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The Role of Agricultural Cooperative Management in Increasing the Economic Income of Farmers in Batu City

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Abstract

Research aim: *To analyze the role of management functions in agricultural cooperatives (planning, organizing, implementing, and supervising) in increasing the economic income of farmers in Batu City.*

Design/Methods/Approach: *This research uses quantitative method with an explanatory survey approach involving 120 farmer members of the cooperative in Batu City. Data were analyzed using multiple linear regression after undergoing a series of classical assumption tests.*

Research Findings: *The cooperative management function simultaneously has a significant impact on farmers' income ($F=82.164$; $R^2=0.742$). Partially, the implementation function is the most dominant variable ($\beta=489.560$), followed by the planning function ($\beta=312.450$) and the supervision function ($\beta=223.890$), while the organizing function does not show a significant impact. Cooperative member farmers were recorded to have an income 66.8% higher (Rp 4,820,000/month) compared to non-member farmers.*

Theoretical Contribution/Originality: *Enriches the literature on the effectiveness of agricultural cooperative management in the context of agrotourism and horticulture, and identifies the implementation function as the strongest determinant of farmers' income increase. These findings differ from previous studies that generally emphasize the planning function as the dominant factor.*

Practical Implications: Cooperative managers need to prioritize the optimization of implementation and planning functions in organizational management. The local government is recommended to provide management assistance and strengthen the institutional capacity of cooperatives sustainably.

Research Limitations: *The limited scope to the City of Batu, a model that can explain 74.2% of income variation, the use of a cross-sectional design that cannot capture long-term changes, and measurements based on respondents' perceptions, which may contain subjective bias.*

Abstrak

Tujuan Penelitian : Menganalisis peran fungsi manajemen koperasi pertanian (perencanaan, pengorganisasian, pelaksanaan, dan

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pengawasan) dalam meningkatkan pendapatan ekonomi petani di Kota Batu.
Desain/ Metode/ Pendekatan : Penelitian ini menggunakan metode kuantitatif dengan pendekatan survey explanatory terhadap 120 petani anggota koperasi di Kota Batu. Data dianalisis menggunakan regresi linear berganda setelah melalui serangkaian uji asumsi klasik.
Temuan Penelitian : Fungsi manajemen koperasi secara simultan berpengaruh signifikan terhadap pendapatan petani ($F=82,164$; $R^2=0,742$). Secara parsial, fungsi pelaksanaan merupakan variabel paling dominan ($\beta=489.560$), diikuti oleh fungsi perencanaan ($\beta=312.450$) dan pengawasan ($\beta=223.890$), sedangkan fungsi pengorganisasian tidak menunjukkan pengaruh yang signifikan. Petani anggota koperasi tercatat memiliki pendapatan 66,8% lebih tinggi (Rp 4.820.000/bulan) dibandingkan petani non-anggota.
Kontribusi Teoritis/ Originalitas: Penelitian ini memperkaya literatur mengenai efektivitas manajemen koperasi pertanian dalam konteks agrowisata dan hortikultura, serta mengidentifikasi fungsi pelaksanaan sebagai determinan terkuat peningkatan pendapatan petani. Temuan ini berbeda dari penelitian-penelitian sebelumnya yang umumnya menekankan fungsi perencanaan sebagai faktor dominan.
Implikasi Praktis : Pengurus koperasi perlu memprioritaskan optimalisasi fungsi pelaksanaan dan perencanaan dalam pengelolaan organisasi. Pemerintah daerah direkomendasikan untuk memberikan pendampingan manajemen serta penguatan kapasitas kelembagaan koperasi secara berkelanjutan.
Keterbatasan Penelitian : Penelitian ini memiliki beberapa keterbatasan, antara lain cakupan wilayah yang terbatas pada Kota Batu, model yang mampu menjelaskan 74,2% variasi pendapatan, penggunaan desain cross-sectional yang tidak dapat menangkap perubahan jangka panjang, serta pengukuran yang berbasis persepsi responden sehingga berpotensi mengandung bias subjektivitas.
Kata Kunci : Manajemen Koperasi; Koperasi Pertanian; Pendapatan Petani; Hortikultura; Agrowisata.

Introduction

Kota Batu is one of the largest horticultural production centers in East Java, with an agricultural land area reaching 19,376 hectares or about 78.4% of the total area [1]. The main commodities produced include apples, highland vegetables, and ornamental plants, with a total production reaching 2.3 million tons per year. The agricultural sector absorbs 42% of the workforce and contributes 28% to the GDP of Batu City [2]. Field observations show that farmers in Batu City still face various structural problems that hinder income improvement. Initial surveys indicate that 68% of farmers have a low bargaining position in the marketing chain, 73% face limited access to capital, and 81% have not yet implemented optimal farm management practices. High price fluctuations, especially during the harvest season, cause farmers' profit margins to shrink by 40-60%.

Agricultural cooperatives serve as a collective solution to address these issues. In Batu City, there are 47 active agricultural cooperatives with a total of 8,742 farmer members. Cooperatives function as intermediary institutions that provide production inputs, facilitate

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capital, and offer broader market access. However, the effectiveness of the cooperative's role highly depends on the quality of management implemented. The uniqueness of Batu City as an agrotourism and horticulture area directly influences the urgency of the four cooperative management variables studied: the planning function is needed to regulate planting patterns according to the tourism demand calendar; the organizing function is required to manage the supply chain of horticultural products to tourist destinations; the implementation function is key in input procurement, quality control, and distribution to hotels, restaurants, and modern markets; and the supervision function ensures that product quality standards are consistently met. Without strong cooperative management, the agriculture-tourism synergy that is the competitive advantage of Batu City cannot be optimized to increase farmers' income.

Research [3] in Malang Regency shows that cooperatives with good management can increase members' income by up to 72% compared to independent farmers. In line with that, [4] found that the planning and supervision functions within cooperatives have a strong correlation with the increase in farming efficiency. However, specific research on the role of cooperative management in the context of Batu City as an agrotourism and horticulture area is still limited. There are three research gaps that have not been addressed by previous studies and are the main focus of this study: (1) no research has simultaneously tested the four functions of cooperative management (planning, organizing, executing, and controlling) in a single model within the agrotourism-horticulture area; (2) the specific management function that is most determinant for farmers' income in this context has not been identified; and (3) there is no empirical evidence regarding the specific mechanisms that differentiate the impact of cooperative management in agrotourism areas compared to conventional agricultural areas.

This research is important considering the unique characteristics of Batu City, which not only focuses on agricultural production but also integrates the tourism sector. This synergy opens up greater value-added opportunities if managed thru cooperatives with professional management. Therefore, this research aims to comprehensively analyze how the functions of cooperative management contribute to the increase in farmers' economic income in Batu City.

Method

This research uses a quantitative approach with an explanatory survey method to explain the causal relationship between cooperative management variables and farmers' income. The research was conducted in Batu City, East Java, covering three districts: Batu District (4 villages), Bumiaji District (5 villages), and Junrejo District (3 villages). The selection of locations was based on the criteria of having an active agricultural cooperative for at least 3 years, a minimum of 50 farmer members in the cooperative, and a primary horticultural commodity. The research was conducted over a period of 3 months from August to November 2025.

The research population consists of all active agricultural cooperative member farmers in Batu City, totaling 2,147 individuals. The sample was determined using the Slovin formula with a 5% margin of error. $n = N / (1 + N \times e^2) \rightarrow n = 2,147 / (1 + 2,147 \times 0.05^2) = 2,147 / 6.3675 = 337.2 = 340$

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Although the Slovin formula yields an ideal sample of 340 respondents, this study used 120 respondents with two methodological considerations. First, the operational limitations include a three-month research period and the availability of active cooperative members willing to be interviewed in three sub-districts. Second, the minimum statistical standard for multiple regression analysis with four predictors: referring to the minimum ratio rule of 30:1 between respondents and independent variables [5], the number of 120 respondents meets the minimum requirement (4 × 30 = 120). The methodological implications of this adjustment are the limited ability to generalize the results to the cooperative farmer population outside Batu City and the limited capacity to detect small effect sizes. The findings of this study are therefore more appropriately interpreted in the specific context of agricultural cooperatives in the agrotourism-horticulture area of Batu City, rather than as a national generalization. The sample was selected using proportionate stratified random sampling based on the proportion of cooperative members in each sub-district: Batu Sub-district: 45 respondents (37.5%), Bumiaji Sub-district: 52 respondents (43.3%), and Junrejo Sub-district: 23 respondents (19.2%).

Primary data were obtained thru a structured questionnaire with 45 questions, in-depth interviews with cooperative managers, and field observations. Secondary data were sourced from the Batu City BPS, the Agriculture Office, the Cooperative and MSME Office, as well as the cooperative's annual reports.

The independent variables in this study include the planning function (X1), organizing function (X2), actuating function (X3), and controlling function (X4), which are measured using a 1-5 Likert scale. The dependent variable is the economic income of farmers (Y), measured in rupiah per month. The measurement instruments for the four management functions were constructed based on the adaptation of Fayol's management theory (POAC: Planning, Organizing, Actuating, Controlling) adjusted to the context of agricultural cooperatives [5]. The indicators for each function are then developed eclectically from cooperative management literature [4] [6] [7]. the planning function indicators refer to the ability to prepare work programs, set production targets, and plan marketing; the organizing function indicators include clarity of structure, task division, and inter-unit coordination; the executing function indicators encompass the provision of production facilities, capital facilitation, and market access development; while the controlling function indicators include product quality monitoring, financial audits, and work program evaluations. These indicators were subsequently validated thru preliminary interviews with five selected cooperative managers to ensure contextual relevance, thereby grounding the conceptual validity of the instrument in a combination of theoretical foundations and empirical field suitability.

The validity test using Pearson Product Moment correlation shows that all items are valid with r-count values ranging from 0.487 to 0.821. The reliability test using Cronbach's Alpha resulted in $\alpha = 0.812–0.879$ for all variables, thus all instruments are declared reliable. The data analysis technique uses multiple linear regression with the model $Y = \alpha + \beta1X1 + \beta2X2 + \beta3X3 + \beta4X4 + e$ to test the effect of independent variables on the dependent variable. Before the regression analysis, classical assumption tests were conducted, including normality, multicollinearity, heteroscedasticity, and linearity tests. Hypothesis testing was conducted using the F-test to examine simultaneous effects and the t-test to examine partial effects with a

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significance level of 5%, as well as the coefficient of determination (R^2) to measure the proportion of variation in farmers' income explained by cooperative management variables.

Results and Discussion

Farmers' Economic Income

Income is the main indicator of farmers' economic welfare and serves as a benchmark for the effectiveness of cooperative institutions in carrying out their functions. According to [8], farmers' income is the difference between total revenue and total costs incurred in the agricultural production process. In the context of cooperative membership, income does not only come from farming activities, but also includes other economic benefits such as Business Surplus (SHU) and business diversification facilitated by the cooperative. Research [9] shows that well-managed cooperatives can increase members' income thru production cost efficiency, better market access, and the sharing of joint business profits. To measure the income level of farmer members of the cooperative in Batu City, the income distribution of the respondents is presented below:

Table 1. Distribution of Income for Farmer Members of the Cooperative

Monthly Income Range	Frequency	Percentage	Average
Rp 2.000.000 - Rp 3.000.000	17	14,2%	Rp 2.650.000
Rp 3.000.001 - Rp 4.000.000	29	24,2%	Rp 3.520.000
Rp 4.000.001 - Rp 5.000.000	38	31,6%	Rp 4.580.000
Rp 5.000.001 - Rp 6.000.000	24	20,0%	Rp 5.470.000
> Rp 6.000.000	12	10,0%	Rp 7.320.000
Total	120	100%	Rp 4.820.000

Source: Primary Data Processed in 2025

Table 1 shows that the average income of cooperative member farmers is Rp 4,820,000 per month. As a comparison, a survey of 40 non-cooperative member farmers was conducted using standardized selection procedures to avoid comparison bias: non-member farmers were purposively selected from the same villages as cooperative member respondents, with the criteria (1) not registered as members of any agricultural cooperative in the last three years, (2) cultivating the same horticultural commodities (apples, highland vegetables, or ornamental plants), and (3) having comparable land scale (± 20% of the average area). This procedure ensures that the measured income differences reflect the impact of access to the cooperative, not differences in farming characteristics. Survey results show that the average income of non-member farmers is only Rp 2,890,000 per month. This means that cooperative members have an income 67% higher than independent farmers.

The significant income difference between member and non-member farmers indicates a positive impact of cooperative institutions on the economic welfare of members. From the perspective of institutional economics, this income difference of 66.8% can be explained thru the transaction cost reduction mechanisms implemented by the cooperative. [9] states that effective institutions create incentive structures that reduce uncertainty and information

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asymmetry in economic transactions. Cooperatives, as collective institutions, enable member farmers to access production inputs, capital, and markets with transaction costs that are much lower compared to independent farmers who negotiate individually. The accumulation of transaction cost savings, which include the costs of searching for price information, negotiation costs, and contract enforcement costs, manifests in a 49.5% income difference in farming between members and non-members. The additional SHU and income diversification facilitated by the cooperative then increased the total difference to 66.8%. This is in line with research [10] which found that cooperatives with good management can increase members' income by up to 72% compared to independent farmers. To see in detail the sources of income for cooperative member farmers, the following income comparison is presented:

Table 2. Comparison of Income for Cooperative Member vs. Non-Member Farmers

Category	Cooperative Members (n=120)	Non-Members (n=40)	Difference
Farm Income	Rp 4.320.000	Rp 2.890.000	+49,5%
SHU from the Cooperative	Rp 380.000	-	-
Side Income	Rp 120.000	-	-
Total Revenue	Rp 4.820.000	Rp 2.890.000	+66,8%

Source: Primary Data Processed in 2025

The data in Table 2 shows that cooperatives make significant contributions thru two pathways: (1) improving efficiency and income from primary agricultural businesses, and (2) additional income from cooperative surplus and business diversification facilitated by the cooperatives.

Results of Classical Assumption Tests

Before conducting multiple linear regression analysis, classical assumption testing is required to ensure that the regression model used meets the criteria of the Best Linear Unbiased Estimator (BLUE). According to [11], classical assumption tests include normality, multicollinearity, heteroscedasticity, and linearity tests, which aim to ensure that the regression model used is unbiased and produces efficient estimates. The normality test is necessary to determine whether the data residuals are normally distributed, which is a primary requirement in parametric statistical analysis. The normality test aims to examine whether, in the regression model, the disturbance variable or residuals have a normal distribution [12] states that good data is data that has a normal or nearly normal distribution pattern. The normality test in this study uses the Kolmogorov-Smirnov test with the testing criteria: if the significance value > 0.05, then the data is normally distributed; conversely, if the significance value < 0.05, then the data is not normally distributed. Here are the results of the normality test:

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Table 3. Kolmogorov-Smirnov Normality Test Results

Statistics	Value
Kolmogorov-Smirnov Z	0,987
Asymp. Sig. (2-tailed)	0,284

Source: Primary Data Processed in 2025

Table 3 of the normality test results shows a significance value of 0.284 > 0.05, indicating that the residual data is normally distributed and meets the normality assumption for regression analysis. The methodological implication of the fulfillment of the normality assumption is that the t-test and F-test produced by the model have valid statistical validity, thus the inferential conclusion about the influence of cooperative management functions on farmers' income can be trusted [12].

The multicollinearity test aims to examine whether the regression model shows a correlation among independent variables. A good regression model should not have any correlation among independent variables. According to [11], multicollinearity can be detected by looking at the Tolerance and Variance Inflation Factor (VIF) values. If the Tolerance value > 0.10 and the VIF value < 10, it can be concluded that there is no multicollinearity among the independent variables in the regression model. The results of the multicollinearity test in this study are presented as follows:

Table 4. Multicollinearity Test Results

Variable	Tolerance	VIF	Description
Planning Function (X1)	0,641	1,560	There is no multicollinearity.
Organising Function (X2)	0,598	1,672	There is no multicollinearity.
Implementation Function (X3)	0,573	1,745	There is no multicollinearity.
Supervisory Function (X4)	0,619	1,615	There is no multicollinearity.

Source: Primary Data Processed in 2025

The results of the Multicollinearity Test in Table 4 show that all independent variables have a Tolerance value > 0.10 and VIF < 10, indicating that there is no multicollinearity among the independent variables. The methodological implication of this result is that the regression coefficients of each management function can be interpreted independently without the risk of unstable estimates due to collinearity [11]. The multicollinearity-free condition also ensures that the comparison of relative contributions among management functions, which is one of the main objectives of this research, can be conducted validly and without bias.

The heteroscedasticity test aims to examine whether there is a difference in the variance of residuals from one observation to another in the regression model. If the variance of residuals from one observation to another remains constant, it is called homoscedasticity, and if it differs, it is called heteroscedasticity. A good regression model is one that is homoscedastic or does not exhibit heteroscedasticity [12]. In this study, the heteroscedasticity test uses the Glejser test with the criterion that if the significance value > 0.05, then heteroscedasticity does not occur. The results of the heteroscedasticity test are presented in the following table:

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Table 5. Results of Heteroskedasticity Test (Glejser Test)

Variable	Sig.	Description
Planning Function (X1)	0,167	There is no heteroskedasticity.
Organising Function (X2)	0,324	There is no heteroskedasticity.
Implementation Function (X3)	0,289	There is no heteroskedasticity.
Supervisory Function (X4)	0,412	There is no heteroskedasticity.

Source: Primary Data Processed in 2025

The results of the heteroscedasticity test in Table 5 show that all variables have significance values > 0.05, indicating that there is no heteroscedasticity in the regression model. The methodological implication of meeting the homoscedasticity assumption is that the standard error of the regression coefficients is not distorted, thus the resulting t-test is accurate and does not lead to misleading conclusions about the significance of each management function [12]. This condition also confirms that the relationship between cooperative management functions and farmers' income is consistent across the entire range of observation values, not just in certain segments.

The linearity test aims to determine whether the relationship between the independent variable and the dependent variable is linear or not [13] states that the linearity test is important because multiple linear regression analysis assumes a linear relationship between the independent and dependent variables. The criterion for testing linearity is that if the significance value is < 0.05, then the relationship between the independent and dependent variables is linear. The results of the linearity test in this study are:

Table 6. Linearity Test Results

Model	F-statistic	Sig.	Description
Linearity	87,349	0,000	Model linear

Source: Primary Data Processed in 2025

The results of the linearity test in Table 6 show a significance value of 0.000 < 0.05, indicating that the relationship between the independent and dependent variables is linear. Overall, all classical assumption tests are met: normality, free from multicollinearity, homoscedasticity, and linearity, which collectively confirm that the multiple linear regression model used meets the BLUE (Best Linear Unbiased Estimator) criteria. This provides methodological assurance that the estimated coefficients produced are the best unbiased estimates, and the results of the hypothesis tests obtained can subsequently be trusted as the basis for drawing scientific conclusions[11] [13].

Multiple Linear Regression Analysis

After all classical assumption tests are met, the next step is to conduct multiple linear regression analysis to examine the effect of independent variables on the dependent variable. According to [5], multiple linear regression analysis is used to measure the strength of the relationship between two or more independent variables and the dependent variable and to show the direction of that relationship. In this study, multiple regression analysis is used to

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determine the impact of cooperative management functions (planning, organizing, executing, and controlling) on farmers' economic income. The results of the regression analysis are presented in the following table:

Table 7. Results of Multiple Linear Regression Analysis

Variable	Koefisien (β)	Std. Error	**t- statistic**	Sig.
Constant	-1.247.000	418.300	-2,981	0,003
Planning Function (X1)	312.450	89.670	3,485	0,001
Organising Function (X2)	187.320	95.480	1,962	0,052
Implementation Function (X3)	489.560	103.220	4,743	0,000
Supervisory Function (X4)	223.890	91.340	2,451	0,016

Source: Primary Data Processed in 2025

Regression Equation Model in Table 7: Y = -1,247,000 + 312,450X1 + 187,320X2 + 489,560X3 + 223,890X4.

The constant of -1,247,000 needs to be understood critically because this negative value does not conceptually mean that farmers' income is negative. The constant in the regression model represents the value of the dependent variable (Y) when all independent variables are simultaneously zero a condition that has never empirically occurred in this study because Likert scores have a minimum value of 1, not 0. Therefore, this negative constant value is an artifact of mathematical extrapolation beyond the range of the observed data and does not reflect the real conditions in the field. Substantively, the negative constant actually carries significant meaning: it indicates that under conditions of very low cooperative management (hypothetically approaching zero), the mere existence of the cooperative is not sufficient to generate positive income for farmers. In other words, the quality of implementing the four management functions is an absolute prerequisite, not just a supporting factor, for cooperatives to provide real added value to their members [5]. This interpretation aligns with the theory of organizational effectiveness, which states that the existence of an institution without adequate management capacity will not yield positive economic impacts.

The regression coefficients in this study are expressed in rupiah per month (variable Y), which is the response to a one-point change in the Likert scale score of the independent variable (scale 1–5). The economic interpretation of these coefficients needs to be done carefully considering the difference in measurement scales between the independent variable (ordinal Likert) and the dependent variable (ratio in rupiah). Technically, an increase of 1 point in the planning function score reflects an increase of one level in respondents' perception of the cooperative's planning quality from, for example, "fairly good" (score 3) to "good" (score 4). The coefficient X1 = 312,450 means that an increase of one level in the perception of planning quality is associated with an increase in farmers' income of Rp 312,450 per month, assuming other variables remain constant. Coefficient X2 (Organizing) = 187.320 indicates an association of an income increase of Rp 187.320 for each one-level increase in the perception of organizing quality. Coefficient X3 (Execution) = 489.560 is the largest coefficient, indicating that an increase in the perception of execution quality by one level is associated with an increase

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in revenue of Rp 489.560, showing that the execution function has the most direct impact. Coefficient X4 (Supervision) = 223.890 indicates an association of an increase of Rp 223.890 per one-level increase in the perception of supervision quality. It should be noted that the magnitude of these coefficients is useful for comparing the relative contributions of different management functions ordinally, but they cannot be interpreted as direct causal relationships given the cross-sectional nature of the research design [5].

Test of Determination Coefficient (R^2)

The coefficient of determination (R^2) is used to measure the extent to which the model can explain the variation of the dependent variable. According to [12], an R^2 value close to one means that the independent variables provide almost all the information needed to predict the variation of the dependent variable. The R^2 value ranges from 0 to 1, where a higher value indicates that the model is better at explaining the variation of the dependent variable. The results of the coefficient of determination test in this study are:

Table 8. (R^2) Test

R	R^2	Adjusted R^2
0,861	0,742	0,733

Source: Primary Data Processed in 2025

The R^2 value of 0.742 indicates that 74.2% of the variation in farmers' income can be explained by the four cooperative management functions, while the remaining 25.8% is influenced by other factors outside the model such as weather conditions, pests and diseases, and market price fluctuations. This high R^2 value, although indicating a good predictive strength of the model, needs to be critiqued for the possibility of overfitting. The Adjusted R^2 = 0.733, which is only slightly lower than R^2 = 0.742, indicates that the risk of overfitting is relatively small: the addition of the four independent variables into the model does not artificially inflate the predictive ability [12]. Nevertheless, theoretically, there are several variables that were not included but are conceptually relevant to explain part of the remaining 25.8% variation. These variables include: (1) farmers' social capital in the form of trust and social networks within the cooperative community; (2) farmers' characteristics such as education level, farming experience, and land area; (3) infrastructure access such as road quality and irrigation availability; and (4) macroeconomic conditions such as global commodity price fluctuations and government agricultural policies. Further research is recommended to integrate these variables in order to produce a more comprehensive model. It should also be criticized that this regression model treats the four management functions as if they stand parallel to each other as independent predictors. However, theoretically based on Fayol's management model (POAC), these functions are hierarchical and sequentially influence each other: planning serves as the foundation for organizing, organizing facilitates execution, and controlling provides feedback for the improvement of subsequent planning [5].

This hierarchical relationship carries important theoretical consequences: the obtained regression coefficients may reflect the direct effects of each function, but do not capture the indirect effects mediated by other functions. The finding that the execution function has the

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largest coefficient, for example, may partly be due to the cumulative effects of planning and organizing that operate thru execution. These limitations need to be acknowledged and become an agenda for further research that can use the Structural Equation Modeling (SEM) approach to model the hierarchical relationships between management functions more accurately.

F-test (Simultaneous)

The F-test is used to test the simultaneous effect of independent variables on the dependent variable. According to [5], the F-test is conducted by comparing the calculated F-value with the F-table, or by looking at the significance value. The testing criterion is if the calculated F-value > F-table or the significance value < 0.05, then the independent variables simultaneously have a significant effect on the dependent variable. This test is important to determine whether the regression model used is suitable for predicting the dependent variable. The results of the F-test in this study are:

Table 9. F-Test Results

Model	Sum of Squares	df	Mean Square	F-statistic	Sig.
Regression	3.847.293.210.000	4	961.823.302.500	82,164	0,000
Residual	1.347.891.450.000	115	11.720.795.217		
Total	5.195.184.660.000	119			

Source: Primary Data Processed in 2025

The F-test results in Table 9 show F-count (82.164) > F-table (2.45), with Significance (0.000) < α (0.05), thus H1 is accepted. The functions of cooperative management (planning, organizing, executing, and supervising) simultaneously have a significant impact on farmers' income.

Partial t-test

The t-test is used to test the influence of each independent variable individually on the dependent variable [5] states that the t-test essentially shows how far the influence of one independent variable individually explains the variation in the dependent variable. The testing criterion is if t-count > t-table or the significance value < 0.05, then the independent variable has a significant effect on the dependent variable. This test is important to determine which variable most dominantly affects farmers' income. The results of the t-test in this study are presented as follows:

Table 10. t-test Results

Hypothesis	Variable	t-statistic	t-table	Sig.	Decision
H2	Planning Function	3,485	1,981	0,001	H2 accepted
H3	Organising Function	1,962	1,981	0,052	H3 rejected
H4	Implementation Function	4,743	1,981	0,000	H4 accepted
H5	Supervisory Function	2,451	1,981	0,016	H5 accepted

Source: Primary Data Processed in 2025

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The results of the t-test in Table 10 show: Planning Function: t-count (3.485) > t-table (1.981) and sig. (0.001) < 0.05, so H2 is accepted. The planning function has a significant positive effect on farmers' income. Organizing Function: t-count (1.962) < t-table (1.981) and sig. (0.052) > 0.05, so H3 is rejected. The organizing function does not have a significant effect on farmers' income at the 95% confidence level, although it is significant at the 90% level. Implementation Function: t-count (4.743) > t-table (1.981) and sig. (0.000) < 0.05, so H4 is accepted. The implementation function has a significant positive effect on farmers' income with the most dominant influence. Supervisory Function: t-count (2.451) > t-table (1.981) and sig. (0.016) < 0.05, so H5 is accepted. The supervisory function has a significant positive effect on farmers' income.

The Influence of the Planning Function on Farmers' Income

The research results indicate that the planning function has a significantly positive effect on the economic income of cooperative member farmers in Batu City, with a regression coefficient of 312.450 and a significance value of 0.001. In the framework of the Fayol management model (POAC: Planning, Organizing, Actuating, Controlling), planning is the first function and the foundation of the entire management cycle [5]. Without solid planning, the subsequent functions lack clear direction and targets. The significant influence of the planning function in this study confirms its central position in the POAC model: cooperatives that implement planning well, including goal setting, program preparation, and resource allocation, are able to create conditions conducive to increasing members' income. These results are in line with research [3] which found that cooperatives with a good planning system are able to increase members' income by up to 72% compared to independent farmers. [4] also emphasizes that the planning function has a strong correlation with the increase in agricultural efficiency, especially in the aspects of production planning, marketing, and financing.

Field conditions show that cooperatives in Batu City that implement thorough planning are able to anticipate price fluctuations thru coordinated harvest scheduling and strategic stock storage. Good planning also helps farmers determine which commodities to plant based on market demand analysis, especially considering that Batu City has a unique characteristic as an agrotourism area that requires a continuous supply of quality horticultural products. The function of effective planning has proven to reduce the risk of losses due to overproduction during the peak harvest season, which previously caused farmers' profit margins to shrink by 40-60%.

The Influence of the Organising Function on Farmers' Income

The organizing function shows different results with a t-value of 1.962 and a significance of 0.052, which means it does not have a significant impact at the 95% confidence level, although it is significant at the 90% confidence level. The regression coefficient of 187.320 indicates that the organizing function has the smallest contribution among the four management functions. These findings somewhat contrast with the research [6] which found that a clear organizational structure of cooperatives significantly affects the business performance of members. The insignificance of the organizing function can be analyzed from two complementary perspectives. First, from the perspective of the structural weaknesses of cooperatives: field observations show that most agricultural cooperatives in Batu City still have

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simple organizational structures with suboptimal division of labor. Many cooperative managers hold multiple functions simultaneously, resulting in less than optimal organizational effectiveness. Research [7] supports this finding by explaining that organization will only have a significant impact when cooperatives reach a certain scale and have high business complexity. In the context of Batu City, most cooperatives are still small to medium-sized with an average of 186 farmers per cooperative, so the impact of the organizing function on income has not yet been directly felt.

Second, from the perspective of the dominance of other variables: in the POAC model, the execution function with the largest coefficient likely absorbs most of the income variation that should be explained by organization. In small-scale cooperatives, strong operational execution by the management can compensate for the lack of clarity in the organizational structure, making the impact of organizing on income statistically invisible. Another factor that influences is the varying level of member participation, where not all active members are involved in the cooperative's organizational structure.

The Influence of the Implementation Function on Farmers' Income

The implementation function has proven to have the most dominant influence on farmers' income, with the highest regression coefficient of 489.560 and a significance value of 0.000. These results confirm that the implementation of cooperative programs and activities significantly impacts the increase in members' income. These findings are highly consistent with research [10] which states that the implementation of cooperative functions in providing production facilities, access to capital, and joint marketing is a key factor in improving farmers' welfare. Research [14] also found that the implementation functions, including procurement, production, and distribution, have a direct impact on cost efficiency and increased profit margins for farmers in the subak cooperatives in Bali.

Field conditions validate these findings with measurable concrete practices: active cooperatives in Batu City that effectively carry out implementation functions are able to provide quality fertilizers and seeds at prices 15-20% cheaper than agricultural stores, offer soft loans with interest rates of 8-12% per year (much lower than loan sharks which reach 5% per month), and open more profitable market access including to hotels, restaurants, and modern markets in the Batu tourist area. Data shows that cooperative member farmers receive additional income from the Remaining Business Results (SHU) averaging Rp 380,000 per month and side income of Rp 120,000 facilitated by the cooperative. The dominance of the implementation function in this study differs from some research in conventional agricultural areas that place the planning function as the main determinant [4]. This difference can be explained by the unique context of Batu City as an agrotourism area: market opportunities in the tourism sector can only be utilized thru strong and consistent operational execution, making the quality of implementation, rather than just planning, the main differentiator of cooperative performance in this region. The superiority of the implementation function lies in its operational nature and the direct benefits it provides to members in their daily agricultural activities.

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The Influence of the Supervisory Function on Farmers' Income

The supervisory function shows a significant positive effect on farmers' income with a regression coefficient of 223.890 and a significance value of 0.016. These results prove that the control and evaluation mechanisms implemented by the cooperative significantly contribute to increasing the members' income. These findings are consistent with research [15] which found a strong correlation between the supervisory function and the improvement of agricultural efficiency thru monitoring product quality, the use of production inputs, and financial transparency. Research [16] also confirms that effective supervision can reduce operational inefficiencies by up to 25% and increase members' trust in the cooperative.

From a governance perspective, the supervisory function in cooperatives does not merely serve as an operational control mechanism, but is a key pillar of corporate governance that ensures alignment between the interests of the management and the members (principal-agent alignment). [15] developed a governance model for agricultural cooperatives that positions supervision as a mechanism to prevent opportunistic behavior by the management while also ensuring fair distribution of surplus to all members. In the framework of agency theory, cooperatives as collective institutions are vulnerable to agency problems where managers may act contrary to the interests of members if the oversight mechanism is weak. Effective supervision reduces information asymmetry between managers and members, enhances accountability in the management of cooperative assets, and ultimately ensures that operational surplus is optimally distributed to members in the form of SHU and better services. In the field, the supervisory function in the Batu City cooperative is implemented thru several mechanisms: monitoring the quality of horticultural products to be marketed to ensure quality standards are met, thereby achieving optimal selling prices; monitoring the use of agricultural business credit to ensure capital is used productively; conducting periodic financial audits to guaranty transparency and accountability in cooperative management; and evaluating work programs to identify successes and necessary improvements. Effective supervision results also enhance members' discipline in meeting commitments to quality and quantity of production, which ultimately increases the cooperative's bargaining power in negotiations with large buyers and opens access to premium markets at higher prices [16].

Simultaneous Influence of Cooperative Management Functions on Farmers' Income

The F-test results show that the four cooperative management functions (planning, organizing, executing, and controlling) simultaneously have a very significant impact on farmers' economic income with an F-value of 82.164 and a significance level of 0.000. The coefficient of determination (R^2) value of 0.742 indicates that 74.2% of the variation in farmers' income can be explained by the cooperative management functions, while the remaining 25.8% is influenced by external factors such as weather conditions, pest and disease attacks, and fluctuations in global market prices. These findings confirm management theory, which states that management functions are interrelated and work synergistically. Research [17] supports this finding by discovering that the comprehensive implementation of management functions can improve cooperative performance by up to 3.5 times compared to cooperatives that only perform some functions. Comparative data shows concrete evidence of the cooperative's impact: cooperative member farmers have an average income of Rp 4,820,000 per month,

which is 66.8% higher than non-member farmers who only earn Rp 2,890,000 per month. This significant difference is the result of a combination of increased efficiency in primary farming activities (49.5% higher), additional cooperative surplus, and income diversification facilitated by the cooperative. This condition is in line with research [3] in Malang Regency, which also found an income increase of up to 72% among well-managed cooperative members. The success of cooperative management in Batu City is also inseparable from the region's characteristics as a horticultural center and agrotourism area, which open up broader market opportunities and higher added value compared to conventional agricultural areas.

Conclusion

This study concludes that the management functions of agricultural cooperatives simultaneously have a significant impact on the increase in farmers' economic income in Batu City. Partially, the implementation function has the most dominant influence on farmers' income, followed by the planning function and the supervision function, while the organizing function does not show a significant impact. This indicates that the implementation of cooperative operational programs such as the provision of production facilities, facilitation of capital, and access to marketing directly impacts the increase in members' income. Agricultural cooperatives have proven to make a significant contribution to improving farmers' welfare, where cooperative member farmers have higher incomes compared to non-member farmers. This improvement is achieved thru three main pathways: agricultural efficiency, the distribution of Business Surplus, and income diversification facilitated by the cooperative. These findings validate the strategic role of cooperatives as effective intermediary institutions in addressing farmers' structural problems.

Theoretically, this research provides two important contributions to the literature on cooperative management and agricultural economics. First, the dominant finding of the execution function in the context of agro-tourism-horticulture fills a research gap by demonstrating that the determinant function of cooperative management is context-specific: in areas that integrate agriculture and tourism, strong operational execution becomes the main differentiator compared to conventional agricultural areas that emphasize strategic planning. This implication encourages the development of cooperative management theory that is more contextual and sensitive to regional characteristics. Second, the income difference of 66.8% between cooperative members and non-members provides empirical evidence from Indonesia that strengthens the institutional economics argument that cooperatives, as collective institutions, are capable of creating significant surplus thru transaction cost reduction and improved market access.

This finding expands the empirical basis of institutional economics theory to the context of tropical agriculture with agro-tourism characteristics, which has been rarely studied until now.

Based on the research findings, practical recommendations are formulated in three temporal priority scales: Short Term (0–1 year): Cooperative managers prioritize optimizing implementation functions thru improving the quality of agricultural input procurement services, expanding access to soft loans, and opening direct marketing channels to the tourism

industry in Batu City. The local government, thru the Cooperative and MSME Office, needs to expedite the operational management assistance program for cooperatives.

Medium Term (1–3 years): Cooperatives need to strengthen their strategic planning function by integrating agrotourism market demand analysis into production planning and institutional capacity building. Local governments need to facilitate training for cooperative management human resources, especially in operational management, horticultural product quality control, and digital-based marketing to reach a wider tourism market.

Long Term (3–5 years): The development of infrastructure that supports the integration of the agricultural sector with tourism needs to be prioritized, including cold storage facilities, shared horticultural distribution centers, and integrated digital marketing platforms. Strengthening cooperative governance thru technology-based oversight mechanisms needs to be implemented to enhance transparency, accountability, and member trust in cooperative management in the long term.

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