

Jurnal Humaniora
Vol. 10, No. 2 (2026) pp. 237 – 244
http://jurnal.abulyatama.ac.id/index.php/humaniora
p-ISSN: 2684-9275 e-ISSN: 2548-9585

Research Paper

Effect of POAC (Planning, Organizing, Actuating, Controlling) Management Implementation on Red Chili Production in Timang Gajah District, Bener Meriah Regency

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https://doi.org/10.30601/humaniora.v10i2.8122

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Article Info
Received:
25-09-2026
Revised:
24-10-2026
Accepted:
30-10-2026
Published:
30-10-2026

Abstract

Red chili is a high-value horticultural crop in the Bener Meriah highlands of Aceh, but studies of chili production in Indonesia focus on technical inputs and seldom test whether farmers' management functions affect output. This study examines the level of implementation of Planning, Organizing, Actuating and Controlling (POAC) by red chili farmers in Timang Gajah District, Bener Meriah Regency, and the effect of each function on production. A quantitative survey was conducted among 42 farmers drawn from a population of 641 using the Slovin formula (e = 15%). Data were collected by questionnaire, observation and documentation and analysed with the Respondent Achievement Rate (TCR) and multiple linear regression in SPSS 27. TCR values for Planning (95.43%), Organizing (93.81%), Actuating (94.38%) and Controlling (94.19%) all fell in the very good category. Planning had a positive and significant effect on production ($\beta = 0.294$; $p = 0.005$), Controlling a negative and significant effect ($\beta = -0.298$; $p = 0.011$), and Organizing and Actuating no significant effect. The four functions jointly affected production ($F = 5.104$; $p = 0.002$) and explained 28.6% of its variation (adjusted $R^2 = 0.286$). Careful planning is the management function most clearly associated with higher output, whereas intensive controlling appears to be a response to crop problems.

Keywords: POAC management; Farm management; Red chili; Respondent Achievement Rate; Multiple linear regression; Bener Meriah.

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1. Introduction

Agriculture is one of the mainstays of the Indonesian economy. It contributes about 12.29% of gross regional domestic product and plays a central role in food supply, raw materials for industry and employment [1], and it remains a significant source of foreign exchange [2]. Red chili (*Capsicum annuum* L.) is one of the horticultural commodities with the highest economic value, because demand from households and the food-processing industry continues to rise [3].

In Aceh Province, Bener Meriah Regency is a centre of red chili production, with a harvested area of 1,548.00 ha and an output of 89,304.50 quintals in 2024 [4]. Timang Gajah District is one

of the main contributors to this output and therefore has considerable potential for the development of chili farming.

Red chili output depends not only on technical factors such as land area, seed, fertilisation and pest control but also on the ability of farmers to manage their farms [5]. Studies of chili farms in Indonesia and elsewhere attribute output and its risk mainly to land area, seed, fertiliser, pesticide and labour [6], [7], [8], and show that seasonal differences in input allocation change farm income [9]. Beyond inputs, access to credit [10] and the adoption of good agricultural practices [11] raise the efficiency of chili farms, which points to the role of farm-level decision-making. Poor management leads to inefficient use of inputs and lower yields [12]. The four classical management functions, Planning, Organizing, Actuating and Controlling (POAC), are expected to make farm management more effective [13], and they have been used to describe management in small businesses [13], farmer institutions [14], [15] and agribusiness systems [16]. In farmer groups in Sleman, for example, controlling was the least applied function [15]. Most of these studies, however, are descriptive: they report how far POAC is applied but do not test whether each function is associated with output.

Evidence on the level of POAC implementation by red chili farmers and its effect on production in Timang Gajah District is therefore limited. This study addresses two questions: (1) to what extent do red chili farmers in Timang Gajah District implement the POAC management functions, and (2) how does each function affect red chili production? By combining a descriptive measure of implementation with a regression test of each function at the level of the individual farm, the study adds farm-level evidence from a highland chili-producing area of Aceh and provides a basis for strategies to raise farm productivity.

2. Method

This study used a quantitative approach with a survey method to analyse the effect of POAC management implementation on red chili production [17]. It was conducted in Timang Gajah District, Bener Meriah Regency, Aceh Province, which was chosen purposively as one of the red chili production centres of the regency. The population consisted of 641 red chili farmers. The sample size was determined with the Slovin formula at a margin of error of 15%, giving 42 respondents, who were farmers that had grown red chili for at least one growing season. Primary data were collected through field observation and questionnaires, and secondary data were obtained from Statistics Indonesia (BPS), the scientific literature and relevant agencies.

Variables and Instrument

The independent variables were the four POAC functions, each measured by five indicators [18]; the dependent variable was red chili production in one growing season [16]. Planning covered the determination of input needs, costs and the cultivation schedule. Organizing covered the division of tasks, the management of production facilities and the coordination of labour; good organizing requires a clear work structure and a balanced division of responsibilities [19]. Actuating covered the execution of cultivation, including planting, fertilisation, pest and disease control, maintenance and harvesting according to technical recommendations [13]. Controlling covered the monitoring and evaluation of crop growth, input use and harvests and the correction of deviations from the plan [14]. Production was measured by the farmers' assessment of total output, optimality, quality, harvest frequency and satisfaction with the harvest [20].

The questionnaire was based on the indicators of each variable [21]. All indicators were rated on a five-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree).

Data Analysis

The level of implementation was measured with the Respondent Achievement Rate (TCR), calculated from the mean score of each indicator and classified as not good (0–25%), less good (26–50%), good (51–75%) or very good (76–100%) [22]:

$$TCR = (Rs \times 100) / N \quad (1)$$

where Rs is the mean score of the respondents and N is the maximum score.

The effect of the four functions on production was tested with multiple linear regression:

$$Y = \alpha + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \varepsilon \quad (2)$$

where Y is red chili production, α is the constant, X_1–X_4 are Planning, Organizing, Actuating and Controlling, β_1–β_4 are the regression coefficients and ε is the error term.

The partial effect of each function was tested with the t test, and the joint effect with the F test:

$$t = \beta_i / SE(\beta_i) \quad (3)$$

$$F = (SSR / k) / [SSE / (n - k - 1)] \quad (4)$$

where $SE(\beta_i)$ is the standard error of coefficient i, SSR and SSE are the regression and residual sums of squares, k is the number of independent variables and n is the sample size. H_0 was rejected when the significance value was below 0.05, that is, when $|t|$ exceeded the critical value of 2.026 (df = 37) or F exceeded 2.63 (df = 4, 37). The explanatory power of the model was measured with the coefficient of determination:

$$R^2 = 1 - SSE / SST \quad (5)$$

where SST is the total sum of squares. R^2 ranges from 0 to 1, and values closer to 1 indicate greater explanatory power.

3. Results and Discussion

Implementation of POAC Management

Descriptive statistics were used to describe the respondents' answers through the mean and the TCR of each indicator [23]. Table 1 shows that all four management functions and production fell in the very good category.

Table 1. Mean score and Respondent Achievement Rate (TCR) of each indicator

No	Indicator	Mean	TCR (%)
	Planning		
1	Timing of planting, cropping pattern and cultivation stages for optimal output	4.74	94.76
2	Selection of superior, healthy seedlings suited to land and climate	4.76	95.24
3	Use of fertiliser type and dose according to crop needs	4.83	96.67
4	Use of pesticides of the right type, dose and timing	4.82	96.19
5	Planning and allocation of costs for all cultivation activities	4.71	94.29
	Total Planning (very good)		**95.43**
	Organizing		
1	Assignment of labour according to roles and abilities	4.69	93.82
2	Efficient arrangement and use of tools and facilities	4.74	94.76
3	Scheduling of each cultivation activity	4.71	94.29
4	Management of planted land according to capacity and crop needs	4.81	96.19
5	Cooperation and communication among workers	4.50	90.00
	Total Organizing (very good)		**93.81**
	Actuating		
1	Cultivation carried out according to the plan	4.71	94.29

No	Indicator	Mean	TCR (%)
2	Fertilisation according to the crop growth schedule	4.71	94.29
3	Spraying according to timing and pest attack	4.76	95.24
4	Consistent routine crop maintenance	4.81	96.19
5	Seriousness and responsibility in all activities	4.60	91.90
	Total Actuating (very good)		**94.38**
	Controlling		
1	Monitoring crop development to detect problems early	4.67	93.33
2	Prevention and control of pests and diseases	4.81	96.19
3	Supervision of fertiliser, pesticide and other input use	4.69	93.81
4	Assessment of the harvest to measure cultivation success	4.71	94.29
5	Corrective action when activities deviate from the plan	4.67	93.33
	Total Controlling (very good)		**94.19**
	Red chili production		
1	Total chili output in one growing season	4.50	90.00
2	Production is optimal	4.67	93.33
3	Quality of chili is marketable	4.69	93.81
4	Harvest frequency in one season is good	4.62	92.38
5	Production obtained is satisfactory	4.60	91.90
	Total Red chili production (very good)		**92.29**

Source: Primary data, processed with SPSS (2026).

Planning had the highest TCR (95.43%). The use of fertiliser of the right type and dose scored highest (96.67%) and the timing of planting and cropping pattern lowest (94.76%), which indicates that farmers plan input use carefully. Organizing had the lowest TCR among the management functions (93.81%), mainly because cooperation and communication among workers scored only 90.00%, whereas land management according to crop needs scored 96.19%. For Actuating (94.38%), routine crop maintenance scored highest (96.19%) and seriousness and responsibility in all activities lowest (91.90%). For Controlling (94.19%), pest and disease prevention scored highest (96.19%) and early monitoring and corrective action lowest (93.33%). Production reached 92.29%; the marketable quality of chili scored highest (93.81%) and total output lowest (90.00%).

These very high scores show that farmers regard themselves as applying all four functions well, in line with descriptive studies that found POAC applied well in small enterprises and farmer institutions **[13], [14]**. Because the scores are clustered near the top of the scale, however, they differ little between farmers, and this limits the ability of the regression to distinguish the functions.

Effect of POAC Functions on Production

The regression results are presented in Table 2.

Table 2. Results of the multiple linear regression

Variable	B	Std. error	Beta	t	Sig.
(Constant)	2.021	1.357	–	1.490	0.145
Planning (X_1)	0.294	0.098	0.739	3.003	0.005
Organizing (X_2)	−0.209	0.110	−0.673	−1.910	0.064
Actuating (X_3)	0.156	0.153	0.446	1.020	0.314
Controlling (X_4)	−0.298	0.111	−0.885	−2.679	0.011

Source: Primary data, processed with SPSS 27 (2026). Dependent variable: red chili production.

The estimated equation is $Y = 2.021 + 0.294X_1 - 0.209X_2 + 0.156X_3 - 0.298X_4$. Planning had a positive and significant effect on production ($t = 3.003 > 2.026$; $p = 0.005$), and Controlling a negative and significant effect ($t = -2.679$; $|t| > 2.026$; $p = 0.011$). Organizing ($t = -1.910$; $p = 0.064$) and Actuating ($t = 1.020$; $p = 0.314$) had no significant effect. The F test (Table 3) shows that the four functions jointly had a significant effect on production ($F = 5.104 > 2.63$; $p = 0.002$).

Table 3. Results of the F test (ANOVA)

Model	Sum of squares	df	Mean square	F	Sig.
Regression	7.025	4	1.756	5.104	0.002
Residual	12.732	37	0.344		
Total	19.757	41			

Source: Primary data, processed with SPSS 27 (2026).

Table 4 shows that the correlation between the four functions and production was moderate ($R = 0.596$) and that the model explained 28.6% of the variation in production (adjusted $R^2 = 0.286$); the remaining 71.4% was due to factors outside the model.

Table 4. Model summary

Model	R	R^2	Adjusted R^2	Std. error of the estimate
1	0.596	0.356	0.286	0.58660

Source: Primary data, processed with SPSS 27 (2026).

Planning

The positive and significant effect of Planning means that farmers who plan the timing of planting, the provision of inputs and the allocation of costs more carefully tend to obtain higher production. This agrees with the view that planning is the basic management function that guides all other activities **[13], [18]**, and with the finding that managerial ability, alongside technical inputs, shapes red chili output **[5]**. Good planning reduces the inefficient use of inputs that has been linked to low yields **[12]**, and the result is consistent with evidence that planned input use and good agricultural practices raise the technical efficiency of chili farms **[7], [11]**.

Organizing

Organizing had no significant effect, and its coefficient was negative. Most respondents manage their farms independently or with family members, so the division of tasks and the coordination of labour are not formalised and vary little between farms. Organizing has been found to matter more in group-based enterprises and farmer institutions **[14], [19]** than on individual family farms such as those studied here, where labour is the input most often found to matter **[6], [8]**. The low score for cooperation and communication among workers (90.00%) supports this interpretation.

Actuating

Actuating also had no significant effect. Farmers in the study area apply broadly uniform cultivation practices based on habit and experience, so differences in how activities are carried out are small and do not translate into differences in output. Production is therefore more likely to depend on factors outside the model, such as weather, pest pressure, the season and input prices **[3], [5], [9]**, or on farmer characteristics such as education and farmer-group membership that shape technical efficiency **[7]**.

Controlling

Controlling had a negative and significant effect. This does not mean that supervision itself lowers production. Farmers tend to intensify monitoring and corrective action when the crop faces problems such as pest and disease attacks, unfavourable weather or poor growth, so high

controlling scores are associated with seasons in which output was already under pressure. The negative coefficient therefore reflects the farmers' response to unfavourable conditions rather than a harmful effect of controlling. Unlike farmer groups in Sleman, where controlling was the weakest function [15], the farmers in this study reported a high level of controlling, which fits the view that it is applied reactively when production risk rises [6]. The large standardised coefficients of opposite sign for Planning, Organizing and Controlling also suggest that the four functions are correlated with one another; multicollinearity was not reported and may have inflated the individual coefficients, so the partial effects should be interpreted with caution.

Three further limitations apply. Production was measured by the farmers' own assessment on a Likert scale rather than in kilograms per hectare, the sample of 42 farmers was drawn with a 15% margin of error, and the TCR scores are concentrated at the top of the scale. Future studies should measure output in physical units, use a larger sample and test for multicollinearity.

4. Conclusion

Red chili farmers in Timang Gajah District implement all four POAC management functions at a very good level, with TCR values of 95.43% for Planning, 93.81% for Organizing, 94.38% for Actuating and 94.19% for Controlling. Of the four functions, only Planning had a positive and significant effect on production, whereas Controlling had a negative and significant effect that reflects farmers' responses to crop problems; Organizing and Actuating had no significant effect. Together, the four functions significantly affected production and explained 28.6% of its variation. Extension programmes in the district should therefore give priority to strengthening farm planning, particularly the scheduling of planting and the allocation of inputs and costs, and should help farmers act on problems early rather than only after they have reduced the crop.

Acknowledgement

The authors thank the red chili farmers of Timang Gajah District, Bener Meriah Regency, for their time and information, and the Faculty of Agriculture, Universitas Abulyatama, for its support.

Authors' contributions and responsibilities

Gustiar Rahman: conceptualization, investigation, data curation, formal analysis, writing – original draft. M. Nasir Ismail: methodology, supervision, writing – review & editing. Khumaira: supervision, validation, writing – review & editing. All authors have read and approved the final manuscript.

Funding

This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

Availability of data and materials

The questionnaire data supporting the findings of this study are available from the corresponding author upon reasonable request.

Competing interests

The authors declare no competing interests.

Ethical approval

The study surveyed adult farmers about their own farm management practices and did not collect sensitive personal or health information, so review by a research ethics committee was

not required. Respondents took part voluntarily after the aims of the survey were explained to them, and the results are reported only in aggregate, so no individual farmer can be identified.

Declaration of generative AI use

Claude (Anthropic) was used during the preparation of this article to translate the Indonesian manuscript into English, reorganise the text into the journal's structure and check the consistency of the reported statistics. The data collection, statistical analysis and interpretation are the authors' own work. The authors checked all AI-assisted text against their data and sources and accept full responsibility for the article.

Additional information

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