



Challenges and Opportunities in Family Sheep Farming Succession: Insights from Participatory Systems Analysis in Garut, Indonesia

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Abstract | Succession issues in family farming have been a global concern since the 1990s. Changes in economic structure have encouraged young farmers to refrain from participating in family farms, including family sheep farms in Garut district, West Java Province, Indonesia. Therefore, this study aimed to investigate the factors that influence young farmers to continue or not to continue family sheep farming. These factors were determined using Focus Group Discussions (FGD) through Participatory System Analysis (PSA). The results showed that the factors influencing the decision of young farmers to continue family sheep farming are a hobby, hereditary business, profitable business, sheep as savings, sheep agility competition, environmental support, side business, and utilization of family labor. The eight factors are spread across three quadrants: symptom, critical element, and buffer. Factors influencing young farmers not to continue family sheep farming are not a hobby, preferring to work outside the farm, limited fodder forage, farmers lose but traders gain, lack of sheep farming skills, limited land and capital, no parental support, farming is not a prestigious profession and uncertain income. The nine are spread into two quadrants, namely symptom, and critical elements. Therefore, the local government continues to maintain the continuity of livestock contests and agility fights of Garut sheep. These events are proven to encourage farmers to keep raising sheep, including the next generation.

Keywords | Succession, Sheep farms, Young farmer, Family farms, Participatory system analysis

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INTRODUCTION

Family farms dominate the agricultural sector in Asia and the Pacific, with approximately 74 percent being family farmers (Jingzhong and Lu., 2016), including in Indonesia. Family farms are characterized by small-scale operations managed and operated by family labor (World Bank, 2003; Garner and Compos, 2014). Family farm-

ing plays a vital role in food security, poverty alleviation, improving livelihoods improvement, managing and protecting natural resources and the environment, and labor absorption (AFA, 2014). Although the production capacity of family farms is small, they are able to provide food sources not only for their families but also sell the surplus to others. Sales of surplus food resources are used to meet the needs of their families. The critical role of the family

farming sector is expected to reduce the migration rate of family members out of the agricultural sector (FAO, 2013). However, in this digital era, family farms may be unable to keep family members out of the agricultural sector, especially young farmers, because work outside the agricultural sector is more prosperous than in the agricultural sector (Suriani *et al.*, 2023).

The phenomenon of family farm successors is one of the obstacles in operating family farms, not only in developed countries but also in developing countries. This condition has become a severe issue in developed countries since the 1990s (Bohak and Borec, 2009). The emergence of industry in urban buffer areas and the relatively rapid development of cities are critical factors for agricultural youth to work in these two areas (Lobley *et al.*, 2010; Firman *et al.*, 2018). Moreover, the rapid development of digital technology can change agricultural youth's behavior, relationships, and perspectives toward agriculture (Suriani *et al.*, 2023). This factor is one of the obstacles young farmers face when continuing family farming.

The generation of young farmers emphasizes the replacement of parents by agricultural youth through a complex and time-consuming process. This process involves the transfer of ability, tradition, and agricultural capital to continue the family farming (Bohak and Borec, 2009; Firman *et al.*, 2018). The process of transferring knowledge, skills, management and control, ownership of a family farm business, or intangible assets from parents to their children or younger generations is not a simple task (Lobley, 2010; Firman *et al.*, 2019), or it can be called the succession process (Kebler, 2012). Succession is not a sudden or momentary event but a time-consuming process that requires patience and understanding. Potential successors usually start engaging in farming practices and family farm management from primary school age (Firman *et al.*, 2019). However, involvement from this age does not necessarily mean that children can continue on the family farm. Many factors contribute to children's willingness to continue on the family farm, such as the image declining of working in agriculture because of information from social media, ignoring smallholder producers, limited accessibility of the farmland, no good incentives for working in agriculture, and preferring to work in industry (Ambarwati, 2016).

Livestock farming is very diverse in Indonesia, including dairy farming, beef cattle farming, sheep farming, and others. However, these farms are dominated by family farms and small-scale farms. Succession research on dairy cattle enterprises has been conducted. The results showed that of the 16 factors involved in the model, only two factors influenced the successor to continue the parents' business: the number of family members and the length of time participating in the family dairy farming business (Firman *et al.*,

2019). How about the succession of sheep farmers in Garut Regency? Garut Regency is one of West Java Province's regencies, and it has a native breed of sheep, namely Garut Sheep. The Indonesia Ministry of Agriculture (2011) determined that the Garut sheep is one of Indonesia's local sheep breeds, with uniform physical form and composition and good adaptability to environmental limitations. Garut sheep originated from the crossing of merino sheep from Australia, with the kaapstad sheep from South Africa crossed with thin-tailed sheep or local sheep (FAO, 2007). Qualitative and quantitative characteristics of Garut sheep are: coat color is dominated by a combination of black and white, male coat color is more black and large circular horns (Heriyadi, 2005), and average body weight is 57.74 kg, body length is 63.41 cm and chest circumference is 88.73 cm (Heriyadi *et al.*, 2012).

Garut sheep are a germplasm asset of West Java and can be a source of meat and an agile type (Mansjoer *et al.*, 2007). One of the factors that has caused this local sheep to survive until now is agility events. This agility competition was initiated by the 5th Garut Regent, R.A.A. Soeria Kartalegawa, in 1915-1926 (Hidayatulloh *et al.*, 2019). The competition changed the rules of the game; therefore, animal welfare rules were not violated. This event is not only about sheep agility but also about bargaining among sheep farmers and hobbyists. Generally, the price of Garut sheep will increase if the sheep wins the agility event. This event is held in each district and organized by the Sheep and Goat Breeders Association (HPDKI) at the district level in West Java Province. In addition, the West Java Provincial Government holds an annual Garut sheep livestock contest. The contest is held to find superior seeds of Garut sheep, such as the queen of Garut sheep ewes, king of Garut sheep males, king of lambs, king of meat/weight, and king of handsome. Both events (agility and livestock contests) are enticements for Garut sheep farmers to maintain the genetic resources of Garut sheep (Hidayatulloh *et al.*, 2019; Izzati, 2017).

These events are one of the factors that signify the sustainability of Garut sheep farming. However, these events influence the younger generation to continue the family's Garut sheep farm. This question became the basis for researchers in researching the decision of the next generation to continue or not continue the family's Garut sheep farm. Previous researchers have used several approaches to determine the factors that influence which generation is likely to continue the family farm, such as DEX (Decision EXpert) and econometric methods (Borec *et al.*, 2013; Misra *et al.*, 2010). Unlike the previous researchers, this research uses the Participatory System Analysis (PSA) approach. PSA is a Focus Group Discussion (FGD) method that involves a group of stakeholders, such as farmers, traders, government staff, or those related to participants, to find impor-

tant factors and make meaning of the data obtained from the views or ideas of participants (Lynam, 2001; Herweg and Steiner, 2002). Therefore, this study aims to analyze what factors influence the younger generation to continue or not to continue the family's Garut sheep farming with the PSA approach.

MATERIALS AND METHODS

RESEARCH SUBJECT

Research on the factors influencing successors to participate and not participate in Garut family sheep farming was conducted through Focus Group Discussions (FGDs). This study, which involved 32 informants, including 19 government representatives, 11 sheep farmers and young farmer representatives, one representative trader, and one representative of the HPDKI organization, is of significant importance to the understanding of sheep farming participation factors. Informants are individuals who have a deep understanding and experience of a matter, and can provide information that data and information that can represent certain individuals who are usually used in qualitative research (Sinha and Hassan, 2012; Tongco, 2007). Due to informants can represent several individuals (Sinha and Hassan, 2012) and in qualitative research does not know the withdrawal of samples and populations because qualitative research aims to generalise the population, such as family sheep research (Robinson, 2014). The informants invited in the FGDs were selected by purposive sampling, who are knowledgeable and reliable in raising and selling Garut sheep. The selected informants can contribute to providing extensive information about Garut sheep. The informants were aged between 20 and 45, with the majority aged 20 and 29 years old (Adioetomo *et al.*, 2014). This means that the age range includes the youth category as Law of the Republic of Indonesia, No. 40/2009. In particular, the selected sheep farmer informants are within this age range, representing five farmer groups from each study area, and the young sheep farmer informants are also industrial labourers in Garut City. Factory labour is the main livelihood, while Garut sheep farming is a side business. Government representatives, sheep traders, and associations can provide information related to their respective fields, such as regulations, sheep marketing, and livestock contests.

RESEARCH LOCATION AND COLLECTING DATA

This study covers Garut Regency because it is the genetic source of Garut sheep. Five sub-districts were selected based on purposive sampling because they are the areas that produce genetically pure Garut sheep: Leles, Banyuwresmi, Tarogong Kidul, Tarogong Kaler, and Cilawu. The local government has designated the five regions as genetic sources for pure Garut sheep.

The data collected were primary and secondary data. Pri-

mary data was obtained from the FGD results, and secondary data was obtained from agencies related to the research, such as the Garut Regency Fisheries and Livestock Service Office, Garut Regency Central Bureau of Statistics, and other related agencies.

PARTICIPATORY SYSTEMS ANALYSIS (PSA) PROCEDURES

This research adopts a unique qualitative approach, the Participatory Systems Analysis (PSA). This method places a strong emphasis on the individual perspectives of the participants in the Focus Group Discussion (FGD), thereby providing a diverse range of views on the questions posed. The researchers engaged a variety of stakeholders, including representatives from the local government, Garut sheep farmers, young farmers, traders, and the association (HPDKI). The Garut District Fisheries and Livestock Service Office generously provided the venue for the FGD. As previously mentioned, the participants represented a cross-section of the community, including government officials, breeders, traders, and association members. Although the FGD activities were held at the local government because it had a representative FGD venue and limited facilities, each participant should not be influenced by the venue and other FGD participants. This is in accordance with the PSA rules of the game that were conveyed by the FGD facilitator prior to the activity. FGD participants were free to give suggestions and inputs according to their own perceptions without influencing each other.

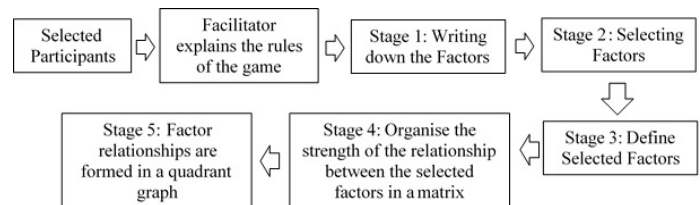


Figure 1: Participatory system analysis (PSA) procedure.

The PSA procedure (Figure 1), as outlined by Herweg and Steiner (2002), was employed to understand the factors influencing young farmers' participation in family Garut sheep farming, following these steps:

- Stage 1: Informants were asked to mention 3-5 factors influencing young farmers to participate and not participate in family Arrowroot sheep farming and write them down on the paper distributed. Informants were not allowed to cooperate in mentioning these factors.
- Stage 2: The facilitator plays a crucial role in the PSA procedure. They are responsible for collecting all the participants' answers and grouping similar responses, facilitating the data analysis process. The facilitator asked the informants to select the factors that strongly influence the young generation's willingness to participate or not participate in Garut family sheep farming.
- Stage 3: Furthermore, the informants defined the se-

lected factors to clarify their meaning.

- Stage 4: The next step calculates the relationship of one factor to another; for example, factors A to B have a value of 0.5 weak relationship, one medium relationship, and two strong relationships.
- Stage 5: We are analyzing the relationship of these factors described in the analysis method using a quadrant graph.

ANALYSIS METHOD

Participatory System Analysis (PSA) analysis to measure the strength of the relationship between the selected factors (Herweg and Steiner, 2002). The strength of the relationship is calculated based on the following criteria: (a) A value of 2 is a strong relationship, (b) A value of 1 means a medium relationship, and (c) A value of 0.5 indicates a weak relationship (Table 1). The assignment of relationship strength values, such as 0.5, 1, and 2 by participants is based on each individual's experience and knowledge, and other participants cannot influence each other because they are supervised by the FGD facilitator. Table 1 measures the strength of the relationship between factors, either starting from the column or row, for example, the relationship between factors A and B in one column, A and C, and so on, then given a value according to the strength of the relationship. Next is summing between columns (passive sum (PS)) or rows (active sum (AS)). Table 1 shows the Active Ratio and Degree Interrelation assessment. The Active Ratio was measured by dividing AS with PS (AS/PS), and the Degree of Interrelation was determined by AS times PS ($AS*PS$) on each factor. Both assessments are used to see the position of the values on the quadrant chart.

Table 1: Power scoring between factors' relationship.

No	Factors	A	B	C	D	etc	Active Sum	Degree of Interr
							(AS)	PS*AS
1	A							
2	B							
3	C							
4	D							
5	etc							
Passive sum (PS)								
Activity ratio(AS/PS)								

The quadrant graph is divided into four quadrants: Symptom, Buffer, Critical Elements, and Motor/Lever (Figure 2) (Herweg and Steiner, 2002). The symptom quadrant illustrates factors were strongly affected by the other and did not have the power to change the system. Buffer quadrants are factors that do not affect or influence other factors in the system. The Critical Element quadrant reveals factors that accelerate and catalyze the system, but these factors

can change over time and produce adverse effects on the system. The Motor/Lever quadrant describes factors predicted to influence other factors.

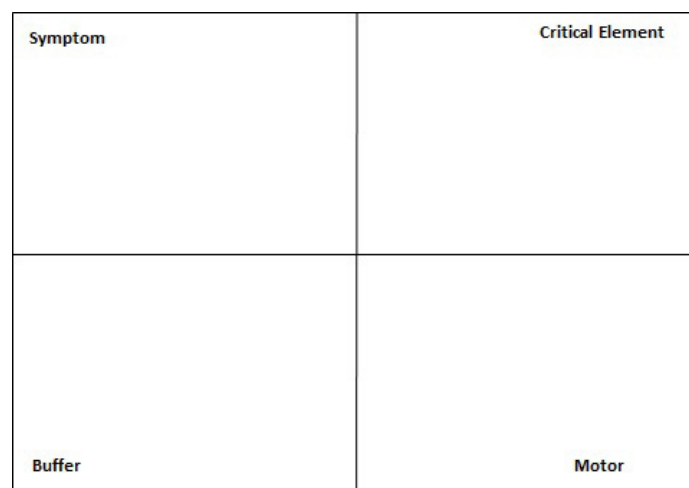


Figure 2: Factor position in quadrant.

RESULTS AND DISCUSSIONS

OVERVIEW OF SHEEP POPULATION

Garut Regency, a gem in the West Java province, is celebrated for its sheep commodity. The local breed, the Garut Sheep, has not only become an icon for the district but also a source of pride for the entire region. The Indonesian government, through the Ministry of Agriculture, has acknowledged the importance of this breed, as evidenced by the Minister of Agriculture Regulation No. 2914/Kpts/OT.140/6/2011 on the Determination of Garut Sheep Breed. This regulation has firmly established Garut Sheep as a key part of Garut Regency's agricultural identity. For a visual representation, please refer to Figure 3.

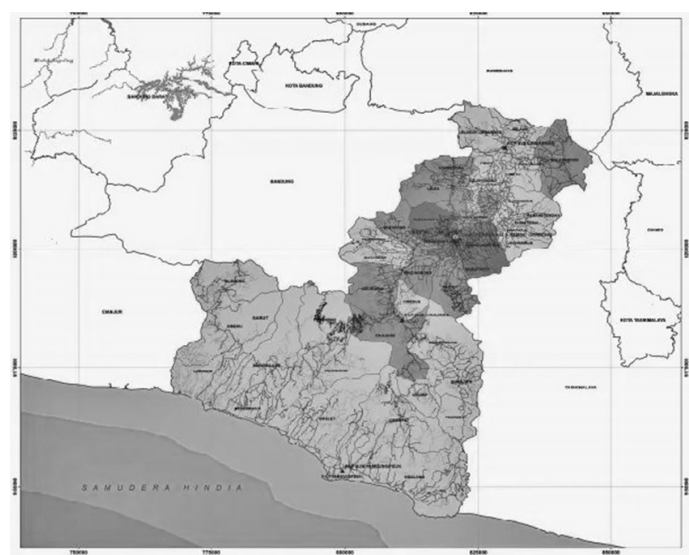


Figure 3: Garut regency map.

Based on data from the Central Bureau of Statistics (BPS) Garut Regency in 2024, the number of sheep exceeds other

commodities (Figure 4). In the figure, the sheep population from 2019 - 2023 experienced an increase in population, from 976,492 heads to 1,036,978 heads. The goat commodity ranks second in the livestock population, although the population is smaller than sheep. The population of goats did not increase from 2019 to 2023, indicating that Garut farmers are more likely to raise sheep than goats. Sheep is the most minor commodity compared to other livestock. Sheep are the livestock most affected by the Foot-and-Mouth Disease (FMD) outbreak. The number of sheep population decreased by 1,300 from 2022 - 2023. The population growth of beef and dairy cattle fluctuates from 12,000 heads to under 35,000 heads.

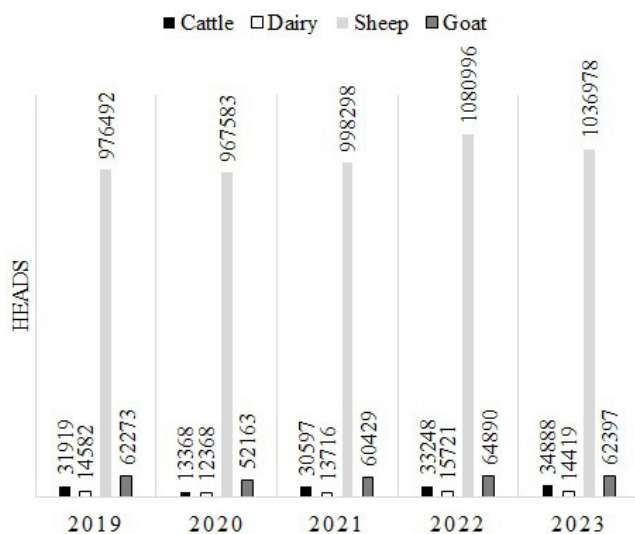


Figure 4: Ruminants population growth in garut regency.

STAGES OF PARTICIPATORY SYSTEM ANALYSIS

The facilitator, a key figure in this process, has raised concerns about the future sustainability of sheep farming, particularly in the Garut Regency. The changing times and the behavior of the younger generation, influenced by lifestyle changes and digitalization, are seen as potential causes for the declining interest in sheep farming. Therefore, the focus of this stage of the FGD is to identify the factors that influence the younger generation's decision to either continue or discontinue family sheep farming under the expert guidance of the facilitator.

This stage of PSA consists of determining and agreeing on the factors that influence young farmers' decision to continue the Garut Family sheep farming, the influence between factors, and factor analysis. These processes were carried out in focus group discussions involving 32 informants. The informants freely expressed their opinions, which were written on paper by the direction of the facilitator. The questions focused on the factors encouraging young farmers to continue or discontinue Garut sheep farming.

FACTOR DETERMINATION AND DEFINITION

Participants were asked to write 3 - 5 words related to what

factors influence whether or not to continue the family's Garut sheep farming. Participants wrote 3-5 influential factors on two papers distributed by the facilitator, namely whether to continue or not to continue. FGD participants are given 10 minutes to write; then the facilitator collects the two papers. The facilitator categorizes the same or similar answers from the participants, while the answers that do not fit into these groups are separated.

After a thorough process of grouping similar or identical answers, the factors influencing young farmers to continue or discontinue family Garut sheep farming were identified. There were 12 factors for continuation and 13 factors for discontinuation. In agreement with the FGD participants, the factors were further categorized into eight for continuation and nine for discontinuation. Participants were then asked to provide definitions for these factors, which can be found in Table 2.

DETERMINATION OF STRENGTH OF RELATIONSHIP BETWEEN FACTORS

The facilitator created two tables. Table 1, which illustrates the factors influencing young farmers to continue family farming and those who do not, was made on the board. The facilitator invites participants to assess these factor relationships, horizontally or vertically, by rating 2 strong relationships, one medium relationship, and 0.5 weak relationships. The tables of results of the assessment of the relationship between factors can be seen in Tables 3 and 4. Table 3 shows that the highest value for the degree of relationship is 120, while the lowest value is 59.5. The highest value on the activity sum is 1.2, and the lowest is 0.8. Table 4 shows that the highest degree value is 137.5, while the lowest is 81. It means that participants scored highly for the factor relationship in Table 3. It is likely related to the FGD participants' intense concentration on the sustainability of family sheep farming.

DETERMINATION OF FACTOR COORDINATES ON THE GRAPH OF PARTICIPATORY SYSTEM ANALYSIS

The results of determining the factors in Tables 3 and 4 form the basis for drawing the position of the factors on the gradient. In Figure 1, there will be four gradients, namely the Symptom, Buffer, Critical Elements, and Motor/Lever quadrants (Herweg and Steiner, 2002). Symptom quadrants are factors strongly influenced by other factors and have no power to change the system. Buffer quadrants are factors that neither affect nor are affected by different factors. The Critical Elements quadrant is a factor that acts as an accelerator and catalyst for the system. Still, these factors must be understood in detail because they can change at any time, not as expected, or have side effects. Finally, the motor/lever quadrant is a factor that is predicted to influence other factors, providing a sense of predictability and reassurance in the system's analysis.

Table 2: Definition of factors.

No	Factors	Definition
A. Continuing the family farming		
1	Hobbies	Hobbies are raising sheep has been a habit since childhood
2	Hereditary business	raising sheep is passed down through generations
3	Profitable business	raising sheep is very profitable, especially the sheep become agility champions
4	Sheep as savings	sheep as savings because in case of urgent need it can be sold quickly
5	Sheep agility competition	an event of Garut sheep agility by competing using the rules of the game and accompanied by a set of traditional art tools, and there are elements of martial arts.
6	Environmental support	Environmental support, especially fodder sources, climate, and neighbors
7	Sheep farming as a side business	sheep farming as a side business in addition to the main business, such as farmers, factory workers, civil servants, etc.
8	Using family labor	sheep rearing does not require labor outside the family, it is sufficiently handled by family labor
B. Not continuing the family farming		
	Dislike livestock/not a hobby	sheep rearing is not interesting to keep it, and is not a hobby.
	Prefers to work off-farm	The younger generation prefers to work outside the farm because they can get regular income per month compared to the farm with uncertain income.
	Limited forage	Limited agricultural land as a source of forage feed due to land conversion to housing, factories, or for other uses
	Farmers lose, traders gain	Generally, the bargaining position of farmers is lower than that of sheep traders.
	Lack of sheep-keeping expertise	Young farmers have no experience in raising sheep
	Limited land and capital	Young farmers have limited land and capital and tend to rely on their parents
	No parental support	Parents are more likely to work outside of sheep farming
	Farming is not a prestigious profession	Being a sheep farmer is not an exciting and prestigious job
	Uncertain revenue	Sheep farmers do not provide regular and uncertain income

Table 3: Factors influencing young farmers' decisions to continue family farming.

No	Elements	1	2	3	4	5	6	7	8	Active Sum (AS)	Degree of Interr (PS*AS)
1	Hobbies		2,0	2,0	1,0	2,0	2,0	1,0	1,0	11,0	99,0
2	Hereditary business	2,0		2,0	2,0	1,0	1,0	0,5	2,0	10,5	94,5
3	Profitable business	2,0	1,0		2,0	2,0	2,0	1,0	0,5	10,5	115,5
4	Sheep as savings	1,0	1,0	2,0		1,0	2,0	2,0	2,0	11,0	115,5
5	Sheep agility competition	2,0	1,0	2,0	0,5		2,0	1,0	2,0	10,5	94,5
6	Environmental support	1,0	2,0	1,0	1,0	2,0		2,0	1,0	10,0	120,0
7	Sheep farming as a side business	0,5	1,0	1,0	2,0	0,5	1,0		1,0	7,0	59,5
8	Using family labor	0,5	1,0	1,0	2,0	0,5	2,0	1,0		8,0	76,0
	Passive sum (PS)	9,0	9,0	11,0	10,5	9,0	12,0	8,5	9,5		
	Activity ratio (AS/PS)	1,2	1,2	1,0	1,0	1,2	0,8	0,8	0,8		

FACTOR INFLUENCING YOUNG FARMER'S TO CONTINUE FAMILY SHEEP FARMING

Table 3 describes young farmers who will continue the family sheep farm. The table was transformed into a four-gradient divided graph form. It can be seen in Figure 5. Factors in the symptom category include a profitable business (No.3), savings (No.4), environmental support (No.6), and utilization of family labor (No.8). The category means that other factors strongly influence these four factors and do

not have the power to change the system. Sheep breeding, especially Garut sheep, is a profitable business because two competitions can increase the price value of Garut sheep, namely livestock contests and agility events (Hidayatulloh *et al.*, 2019; Alhuur *et al.*, 2023). These two events become the target of Garut sheep breeding to produce the best genetics, such as queen ewe, handsome king, lamb king, meat king, and agility champion (Regional Regulation No. 6 Year 2022 on the Preservation and Development of

Garut Sheep, article 7 paragraph 3; [Dahtiar et al., 2024](#)). However, these events need to be organized or held for long periods, which can discourage farmers from keeping Garut sheep. Generally, farmers keep sheep as savings because the asset can be liquidated or sold quickly for family needs, such as school needs, weddings, children's circumcisions, and sheep sacrifices on Eid al-Adha ([A'yun et al., 2024](#)). Agriculture is the leading sector in Garut Regency. In addition, the study location is in a tropical climate. Therefore, the environment supports the development of Garut sheep farming in Garut Regency, not only in terms of climate but also the provision of feed support in terms of agricultural waste. Garut sheep are suitable for raising in tropical climates such as the Garut Regency ([Firman et al., 2018](#)). Garut sheep farmers tend to raise their sheep by using family labor, especially involving the farmer's children in looking for grass ([Khotimah et al., 2022](#)). Therefore, all factors in the Symptom quadrant should be considered carefully, as these factors may become future constraints for the family sheep farm.

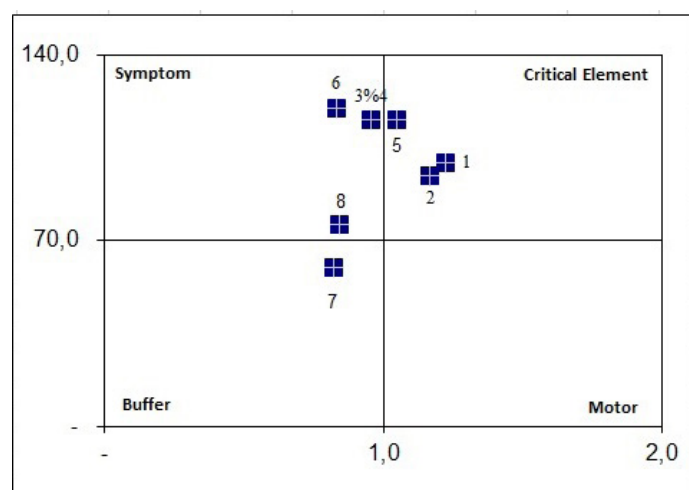


Figure 5: Factors influencing young farmer's decision to continue family sheep farming.

Other factors such as hobby (No. 1), hereditary business (No. 2), and sheep agility competition (No. 5) are included in the critical element quadrant. These quadrants act as accelerators and catalysts for the system, but these factors must be understood in detail because they can change at any time, not as expected, or have side effects. This quadrant can induce other factors in the system to have a positive or negative impact. Hobbies are an influential factor for young farmers to continue family sheep farming. There needs to be more than Garut sheep farming to raise sheep. The Theory of Planned Behaviour states that attitudes, controls and norms influence behaviour and are triggered by intentions, for instance a hobby. The hobbyist who gradually discovers that a business can be made out of a hobby ([Kautonen et al., 2014](#)). This condition is similar to Garut sheep farming because the environment, such as friends who are also Garut sheep hobbyists, will strongly influ-

ence young farmers to raise sheep. Intensive friendship with Garut sheep hobbyists can indirectly influence young farmers to be interested in raising sheep. Moreover, in this commodity, there are various events held in order to improve the genetic quality of sheep, such as the Garut sheep agility competition and livestock contest ([Hidayatuloh et al., 2019](#)).

In general, Garut sheep farming is a hereditary business from one generation to the next because one of them is the Garut sheep agility event ([Rusdiana and Adiati, 2019](#)). The gamut sheep agility event is a routine event organized by HPDKI. It is organized differently in each region, such as every month, three, or six months. Garut sheep farmers eagerly await the event because it can increase the price value of the sheep, especially as agility champions ([Figure 6](#)). Therefore, the factors described earlier are critical elements that can catalyze and accelerate the system, but they can change at any time and negatively impact the system.



Figure 6: Garut sheep agility competition.

The factor of sheep as a side business (No. 7) is the only factor that falls into the buffer quadrant. This factor cannot be influenced or affect other factors in the system. Garut sheep farming is still a side business for some farmers because it has yet to become the family's livelihood ([Rusdiana and Adiati, 2019](#)). Generally, farming communities have a main livelihood in supporting their families, such as farming, sharecropping, factory labor, or delivering people or goods via motor vehicles. Sheep farming meets urgent family needs because sheep are liquid assets.

FACTOR INFLUENCING YOUNG FARMER'S TO NOT CONTINUE FAMILY SHEEP FARMING

[Table 4](#) illustrates the condition of young farmers not continuing family sheep farming. The values in [Table 4](#) are transformed into a gradient, the results of which can be seen in [Figure 7](#). Nine factors influence farmers to quickly discontinue family sheep farming, namely (1) unhobby, (2) prefer to work outside the farm, (3) Limited fodder forage, (4) Farmers lose but traders gain, (5) Lack of sheep farming skills, (6) Limited land and capital, (7) No parental

Table 4: Factors influencing young farmers' decision not to continue family farming.

No	Elements	1	2	3	4	5	6	7	8	9	Active Sum (AS)	Degree of Interr (PS*AS)
1	Dislike livestock/not a hobby		2,0	0,5	1,0	1,0	0,5	2,0	2,0	1,0	10,0	135,0
2	Prefers to work off-farm	2,0		1,0	2,0	0,5	1,0	1,0	1,0	1,0	9,5	123,5
3	Limited forage	1,0	1,0		1,0	2,0	2,0	1,0	1,0	2,0	11,0	82,5
4	Farmers lose, traders gain	2,0	2,0	1,0		1,0	0,5	1,0	2,0	2,0	11,5	103,5
5	Lack of sheep-keeping expertise	2,0	2,0	1,0	1,0		2,0	1,0	2,0	1,0	12,0	102,0
6	Limited land and capital	0,5	1,0	2,0	1,0	1,0		1,0	0,5	2,0	9,0	81,0
7	No parental support	2,0	2,0	0,5	1,0	1,0	1,0		2,0	2,0	11,5	115,0
8	Farming is not a prestigious profession	2,0	1,0	1,0	1,0	1,0	1,0	2,0		2,0	11,0	137,5
9	Uncertain revenue	2,0	2,0	0,5	1,0	1,0	1,0	1,0	2,0		10,5	136,5
	Passive sum (PS)	13,5	13,0	7,5	9,0	8,5	9,0	10,0	12,5	13,0		
	Activity ratio (AS/PS)	0,7	0,7	1,5	1,3	1,4	1,0	1,2	0,9	0,8		

support, (8) Farming is not a prestigious profession, and (9) Uncertain income.

All these factors are spread over two quadrants: the symptom quadrant and the critical elements quadrant. However, none of the factors fall into the buffer and motor/leverage categories. In critical quadrant, there are four factors that fall into this category, namely limited forage (No. 3), farmers lose but traders gain (No. 4), lack of expertise in raising sheep (No. 5), and no parental support (No. 7). These quadrants act as accelerators and catalysts for the system, but these factors must be understood in detail because they can change at any time, not as expected, or have side effects. One of the barriers for young farmers to get involved in sheep farming is limited forage. Farmers look for forage in grassy fields or in gardens or other vacant land. However, with the rapid conversion of land from agriculture to housing, factories and so on, vacant land is becoming limited, which affects the supply of forage (Tanuwiria *et al.*, 2007). The Indonesian government through the Ministry of Agriculture has issued Law No. 41/2009 on the Protection of Sustainable Food Agricultural Land, so that rice fields in this category cannot be converted into any form, such as factories or settlements. With this regulation, it is still possible for sheep farmers to get forage from agricultural waste. Generally, farmers always lose their bargaining position with traders. Likewise, sheep farmers always lose the bargaining position of the selling price of sheep by traders because farmers need some money for urgent needs (Santoso and Fitasari, 2017). Therefore, the farmer will accept the price offered by the trader and it is usually far from the price offered by the farmer. Farmers have to look for forage further away from their homes using motorised vehicles. The factor 'lack of expertise in raising sheep' belongs to the critical quadrant where the factor can act as accelerators and catalysts for the system, but these factors can change

at any time or have side effects. Therefore, the government in collaboration with farmer groups conducts training programmes on Garut sheep rearing for young farmers. Possibly, young farmers could be interested in sheep farming after the training programme. The factor "no parental support", this factor may change parents' thinking to support their children to continue family sheep farming, if parents witness the success of young farmers in raising sheep and making the farm a livelihood.

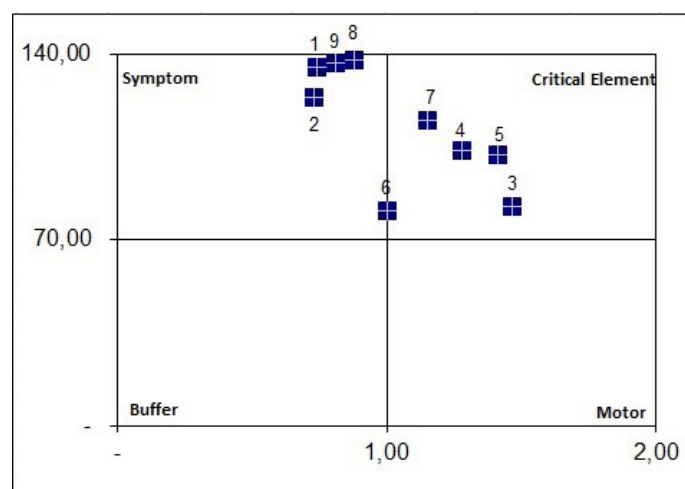


Figure 7: Factors influencing young farmer's decision not to continue family sheep farming.

In symptom quadrant, there are four factors that fall into this category, namely unhobby (No 1), prefer to work outside the farm (No. 2), farming is not a prestigious profession (No. 8), and uncertain income (No. 9). The symptom quadrants are factors strongly influenced by other factors and have no power to change the system. The unhobby factor of keeping sheep is a factor that arises from oneself due to something that traumatises the individual himself caused by various things, such as being hit by a sheep's horn.

The unhobby factor is very difficult to change unless the traumatic condition can be cured. Young farmers are more likely to choose to work off-farm due to the emergence of industries in rural areas, especially in Garut Regency. The emergence of industries located in rural areas encourages young farmers to work in these industries rather than raising family sheep. Factory labour is an option for children of farmers to work in the industry because the job provides regular income. In addition, working in a factory is more prestigious than working on a family sheep farm. The factor 'farming is not a prestigious profession' is one of the factors inhibiting young farmers to work in sheep farming (Sahidu *et al.*, 2023). Information related to news on social media that leads to negative information about livestock can encourage young farmers not to work on sheep farms, such as animal husbandry is a source of waste, and difficult to get rich.

The number of agricultural households in Indonesia was 27.68 million in 2018. Only 63.66% of these households make agriculture their main source of livelihood (Komalasari *et al.*, 2022). Based on the results of the 2018 agricultural survey, it shows that the average income of agricultural households is IDR 26.56 million per year and 46.7% of the total income is contributed from agriculture (Ministry of Agriculture, 2022). Based on the results of the 2018 agricultural survey, it shows that the average income of agricultural households is IDR 26.56 million per year and 46.7% of the total income is contributed from agriculture, such as food crops, livestock, plantations, or fisheries. This shows that agricultural income is not able to fulfil the needs of agricultural households (Azarov *et al.*, 2022). Generally, farm income is erratic or uncertain income. Agricultural income is erratic because agriculture is highly dependent on the season (dry and rainy season, or market season). Therefore, farmers look for other sources of income to fulfil their family's needs

The "Limited land and capital" factor (No. 6) was between the symptom and critical element quadrants. Other factors can influence the factor but do not have the power to change the system. Limited land and capital are typical constraints in agricultural communities. This limitation is the reinforcing factor or reason why farmers have small and limited agricultural or livestock production capabilities. This condition causes farmers to be in or below the poverty line. This is evidenced by the fact that 95.04% of farmers have small plots of land, and the rest is 4.96%. Land ownership is the main source of agriculture because agriculture requires land resources. Therefore, farmers will continue to strive to manage narrow agricultural lands. On the other hand, this factor can also catalyze and accelerate the system but can change at any time and have a negative impact. However, the government conducts technology assistance programs to improve livestock or agriculture on limited

land; this limitation is not an obstacle to increasing production. Over time, the impact of government programs on farmers may lead to farmer dependency on government programs. Capital constraints, which are one of the problems of agriculture, have been reduced by the government through the people's business credit programme through the banking mechanism. The government subsidises the programme to increase agricultural capital, including sheep farmers. The obstacle is that farmers do not dare to take loans from banks because they are afraid they will not be able to pay the instalments (Rahmah and Nurhayati, 2024).

The livestock industry in developing countries has been dominated by small producers. The characteristics of small farmers have small livestock holdings, limited land and capital, semi-permanent cages, traditional management, family based labor, poor and food insecure, having multiple economic activities, insufficient money and assets to maintain livestock (Daud *et al.*, 2015; Asmara *et al.*, 2017; Firman *et al.*, 2018; Rapsomanikis, 2015). In contrast, it can be noted that farmers in developed countries differ in terms of production, assets, capital, and financial structure. The different characteristics reflect the conditions of the agricultural industry in the respective countries.

Farm characteristics can reflect the succession conditions of family farms. Some research results related to the factors that influence the succession of family farms are as follows:

- Factors influencing the younger generation to continue family farming in the UK are that family farmers who have succession planning are more successful than farmers who do not have succession planning (Lobley, 2010).
- An underlying factor in the decision of the younger generation to continue farming in the UK, France and Canada is the division of responsibilities between farmers and their successors (Errington, 2002).
- Research in Greece shows that family farms are more likely to favour men as successors to family farms (Gidarakou *et al.*, 2000).
- A succession factor in Belgian farms is that low total assets are a cause of family succession stalling (Calus *et al.*, 2008).
- Research on dairy farms in Pangalengan sub-district in Indonesia shows that the number of family members and the length of time helping parents on the family farm are factors that encourage children to continue the family farm (Firman *et al.*, 2018).

Compared to the results of research on Garut sheep farming, the factors that influence young farmers to continue family sheep farming are hobby, hereditary business, profitable business, sheep as savings, sheep agility competition, environmental support, sheep farming as a side business

and using family labour. The eight factors encourage the younger generation to continue the family's Garut sheep farming. This finding is very different from research results in several developed countries and dairy farms in Indonesia. The existence of young farmers to continue Garut sheep farming is the key to the sustainability of Garut sheep in Garut Regency.

CONCLUSIONS AND RECOMMENDATIONS

Based on the description above, the conclusions that can be summarized are as follows: (1) factors influencing young farmers' decision to continue family sheep farming are a hobby, hereditary business, profitable business, sheep as savings, sheep agility competition, environmental support, side business, and utilization of family labor. Factors in the symptom category include a profitable business, savings, environmental support, and utilization of family labor. The critical elements are hobbies, hereditary business, and sheep agility competition. The factor 'sheep as a side business is the buffer category. (2) factors influencing young farmers' decision to continue family sheep farming are not a hobby, preferring to work outside the farm, limited fodder forage, farmers lose but traders gain, lack of sheep farming skills, limited land and capital, no parental support, farming is not a prestigious profession, and uncertain income. The factors in the symptom category are limited forage, farmers lose but traders gain, lack of expertise in raising sheep, and no parental support. The critical element categories are not a hobby, preferring to work off-farm, farming not being a prestigious profession, and uncertain income. Limited land and capital are between the symptom and the critical element of the category. Recommendations that can be given on the results of the study are that the local government continues to maintain the continuity of livestock contests and agility fights of Garut sheep. These events have been shown to encourage farmers to continue raising sheep. Because these results are the results of FGDs, for further research, surveys to direct farmers can be carried out next year.

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NOVELTY STATEMENT

The novelty of this study lies in its research objectives and analysis methods. The objective of this research is the decision of young farmers to continue or not to continue family sheep farming. The method used is participatory systems analysis (PSA) where previous studies used DEX (Deci-

sion EXpert) and econometric methods.

AUTHOR'S CONTRIBUTIONS

Achmad Firman: Conceptualization, Supervision, and Editing. Diki Ramdani and Lilis Nurlina: Validation, Methodology, and Writing Review. Yayan Rismayanti: Data Analysis, Resources, and Writing Original Draft.

CONFLICT OF INTEREST

The authors have declared no conflict of interest.

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