

Strategic analysis of red chili development innovation system in Majalengka regency, West Java Indonesia

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Abstract

One of the potential commodities that can be developed are red chili. But this commodity is still getting attention because it affects inflation due to fluctuating prices. Production supply is still not continuous and quality is not optimal. Complex and dynamic problems in red chili because it involves many actors in the development of this plant as well as the actual conditions of the red chili plant.

This paper aims to examine the root causes of the sub-optimal red chili development system, starting from production and downstream, so that it can offer various solutions through the analysis of innovation strategies in future development. This research uses a soft system methodology approach because the method can describe the relationship between variables in a systemic, complex, and dynamic manner related to the phenomena of red chili development in the Majalengka Regency which is one of the red chili centers in West Java. The informants in this case study consisted of farmers, related stakeholders, consumers, related institutions, and traders. The results showed several innovation strategies, namely the need to build a system for procurement of production facilities, a coordinating system for market guarantee partner institutions, quality standards, and price stability, systems in agro-industry business units, product quality assurance systems through the establishment of innovation in Good agriculture practices and standard operating procedures. It is hoped that the stages in the CATWOE analysis can be applied to achieve future red chili development.

Keywords: red chili, fluctuation, ssm, strategy, development

Introduction

Agricultural commodities, including those that have uncertain characteristics of the results (Du Yilong, 2018) ^[1]. This agricultural sector is also affected by various climate changes, causing problems (Boer *et al*, 2014) ^[2] and having a negative impact (Mashiza, 2019) ^[3]. Red chili is a commodity that has uncertainty in terms of production, also has fluctuating prices and farmers find it difficult to control this condition (Hariyani N, 2017) ^[4], (Andayani, SA, *et al*, 2016) ^[5], and has a high price risk (Hasan F, *et al* 2016). The price pattern of red chilies are still seasonal (Hakim, L, *et al*, 2019). However, red chili is a commercial crop for the food industry in Indonesia (Ferniah R, S, *et al*, 2018) ^[8], as well as a potential crop to be developed. The distinctive taste of red chilies has become a popular element in Indonesian cuisine (Khasanah S, M, *et al*, 2020) ^[9]. The quality of red chilies is characterized by color and spiciness (Khan M, H, *et al*, 2020) ^[10].

In carrying out red chili farming, it is necessary to formulate alternative strategies in development if you look at the condition of the problem in red chili (Rizieq R, *et al*, 2018) ^[11], as well as participatory collaboration to maintain sustainable production (Andayani S, A, *et al*, 2016) ^[5], as well as in handling Fusarium wilt disease which is often infected in red chilies has been done in testing the ability of Chytrid bacteria as a bio-control agent in red chili seeds (Suryanto D, *et al*, 2010) ^[12]. The development of red chili production in the Majalengka Regency is still not optimal, innovation in handling pests and diseases is still low and farmers have not optimally implemented standard operating

procedures in implementing red chili cultivation patterns. This phenomena still occurs in almost every area of Majalengka Regency. This region is a potential area in the development of red chili production, although it is not yet optimal and production tends to increase every year, however, fluctuations in production and prices still occur.

In further examining the root of the problem in the red chili development system which is not optimal and balanced between Production and downstream, it is necessary to analyze a strategy for future development. This analysis will describe the phenomena and be useful for further strategic action. The method that can describe the relationship between variables systemically in complex and dynamic situations is the soft system methodology (SSM) approach. Based on the phenomena that occurs, it raises questions to be studied so that the purpose of this study is to analyze the situation so that it can provide alternative strategies in innovation in the development of red chilies. The contribution of this research is expected to produce a holistic picture of the next strategic analysis so that it can describe the cause and effect of the red chili cultivation phenomena.

Method

The strategic analysis of the innovation system for red chili development uses the soft system methodology (SSM) approach. This approach is a tool that is used in designing and implementing various changes from real conditions with various ways of improving something needed in a better direction. The proposed changes by this method can take the

form of strategic issues at the operational level on social problems (Rodriguez, *et al*, 2009) [13].

The SSM approach is carried out in seven stages, consisting of (1), (2) in stages 1, 2, understanding the problem that is not structured into a structured part through a rich picture, this is to help understand phenomena, (3) understand the problem with the transformation process through CATWOE analysis, (4) building a conceptual model (Human Activity System), (5) comparing the conceptual model with the problem situation, (6) analyzing and determining the desired changes, (7) taking various actions or correcting existing problems (Checkland & Scholes, 1990), (Alamsyah, 2011) [15]. The complete stages can be seen in the framework of Figure 1.

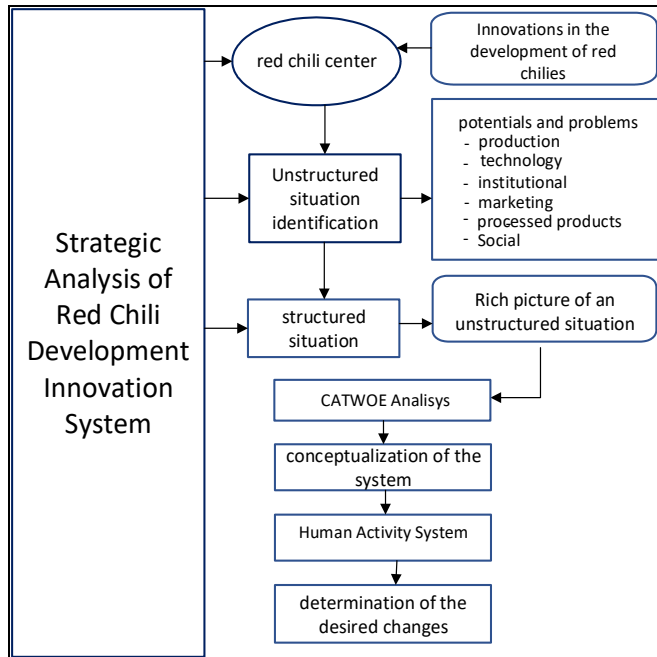


Fig 1: Framework for Strategic Analysis of the Red Chili Development Innovation System

Results and Discussion

Unstructured Problems

The development of red chilies in the Majalengka Regency is quite good with various central areas, this is certainly a pretty good opportunity in the development of this commodity going forward, however, problems are still an obstacle to increasing production and productivity, fluctuations still occur, innovation systems are still not optimal. Through the analytical descriptive method can reveal unstructured problems in the strategic analysis of the red chili development innovation system. This method is a method that can explain some of the problems faced descriptively based on actual conditions (Lau, AKW & Lo, W, 2015), (Trisnasari W, *et al*, 2020) [18]. Some of the problems faced in the development of red chilies include:

1. Problems in red chili production

The development of red chili production for 5 years tended to increase, although the planted area had decreased, as can be seen in Figure 2. However, production and productivity have not shown a significant increase. Several things that affect the problems in production,

namely fertilizers and seeds are not following the needs and planting time of red chili farmers, as well as the application of pest control technology that is not optimal, and the cropping pattern control system.

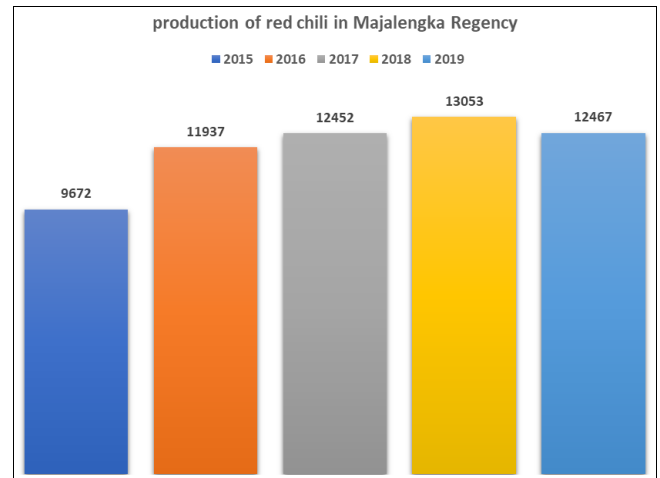


Fig 2: Development of Red Chili Production in Majalengka District

2. Problems in terms of technology

Farmers still rely on experience in implementing red chili cultivation, innovation has not been applied, the application of standard operating procedures and Good Agriculture Practice has not been implemented optimally.

3. Problems in terms of price

The characteristic feature of red chili is that it experiences high price fluctuations so that red chili is a commodity that affects inflation, as seen in Figure 3 of 2015 to 2020, the price of red chili fluctuates, it will affect farmers' income.

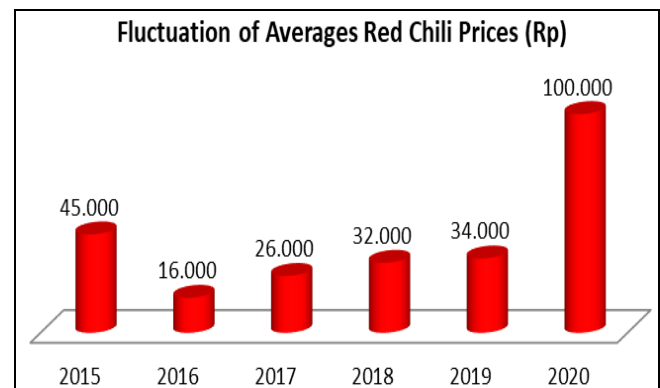


Fig 3: Development of Red Chili Prices

4. Problems in terms of institutional

The related institutional function is not optimal, farmer groups are still limited in routine cultivation activities, there has been no effort to increase product competitiveness to achieve structured marketing, partner institutions have not been coordinated effectively either through village or district partners, agricultural extension agents are still limited for technical cultivation. Only banking institutions have facilitated the cultivation process and this is still limited to farmers who only meet banking requirements. In general, farmers still rely on their capital for bookies.

5. Problems in terms of marketing

Red chili is still limited to the local market, the main market in Jakarta, Tangerang, and outside the region. The purpose of a structured market has not been well coordinated. Farmers still rely on sales to collector traders, wholesalers. Almost 82% are sold to collectors and the rest to large traders.

6. Problems with industrial processing.

Processed products are still limited to the home industry for their consumption, namely dry chili powder. Home industry players are still limited.

Rich Picture (unstructured problem assessment)

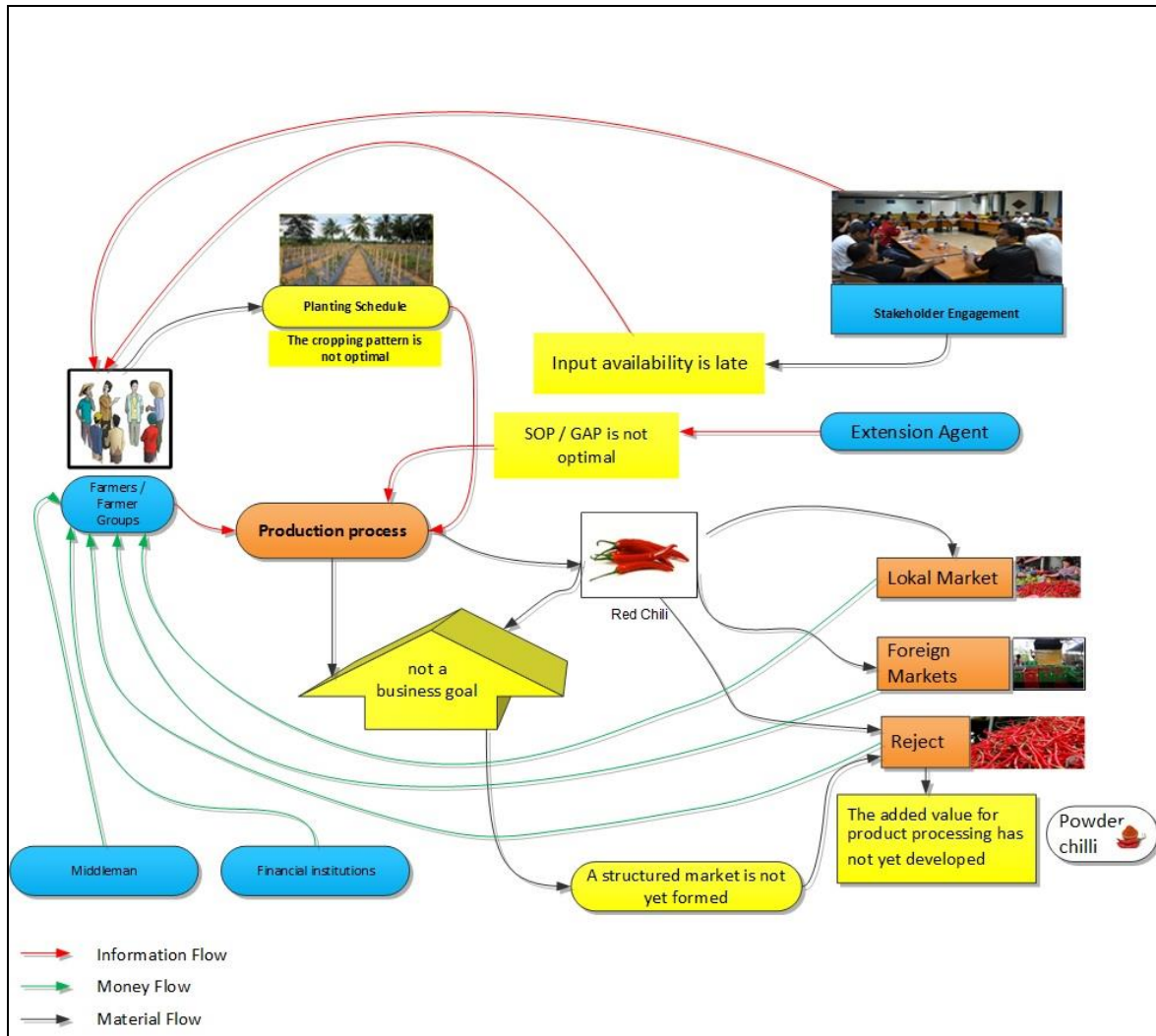


Fig 4: Rich Picture of Red Chili Development in Majalengka Regency

A rich picture is to understand the problem situation from various perspectives including the structure and process of activities, patterns of relationships between actors, intertwined relationships, conflicts, which are also the result of mapping in the field through external validation (Checkland & Scholes, 1990).

In the rich picture, we can see the relationship between actors and the problems that occur. Based on the rich picture, we can see some potential problems that occur in the innovation system for red chili development. These problems consist of: (1) dependence on subsidies of seeds

and fertilizers which are often late and not following needs, (2) capital is still dependent on dealers, (3) traditional pest control technology, (4) assistance and guidance from extension workers still lacking, (5) productivity is still not optimal, (6) quality is still not optimal so that it does not match industry specs, (7) market guarantees are still low so that price formation is still below average and prices fluctuate (8) the goal is still towards the local market traditional, (9) reject or post-harvest product processing is still low. Table 1 describes the main problems in the development of red chili.

Table 1: Issues of problems in the development of Red Chili

No	Issues	Problems	Potential Impacts
1		Production	
	The land for planting red chillies is decreasing	<ul style="list-style-type: none"> ▪ Delay in fertilizer and seed subsidies for red chili cultivation ▪ Application of low pest control technology ▪ Minimal cropping system and arrangement 	<ul style="list-style-type: none"> ▪ Productivity is not optimal <ul style="list-style-type: none"> ▪ Still low quality ▪ Prices fluctuate

		<ul style="list-style-type: none"> ▪ Cultivation has not fully implemented standard operating procedures and Good agriculture practice 	
2		<ul style="list-style-type: none"> ▪ Technology 	<ul style="list-style-type: none"> ▪
	The cost for carrying out red chili cultivation is high	<ul style="list-style-type: none"> ▪ Farmers do not have technological innovation in the production of fertilizers and seeds - 	<ul style="list-style-type: none"> ▪ they only rely on subsidized fertilizers and seeds
3		<ul style="list-style-type: none"> ▪ Marketing 	<ul style="list-style-type: none"> ▪
	Still low market guarantees	<ul style="list-style-type: none"> ▪ Structured market demand has not been formed ▪ Local and traditional market demand is around 82% ▪ Market demand outside the region is around 18% 	<ul style="list-style-type: none"> ▪ product quality is not yet in accordance with industrial specs or structured market so that it has not been formed to meet structured market demand ▪ reference price is only in accordance with the destination main market ▪ processed red chili products are not optimal
4		<ul style="list-style-type: none"> ▪ Institutional 	<ul style="list-style-type: none"> ▪
	Industry partner institutions have not played a role in product absorption	<ul style="list-style-type: none"> ▪ Products do not have industrial quality standards ▪ There is no price control yet there is no price 	<ul style="list-style-type: none"> ▪ reference so that price fluctuations are high ▪ has not yet entered the structured market
5		<ul style="list-style-type: none"> ▪ Social 	<ul style="list-style-type: none"> ▪
	Farmers / farmer groups do not have commercial objectives	<ul style="list-style-type: none"> ▪ Farmers only implement it as a routine in planting red chilies, there has been no effort to increase the added value of red chilies ▪ Farmer groups / farmer group associations have not played an optimal role for commercial purposes as a networking forum 	<ul style="list-style-type: none"> ▪ there is still minimal increase in added value to products

Source: data processing, 2020

The Problem Transformation Process

An overview of the system for the modeling process can be described in Root's definition (Jhon Wiley, 2009) [17]. The PQR formula can be arranged in a conceptual model, including do P, by Q, and to help R so that the questions in this study can be answered, what, how, and why.

Definition of Relevant System (CATWOE)

Root definition is tested through CATWOE analysis (C = customer, A = actors, T = transformation, W = Worldview, O = owners, E = environmental constraint). By looking at the conditions in the rich picture, CATWOE analysis is compiled for the relevant system in the transformation process. The preparation of the transformation statement, namely: (1) not optimal support for production facilities and regulation of cropping patterns in increasing continuity of

production, (2) there is no special institution or partner as a product absorber, a stable price guarantee regulator, and product quality standards, (3) there is no Special assistance related to standard operating procedures and Good Agriculture Practice in ensuring quality and quantity for structured market purposes, (4) there has been no training or special institutions in increasing value-added products (agroindustry) continuously at the farm level as a business unit.

The root definition is built based on the Relevant system, namely:

Root definition 1, namely: "There is a system to regulate the need for production facilities related to fertilizers and seeds (P) through coordination with related institutions and arrangement of cropping patterns (Q) in increasing the continuity of red chili (R) production."

Table 2: Catwoe Analysis

Customers	Farmers' or other related communities who benefit from the system
Actors	Farmers, farmer groups and the government, in this case the Related Office in regulating production facilities, especially seeds and fertilizers, which have only relied on subsidies which are often late
Transformation	Farmers are able to plant red chilies continuous without being constrained by shortages of seeds and fertilizers, so that system changes will ensure the continuity of production
Worldview	Trust in the system will improve production fluctuations so as to reduce price fluctuations and improve the quality of the
Ownership	System owned by farmers, farmer groups, and institutions in Village
Environmental Constraints	Support for change from the perpetrators of farmers, farmer groups, related agencies, village institutions, and resistance will emerge from actors who maintain their original conditions

Root Definition 2, namely: "Establishment of a system of coordination and synergy between farmers and markets. (P) Through partner institutions in absorbing red chili products

(Q) to ensure that prices do not fluctuate with clear quality standards.

Table 3: Catwoe Analysis

Customers	Farmers' or other related communities who benefit from the system
Actors	Farmers, farmer groups and the government, in this case the Related Office, the market guarantor partners in the marketing process and the stable price of red chili
Transformation	Partner institutions can absorb the product and as market guarantor can stabilize prices and clear production processes

	with quality standards according to market objectives
Worldview	Trust in the system will improve price fluctuations and minimize market risk
Ownership	System owned by farmers, farmer groups, and institutions in the village, market players involved in
Environmental Constraints	Support changes from farmer actors, farmer groups, related agencies, village institutions, and farmer partners, as well as resistance will emerge from actors who maintain their original conditions in conventional marketing who continue to maintain dealers and middlemen as market partners

Root Definition 3, namely: "The establishment of a system which can make farmers cultivate red chili according to Good Agriculture Practice and Standard Operating

Procedures (P) through high innovation assistance (Q) to produce quantity and quality of red chili products according to structured market objectives (R)".

Table 4: Catwoe Analysis

Customer	Farmers, consumers, or society other relevant benefiting from the system
Actors	Farmer, farmer groups, the government, in this case, the Department Related, Consumer, Universities, Bank Indonesia, Banking, partners market guarantor in the process of research development for the sustainability of the production well consumer preferences including product absorbing partners.
Transformation	Development of products according to the quality of structured market objectives that shift from traditional market goals, so that products have high competitiveness.
Worldview	The system will build farmers to change their mindset through innovation in applying GAP that continues to the welfare of red chili farmers.
Ownership	The system is owned by farmers, farmer groups, and Institutions in the Village, involved market players, consumers, and partners as institutions to absorb products from structured markets
Environmental Constraints	Support for change from farmer actors, farmer groups, related agencies, village institutions, and farmer partners, Structured market institutions, and consumers and resistance will emerge from actors who maintain their original conditions in conventional marketing without paying attention to market competitors.

Root Definition 4, namely: "The establishment of a system in the development of an agroindustry Institution (P) through training and mentoring activities to increase the

added value of natural products. Red chili as a business unit (Q) to increase the income and welfare of farmers by adding product value."

Table 5: Catwoe Analysis

Customer	Farmers', or other related communities who benefit from the system
Actors	Farmers, farmer groups, the government, in this case, the Related Service, Consumers, Universities, Bank Indonesia, are in the process of developing research for the processing of derivative product innovations to increase the added value
The Transformation	The development of agroindustry derivative products with innovations that can be used as additional farmer businesses with high product competitiveness.
Worldview	The system will build innovation from farmers through agroindustry activities in producing business units as an increase in farmer income.
Ownership	System owned by farmers, farmer groups, and institutions -Institutions in the village, consumers, and partners as agencies absorbing red chili derivative products
Environmental Constraints	Support for change from the perpetrators of farmers, farmer groups, related agencies, village institutions, and farmer partners, and consumers and resistance will arise from actors who still maintain the original conditions in the marketing of the main product even the obstacles can be from large-scale entrepreneurs as producers of processed red chili

Human Activity System (HAS)

HAS is a linkage of the activities of the actors needed in the transformation process activities in the development of red

chilies in Majalengka district. With "5E" it can be used as an evaluation of planning activities to achieve transformation needs.

Table 6: Formulation 5 E

No	Aspects	Formulation
1	Efficacy	Coordination and synergy of the actors of red chili development
2	Efficiency	Coordination through special institutions related to the procurement of production facilities (seeds, fertilizers)
3	Effectiveness	Strengthening of institutions related to red chili development
4	Ethicality	Cultivating red chili Good Agriculture Practice (GAP) and Standard Operating Procedures and implementation of innovation
5	Elegance	Optimization of business unit institutions in the management of derivative products as an added value.

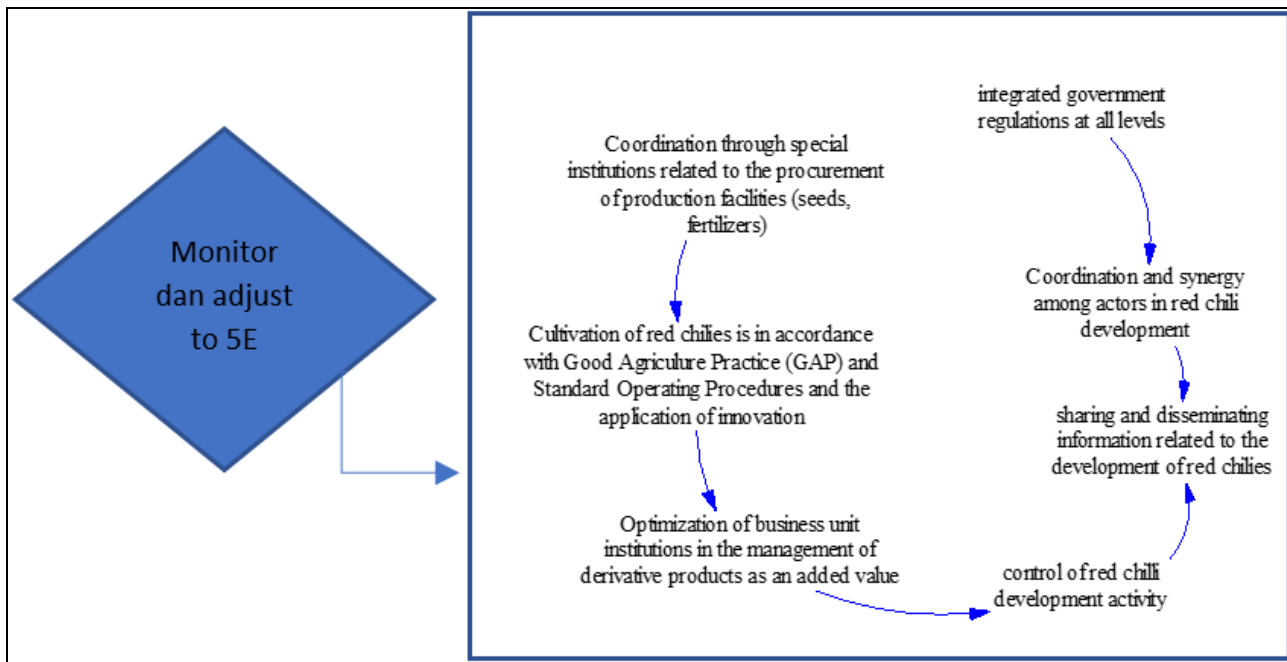


Fig 5: Human Activity System in Red Chili Development

Conclusion

The development of red chili in the Majalengka Regency has not been optimal as expected, this can be seen that there are still several problems related to production, technology, price, institutions, marketing, and processing of red chili derivative products. This study resulted in an analysis of the innovation strategy for red chili development through the relevant system with CATWOE analysis.

The results of the analysis show that it is necessary to build several systems, namely (1) a system for regulating the need for production facilities related to fertilizers and seeds and planting patterns, (2) a system of coordination and synergy between farmers and markets through partner institutions in absorbing red chili products, (3) system which can make farmers cultivate red chilies according to Good Agriculture Practice and Standard Operating Procedures through high innovation assistance with the aim of structured markets, and (4) agro-industry institution development system as a business unit.

It is hoped that the development of red chili areas with high productivity and quality can be achieved through the stages of the results of the transformation formulation of the soft system methodology method in this study.

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