

# The rational choice of vegetable farmers in the revocation of fertilizer subsidies

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**Abstract.** This research aims to elucidate farmers' thoughts about the revocation of fertilizer subsidies, explore the rational actions behind their decision to deal with the fertilizer shortage due to the costly prices and develop actionable plans to support farmers regarding subsidized fertilizer revocation. The results show that farmers understand the policy of fertilizer subsidy revocation as a form of the government's workload. Since farmers think that the government pays little attention, they hope it will change its fertilizer subsidy policy. Demography-wise, older farmers are still hoping for fertilizer subsidies, while young farmers are more realistic and have shifted to producing organic fertilizer and other alternatives. Notably, farmers respond to the scarcity of subsidised fertilizer through preference-based actions and existing resources. Based on these two, farmers' rational choices are classified into five actions: Using non-subsidized fertilizers, using subsidized fertilizers illegally, reducing the use of subsidized fertilizers on other commodities – leaving the rest for vegetables, using organic fertilizers of self-made or store-bought, and choose to not fertilize. The manufacture and use of organic fertilizer from local raw materials have not been implemented.

## 1 Introduction

At the end of 2022, the Food and Agriculture Organization (FAO) stated that the near future calls for several main types of food that will remain in progressive high demand, such as cereals, sugar, meat, milk, fish, fruit, and vegetables, which is of course followed by an increase in the trend in commodity prices. Such an increase is mainly caused by multiplying populations, changing lifestyles, and growing per capita income. Moreover, the escalating prices were also caused by limited production, transportation, energy scarcity, quality of seeds, expensive labor, and fertilizer scarcity [1].

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Concurrently, the global fertilizer shortage has impacted Indonesia. Due to budget efficiency and increasing farmers' competitiveness, the Indonesian government has decided to reduce fertilizer subsidies to farmers. In 2021, fertilizer subsidies were IDR 29.1 trillion and decreased to IDR 25.3 trillion in 2022. In 2023, this number plummeted to IDR 24 trillion [2][3][4]. The reduction has caused the government to limit fertilizer distribution for rice, corn, soybeans, coffee, cocoa, sugar cane, shallots, garlic, and chilies only. Commodities outside these categories cannot obtain subsidized fertilizer, or farmers planting other crops must purchase non-subsidized fertilizer.

However, farmers whose commodities are on the fertilizer subsidy list also experience the impact of the increasing fertilizer prices, for example, rice farmers who experienced shifts in their farming activities [5]. Even some traders and farmers, with or without subsidized fertilizer, usually commit actions that cannot be justified legally. Their actions do not concur with the rules for distributing subsidised fertilizer [6].

In 2023, when the government reduced the fertilizer subsidy budget despite their deliberate target of increasing production for all agricultural commodities, vegetable farmers without subsidized fertilizer must take rational actions. Based on utilitarian considerations and limited resources, farmers must decide on rational action options to maximise farming production and profits [7][8].

Vegetable farmers' responses to the policy of fertilizer subsidy revocation are likely to vary according to their thoughts, financial capital, farming skills, social networks, and managerial abilities [9][10][11]. Farmers' actions to optimize vegetable farming for their benefit are samples of the phenomenon when carrying out rational actions [12][13]. To understand farmers' rational action choices, this research was formulated to describe "How do vegetable farmers understand the fertilizer subsidies revocation?" It is thus necessary to describe "the rational actions that farmers decide to continue farming amid limited resources for production facilities". Answers to these research questions underlie "the actionable plans by farmers to carry out farming with limited fertilizer resources", but willing to produce vegetable production and optimal profits for their income.

Farmers' behavior during farming is always challenged by limited resources for production facilities. When one of the production facilities is scarce or expensive, such as the required chemical fertilizer, farmers are on their own in making decisions based on their rationality. This present study thus regards the Rational Choice Theory (RCT) introduced by James S. Coleman as a suitable choice to investigate the phenomenon of rational farmers. RCT can be used as a basis for micro-level analysis to explain macro-level phenomena [14]. In this case, farmers' responses to the fertilizer subsidy revocation are diverse despite their shared goal of achieving farming profits [15]. Such diverse responses were guided by rational actions shaped by their values and preferences [12][13][16]. However, it is contended that farmers likely choose actions that maximize utility or satisfy their needs and wants.

Using RCT to unpack this phenomenon can elaborate farmers' understanding of the fertilizer subsidies revocation, identify the rational actions behind their actions related to the rising fertilizer prices, and design actionable plans to achieve success using their existing resources.

This present study contests that farmers' actions generally can be studied from the perspective of agribusiness management, their preferences as consumers, profit-loss analysis, and their technical considerations on agricultural cultivation. This research looks at farmers from a sociological perspective, especially RCT, thereby strengthening the documented studies on Agricultural Sociology.

## 2 Methods

This research employs the social definition paradigm following the sociological theory that falls into this category [12][13]. Qualitative design is applied [17] with a Phenomenology approach [18][19]. The research location was Triwungan Village, Kotaanyar Sub-district, Probolinggo District (one of the vegetable centers in Probolinggo District)

The primary data collection techniques were in-depth interviews and social media communication. The validity was obtained through triangulation techniques. The secondary data collection was curated from information from the Central Statistics Bureau and the websites of the Ministry of Agriculture, the regional government, and Data Indonesia.

The research subjects were vegetable farmers, vegetable farmer leaders, farmer group leaders, subsidized and non-subsidized fertilizer sellers, field agricultural instructors, village officials of agricultural affairs, and agricultural service staff responsible for the distribution of subsidized fertilizer.

Phenomenological data analysis was carried out in the following stages: (1) determining the appropriacy of research problems within the phenomenological approach; (2) identifying the phenomenon being studied along with its description; (3) determining phenomenological assumptions; (4) collecting data using in-depth interviews in various settings; (5) generalizing themes; (6) writing a textual and structural description of the phenomenon; (7) writing a composite description of common themes; and (8) presenting findings in written form [20].

## 3 Farmers' Action on the Revocation of Fertilizer Subsidies

Vegetable farmers in Desa Triwungan responded to revoking fertilizer subsidies with various actions. According to AM (Chair of the Sumber Rejeki Farmers Group, 47 years old), the revocation of fertilizer subsidies has caused fertilizer prices to rise. He expressly indicated that the costs are skyrocketing as can be seen from the following statement:

*“The government does not care about us. Fertilizer subsidies have been evoked, and it is strangling us farmers. In turn, we face difficulties because the withdrawal of fertilizer subsidies was also due to the low price of vegetables. Farmers continue to use urea fertilizer at small doses.”*

It can be concluded from the transcriptions above that the revocation of fertilizer subsidies meant that farmers had to reduce the fertilizer dose from the usual dose. Theoretically, this could reduce production. When production decreases, costs increase, and vegetable prices remain constant, farmers' profits will decrease.

Another research subject, AH (a 49 years old vegetable farmer) had a different opinion from the Head of the Farmer Group:

*“Withdrawing or reducing subsidized fertilizers is not a problem for horticultural farmers because subsidized fertilizers are not good for us anyway. Non-subsidized fertilizers are better because the ingredients are better. No doubt, horticultural farmers have always been using non-subsidized fertilizer because it has been proven to yield better quality. Those who refuse the revocation of subsidized fertilizer are farmers of plantation and leafy vegetables, such as mustard greens, kale, and spinach, because they are in dire need of subsidized fertilizer.”*

According to Mr. AH, vegetable farmers growing fruit vegetables such as tomatoes, chili peppers, long beans, eggplants, zucchinis, and chayotes do not like subsidized fertilizers

because the nutrients needed by these plants are not widely available in subsidized fertilizers. Most farmers who need urea/ ZA, which contains much nitrogen, are farmers of mustard greens, spinach, kale, and various other vegetables that rely on vegetative growth production. Farmers who grow leaf-based vegetables still need subsidized fertilizers.

On the other hand, some young farmers consider the countering sides in response to the revocation of subsidized fertilizer. ATH (28 years old), a young farmer, said that:

*“There are pluses and minuses to the government’s plan of revocation of subsidized fertilizers for vegetable farmers. They [the government] do not want to supply fertilizer subsidies, especially if they are distributed evenly across all commodities. Because the cost of fertilizer subsidies is prohibitive, and what is urgent right now is food crops, the majority of subsidized fertilizer is allocated there. The government saves money by withdrawing subsidized fertilizers for vegetable farmers because food farmers struggle with fertilizers. [by so doing] farmers are indirectly being forced to become self-sufficient in fertilizer – continuing to use non-subsidized fertilizer and using organic instead. I think fertilization depends on the plants’ condition.”*

According to him, revoking fertilizer subsidies forces farmers to become fertilizer-independent. This means that farmers must buy non-subsidized chemical fertilizer or make their organic fertilizer to reduce their dependency on the government. This positive side reflects the optimistic thoughts of farmers as young as 28. This opinion, of course, differs from the other participants over 45 years old. Mr. AA (60 years old), a small farmer of chili pepper stated that:

*“The government pays little attention to farmers. Many subsidized fertilizers have been revoked; some are still available but difficult to obtain. We [vegetable farmers], anyway, still buy subsidized fertilizer because kiosks and distributors do not ask about the commodity we are planting, so we [vegetable farmers] can still get subsidized fertilizer. The government looks forward to cutting subsidized fertilizers; they want to remove them [subsidized fertilizers] slowly through deliberate limitation, so mafias are playing with subsidized fertilizers.”*

The above transcriptions reflect AA’s opinions on old farmers. In this case, older farmers do not seem to think about making organic fertilizers independently at the farmer group level or individually. Mr. NS (59 years old), an extension worker living in the village, stated that:

*“Farmers hope that the government will review the policy regarding subsidized fertilizers: the more revocation, the more burden for farmers. We look forward to positive changes concerning the fertilizer subsidy policy. [Perhaps] the government can put additional fertilizer subsidies, following law number 13 of the year 2019, about the protection and empowerment of farmers, including the stuff that comes with protection, such as subsidies and production facilities. It is not only about reducing fertilizer subsidies for vegetables but also for other commodities to review regarding its subsidy policy.”*

NS’s opinion reflects his concern about partiality among agricultural instructors towards the farmers he supports and his customers. Noteworthy, NS is a senior agricultural extension officer at the study location with immense knowledge of agricultural extension policies. Furthermore, Mr. JJ (59 years old), the Village Head at the study location, tends to represent the opinions of many farmers in his area:

*“The revocation of fertilizer subsidies is burdensome for farmers because only rice, corn, and soybean farmers are subsidized – vegetable farmers are not. We found that vegetable farmers still buy subsidised fertilizer because the kiosks allow them to do so as long as they show their Farmer’s Card. Young farmers who are good at the vegetable business buy non-subsidized fertilizer despite the higher price. I sense that farmers take no action to use homemade organic fertilizers, such as manure. Although both non-subsidized fertilizer and factory-made organic are expensive, making homemade organic fertilizer is not an option due to labor costs for processing and transportation.”*

Last, our participant from the Department of Agriculture stated that farmers generally have faced difficulties shifting behaviors from chemical fertilizers to organic ones. The subject (FS, 55 years old) said that:

*“Farmers here complain about the availability and price [of fertilizers]. In every meeting, the issue is always raised. Yet they [farmers] cannot get away from chemical fertilizers. More intensive outreach and encouragement are needed for solutions to avoid chemical fertilizers. Currently, farmers tend to psychologically oppose or ignore recommendations for using non-chemical fertilizers.”*

## **4 Discussion of Farmers’ Actions on the Revocation of Fertilizer Subsidies**

Vegetable farmers’ understanding of the subsidized fertilizer revocation dramatically varies. Some farmers feel that the government is giving too many subsidies, and thus, they are carrying too much of a burden. However, farmers still expect a policy review so that the farming expenses are not high. Several people, including farmers, fertilizer traders, and extension officers, interpreted the policy of fertilizer subsidy revocation as a lack of concern from the government for farmers, and they wondered why the government was not siding with them.

Farmers responded to the policy of fertilizer subsidy revocation with various actions. This present study approaches this phenomenon through the lens of RCT. This theory is ignited by the idea that individuals have preferences and choices about things (goods, ideas, actions). It elucidates the preferences and reasons for human choices for their actions as influenced by their circumstances.

The focus in the reviews using RCT is the actors (here refers to farmers) who are considered to have a purpose or intention that underpins their actions. In this study, farmers are considered to have preferences (values and utilities), in which their actions in achieving goals are in line with their preferences. We denote at least two things found to be the basis for their consideration: the scarcity of available resources and the availability of social institutions [13].

The object of this present study is the scarcity of subsidized fertilizer. The social institutions regulating fertilizer distribution are working organizations, such as agricultural services, fertilizer sales shops, farmer groups, agricultural extension workers, and farmers. Apart from being work organizations or individuals, they also act on behalf of a set of norms to regulate their actions in meeting fertilizer needs [21].

Farmers’ actions in responding to fertilizer scarcity are also influenced by the scarcity of resources they have, such as financial resources, knowledge resources, social capital, and work organizations outside themselves (for example, fertilizer shops and regional agricultural services). The scarcity of resources is evident through the size of their land holdings (of less than one hectare) and the small number of luxury goods in their homes. The scarcity of knowledge is especially observed among older farmers who are incompatible with

information technology equipment (low access to online agricultural information sources). Next, the scarcity of social capital, in the form of self-values or norms, is shown in the attempts to find solutions other than subsidized fertilizers. The social networks needed to resolve the scarcity of subsidized fertilizers are severely lacking, and the dependence on the government is very high. Last, the role of social capital in overcoming farmer problems and welfare is in line with Nugroho’s opinion [22].

The actions of vegetable farmers can be classified into five action options or a combination of these options, namely:

- a) Farmers use non-subsidized chemical fertilizers.  
This action is based on the farmer’s financial resources, level of knowledge to resolve problems of his farming business, profitability prior to the affordance of non-subsidized fertilizer, business relationships, and extensive information. Many previous studies support this statement, including those by Ibrahim, JT [23].
- b) Farmers use subsidized chemical fertilizers at fertilizer shops without mentioning their commodities, and the sellers do not have any problem with it.
- c) Farmers reduce the amount of purchased subsidized fertilizer so that vegetable productivity is not optimal. This finding aligns with Qiao and Huang’s opinion [15].
- d) Farmers use organic fertilizers, either homemade or purchased from other parties. This statement strongly supports the previous study regarding the use of organic fertilizer [24].
- e) Farmers do not fertilize the vegetables they plant [25].

Several actions have been taken by farmers in resolving these challenges apart from their awareness, such as making and using organic fertilizer from raw materials available on site, such as manure and leftovers from agricultural home industries; additional labor; and transporting organic fertilizer from the production site at home to the land. However, making organic fertilizer independently or in farmer groups is not yet common practice.

Various actions can be taken to influence farmers to fertilize with non-subsidized fertilizer. One of these is the conceptual framework from Douglas D. Harthorn in the book Handbook of Social Theory [12]. The conceptual framework for action to influence the rational actions of farmers using non-subsidized fertilizers, both organic and inorganic, is presented below.

**Table 1. A conceptual framework for action to influence the rational actions of farmers using non-subsidized and organic fertilizers.**

| Influence source  | Influence target   |                                  |
|-------------------|--------------------|----------------------------------|
|                   | Individual farmers | Farmers from a diverse structure |
| Individual actors | Market mechanism   | Hierarchy mechanism              |
| Diverse actors    | Norms              | Multiple systems                 |

**Note:** Institutions as the resource functions and influence target

To carry out actions as the basis for farmers’ Rational Choice actions, the influencing actors can come from individual and diverse actors (work organizations, community organizations, work groups). The targets to influence can be individual farmers or farmers from a diverse structure (farmer groups, farming communities, or farmer organizations).

For example, an individual actor can influence the behavior of other farmers in responding to the scarcity of subsidized fertilizer to use ordinary commercial fertilizers. The

approach taken by farmers who want to influence is simply to use the market mechanism reasons approach. Suppose an individual actor wants to influence a group of farmers to use non-subsidized fertilizer. In that case, the used approach will be a hierarchical approach from the government and farmer group leaders.

Further, if various groups of farmers team up with the government to influence farmers' actions to switch to non-subsidized fertilizers, they can use a norm system approach. They can create a norm system where individual behavior could shift to non-subsidized fertilizer. Suppose the sources of influence are various parties, and the target farmers are diverse from various parties. In that case, the possible approach is to create various systems that offer choices to many parties.

## 5 Conclusion

Farmers understand the policy of revoking fertilizer subsidies as a form of the government's demands, yet they also think the government pays little attention to them. Farmers hope the government will change its policy to re-activate subsidized fertilizer. Older farmers strongly wish that the government would provide fertilizer subsidies again, while young farmers are more realistic about producing organic fertilizers or other alternative fertilizers.

It can be said that farmers respond to the subsidized fertilizer revocation by taking action based on their preferences and the existing resources. Based on their preferences and resources, farmers' rational choices are classified into five actions: using non-subsidized fertilizer, using subsidized fertilizer illegally, reducing the use of subsidized fertilizer on other commodities and using the remainder for vegetables, using organic (non-chemical) fertilizer that is self-made or purchase, and the final choice of action is not to fertilize. However, the manufacture and use of organic fertilizer from local raw materials have not been implemented. No farmer deliberately chooses this course of action.

## Suggestions

To help farmers choose independent action options for providing fertilizer, independent farmers/ extension agents/ and other reform agents can provide technical training in making organic fertilizer from locally available raw materials. By so doing, fertilizer can be produced in their regions and be available when needed. Farmer groups, as farmers' associations, need to improve their dynamics to become media forums for agents of change and members to help each other overcome the problem of fertilizer scarcity.

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