also shown that agricultural cooperatives have proven to be a valuable vector for the socioeconomic development of territories, acting as a lever for social and environmental protection, as well as a driver of sociopolitical emancipation and reduction of social and spatial inequalities (ODCO, 2014 [12]). Despite the difficulties faced by small cooperatives at the beginning of their existence, such as difficulties in financing, access to land, and gaining market share, the sector has seen sustained growth.

The inactivity and mortality of agricultural cooperatives is hindering the development of the agricultural sector and neutralizing the role of small farmers in driving socioeconomic development. Nearly 20% of cooperatives become inactive within the first few years of their creation, and this is largely due to obstacles such as limitations related to governance, management, marketing, legislation, supervision, and financing, as well as fundamental problems related to leadership and project formalization, largely due to the low-level skills of beneficiaries. Public authorities are committed to addressing this issue through the implementation of the MOURAFAKA program, which aims to provide quality support to newly created cooperatives during the creation process and post-creation support services such as training and coaching of the cooperative's managers, technical assistance, advice and commercial promotion of the cooperative's products/services, and development and implementation of a development plan for the cooperative.

This study aims to bridge the research gap on the factors that affect the sustainability of agricultural cooperatives in Morocco. The study focuses on understanding the reasons behind the high rate of inactivity and mortality of cooperatives in the country, particularly during their early years of existence. The study also aims to evaluate the effectiveness of MOURAFAKA support programs in addressing the various challenges faced by cooperatives. Furthermore, the article targets the policy-related issue of promoting sustainable and inclusive agricultural development through the support of cooperatives. The paper aims to provide insights that could inform the design and implementation of more effective policies and programs to support the growth and sustainability of agricultural cooperatives in Morocco and contribute to the socioeconomic development of the country.

This study will contribute to the existing literature in two ways. First, analytically, by highlighting the relevance of support programs to the viability of cooperatives as well as the main determinants of cooperative survival. Secondly, on the methodological level, by using original data constructed from a survey of 232 cooperatives to analyze the impact of the MOURAFAKA program on the survival of agricultural cooperatives. On the other hand, this study differs from the existing literature by employing a methodological approach that is used for the first time in the literature and that is based on the analysis of survival functions and Cox regression.

The paper begins by providing an overview of existing research on the subject in Section 2. The data and methodology employed in the study are described in Section 3, followed by the presentation of empirical results on key factors in agricultural cooperative survival in Section 4. The discussion and policy recommendations are presented in Section 5, and the main policy implications are summarized in the concluding remarks of Section 6.

2. Determinants of Agricultural Cooperatives' Survival: Literature Review

The high rate of inactivity and mortality of agricultural cooperatives in Morocco during their first years of existence is a pressing issue that needs to be addressed. Studies such as [24] have identified factors such as the perception of cooperation and belonging to society as important determinants of the survival and development of agricultural cooperatives. Additionally, the ability to adapt to external changes in the environment is crucial for the survival of these cooperatives [25].

2.1. Endogenous Determinants of Cooperative Survival

The survival of agricultural cooperatives is a complex issue that is influenced by a variety of factors, including management skills, leadership style, and demographic characteristics. According to [26], the leadership style and personality traits of managers play a crucial role in determining the survival of cooperatives. Additionally, the ability to anticipate and respond to megatrends such as climate change, urbanization, and digitalization is a critical factor in the survival of cooperatives [19].

Cooperative age is also a key determinant of survival. Research has shown that there is a link between age and mortality of cooperatives [27], with newly created cooperatives having a lower risk of mortality and older cooperatives having a higher risk. Furthermore,

the size of the cooperative, or the number of members, has been identified as a key factor in the survival of agricultural cooperatives [24]. Larger cooperatives are more likely to survive due to the advantages and benefits associated with having more relationships with the external environment. [28] conducted a study on the longevity and persistence of farmer cooperatives in the United States, which found that younger and older cooperatives were more likely to fail, the relationship between member size and survival rate was U-shaped, and cooperatives with intangible assets had lower chances of survival. Additionally, factors such as efficiency, leverage, or liquidity were not significant in explaining the survival rate of cooperatives.

However, it should be noted that large group size can also be a hindrance to cooperation and survival. According to the theory of collective action, unanimous action is necessary for efficiency and cooperation [29]. However, large groups may face the problem of free riders, which can be an obstacle to collective action. Additionally, research from management theory has shown that large group size can lead to increased conflict and a decrease in group cohesion [30]. Despite these challenges, it has been shown that larger membership size can also align with a higher level of social capital and better economic performance [24,31].

2.2. Exogenous Determinant of Cooperative Survival

Surviving in the ever-changing landscape of the agricultural industry requires a strategic ability to adapt to external factors. Cooperatives that are able to navigate the challenges of competition, shifting consumer needs, economic fluctuations, and government policy changes are the ones that will thrive. The survival and longevity of agricultural cooperatives are closely linked to their ability to adapt to changes in the external environment. Strategic adaptation to external changes is a multidimensional survival factor, with cooperatives that are able to adapt and face challenges such as competition, changes in consumer needs and expectations, inflation, and variations in raw material prices, as well as changes in public policy, being more likely to survive [3]. Additionally, [25] conducted a qualitative study on farmer cooperatives and found that common strategies for adaptation include vertical integration, geographic expansion, and portfolio diversification, which can sometimes lead to a shift away from user-oriented goals towards investor-oriented objectives.

Another exogenous factor that plays a role in the survival of agricultural cooperatives is the local culture regarding the notion and principles of cooperation. The maintenance and development of cooperative activity is heavily dependent on the degree of cooperation between members and social partners such as inhabitants and financial backers. Therefore, in terms of specific socioeconomic indicators, financial stability and market competitiveness are important determinants of the longevity and survival of agricultural cooperatives. Additionally, eco-social indicators such as the use of sustainable farming practices and responsible resource management are crucial [3].

Moreover, the agriculture sector, including cooperatives, is facing a significant shift as a result of the fourth industrial revolution or Industry 4.0. This era is characterized by the integration of advanced technologies such as the Internet of Things, big data, blockchain, robotization, and artificial intelligence. These technologies have the potential to revolutionize the entire value chain of the agricultural sector, from production to distribution and consumption of agricultural products, providing a competitive advantage to cooperatives by increasing efficiency, precision, and cost-effectiveness in their operations. Adopting these technologies can help agricultural cooperatives to stay relevant in the market and ensure their survival in the long term while also contributing to sustainable development goals. Agricultural cooperatives are now aware of the importance of adopting technology in their business; otherwise, they will disappear in such an environment which is extremely competitive. Introducing technology allows cooperatives to develop the agricultural activity, to produce with efficiency, and to transform the products to finally increase the profitability of the cooperative. Consequently, the cooperative's activity is maintained and developed, which is important for their survival [4].

3. Data and Methodology

3.1. Data

Our study monitored 1131 agricultural cooperatives newly granted in Marrakech. To assess the services developed by the MOURAFAKA program, an ad hoc survey was also conducted among a sample of 272 cooperatives, 131 of which were beneficiaries of the MOURAFAKA program (48.2%) in 2021. The selected dimensions analyze the training courses followed, the degree of satisfaction with the support, and future intentions (Table 1).

Table 1. Sample characteristics.

	%
1. PROVINCE	19.1
Essaouira	11.9
El kalaa de	29.2
Rhamna	8.0
Marrakech	14.9
Al haouz	16.9
Chichaoua	19.1
2. BRANCHES	
Agriculture and Forestry Products	39.9
Livestock and Poultry	28.4
Beekeeping	22.6
Bakery, Pastry, and Dairy Products	7.9
Rabbit Farming	0.05
Pumping	0.04
Supply and Food Chain	0.03
3. GENDER Of The MANAGER	
Male	82.1
Female	17.9

3.2. Methodology

To analyze the determinants of survival of agricultural cooperatives in the presence of censored data, two approaches were used: nonparametric and parametric approaches.

For the nonparametric approach, the study of the impact of a variable on the duration of an activity is carried out in the following way: the sample is stratified on the basis of the sector of activity which defines groups, and the effect of the chosen factor is evaluated by comparing their survival functions. The groups with the highest survival curves are the most disadvantaged, and they are the ones with the lowest chances of exiting unemployment. If the survival functions of the groups concerned are "almost" equal (the case of homogeneous groups), then the stratifying variable has no effect on the distribution of durations.

Three statistical tests, the log-rank test, the Wilcoxon test, and the likelihood ratio test, are used to test and reject at the usual significance levels the homogeneity of the populations according to the variables selected.

1.   Basic concepts

Let T denote the duration variable with a continuous distribution. This variable represents the time spent in activity. There are different ways of specifying the distribution of such a non-negative random variable T, which we explain here:

2. The distribution function

$$F(t) = \Pr(Y \leq t) = \int_0^t f(x)dx \tag{1}$$

3. The density

$f(t), t \in IR^+$ represents the density of Y corresponding to the probability that T is located in a given small time interval, and it is defined by

$$f(t) = \lim_{\Delta t \to 0} \frac{\Pr[t \leq T \leq t + \Delta t]}{\Delta t} \tag{2}$$

4. Survival function

$$S(t) = \Pr(Y > t) = 1 - F(t) = \int_t^{+\infty} f(x)dx \tag{3}$$

5. The hazard (or risk) function

$$h(t) = \frac{f(t)}{1 - F(t)} = \frac{f(t)}{S(t)} \tag{4}$$

One of the key advantages of using duration data in the analysis of cooperative start-ups is the ability to estimate the time until a specific event occurs, such as the failure of a cooperative. By using duration models, researchers can estimate the probability of a cooperative surviving for a certain amount of time, which can be used to identify the factors that contribute to the success or failure of a cooperative. This information can then be used to develop targeted support and interventions to help improve the chances of success for new cooperatives.

Another advantage of using duration data is the ability to handle censoring, which is a common issue in survival analysis. Censoring occurs when the event of interest has not occurred at the time of data collection. The duration models used [17,32–34] can accommodate different types of censoring, such as right censoring, left censoring, and interval censoring, and have several specific features [35]. This permits more accurate and reliable estimates of survival probabilities even when data are incomplete.

The use of duration data in the analysis of cooperative start-ups is a valuable tool for understanding the challenges facing these organizations and developing effective support strategies to help them succeed. The specific features of the duration models used, such as the ability to estimate survival probabilities and handle censoring, make them well suited to this type of analysis.

4. Empirical Results: Key Factors in Agricultural Cooperative Survival

The program "MOURAFAKA" has three main components. (1) The strategic diagnosis of the cooperative to identify its needs in terms of training and support of the actors, trade promotion, and winning new market shares. (2) Collective training of managers whose objective is to strengthen the economic and social competence of the actors of the cooperatives through the organization of training courses oriented towards the management of cooperatives, the retention of summary statements of the cooperatives, etc. (3) Individual coaching, which takes place after the creation of the cooperative and consists of personalized support (management, technical assistance, etc.) for a period of two years (post-creation). The objective of this training is to strengthen the knowledge and skills of the cooperative's actors in order to make them more efficient on the market. Having presented the content of the MOURAFAKA program, we must now verify, from an econometric point of view, whether this program has an impact on the survival of cooperatives. To achieve this, we adopted a nonparametric approach based on the analysis of survival functions of cooperatives by size and by beneficiary or non-beneficiary of the MOURAFAKA program.

4.1. Results of the Nonparametric Approach

4.1.1. Impact of the Size of the Cooperative

To investigate the determinants of the survival of agricultural cooperatives, we mobilized a dual methodological approach (nonparametric and parametric). The first approach is based on the analysis of survival functions by segment of beneficiary and non-beneficiary cooperatives of the MOURAFAKA program and by size. In addition, three statistical tests were used, the log-rank test, the Wilcoxon test, and the likelihood ratio test, to test and reject the homogeneity of the populations according to selected variables at the usual levels of significance. The second approach is based on a Cox regression to identify the determinants of agricultural cooperative survival.

The results of our analysis, including the log-rank, Wilcoxon, and likelihood ratio tests (presented in Table 2), provide strong evidence to support the rejection of the assumption of population homogeneity by size variable at a significance level of 1%. Furthermore, our analysis of survival functions by size (shown in Figure 1) reveals that small agricultural cooperatives are more likely to become inactive during the early stages, compared to larger cooperatives. This supports the "too big to fail" hypothesis in the context of agricultural cooperatives. This conclusion is consistent with previous empirical research [24] which has demonstrated that as the size of a cooperative increases, the risk of cooperative mortality decreases.

Table 2. Comparisons of survival functions by size of agricultural cooperative.

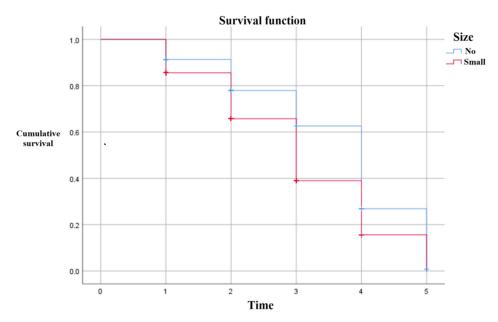|	Chi-Square	ddl	Sig.
Log-Rank (Mantel-Cox)	36,553	1	0.000
Breslow (Generalized Wilcoxon)	34,847	1	0.000
Tarone-Ware	36,775	1	0.000
Test of equality of survival distributions for different size levels.			

Source: author's elaboration.

Figure 1. Survival function of cooperatives by size. Source: author's elaboration.

4.1.2. Impact of the MOURAFAKA Support Program

The results generated by using the log-rank, Wilcoxon, and likelihood ratio tests (presented in Table 3) have provided robust evidence to reject the assumption of homogeneity among the populations of beneficiaries and non-beneficiaries of the MOURAFAKA program at a significance level of 1%.

Table 3. Comparisons of the survival functions of agricultural cooperatives benefiting from MOURAFAKA support and non-beneficiaries.

	Chi-Square	ddl	Sig.
Log-Rank (Mantel-Cox)	73,718	1	0.000
Breslow (Generalized Wilcoxon)	73,203	1	0.000
Tarone-Ware	75,771	1	0.000
Test of equality of survival distributions for the different MOURAFAKA levels.			

Source: Author's elaboration.

The results of the segment estimates for agricultural cooperatives that have benefited and not benefited from the MOURAFAKA program show that cooperatives that have received support from the MOURAFAKA program have a higher probability of survival compared to non-beneficiary cooperatives. This finding provides strong evidence of the positive impact of the MOURAFAKA program on the viability of agricultural cooperatives (as illustrated in Figure 2). The result suggests that the program has effectively provided the necessary support and resources for these cooperatives to sustain their operations and increase their chances of success. Additionally, it highlights the importance of such programs in promoting the development and growth of agricultural cooperatives, which play a crucial role in the agricultural sector. This result supports the idea that government support programs can have a significant impact on the survival and performance of agricultural cooperatives.
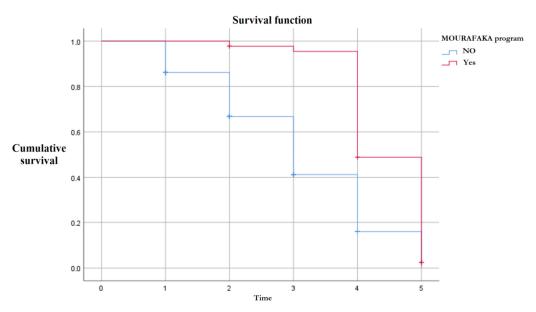

Figure 2. Survival function of cooperatives by beneficiaries and non-beneficiaries of the MOURAFAKA program. Source: author's elaboration.

4.2. Results of the Semiparametric Approach: Cox Regression

Our econometric analysis aimed to identify the key factors that determine the survival of agricultural cooperatives. To achieve this, we employed a Cox regression, which is a widely used statistical method for analyzing time-to-event data. The Cox regression model uses the hazard function to estimate the risk of cooperative mortality, while controlling for various other variables that may influence the outcome. These variables include cooperative size, beneficiaries and non-beneficiaries of the MOURAFAKA program, gender of the cooperative manager, and location of the cooperative.

By including these variables in the model, we were able to examine the relationship between the risk of cooperative mortality and these factors while controlling for other

potential confounding variables. This approach allows us to identify the variables that are most strongly associated with the survival of agricultural cooperatives. Furthermore, this could help policymakers and practitioners to identify the key factors that affect the survival of agricultural cooperatives, and thus design effective policies and programs to support their viability.

In addition, by using the Cox regression model, we can estimate the relative risk of cooperative mortality for different values of the independent variables. The results of this analysis provide valuable insights into the factors that are most critical for the survival of agricultural cooperatives and help to identify potential areas for improvement. Furthermore, this will help to identify the most effective interventions for supporting the viability of agricultural cooperatives, and thus contribute to the development of the agricultural sector in Morocco (Table 4).

Table 4. Estimation results: determinants of cooperative mortality risk.

	B	Sig.
Size of the cooperative		
Small cooperative	0.262	0.000
Gender		
Female	0.006	0.925
MOURAFAKA program		
Beneficiary	−0.493	0.000
Location of the cooperative		
ESSAOUIRA	0.114	0.229
EL KALAA	0.173	0.111
RHAMNA	0.190	0.033
MARRAKECH	0.314	0.000
AL HAOUZ	0.466	0.000

Source: author's calculations.

The results of our econometric estimations provide a deeper understanding of the factors that influence the survival of agricultural cooperatives and are consistent with the findings of our nonparametric analysis. Specifically, the results indicate that being a beneficiary of the MOURAFAKA program is negatively and significantly associated with the risk of cooperative mortality. This suggests that receiving support from the MOURAFAKA program can effectively reduce the risk of closure for agricultural cooperatives, which supports the conclusions drawn from our earlier analysis.

Additionally, our results indicate that the size of the cooperative is positively and significantly correlated with the risk of mortality. This means that small agricultural cooperatives are more likely to close in the start-up phase, which is consistent with the "too big to fail" hypothesis discussed earlier.

Furthermore, the results reveal some heterogeneity in the relationship between the risk of cooperative mortality and location. The study found that cooperatives active in the province of Al Haouz and the prefecture of Marrakech are more likely to become inactive at the beginning of their development cycle, which is a significant finding at the 1% threshold. This suggests that certain regions or localities may have unique characteristics that increase the risk of failure for agricultural cooperatives. This highlights the importance of understanding the local context when designing policies and programs to support agricultural cooperatives and suggests that different regions may require different approaches to support cooperative viability.

5. Discussion and Policy Recommendations

Based on the preliminary analysis of our database, it is clear that cooperatives surveyed face significant challenges in terms of management, marketing, and financing. Additionally, the level of education among cooperative directors is low, with a significant percentage being illiterate or having limited education. However, it is encouraging to see that a high percentage of cooperatives surveyed are familiar with the MOURAFAKA program, and that the program has had a positive impact on improving governance within the cooperatives. A total of 57% of the beneficiary cooperatives from the MOURAFAKA support program experience a progression in the next 5 years, contrary to the non-beneficiary cooperatives, where failure is likely to affect more than 60% of the cooperatives. This result clearly shows the relevance of the MOURAFAKA program insofar as it contributes to strengthening the sustainability and development prospects of beneficiary cooperatives.

Given these findings, it is recommended that the following actions be taken to support the development and sustainability of cooperatives: Increase access to financial resources for cooperatives, through partnerships with banks and other financial institutions. Develop and implement marketing strategies to help cooperatives increase their visibility and reach new markets. Develop training and education programs to improve the management and leadership skills of cooperative directors, with a focus on increasing literacy and education levels. Provide ongoing support and follow-up for cooperatives participating in the MOURAFAKA program, including additional training and resources to help cooperatives implement the program effectively. Ensure that the MOURAFAKA program is continuously evaluated, and that adjustments are made to improve the program's effectiveness. Encourage the cooperative members to actively participate in the program, and make the interaction with the program more interactive and practical.

In addition, the results of our econometric analysis provide a more detailed understanding of the factors that affect the survival of agricultural cooperatives and help to identify potential areas for improvement. The findings of this study can inform policy and practice and contribute to the development of effective interventions to support the viability of agricultural cooperatives in Morocco. In terms of the connection between our findings and the existing literature, our findings on the determinants of agricultural cooperatives' survival are consistent with the existing literature. The literature review we conducted has shown that internal factors such as management skills, leadership style, and the number of members, as well as external factors such as technical progress and strategic adaptability, are all important factors that impact the survival of agricultural cooperatives.

Our study's results also support the idea that the perception of the principles of cooperation and belonging to society can be a determining factor for the development and survival of agricultural cooperatives. The literature we reviewed, such as the work of [24], highlights the importance of citizens' perception of cooperation and their motivation towards it in the maintenance of agricultural cooperatives' activity. Furthermore, our study's findings on the impact of support programs on the viability of cooperatives and the main determinants of cooperative survival are consistent with previous research such as that by [24] that have shown that as cooperative size increases, the risk of cooperative mortality decreases. This validates the "too big to fail" hypothesis in the world of agricultural cooperatives.

Our study also differs from the existing literature by using a methodology based on survival function analysis and Cox regression, which we used for the first time in this field. This methodology allowed us to provide a more in-depth analysis of the determinants of agricultural cooperatives' survival and to identify the variables that have the most significant impact on cooperative mortality.

The results of our study have several important policy implications for the development and support of agricultural cooperatives in Morocco. One key finding is that the optimization of the impact of the training provided by the MOURAFAKA program depends on several exogenous factors. These include the supervision rate, which is still relatively low and needs to be increased in order to optimize the impact of the training provided by the program. Additionally, the cooperatives lack technical assistance in areas

such as good harvesting, domestication, and marketing practices, which further hinders their ability to effectively implement the training they receive. Furthermore, the study found that while the program places a strong emphasis on the development of management capacities, it does not sufficiently address financing needs, which is a critical factor for the viability of agricultural cooperatives, particularly during the start-up phase.

Another important policy implication is the need for the creation of synergy between the different local actors and with sectoral policies, with a particular focus on market access and the establishment of network links. This implies the inclusion of actors from the cooperative environment in ecosystems and value chains at both the regional and cross-sectoral levels. To achieve this, an integrated system of national, regional, and local governance is required. Additionally, improving the information system would be a vector for improving the environment, programs, and actions, particularly through monitoring and evaluation.

In today's digital age, the adoption of digital technology in the cooperative sector offers several advantages, mainly related to the smooth running of the cooperative's activities in crisis situations (e.g.–COVID-19) and with a view to improving the cooperative–client relationship via the creation of an "e-commerce" site to sell these goods on national and international markets, the proposal of payment facilities for clients, and delivery services. Digitization also allows cooperatives to optimize their process and distribution chain through access to decentralized instruments necessary for the management of the cooperative.

In conclusion, the viability of agricultural cooperatives in Morocco depends on both upstream and downstream factors. Upstream, efforts are needed to build the capacity of cooperative project leaders through literacy programs and training institutions. Downstream, cooperatives must have access to financing [36] and the ability to market their products effectively. These policies and programs must be implemented in a comprehensive and integrated way, through the establishment of an integrated system of national, regional, and local governance and the development of a robust information system. In addition, to strengthen their value chain, the marketing of cooperative sector products is crucial, and this can be achieved by making cooperatives benefit from programs such as "Maroc Taswiq". (Maroc Taswiq is a development strategy for equitable commerce implemented by the Office de Commercialisation et d'Exportation (OCE) and aimed at small and medium-sized agricultural producers to better valorize their production. The Taswiq Morocco program is based on three main pillars: (1) the aggregation and valorization of the products of small agricultural producers; (2) the marketing and valorization of these products; and (3) the improvement of the financial situation of small agricultural producers.) These steps will help to ensure the sustainability of agricultural cooperatives and contribute to the overall development of the agricultural sector in Morocco.

6. Conclusions

The agricultural cooperatives aim to encourage the small "fellah" (meaning "farmer" in Arabic). If they record high rates of creation, it remains that their inactivity is increasingly severe. Dysfunctions due to objective and subjective factors, internal and external, are eating away at the cooperative fabric. For some, joining a cooperative often stems from a spirit of opportunism and assistance, which goes against the entrepreneurial principle carried by many cooperatives. MOURAFAKA is presented as a set of tools for agricultural cooperatives.

The objective of this paper was to evaluate the impact of the MOURAFAKA program on the sustainability of agricultural cooperatives in Morocco. To do so, we deployed a double methodological approach, on the one hand by mobilizing a nonparametric approach by analyzing the survival functions by size of cooperatives and by beneficiary or non-beneficiary of the MOURAFAKA program, and on the other hand by using a semi-parametric approach based on a Cox regression. In addition, regarding the source of our data, two databases were used, the first compiled via a survey of 232 cooperatives and the second based on data from 1131 cooperatives.

The results of the nonparametric analysis highlighted the validity of the "too big to fail" hypothesis in the case of Moroccan agricultural cooperatives: as the size of the cooperative increases, its mortality risk decreases, a result that is consistent with several empirical works [24]. The analysis of the survival functions of beneficiary and non-beneficiary cooperatives of the MOURAFAKA program also proved that the agricultural cooperatives that benefited from the MOURAFAKA program have a higher survival function than non-beneficiary cooperatives, a result that attests to the impact of this program on the viability of agricultural cooperatives and contributes to filling the gap in terms of managerial capacities among the leaders of the cooperatives.

The results of the semiparametric approach support the results of the nonparametric approach, on the one hand by highlighting the main determinants of the viability of agricultural cooperatives, namely size and benefiting from the MOURAFAKA program. On the other hand, the Cox regression highlighted a certain heterogeneity of results according to the locality of the cooperative, as cooperatives active in the localities of the province of Al Haouz and the prefecture of Marrakech have a greater risk of falling into inactivity during the start-up phase.

In sum, this work has shown the twofold positive impact of the support program on the survival and governance of these cooperatives: (1) capacity building of cooperative managers in the fields of management, marketing, organization, and financing; and (2) the establishment of a transparent system of norms and rules through the organization of general assemblies as well as administrative council.

This paper contributes to the existing literature in two ways. First, analytically, it has shown the relevance of support programs on the viability of cooperatives while highlighting the main determinants of cooperative survival. Second, methodologically, by mobilizing original data constructed through a survey of 232 cooperatives and a second database of 1131 cooperatives. Further, this study differs from the existing literature by using a methodology employed for the first time, one based on survival function analysis and Cox regression.

The findings of this study have several important implications for existing research, future research, and policy. In terms of existing research, the study provides further evidence for the role of agricultural cooperatives in promoting sustainable development and rural development. The study also provides insights into the factors that affect the survival of agricultural cooperatives, which can be used to inform the development of policies and programs to support the viability of agricultural cooperatives. In terms of future research, the study highlights the importance of considering the local context when designing policies and programs to support agricultural cooperatives. Additionally, the study suggests that further research is needed to examine the impact of different types of support programs on the viability of agricultural cooperatives and to identify the most effective interventions to support the sustainability of agricultural cooperatives. In terms of policy, the study has several implications for policymakers in Morocco and other countries who are interested in promoting the viability of agricultural cooperatives. The study suggests that policies and programs that support the development of management capacities and provide access to financing are crucial for the viability of agricultural cooperatives. Additionally, the study highlights the importance of creating synergy between local actors and sectoral policies in order to support the development of agricultural cooperatives and suggests that an integrated system of national, regional, and local governance is required to achieve this.

In light of our study, potential areas for further research include exploring the impact of different support programs on the survival and growth of agricultural cooperatives, as well as investigating the role of social capital and strategic adaptability in cooperative longevity [37]. Additionally, a comparative study examining the success factors of cooperatives in different regions and countries would provide valuable insights. Moreover, government programs that focus on economic development can build capacity for economic performance within the cooperative sector, but this can come at the expense of social

and environmental sustainability [38]. What are the most effective ways for cooperatives to balance economic growth with social and environmental sustainability?

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