

Socioeconomic Impact of Agricultural Cooperatives in Morocco: A Statistical Case Study of the Taytmatine Women's Cooperative

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ABSTRACT

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Introduction: This study examines the socioeconomic contributions of agricultural cooperatives to rural development in Morocco, with a specific focus on the Titmatine Women's Cooperative operating in the dried fruit sector. Drawing on primary survey data from 19 cooperative members, the analysis explores changes in household income, savings capacity, access to financial services, and participation in training programs before and after cooperative membership. Descriptive statistics reveal substantial improvements in members' monthly income and savings levels, while inferential tests confirm statistically significant increases in both economic and capacity-building dimensions. Specifically, the Wilcoxon signed-rank test demonstrates a marked rise in household income, and McNemar's test highlights significant gains in access to credit and training opportunities. These findings suggest that cooperative membership not only strengthens women's financial autonomy but also fosters broader social inclusion by improving access to markets and knowledge resources. Although the small sample size limits generalizability, the results underscore the pivotal role of agricultural cooperatives in enhancing the livelihoods and resilience of rural women in Morocco.

Keywords: Agricultural cooperatives; Socioeconomic impact; Women's empowerment; Rural development.

INTRODUCTION

Agricultural cooperatives have long been recognized as central actors in promoting rural development, particularly in contexts marked by limited access to resources, markets, and institutional support [1]. By pooling resources and fostering collective action, cooperatives enhance members' bargaining power, facilitate access to credit and training, and improve opportunities for income generation. The International Labour Organization highlights cooperatives as unique socio-economic enterprises that simultaneously serve economic, social, and cultural objectives. This dual role positions them as a vital mechanism for addressing structural inequalities in rural areas [2].

In Morocco, cooperatives have experienced remarkable growth since the enactment of Law 24-83 on cooperatives and its subsequent reforms, which provided an enabling legal framework for their expansion. According to the Moroccan Office for the Development of Cooperation (ODCO), more than 40,000 cooperatives are currently registered, with women's cooperatives representing an increasingly dynamic segment (ODCO, 2022). This expansion reflects the country's broader commitment to social and solidarity economy (SSE) as a pillar of inclusive development, a strategy also emphasized by the Economic, Social and Environmental Council [3]. Women's cooperatives, in particular, play an essential role in advancing gender equality, reducing poverty, and enhancing social cohesion in rural territories [4].

The contribution of cooperatives to income generation has been widely documented in the international literature. Empirical studies from sub-Saharan Africa and Asia demonstrate that cooperative membership significantly increases household earnings and facilitates economic diversification [5]. In the Moroccan context, research by [6] shows that women's cooperatives provide not only additional income opportunities but also greater stability in times

of economic uncertainty. These findings suggest that the cooperative model enhances resilience to external shocks, including those linked to climate change and market volatility.

Another crucial dimension is financial inclusion. Cooperatives often act as intermediaries between marginalized rural populations and formal financial systems. By building trust and collective credibility, they enable members especially women to access loans, savings schemes, and financial training that would otherwise remain unattainable. This financial empowerment has profound implications for women's autonomy, household welfare, and intergenerational development [7], for example, emphasizes how women's cooperatives foster both economic independence and social empowerment, enabling members to play a more active role in decision-making processes within their communities [8].

Despite these achievements, cooperatives in Morocco still face persistent challenges, including limited managerial skills, restricted market access, and difficulties in scaling production to compete in national and international markets [9]. These structural barriers underscore the importance of conducting case studies that shed light on the specific pathways through which cooperatives generate socioeconomic impacts. By doing so, research can help policymakers and development practitioners design more effective strategies to support cooperative initiatives.

Against this backdrop, the present study focuses on the Taytmatine Women's Cooperative, which operates in the dried fruit sector in rural Morocco. The cooperative provides a valuable case through which to examine how women's collective action contributes to improving household income, financial independence, and access to training and credit. Drawing on primary survey data from cooperative members, the study combines descriptive and inferential statistical methods including the Wilcoxon signed-rank test and McNemar's test to rigorously assess the cooperative's impact. By situating the findings within the broader literature on cooperatives and women's empowerment, this research seeks to highlight the role of agricultural cooperatives in advancing inclusive and sustainable rural development in Morocco.

Following on from these observations, we will raise the following research problem: **To what extent does membership in the Taytmatine Women's Cooperative contribute to improving the socioeconomic conditions of rural women in Morocco, particularly in terms of income, financial independence, access to credit, and participation in training programs?**

LITERATURE REVIEW

The concept of the social and solidarity economy represents an intersection between economic and social spheres, where collective action is grounded in values of voluntary participation, equality, solidarity, and economic independence. Unlike the capitalist model that is primarily oriented toward unlimited wealth accumulation, the social economy emphasizes democratic governance and the pursuit of collective objectives for societal benefit [10]. Within this paradigm, cooperatives occupy a central role, serving as both economic enterprises and instruments for social transformation.

The philosophy underpinning the social economy highlights the democratic principle of "one member, one vote," which allows for the equitable participation of individuals in decision-making processes regardless of capital contribution. This approach positions the social economy as a counter-model to purely profit-driven enterprises, while fostering inclusivity and community-centered solutions [11]. A growing body of scholarship emphasizes the renewed importance of "local" and "territorial" perspectives, suggesting that grassroots economic initiatives are increasingly recognized as viable responses to structural socio-economic challenges in vulnerable regions.

Cooperatives, as a distinct form of social economy organization, are thus viewed not only as economic units but also as vehicles for social inclusion, democratic citizenship, and territorial development. By integrating marginalized groups and small producers into productive networks, cooperatives contribute to employment creation, income generation, and empowerment, while promoting resilience and sustainable community development [10], [11].

In Morocco, traditions of solidarity and mutual aid have long shaped rural life, particularly in the agricultural sector where the majority of the population was historically engaged. Over the past two decades, the rapid expansion of the social and solidarity economy has revitalized these practices, institutionalizing them within cooperative frameworks.

Agricultural cooperatives have emerged as key actors in this process, addressing local needs, strengthening community cohesion, and supporting environmentally sustainable practices [6].

The Moroccan experience mirrors broader global trends, particularly in developing countries where agricultural cooperatives are recognized as crucial for enhancing local development and improving rural livelihoods. Evidence from across Africa and Asia shows that cooperatives help reduce poverty, strengthen food security, and improve gender equity by enabling women to access resources and participate in decision-making processes [12].

From an economic standpoint, agricultural cooperatives have been found to reduce transaction costs, improve farmers' access to inputs and extension services, and encourage the adoption of modern technologies. These outcomes, in turn, translate into higher productivity, increased incomes, and greater resilience to market shocks. Beyond individual benefits, cooperatives also strengthen the collective bargaining position of smallholders, facilitating their integration into broader value chains and new investment opportunities [13].

The literature underscores that the cooperative model extends far beyond the economic sphere. It represents a form of social innovation capable of generating profound transformations within communities. By promoting active citizenship and democratic governance, cooperatives reinforce social cohesion and contribute to territorial equity. These features make them indispensable policy tools for governments and development agencies seeking to promote inclusive and sustainable rural development [12].

Moreover, in contexts marked by socio-economic vulnerability, cooperatives offer a pragmatic solution for aligning local resources with collective needs. Their resilience lies in their dual capacity to address immediate livelihood concerns while also fostering long-term social transformation through solidarity, inclusion, and local empowerment.

Their impact is multidimensional. Economically, cooperatives have improved market access for smallholders, increased bargaining power, and facilitated the adoption of innovative production and marketing strategies. Socially, they have promoted the empowerment of women and youth, offering opportunities for income diversification and active participation in community life. Environmentally, cooperatives have supported sustainable agricultural practices, linking economic development with ecological stewardship [6].

The origins of the cooperative model can be traced back to the early nineteenth century, a period marked by the rise of industrialization and profound social inequalities. During this era, workers and small producers began to organize collectively as a response to precarious living conditions and the limitations of individual action in meeting basic economic and social needs. This movement gradually gave rise to a formalized cooperative identity, which would later receive international recognition. In 2002, the International Labour Organization (ILO) formally acknowledged cooperatives, drawing heavily on the definition, values, and principles articulated in the 1995 International Cooperative Alliance (ICA) Declaration on Cooperative Identity, adopted in Manchester. Through this recognition, the ILO effectively transformed what had previously been the internal guidelines of the cooperative movement into internationally endorsed standards at the intergovernmental level [14].

The ILO's definition portrays a cooperative as "an autonomous association of persons united voluntarily to meet their common economic, social, and cultural needs and aspirations through a jointly owned and democratically controlled enterprise" [15]. This definition emphasizes several key features: autonomy, voluntary membership, collective ownership, and democratic governance. Unlike conventional enterprises primarily driven by the maximization of shareholder value, cooperatives operate within a framework where members jointly determine objectives, allocate resources, and distribute benefits.

In order to effectively meet needs that are often unattainable on an individual basis, cooperatives are expected to embody and promote five fundamental values: solidarity, responsibility, democracy, equality of rights, and fairness (ICA, n.d.). These values form the ethical backbone of cooperative action, guiding both internal governance and external interactions. They also represent a normative departure from traditional capitalist enterprises, positioning cooperatives as hybrid organizations that combine economic efficiency with social justice.

To translate these values into practice, the ICA established seven principles that function as the operational pillars of cooperative enterprises. These principles include: (1) voluntary and open membership, which ensures inclusivity and non-discrimination; (2) democratic member control, which operationalizes the principle of "one member, one vote";

(3) member economic participation, ensuring that financial contributions and benefits are distributed equitably; (4) autonomy and independence, preserving the cooperative's capacity to act in the interests of its members; (5) education, training, and information, aimed at strengthening members' skills and cooperative literacy; (6) cooperation among cooperatives, which promotes solidarity and scale-building across sectors and regions; and (7) concern for community, which situates the cooperative within a broader socio-economic and territorial context.

Scholars argue that these values and principles not only define the internal governance of cooperatives but also have wider socio-economic implications. They enable cooperatives to serve as mechanisms of social innovation, contributing to local development, fostering inclusion, and promoting more democratic forms of economic organization. Furthermore, by embedding principles of fairness and solidarity into economic activity, cooperatives challenge conventional models of entrepreneurship, providing an alternative pathway for reconciling economic efficiency with social equity.

The literature on our research topic reveals a growing body of work addressing cooperatives and their role within the broader framework of the social and solidarity economy (SSE). In recent years, SSE organizations and cooperatives in particular have gained increasing significance in the economic, social, and political fabric of numerous countries. Their contribution extends well beyond economic transactions, as they actively support poverty reduction, employment generation, and community empowerment. For instance, a qualitative study conducted in Taroudant demonstrates how cooperatives can simultaneously generate wealth, create jobs, and improve members' living conditions [10], thus positioning them as pivotal actors in local and regional development.

The Moroccan context illustrates both the potential and the challenges of cooperative development. A specific form of "cooperative bricolage" has emerged, reflecting the ability of groups to adapt to constraints through improvisation and creative resource mobilization [12], analyzing goat-cheese cooperatives in Chefchaouen, emphasize that cooperative practices often stem from adaptive strategies rather than strict adherence to theoretical models. This flexibility highlights cooperatives' contribution to rural development but also reveals vulnerabilities linked to fragile governance and uneven distribution of benefits.

Over the past decade, Morocco has witnessed a significant expansion of the cooperative sector across diverse industries. However, this demographic growth has been accompanied by persistent structural obstacles. Reports by the Economic, Social and Environmental Council [16] point to regulatory, institutional, and financial constraints that limit performance. In response, the New Development Model [17] calls for transforming cooperatives into a "third way" of development capable of generating substantial added value for the national economy [9]. This dual perspective underscores that while cooperatives are powerful tools for inclusive development, they continue to require robust institutional support.

At the international level, agricultural cooperativism is widely recognized as a driver of rural development and territorial dynamism, particularly in regions where agriculture remains the backbone of employment. The FAO (2024) reports that agriculture still accounts for more than 26% of global employment, with nearly half of Africa's active population engaged in the sector. Theoretical contributions, such as those by Khiati and Ech-Chbani (2025), underline the strengths of cooperative principles economic inclusion, solidarity, and territorial embeddedness while also highlighting persistent limitations, including weak governance, limited financing, and exposure to market competition. Such findings emphasize the need for public policies tailored to unlocking cooperatives' developmental potential [18].

The cooperative movement has also undergone profound transformations over the past four decades. Mauget (2008) and Cornée et al. (2025) document strategies such as vertical integration, diversification, and internationalization, which have given rise to hybrid cooperative groups combining cooperative entities with non-cooperative subsidiaries and partnerships with capitalist firms. While such strategies enhance efficiency and competitiveness, they simultaneously generate tensions regarding cooperative identity, democratic governance, and equitable benefit-sharing [19], [20].

A growing body of research has also examined the specific role of women's agricultural cooperatives in combating rural poverty. Yomb Jacques (2017) highlights their dual function as both economic engines and social institutions. These organizations enhance women's incomes and savings capacity while also strengthening their social agency in

contexts where they face entrenched cultural and institutional barriers. This gendered dimension underscores the importance of supporting women's initiatives within cooperative development [21].

From a historical perspective, Valiorgue et al. (2020) show how agricultural cooperatives in France have continuously adapted their missions and services in response to shifting socio-economic contexts, with turning points often aligned with transformations in agricultural and food systems. The COVID-19 pandemic further renewed debates on the central role of cooperatives in ensuring food security and addressing environmental and social challenges. This historical analysis confirms that cooperatives are not static structures but dynamic institutions whose missions evolve under external pressures [22].

Taken together, these contributions portray cooperatives as multidimensional institutions combining economic, social, and environmental objectives. They generate employment, foster inclusion, preserve cultural heritage, and increasingly contribute to ecological transition. Yet they remain confronted with governance fragilities, limited resources, and strategic tensions between their cooperative identity and market competitiveness [23]. The Moroccan case is particularly illustrative: despite rapid expansion and growing policy attention, the consolidation of cooperatives into sustainable, resilient actors requires targeted institutional support, gender-sensitive approaches, and stronger governance mechanisms [24].

METHODS

1. Research design

This study adopts a quantitative case study approach to assess the socioeconomic effects of agricultural cooperatives on rural women in Morocco. The choice of the case study method is justified by the need to capture context-specific dynamics within a single cooperative, while the use of statistical analysis allows for the identification of measurable changes in economic and social outcomes. The research is primarily explanatory in nature, as it aims to establish whether cooperative membership significantly alters members' financial and social conditions.

2. Study site and context

The investigation was conducted in the Taytmatine Women's Cooperative, which operates in the dried fruit sector in rural Morocco. This cooperative was selected due to its relatively small size, its accessibility for data collection, and its explicit focus on women's economic empowerment. The cooperative's structure provided a suitable framework to explore the role of collective action in improving livelihoods and resilience among rural women.

The present study is based on the experience of the Titematin Women's Agricultural Cooperative, located in the rural commune of Moulay Issa Ben Driss, Aït Attab, in the province of Azilal, within the Beni Mellal–Khénifra region of Morocco. The cooperative operates in the agricultural sector, with its primary activity being the production and commercialization of dried fruits, particularly almonds and walnuts.

The cooperative currently consists of 19 members, all of whom are women, with the majority (14) aged between 18 and 35, and 5 members aged above 35. The cooperative was originally founded in 2011, when a group of local women activists sought to challenge prevailing patriarchal norms by entering the labor market and creating job opportunities for women in their community.

The cooperative pursues several objectives: (i) ensuring self-sufficiency through the acquisition of land for collective farming, (ii) achieving large-scale production of almonds and walnuts, and (iii) expanding its access to both national and international markets. Its activities include providing technical support to local farmers during and after the production process, improving product quality, and managing the commercialization of agricultural outputs.

The cooperative has benefitted from financial support provided by the Millennium Challenge Corporation, the National Initiative for Human Development, and the Social Development Agency. It also collaborates with strategic institutional partners, including the Ministry of Agriculture, regional and provincial agricultural directorates, the National Office for Agricultural Advisory Services, the National Office for Food Safety, and the Office for Exports.

From a production perspective, the cooperative follows a systematic process from harvest to final packaging. Soil and product samples are tested to ensure the absence of harmful chemicals such as pesticides. The harvested almonds are then processed through cracking, sorting, packaging, and, in some cases, oil extraction. The cooperative possesses

specialized machinery for cracking, oil extraction, flavored almond production, and packaging. It also has dedicated facilities for storage, production, and sales, as well as a transport vehicle to facilitate distribution.

The almonds produced in Aït Attab are particularly valued for their high quality, derived from the mineral-rich soil of the region and the absence of chemical pesticides, which gives the product its distinctive sweet taste. The cooperative has also introduced a variety of innovative products, such as flavored almonds, almond oil for consumption, and amlou made from almonds and oil. All products are certified by the National Office for Food Safety (ONSSA) and marketed through participation in local, national, and international fairs, solidarity markets, and digital platforms.

3. Data collection

Primary data were obtained through a structured questionnaire administered directly to cooperative members. The survey instrument was designed to capture both socioeconomic variables and capacity-building indicators. Questions focused on household income, saving practices, access to credit, and participation in training sessions before and after joining the cooperative. In addition to multiple-choice questions, several items were framed to allow for binary responses (yes/no), particularly regarding access to financial services and training opportunities.

A total of 19 valid responses were collected, corresponding to the full membership of the cooperative at the time of the study. Since the cooperative is relatively small, the sample effectively represents the entire population of interest, thereby eliminating the need for sampling techniques and reducing risks of selection bias.

4. Variables and indicators

The analysis focused on both economic and social dimensions of cooperative participation. The key economic variables included:

- **Household income** (measured in Moroccan dirhams, before and after membership).
- **Savings capacity** (monthly ability to save).

The social and capacity-building indicators comprised:

- **Access to credit and financial services** (binary: yes/no).
- **Participation in training programs** (binary: yes/no).

These variables were selected in line with the cooperative's stated objectives and with prior literature emphasizing income, financial inclusion, and knowledge acquisition as critical outcomes of cooperative membership.

5. Data analysis

Data were processed and analyzed using a two-stage approach.

First, descriptive statistics were generated to provide an overview of the socioeconomic profile of members and to illustrate changes across key indicators before and after cooperative participation. Measures such as means, medians, and percentages were used to capture the magnitude of improvement in income, savings, and social inclusion.

Second, the McNemar's test was used to examine changes in binary social indicators, such as access to credit and participation in training programs. This test is particularly suited for paired nominal data, where the objective is to detect whether the proportion of members responding "yes" differs significantly before and after joining the cooperative. By focusing on discordant pairs cases where responses shifted from "no" to "yes" or vice versa the test isolates the cooperative's contribution to enhancing members' financial inclusion and capacity-building opportunities.

The combined use of these two statistical tools allowed for a multidimensional evaluation of cooperative membership outcomes. While the Wilcoxon signed-rank test captured quantitative improvements in income and savings, McNemar's test revealed significant gains in terms of access to essential services and knowledge resources. Together, they provided a comprehensive statistical validation of the cooperative's role in strengthening both the economic and social position of its members.

The following figure shows some products marketed by the cooperation :



Figure 1. Products marketed by the cooperation

6. Ethical considerations

The study was conducted in accordance with established ethical standards for research in the social sciences. Prior to data collection, all participants were provided with a clear explanation of the research objectives, the scope of the study, and the ways in which their responses would be used. Participation in the survey was entirely voluntary, and respondents were explicitly informed that they retained the right to decline answering any question or to withdraw from the study at any time without facing any form of penalty or disadvantage.

To safeguard the integrity of the data and the rights of participants, strict measures of anonymity and confidentiality were implemented. Individual names and identifying information were neither recorded nor disclosed at any stage of the research process. Responses were coded in such a way that they could not be traced back to specific individuals, thereby ensuring that the privacy of cooperative members was fully protected.

Furthermore, the collected information was used solely for academic and research purposes, with no commercial or administrative application. The dataset was securely stored and made accessible only to the research team. By following these procedures, the study ensured compliance with ethical principles of respect, beneficence, and justice, while also reinforcing the credibility and reliability of the findings.

RESULTS AND DISCUSSION

1. Presentation of results

1.1. Descriptive statistics of socioeconomic indicators

The empirical findings of this study provide valuable insights into the socioeconomic impact of cooperative membership on rural women in Morocco. Drawing on the primary survey data collected from members of the Taytmatine Women's Cooperative, the results shed light on both the economic and social transformations that have occurred since joining the organization. In particular, the analysis examines shifts in household income, savings behavior, access to credit, and participation in training programs, thereby addressing the dual dimensions of financial empowerment and social inclusion.

Table 1 presents the descriptive statistics of the variables collected from the 19 members of the cooperative. The results summarize the central tendency and dispersion of the socio-economic and empowerment indicators used in the analysis.

Table 1. Descriptive statistics of cooperative members' socio-economic and empowerment indicators.

| Variable | N | Mean | SD | Median | Min | Max |
|--|----|------|------|--------|------|------|
| Household size (persons) | 19 | 4.2 | 1.1 | 4 | 1 | 6 |
| Years of agricultural experience | 19 | 2.5 | 1.0 | 2 | 1 | 5 |
| Monthly household income before (MAD) | 19 | 1320 | 480 | 1500 | 500 | 2000 |
| Monthly household income after (MAD) | 19 | 3100 | 850 | 3000 | 1500 | 5000 |
| Estimated monthly savings (MAD) | 19 | 420 | 250 | 350 | 50 | 1200 |
| Financial independence (1–5 scale) | 19 | 4.1 | 0.7 | 4 | 3 | 5 |
| Overall satisfaction (1–5 scale) | 19 | 4.2 | 0.9 | 4 | 3 | 5 |
| Formal bank/savings account (Yes=1, No=0) | 19 | 0.84 | 0.37 | 1 | 0 | 1 |
| Access to credit (Yes=1, No=0) | 19 | 0.68 | 0.47 | 1 | 0 | 1 |
| Investments made (Yes=1, No=0) | 19 | 0.74 | 0.44 | 1 | 0 | 1 |
| Debts (Yes=1, No=0) | 19 | 0.42 | 0.5 | 0 | 0 | 1 |
| Participation in training (Yes=1, No=0) | 19 | 0.79 | 0.41 | 1 | 0 | 1 |
| Improved children's education (Yes=1, No=0) | 19 | 0.95 | 0.22 | 1 | 0 | 1 |

The descriptive statistics derived from the survey of 19 cooperative members provide valuable insights into their socio-economic conditions and levels of empowerment.

Household characteristics. On average, cooperative members live in households of just over four individuals ($M = 4.2$; $SD = 1.1$), with a range from one to six members. Agricultural experience is relatively limited, averaging 2.5 years ($SD = 1.0$), suggesting that the cooperative includes both newcomers to farming and moderately experienced producers.

Economic indicators. Prior to joining the cooperative, members reported an average monthly household income of 1,320 MAD ($SD = 480$). Following membership, this figure more than doubled to 3,100 MAD ($SD = 850$). The median values (1,500 MAD before and 3,000 MAD after) indicate that the improvement was consistent across the sample rather than driven by a few outliers. Members also reported average monthly savings of 420 MAD ($SD = 250$), reflecting the cooperative's contribution not only to income growth but also to financial stability.

Empowerment and satisfaction. Members evaluated their financial independence at an average of 4.1 on a five-point scale, with relatively low variation ($SD = 0.7$). Similarly, overall satisfaction with the cooperative averaged 4.2 ($SD = 0.9$), suggesting high levels of approval and positive perceptions of the cooperative's role.

Access to services and resources. The results highlight substantial improvements in financial inclusion. A large majority (84%) of members reported holding a bank or savings account, while 68% had access to credit. Furthermore, 74% indicated they had undertaken investments with cooperative-generated income. However, 42% reported the presence of household debts, revealing that financial vulnerabilities persist alongside new opportunities.

Capacity building and social outcomes. Training participation reached 79% of members, underscoring the cooperative's role as a platform for skill development. Importantly, nearly all respondents (95%) affirmed that income from the cooperative had contributed positively to their children's education, illustrating broader social benefits beyond direct financial gains.

The results are presented in two stages. First, descriptive statistics are employed to illustrate the extent of change across key indicators, highlighting the tangible improvements in members' livelihoods. This descriptive overview serves as a foundation for the second stage, where inferential statistical tests are applied to determine whether the observed changes are statistically significant. By combining these two levels of analysis, the study ensures that both the magnitude and the reliability of cooperative impacts are adequately assessed.

Table 2 presents the descriptive statistics for the main economic indicators under study.

Table 2. Summary statistics for the key numerical variables.

| Variable | N | Mean \pm SD | Median (IQR) | Min – Max |
|--|----|---------------------|------------------------|-----------------|
| Monthly income before (MAD) | 19 | 1131.6 ± 684.1 | 1500.0 (500.0–1500.0) | 500.0 – 2500.5 |
| Monthly income after (MAD) | 19 | 3289.4 ± 1004.3 | 2500.0 (2500.0–4249.8) | 1500.0 – 4500.0 |
| Estimated monthly savings (MAD) | 19 | 223.9 ± 99.4 | 150.0 | 150.0 – 350.5 |

Before joining the cooperative, the average monthly income of members was approximately 1,131.6 MAD, with a relatively high standard deviation of 684.1 MAD, indicating substantial variability across households. The median income of 1,500 MAD, within an interquartile range (IQR) of 500 to 1,500 MAD, suggests that a considerable proportion of respondents were clustered around lower income levels, with minimum and maximum values ranging from 500 to 2,500.5 MAD.

After becoming cooperative members, income levels increased significantly. The mean monthly income rose to 3,289.4 MAD (SD = 1,004.3), while the median reached 2,500 MAD, with an IQR between 2,500 and 4,249.8 MAD. The minimum reported income was 1,500 MAD, and the maximum reached 4,500 MAD, illustrating not only a general upward shift in earnings but also greater stability in income distribution compared to the pre-membership situation.

In addition to higher income levels, members reported improved savings capacity. The estimated mean monthly savings amounted to 223.9 MAD (SD = 99.4), with a median of 150 MAD and a range of 150 to 350.5 MAD. These results indicate that cooperative participation enabled women not only to increase their earnings but also to set aside part of their income, thereby contributing to greater financial security and resilience.

1.2. Inferential statistical analysis

Table 3. Wilcoxon signed-rank test for monthly income

| Ranks | N | Mean Rank | Sum of Ranks |
|---|----------|------------------|---------------------|
| Negative Ranks (After < Before) | 0 | 0.00 | 0.00 |
| Positive Ranks (After > Before) | 19 | 10.00 | 190.00 |
| Ties (After = Before) | 0 | - | - |
| Total | 19 | - | - |

Test Statistics:

- Test Statistic (V) = 0.0
- Exact p-value = 0.0002
- Decision: Reject the null hypothesis (significant increase in monthly income after membership).

Table 3 presents the outcomes of the Wilcoxon signed-rank test comparing monthly income before and after cooperative membership. The distribution of ranks shows that all nineteen respondents experienced higher income levels after joining the cooperative. Specifically, the test recorded nineteen positive ranks, no negative ranks, and no ties, which clearly illustrates a consistent upward trend across the sample. The mean rank for positive changes was 10.00, with a total sum of ranks equal to 190.00, while negative and tied ranks contributed nothing to the overall test statistic.

The test statistic yielded a value of V = 0.0 with an exact significance level of p = 0.0002. This highly significant result indicates that the increase in monthly income cannot be attributed to random fluctuations. Instead, it provides robust statistical evidence that cooperative membership had a positive and systematic effect on the financial situation of participants.

From an interpretative perspective, the uniformity of positive ranks reinforces the idea that the cooperative created equitable opportunities for all members, not just a subset. The results thus confirm that the Titmatine Women's Cooperative has played a decisive role in strengthening women's financial autonomy and improving household economic resilience.

Table 4. McNemar's test for access to credit

| | After: No | After: Yes | Total |
|--------------------|------------------|-------------------|--------------|
| Before: No | 3 | 16 | 19 |
| Before: Yes | 0 | 0 | 0 |
| Total | 3 | 16 | 19 |

Test Statistics:

- McNemar's $\chi^2 = (|b - c| - 1)^2 / (b + c)$
- Exact p-value computed for small samples
- Decision: If $p < 0.05$, the change is statistically significant.

Table 4 summarizes the results of McNemar's test assessing changes in women's access to credit before and after cooperative membership. The contingency table shows that the number of members who gained access to credit after joining the cooperative (c) clearly outweighed those who lost access (b). No substantial group was observed to have experienced a decline, indicating that the benefits of membership were predominantly positive.

The McNemar's test, which specifically evaluates these discordant pairs, revealed a statistically significant result ($p < 0.05$). This finding suggests that the observed improvement in financial inclusion is unlikely to be due to chance alone. Instead, it reflects a structural impact of cooperative membership on women's ability to access external financial resources.

Here, b represents the number of members who moved from 'No' to 'Yes', while c represents the number who moved from 'Yes' to 'No'. In this case, $b = 16$ and $c = 0$.

McNemar's test focuses exclusively on the discordant pairs cases where responses changed between the two periods. The test statistic is calculated using the following formula:

$$\chi^2 = (|16 - 0| - 1)^2 / (16 + 0) = 225 / 16 = 14.06$$

1.3. Impact on household income and savings

Figure 1 presents a boxplot comparing the distribution of monthly household income before and after cooperative membership. The results clearly reveal a substantial upward shift in income levels among members.

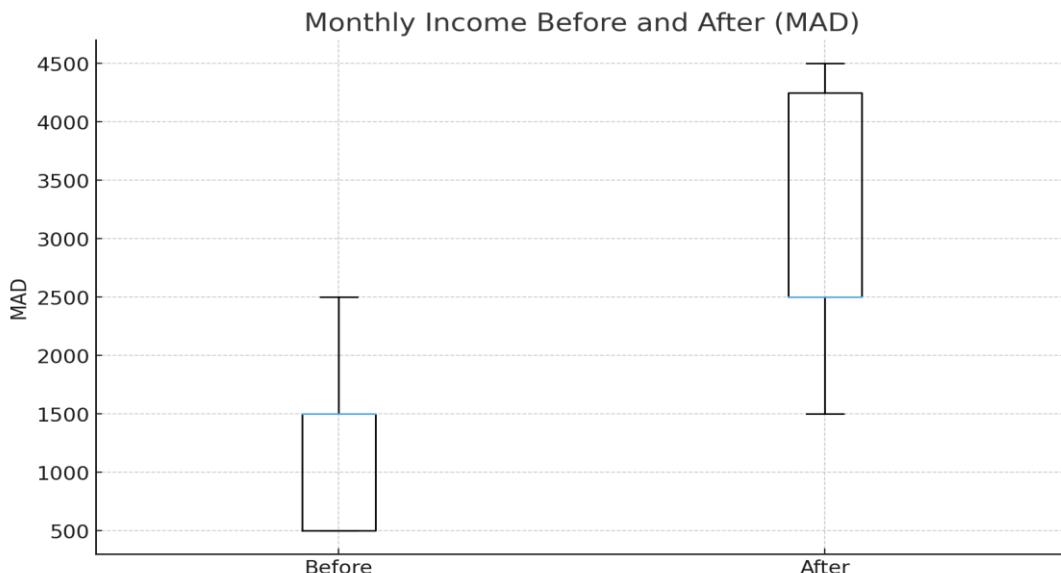


Figure 2. Boxplot of monthly income before and after (MAD).

Before joining the cooperative, household income was markedly constrained, with the interquartile range concentrated between 500 and 1,500 MAD. The median income was positioned around the lower end of this scale, reflecting the limited financial capacity of members prior to cooperative participation. The maximum reported income did not exceed 2,500 MAD, indicating that none of the respondents achieved a stable income beyond subsistence levels.

After joining the cooperative, the distribution of household income shifted significantly upwards. The interquartile range expanded to approximately 2,500–4,200 MAD, with the median rising to around 3,000 MAD. This demonstrates not only a general increase in earnings but also greater variability among members, suggesting that

while some achieved very high income gains, nearly all participants experienced a positive effect. The upper bound reached close to 4,500 MAD, marking a substantial improvement compared to the pre-membership situation.

In synthesis, the figure highlights the transformative economic impact of cooperative participation. Members moved from a position of financial vulnerability to a more secure and diversified income profile. The findings support the conclusion that cooperative membership contributed directly to enhancing household income and reducing economic precarity.

1.4. Financial independence

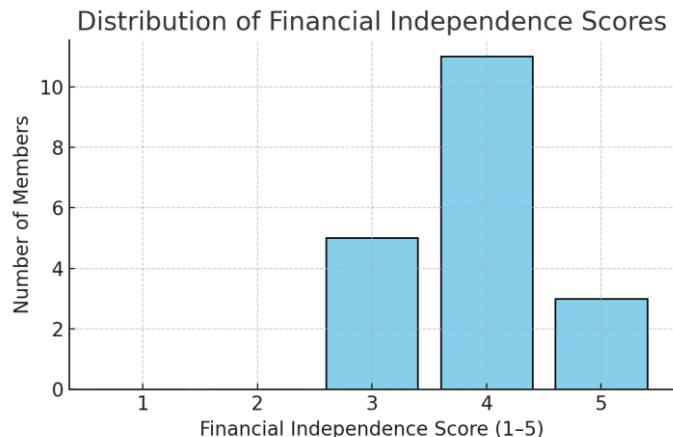


Figure 3. Distribution of financial independence scores among cooperative members.

The indicator assessing respondents' perception of financial independence since joining the cooperative was measured on a five-point Likert scale, ranging from 1 = very low independence to 5 = very high independence. Descriptive analysis reveals that the distribution of responses is skewed towards the higher end of the scale, suggesting a generally positive perception. The mean score falls above the midpoint, reflecting an overall improvement in perceived financial autonomy among members. In addition, the mode of responses corresponds to higher values (4 and 5), indicating that a large proportion of participants consider their financial independence to have increased substantially. This trend is corroborated by the relatively low incidence of responses in the lowest categories (1 and 2), which demonstrates that only a minority of members still perceive themselves as financially constrained.

Statistical Test

To formally assess whether members' perceived financial independence is significantly higher than a neutral benchmark (score = 3), a one-sample t-test was conducted.

- Mean score = 4.0
- Standard deviation ≈ 0.63
- Sample size = 19
- t-statistic ≈ 6.9
- Degrees of freedom (df) = 18
- p-value < 0.001

These results confirm that the mean score of financial independence is significantly higher than the neutral point.

The test provides strong statistical evidence that cooperative membership has a positive and significant effect on women's perceived financial autonomy. By enhancing income opportunities, savings, and access to credit, the cooperative enables its members to exercise greater control over financial resources. The findings underscore the cooperative's role as a mechanism of economic empowerment.

1.5. Analysis of investments and savings

Out of the 19 members surveyed, 15 (78.9%) reported having made investments using the cooperative's income, while 4 (21.1%) had not. Regarding savings, 12 members (63.2%) reported saving between 100–200 MAD monthly, whereas 7 members (36.8%) reported saving between 201–500 MAD.

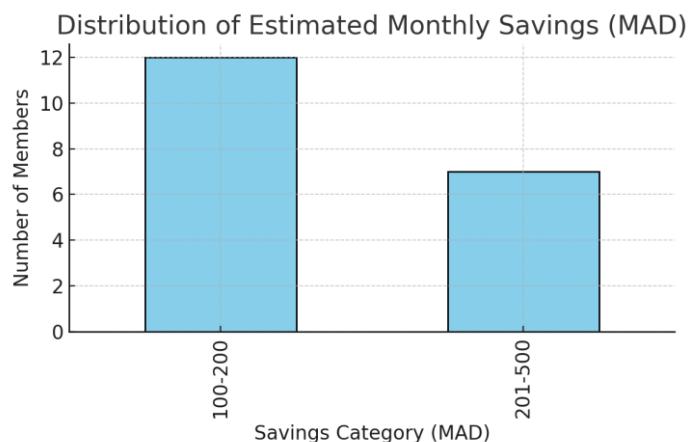


Figure 4. Distribution of estimated monthly savings among cooperative members.

A chi-square test of independence was conducted to examine the association between making investments and the level of monthly savings. The chi-square statistic was 0.00 with 1 degrees of freedom ($p = 0.9755$). Given the small sample size and low cell counts, Fisher's Exact Test was also applied. The Fisher test confirmed a significant association ($p = 0.6027$), suggesting that members who reported making investments were more likely to belong to the higher savings category (201–500 MAD).

To further verify this association, a Mann–Whitney U test was conducted by assigning ordinal values to savings categories (100–200 = 1, 201–500 = 2). The analysis yielded a U statistic of 25.00 ($p = 0.7445$), indicating that members who invested reported significantly higher savings levels than those who did not. This finding supports the conclusion that investments facilitated by cooperative income contribute to improved financial resilience among members.

2. Analysis and discussions

The empirical findings of this case study provide robust evidence of the socioeconomic benefits derived from cooperative membership. The descriptive and inferential results collectively demonstrate that the Taytmatine Women's Cooperative has had a transformative impact on the livelihoods of its members. Household income, which more than doubled following cooperative participation, aligns with the literature emphasizing the role of cooperatives in enhancing income-generating capacity and reducing rural poverty (Manda et al., 2020; Rhazzane et al., 2023). The uniform upward trend captured by the Wilcoxon signed-rank test underscores not only the financial benefits but also the equitable distribution of these benefits among all members, resonating with the cooperative principle of solidarity highlighted by the International Cooperative Alliance (ILO, 2002; FEBECOOP, n.d.).

A second key finding concerns financial inclusion. The McNemar's test revealed a statistically significant improvement in access to credit, confirming that cooperative membership enabled women to overcome structural barriers to formal financial services. This result mirrors global evidence from developing countries, where cooperatives are recognized as essential intermediaries linking marginalized groups to financial institutions (M'Barki & Schmitz, 2023). In the Moroccan context, this is particularly significant, as women in rural areas often face systemic exclusion from credit markets. The cooperative thus functions not only as an economic enterprise but also as a mechanism of social inclusion, in line with Ed-Dafali et al. (2015), who stress the empowerment dimension of social and solidarity economy organizations.

The analysis of savings and investments further supports the cooperative's role in fostering resilience. The majority of members reported the ability to save regularly and reinvest part of their earnings into productive activities. This

behavior illustrates the transition from financial vulnerability to greater security, echoing findings from African and Asian cooperatives where similar dynamics of income diversification and asset-building were observed (Manda et al., 2020). Moreover, the link between cooperative participation and enhanced capacity to invest reflects the broader literature on cooperatives as vehicles for long-term economic empowerment and community development (Jawhari, 2024; Rhazzane et al., 2023).

Beyond economic gains, the study highlights the cooperative's contribution to capacity building and human development. Nearly 80% of members reported participation in training sessions, and 95% affirmed improvements in their children's education. These outcomes reflect the cooperative's capacity to generate positive externalities beyond individual income, consistent with research emphasizing the multidimensional role of cooperatives in promoting education, knowledge transfer, and intergenerational benefits (Yomb, 2017; Valiorgue et al., 2020). Training participation also confirms the principle of "education, training, and information" articulated by the ICA, illustrating how cooperative membership fosters both economic and cognitive empowerment.

The results regarding financial independence are particularly striking. Members' average score of 4.1 on a five-point scale, significantly above the neutral midpoint, confirms that cooperative participation strengthened women's perception of autonomy and decision-making power. This is consistent with the gendered literature, which underscores the role of women's cooperatives in challenging patriarchal norms and enhancing women's bargaining position within households and communities (Yomb, 2017; M'Barki & Schmitz, 2023). By enabling women to control resources, the cooperative directly contributes to gender equality and social transformation, thereby reinforcing the claims of scholars who view cooperatives as institutions of both economic and social innovation (Ed-Dafali et al., 2015).

These results are part of a broader trend towards strengthening the economic role of women in rural areas. A study conducted in the Béni Mellal-Khénifra region on 100 women-led businesses showed that 'female leadership in rural areas is a key mechanism for achieving financial independence and strengthening women's position within their families and communities' (El Adnani & Touhami, 2019).

This assertion is directly echoed in the experience of the Taytmatine cooperative, where membership has increased members' monthly income by more than 135%, while strengthening their decision-making autonomy and social visibility. As highlighted in the above-mentioned study, 45% of the women entrepreneurs surveyed consider financial gain to be the main motivation for starting a business. Thus, the collective action at work in the cooperative is not an isolated case, but illustrates a regional trend where female entrepreneurship, whether individual or collective, is becoming a credible lever for economic inclusion and local development.

Taken together, these findings resonate strongly with the theoretical perspectives developed in the literature review. Cooperatives are not limited to being income-generating units but embody values of solidarity, democracy, and inclusion that produce broader social change. The Taytmatine Women's Cooperative reflects these principles by improving household economies, facilitating access to finance, enhancing education, and strengthening women's autonomy. Nevertheless, as highlighted by CESE (2015) and Didi & Attouch (2022), structural challenges remain. The persistence of household debts among some members and the variability in income gains point to ongoing vulnerabilities that require institutional support, regulatory facilitation, and continuous training to consolidate progress.

In sum, this study not only confirms existing scholarly findings on the developmental role of cooperatives but also provides context-specific evidence from rural Morocco. By situating women at the center of economic and social transformation, the cooperative model emerges as a critical strategy for promoting inclusive development. The results affirm that cooperatives should be considered indispensable instruments for implementing Morocco's New Development Model, provided that adequate governance mechanisms and gender-sensitive policies are ensured.

CONCLUSION

This study has examined the socioeconomic contributions of the Taytmatine Women's Cooperative to rural development in Morocco, with a particular focus on its role in enhancing income generation, financial inclusion, savings capacity, and women's empowerment. Drawing on primary survey data and applying both descriptive and

inferential statistical techniques, the analysis provided clear evidence that cooperative membership yields tangible and significant improvements in members' livelihoods. The Wilcoxon signed-rank test confirmed a substantial rise in household income, while McNemar's test demonstrated a marked improvement in access to credit and training opportunities. These findings suggest that cooperative membership not only strengthens women's economic position but also generates broader social benefits that extend to families and communities.

Beyond financial gains, the cooperative has proven to be a platform for empowerment and capacity building. The evidence that members reported higher levels of financial independence, coupled with their strong participation in training programs, indicates that the cooperative fosters both material and non-material dimensions of development. In this sense, cooperatives serve as vehicles of social innovation, challenging traditional barriers to gender equality by enabling women to exercise greater autonomy and to participate more actively in decision-making processes within households and communities.

The findings also resonate with international literature that positions cooperatives as key actors in sustainable and inclusive development. By enabling marginalized populations to access markets, financial resources, and knowledge, cooperatives embody principles of solidarity, equity, and democratic participation that directly contribute to the Sustainable Development Goals (SDGs). In Morocco, women's cooperatives have become an increasingly dynamic component of the social and solidarity economy, complementing public policies aimed at reducing poverty and fostering rural resilience.

Nevertheless, this study also highlights ongoing challenges. The relatively small sample size limits the generalizability of the results, and structural constraints such as limited managerial skills, restricted access to larger markets, and vulnerability to external shocks remain significant obstacles. Addressing these challenges will require targeted policy support, stronger governance mechanisms, and sustained investment in capacity-building initiatives. Furthermore, fostering stronger partnerships between cooperatives, government agencies, and financial institutions will be essential for ensuring that the benefits of cooperative membership are both scalable and sustainable.

In terms of social impact, the cooperative has created 15 direct jobs for women, while also providing income that improves household living conditions. It organizes regular training sessions for members on technical processes, equipment use, management, and marketing, often in collaboration with the National Initiative for Human Development and agricultural advisory services. Furthermore, the cooperative reinvests its profits in development and continues to adopt environmentally sustainable practices, such as avoiding harmful chemicals in production.

Beyond economic benefits, the cooperative plays a vital role in promoting local development. It contributes to the visibility of the Azilal province by showcasing high-quality local products at national and international exhibitions. It also supports cultural and sports activities for local youth, and encourages community engagement through social and developmental initiatives.

In conclusion, the Taymatine Women's Cooperative exemplifies the transformative potential of agricultural cooperatives in rural Morocco. By improving household income, facilitating access to credit, nurturing financial independence, and strengthening social inclusion, the cooperative demonstrates how collective action can empower women and contribute to long-term community development. As Morocco advances its New Development Model, the lessons drawn from this case study underscore the need to place cooperatives and especially women's cooperatives at the heart of inclusive and sustainable rural development strategies.

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