AGRISOCIONOMICS
Jurnal Sosial Ekonomi dan Kebijakan Pertanian

ISSN 2580-0566; E-ISSN 2621-9778
http://ejournal2.undip.ac.id/index.php/agrisocionomics
Vol 9 (3): 737 -754, November 2025

Mapping and Governance Analysis of Gambier Value Chain Upgrading in West Sumatra

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Submitted 6 April 2025; Approved 6 September 2025

ABSTRACT

Gambier faces various challenges along the value chain, including financing problems and the quality of gambier that does not meet standards because it still uses mixed materials. This study aims to identify value chain mapping, analyze value chain governance patterns, and analyze strategies for improving the gambier value chain in West Sumatra. The research location was purposively selected on the grounds that Lima Puluh Kota Regency and Pesisir Selatan Regency are the largest gambier centers in West Sumatra. This study used the data analysis method from Gereffi and Fernandez-Stark 2016 and ACIAR 2012. The results explained that the activities carried out were planting, harvesting, processing, drying, packing, quality control, sales, with the actors involved being farmers, intermediary traders, cooperatives, large traders, and exporters. The type of governance formed in this gambier value chain is market governance. With low complexity, high codification and high capability variables. The upgrading strategy carried out in this study uses 3 types of upgrading, namely product upgrading, process upgrading, and function upgrading. Product upgrading can be done by making gambier product innovations. Process upgrading can be done by using modern technology in processing to increase the yield and quality of gambier. Function upgrading can be done by building processing facilities that are able to produce high-quality gambier products according to international standards.

Keywords*: Gambie bootchr, Product innovation, Value chain*

BACKGROUND

Gambier is a plantation commodity that is an export commodity for Indonesia and is traded in the form of gambier mix obtained from the extract of the leaves and twigs of the gambier plant. Indonesia is the supplier of 80% of gambier commodities in the world market. Demand for gambier from India as the main destination country for gambier exports also continues to increase, reaching 13-14 thousand tons per year. The gambier plant is used to make betel nut for the community, but another function of gambier is for a mixture of medicinal ingredients, leather tanners, and textile dyes. This commodity is a staple livelihood that grows and develops well in Indonesia, gambier is also an export commodity that is able to contribute to the Gross Regional Domestic Product. (GRDP) (Almizan et al., 2023). The contribution of gambier to the GDP of the agricultural sector ranges from 10% to more than 20%, while in the plantation sub-sector, the contribution even reaches around 40%. This contribution value indicates that gambier is a major commodity that plays an important role in the region's economy (Anggriawan & Indriawati., 2013).

ISSN 2580-0566; E-ISSN 2621-9778
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The main market for Indonesian gambier is export, where Indonesia supplies 80% of the world's gambier needs, this is an opportunity for the development of gambier plants because it has opportunities in international marketing (Elviati et al., 2021). Indonesian gambier exports amounted to 19.10 tons with an export value of 46.59 million USD. The destination countries for Indonesian gambier exports are India, China, Bangladesh, and other countries (Ditjenbun, 2023).

Table 1. Indonesian Gambier Exports by Destination Country in kg and Thousand USD

Export Destination Countries	Volume	Value
India	17.839.007	45.276.633
Pakistan	709.640	462.548
China	305.620	389.696
Bangladesh	183.906	331.275
Korea	9.090	47.470
Nepal	6.800	33.550
Malaysia	7.000	26.900
Myanmar	6.000	12.125
Singapure	35.012	6.592

Sumber: Ditjenbun, 2023

In Indonesia, national gambier production is produced from six provinces of gambier producing centers, namely West Sumatra, North Sumatra, Riau, Riau Islands, South Sumatra and Aceh. The gambier plant is a specific commodity and the largest production center is in West Sumatra with the total production of gambier supply reaching 80% of Indonesia's capacity (Kemenko, 2021). Where gambier plants are widely cultivated in the Lima Puluh Kota Regency and Pesisir Selatan Regency which are the centers of gambier plants in West Sumatra.

Table 2. Volume and Value of Indonesian Gambier Export 2012-2021

Year	Volume	Value
2012	15.685	34.010
2013	15.671	34.847
2014	14.174	30.495
2015	14.020	30.119
2016	15.446	46.735
2017	-	-
2018	18.016	55.169
2019	18.608	44.342
2020	18.061	36.633
2021	19.102	46.587

Sumber: Ditjenbun, 2023

The increasing demand for gambier requires gambier producers to increase the supply of gambier with superior quality (Nasrul et al., 2023). The quality of gambier is highly dependent on the roles and activities of the actors in the gambier value chain. These activities start from land clearing, seed selection, planting, harvesting, processing, and marketing. Of these activities that affect the quality of gambier is harvesting where the gambier leaves taken must be uniform in order to get the desired gambier sap, and during the processing process do not add other ingredients to produce good gambier. The production process of gambier products involves many actors who have important roles in the gambier value chain.

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Although the demand for gambier continues to increase, the economic potential of this commodity has not been fully optimized, because Indonesia still exports gambier in the form of raw materials, so the added value obtained is relatively low. Efforts that can be made by the community are through the expansion of planting areas. Although the area of gambier planting is already quite large, there is still room for expansion of the cultivation area to meet the increasing demand and optimize the gambier economy.

One of the problems that occurs in the gambier value chain is seen from the upstream, namely the source of financing for farmers, which is mostly obtained from traders. This is because cooperatives in gambier-producing areas do not focus on savings and loans, but only as a forum for farmers to improve product quality and market access (Hendra, 2022). Therefore, due to the limitations of cooperatives in terms of savings and loans, farmers borrow from traders (Almizan et al., 2023). The loans made by farmers are mostly used to fulfill their daily needs and the gambier production process. Therefore, when entering the harvest season, farmers will sell their crops to traders who provide loans. This leads to the weak bargaining power of gambier farmers and places farmers as price takers in the gambier value chain. In addition, the long distance between the village and the gambier market leaves farmers with no other choice but to sell to intermediary traders (Nasrul et al., 2020). Farmers tend to sell their gambier to the same person because of kinship and capital. Price information obtained by 80% of farmers comes from traders and 20% from farmers who have sold to traders (Yurista, 2017). Another problem is that farmers still use simple equipment (Evalia et al., 2012) and add other materials such as fertilizer and soil to get high production yields. This makes gambier products not good, which has an impact on the low price of gambier in the market.

Based on this description, it is very important to conduct a comprehensive analysis of the gambier value chain in order to improve product quality, income, and welfare of farmers and communities. Optimizing the global value chain of gambier commodities in West Sumatra requires the right strategy to strengthen farmers' bargaining position, improve product quality to compete in the global market, and optimize the role of institutions such as cooperatives in supporting financing and market access. Thus, the development of a more effective gambier value chain can provide concrete solutions to the various challenges faced, and encourage the upgrading of the welfare of all stakeholders along the gambier value chain.

In the gambier value chain, the key success factor is the pattern of chain governance that will make it easier to understand the behavior patterns of value chain actors (Aisyah., 2021). Value chain governance will describe the character of the actors involved, as well as improvements that will determine the sustainability of the value chain. Therefore, it is important to examine the gambier value chain to help determine the extent to which the roles of the actors involved in the chain are directly related to the benefits received by each gambier value chain actor. So that it can help in making steps or policies to improve the value chain that is considered inappropriate and each actor obtains maximum added value at various levels of actors in the gambier value chain.

RESEARCH METHOD

This research was conducted in gambier plant centers in West Sumatra Province, namely Lima Puluh Kota Regency and Pesisir Regency (BPS Sumatera Barat, 2023). The study was conducted in October - November 2024. The data used in this study are primary data and secondary data. Primary data were obtained through interviews with the help of questionnaires. Interviews were conducted with all actors who play an important role in the gambier value chain, namely farmers, intermediary traders, wholesalers, cooperatives and exporters. Secondary data obtained from the plantation office of Lima Puluh Kota Regency and Pesisir Selatan Regency related to the land area and the amount of gambier production.

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The sampling technique was carried out by snowball and purposive sampling. In qualitative research, the number of samples is not the main focus that must be considered, but how representative the selected respondents are (Juanda, 2009). The purposive sampling method was used to sample 100 gambier farmers. Sampling of gambier value chain actors such as collecting trader 15 respondents, cooperatives 1 respondent, wholesalers 5 respondents, dan exporters 1 respondent.

This research was conducted using qualitative (descriptive) and quantitative methods by assessing the gambier value chain in West Sumatra. The value chain analysis was conducted by adopting the value chain concept proposed by Gereffi and Fernandez-Stark 2016 and the Australian Center for International Agriculture Research (ACIAR) with several approaches, namely:

Mapping Value Chain Analysis.

Mapping is the first step that must be taken in the value chain analysis process. This mapping serves to explain and describe the value chain process that is formed. At this stage of the gambier value chain mapping refers to the value chain mapping analysis in (ACIAR, 2012) with the stages of determining the value chain as follows:

a. Mapping the main activities in the value chain
b. Identify and map the actors involved
c. Map the product flow along the value chain
d. Mapping barriers and potential solutions.

Value Chain Governance Analysis

The value chain governance analysis was conducted based on the theory proposed by (Gereffi et al., 2005) consisting of five types of governance typologies, namely market, modular, regulation, captive, and hierarchy, which can be measured and determined through three variables consisting of complexity, codified, and capabilities. Based on these three variables, they are associated with the main variables that become parameters in determining the type of governance. The governance types formed along the value chain are:

Table 3. Key Parameters Determining Governance in The Value Chain

Type of Governance	*Complexity*	*Codified*	*Capabilities*	Degree of Explicit Coordination and Power Asymmetry
Market	Low	High	High	Low
Modular	High	High	High	↕
Relational	High	Low	High	
Captive	High	Tinggi	Low	
Hierarchy	High	Low	Low	High

Source: Gereffi et al., 2005

To determine the value categories of the three variables determining the type of governance in the value chain, they were measured using a Likert scale of one to five (1-5), categorized into high and low, it can be determined by determining the value interval. To calculate the value interval, it is done by:

1. Maximum Index Value = Highest Score x Number of Samples
2. Minimum Index Value = Lowest Score x Number of Samples
3. Value Interval = (Maximum Value - Minimum Value) : 2

ISSN 2580-0566; E-ISSN 2621-9778
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4. Percentage Value = (Total Score: Maximum Score) x 100
   Then the value interval criteria obtained to determine the value of the three variables are

Table 4. Percentage Assessment and Category

Percentage (%)	Category
0 > X ≤ 50	Low
50 > X ≤ 100	High

Upgrading Value Chain Analysis

According to (Humphrey & Schmitz, 2002), there are three types of upgrading value chain actors: upgrading process, upgrading product, and upgrading functional. This research also uses quantitative methods, namely marketing margin analysis. This analysis uses the marketing margin calculation formula from (ACIAR, 2012; Asmarantaka, 2014). In the marketing margin calculation process, the difference between the price formed at the farm level and the price formed at the level of other value chain actors is identified.

$$MT = Pr - Pf = cost + \pi \text{ institutions} = \sum Mi$$

$$F's = \{\frac{Pf}{Pr}\} X\ 100\%$$

Source: Asmarantaka, 2014

Description:

MT	= Total margin (Rp/Kg)
Pr	= Farm gate retail price
Pf	= price at farm level
π institutions	= Marketing agency profit received by farmers
Mi	= Margin at marketing level I, where I = 1,2, …, n
F's	= Farmer Share (%)

Analysis of value chain upgrading using marketing margin calculations can provide information on quantitative calculation results and provide an overview of cost distribution, revenue distribution, profit distribution and margin distribution for each actor along the gambier value chain. In addition, based on the marketing margin obtained, it can also be analyzed regarding the amount of farmer revenue or farmer share. Based on the farmer share analysis, it will be seen which actors have larger marketing margins in the gambier value chain.

RESULT AND DISCUSSION

Gambier Value Chain Mapping

Mapping in the value chain is the initial stage in conducting value chain analysis which is useful for identifying the actors involved, the conditions of each actor, and the position of the product. From the identification of the input-output structure, there are several indicators such as the actors involved, main activities, product volume, and relationships formed between actors in the value chain which will then be used in the next stage of value chain analysis.

Mapping the Main Activities in The Value Chain

Gambier value chain activities are divided into 6 categories which include planting, harvesting, processing, drying, packaging, and marketing. After mapping the main activities, it will

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be easier to map the actors involved and play a role in each activity. The main activities start from gambier cultivation, which involves the process of land clearing, seed selection, harvesting, processing, drying, packaging and marketing. The first harvest can be done 1 year after planting, then the next harvest can be done about 4 months later. After harvesting, the gambier leaves are brought to the felt house, where this felt house is a gambier processing place that turns gambier leaves into gambier extract. Based on the mapping process, there are 5 stages applied to the coffee value chain in Horsik Village, namely input provision, planting and harvesting, collecting, processing, distribution and trading (Sitorus et al. 2020). In the study (Juliandi et al., 2022), the mapping of the nutmeg value chain in South Aceh involved value chain actors such as farmers (cultivation and harvest), collectors (post-harvest handling and marketing), and distillers (essential oil extraction process).

Identify and Map the Actors Involved

Mapping the actors in the value chain is useful for analyzing how much the various interconnected actors contribute (Zamora, 2016). This stage can then be further developed by breaking down the core process into several more specific activities. To produce processed gambier products, there is a role of actors in carrying out activities in the gambier value chain. Actors involved in gambier value chain activities such as farmers, intermediary traders, wholesalers, cooperatives, and exporters. Research (Aisyah, 2021; Suryana et al., 2023) on the coffee value chain states that the actors involved are farmers, small and large traders, coffee shops, buyers, and exporters. In research (Dewi et al., 2024) on the strawberry value chain, the actors involved are farmers (cultivation), small collectors (buying and sorting), large collectors (processing and distribution), and retailers (sales and distribution). The activities carried out by gambier value chain actors are related to the agribusiness subsystem, namely from upstream to downstream.

Table 5. Core Activities and Actors of the Gambier Value Chain

Core Activities	Value Chain Actors				
	Farmers	Intermediary Traders	Cooperatives	Wholesalers	Exporters
Planting	V	-	-	-	-
Harvesting	V	-	-	-	-
Processing	V	-	-	-	-
Drying	V	V	V	V	-
Packing	V	V	V	V	V
Quality Control	-	V	V	V	V
Sales	V	V	V	V	V

Table 5 shows the main activities carried out by each actor in the gambier value chain to maintain and produce quality gambier. The actors involved in the gambier value chain are 100 farmers, 15 intermediary traders, 5 wholesalers, 1 cooperative, and 1 exporter. Gambier farmers have a large role in the early stages of the value chain, starting from planting, harvesting, to processing gambier leaves. In the next gambier value chain actors, there are intermediary traders, wholesalers, cooperatives, and exporters who play a role in the post-harvest stage, where the main activity of these

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actors is purchasing gambier from farmers and conducting quality control before selling to the next value chain actors.

Mapping the Product Flow

The next step is to draw a product flow diagram along the value chain. In this study, the flow of the processing process carried out is that farmers harvest gambier leaves to process and dry them. After that, they sell to collectors, wholesalers, cooperatives, and exporters. Mapping this product flow will make it easier to analyze the role of actors in the gambier value chain.

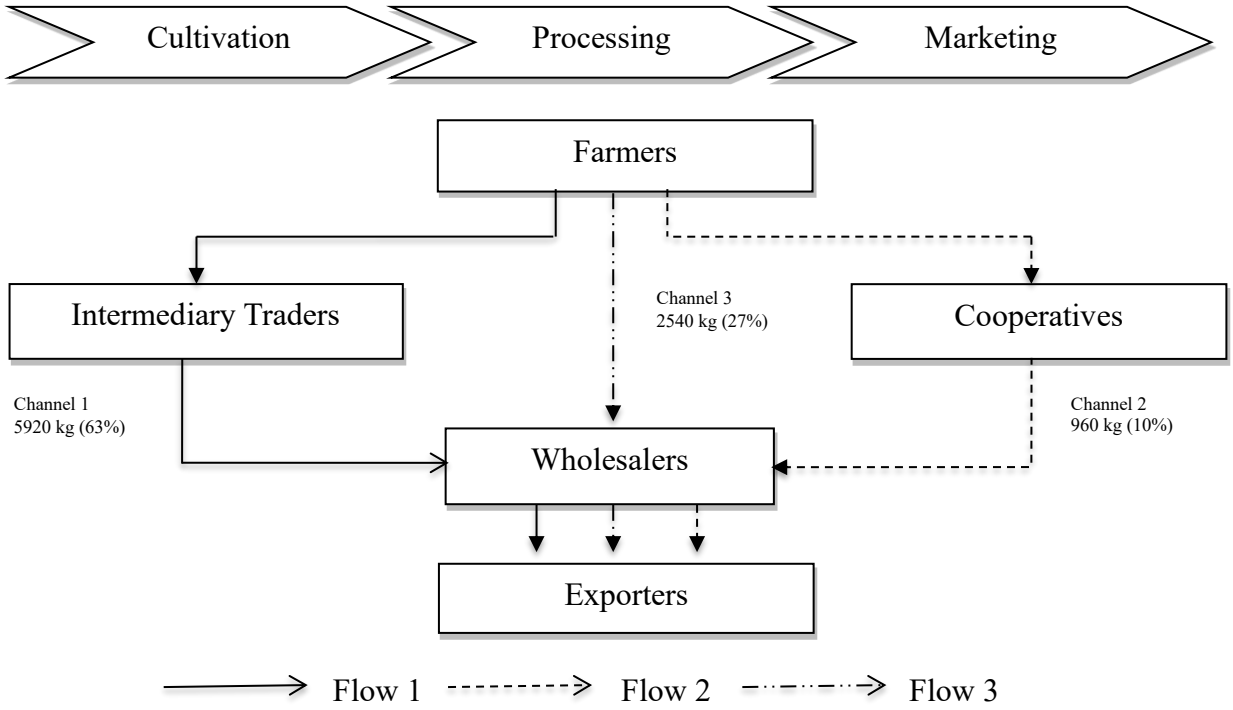

Figure 1. Gambier Product Flow in West Sumatra

The three gambier product flows that are formed produce the same product, namely bootch processed gambier. Where flow 1: Farmers - Collecting Traders - Wholesalers - Exporters. Flow 2: Farmers - Cooperatives - Wholesalers - Exporters. Flow 3: Farmers - Wholesalers - Exporters. It can be seen in Figure 1 that there are no farmers who directly sell their gambier to exporters because of the long distance between the farmer's production site and the exporter's warehouse, which creates additional costs such as transportation costs, packing, and transportation costs. The same is the case with research (Budiraharjo et al., 2020) where farmers prefer to sell to collectors because they are already subscribed and also collectors take soybeans directly to farmers' homes, so that with this system, farmers do not need to pay transportation costs.

Mapping barriers and potential solutions

Obstacle mapping is conducted to analyze the problems that occur in each activity in the gambier value chain actors so that it can map solutions to improve activities in the gambier value chain in West Sumatra.

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Table 6. Barriers and Potential Solutions in the Gambier Value Chain

Activities	Actors	Barriers	Solutions
Planting	Farmers	Pests and diseases	Pesticides
Harvesting	Farmers	Traditional tools	Government Assistance
Processing	Farmers	Capital	Capital loan
		Raw materials	Buy from farmer
Drying	Farmers Intermediary traders Cooperatives Wholesalers	Weather	Using ovens
Packing	Farmers Intermediary traders Cooperatives Wholesalers	None	None
Quality Control	Intermediary traders Wholesalers Exporter	Moisture content	Re-drying
Sales	Farmers Intermediary traders Wholesalers Exporter	Transactions and contracts	Favorable written methods and contracts

Gambier Value Chain Governance

Governance is the next stage of value chain analysis after the mapping process. Governance in this case is a qualitative analysis formed from an interaction between actors in the value chain. Actors in the value chain will work together to form or produce a quality and high-value product. To explain the type of governance in the gambier value chain, several things need to be considered, such as the coordination system that occurs in each actor and regulations in the value chain. This will provide an overview of the governance formed in the gambier value chain.

Coordination System

The coordination system in the gambier value chain describes the relationship between actors, which is one of the tools to facilitate the fulfillment of gambier product standards in the value chain. Basically, coordination between actors is formed informally and unwritten so that all coordination formed is based on trust and habits. According to (ACIAR, 2012), relationships that exist without trust will create weak coordination. Farmers produce gambier through a traditional process. Gambier produced is then sold to collecting traders who usually have kinship or capital links.

Collecting traders go directly to farmers' houses to make purchases and store them in warehouses. They then re-dry the undried gambier (Yurista 2017). The reason why farmers sell their gambier to the cooperative is because the price offered by the cooperative tends to be higher when

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compared to the price at the collecting traders, however, there is an additional cost if selling to the cooperative, namely transportation costs because farmers will bring their own gambier to the cooperative warehouse. In contrast to collecting traders who go directly to the farmer's house, collecting traders and cooperatives will sell their gambier to large traders. The relationship between collecting traders and cooperatives with large traders tends to be more formal. Large traders usually have a large enough storage capacity to reprocess gambier, such as drying undried gambier. The relationship between wholesalers and exporters tends to involve formal contracts with agreed quality and volume specifications. Exporters provide product standards that must be met by wholesalers, such as gambier purity and moisture content, to meet global market demands.

Regulation in the Value Chain

Each actor in the value chain strives to deliver a quality product based on applicable regulations and certain requirements that must be met by each actor. Generally, each player in the gambier value chain must understand the quality of the gambier it processes. One form of regulation that applies is the establishment of uniform gambier quality standards, ranging from water content, purity level (mixed ingredients) to the final form of the gambier product. This standard helps to ensure that the gambier produced meets market needs. This regulation can also encourage farmers to improve the quality of their products through the application of more modern technology, with the support of training and mentoring from the government or related institutions. But in fact, this regulation has not been implemented by most farmers, because the financial situation of farmers makes farmers have to sell gambier in a short time of 4 to 7 days, if they follow the existing regulations, the processing of gambier will take longer, because the processing will be done very carefully and the cleanliness of the processing process must be maintained. In order to get the desired standard of gambier.

Based on the explanation of the two stages above, it can see how the condition of gambier value chain governance is formed. However, to be able to determine the type of governance, it is also necessary to analyze several variables that are the basis for determining the type of governance. These variables are transaction complexity, ability to translate information, and ability to fulfill demand. These three variables will determine the type of governance formed in the gambier value chain.

Transaction Complexity

The transaction complexity variable is useful for identifying information transactions and knowledge about product and process specifications in maintaining the sustainability of relationships between value chain actors.

Table 7. Transaction Complexity of Gambier Value Chain Actors

No.	Description	Score				
		1	2	3	4	5
1	Quantity of products purchased from the supplier	122				
2	Information provided by the buyer to fulfill the product specifications		22	82	18	
3	How many parts and functions the supplier requires to manufacture the product	20	68	34		
	Amount	142	90	116	18	0
	Sum of score	142	180	346	72	0
	∑ score			740		
	Percentage			40,43		

ISSN 2580-0566; E-ISSN 2621-9778
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It can be seen in Table 7 that the complexity of transactions in the gambier value chain in West Sumatra is still simple, where gambier made by farmers is only 1 type, namely bootch gambier. And information exchange is still limited. This is because farmers only focus on 1 type of raw gambier. The standard of gambier products made by farmers is still below the quality that should be, because of financial needs by farmers that make farmers shorten the processing process and add other ingredients so that the quantity of gambier products increases. However, this makes the quality of gambier not in accordance with market standards and the selling price becomes low.

Ability to Interpret Information

The ability to translate information variable is useful in explaining the extent to which information and knowledge from value chain actors can be explained and transmitted efficiently without affecting transactions between actors. In the process of codifying information and knowledge, actors can store it in the form of documents or notes in the software to make it easier for actors to identify changes in information and knowledge that occur.

Table 8. Ability to Translate Information of Gambier Value Chain Actors

No.	Description	Score				
		1	2	3	4	5
1	Has there been any documentation of product knowledge between the supplier and the company?			88	24	10
2	What forms of knowledge are exchanged when working together?			90	32	
3	How well documented are the product specifications and services provided?			100	22	
4	How well documented is the knowledge exchanged?			100	22	
5	To what extent do the product and service specifications produced by suppliers meet market standards			100	22	
	Amount	0	0	478	122	10
	Sum of scores	0	0	1434	488	50
	∑ score			1972		
	Percentage			64,65		

In the process of meeting the needs of gambier products between all actors in the gambier value chain, it is inseparable from product and process specifications (Saputra et al., 2018). There are five aspects that need to be understood to explain the codification process that occurs. These five aspects of codification refer to the information and knowledge owned by actors in the gambier value chain, where the information is stored or collected in a document either in the form of written notes or notes in software. This can be seen in Table 8 in the ability to translate information obtained by value chain actors. Where in conducting this sale and purchase transaction, the value chain actors have documented quite well, because they have recorded sales data, purchase data, and production data such as the use of raw materials.

Ability to Fulfill Demand

The ability to meet demand variable is useful for identifying the ability of actors to meet product criteria (specifications) according to the perspective of consumers. The ability of actors to meet consumer needs in the long or short term depends on the skills of value chain actors.

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Table 9. Ability to Fulfill Demand of Gambier Value Chain Actors

No.	Description	Score				
		1	2	3	4	5
1.	Supplier is able to fulfill product delivery as per agreed data				122	
2.	Supplier are honest in every communication				122	
3.	Committed in providing products according to the quality requested				122	
4.	Suppliers ability to commit to continuous product and process improvement				122	
5.	Suppliers ability to respond to unexpected demand		14	82	26	
6.	Supplier is able to be in a stable financial condition			78	44	
7.	Suppliers are able to provide products and processes in a cost-efficient manner			78	44	
8.	How capable is your supplier			100	22	
	Amount	0	14	338	624	0
	Sum of scores	0	28	1014	2496	0
	∑ Score			3538		
	Percentage			72,5		

It can be seen from Table 9 that the ability to fulfill requests from actors in the value chain, based on interviews that have been conducted, value chain actors are able to fulfill requests according to a predetermined time. Not only that, value chain actors are also able to commit to providing products that are in accordance with the requested quality and continue to improve products and gambier production processes. And value chain actors are honest in conducting transactions between actors in the gambier value chain.

Based on the results of interviews that have been conducted, 82 value chain actors are quite capable of coping with unexpected demand, as long as the raw material, namely gambier leaves, is still available. 14 value chain actors are unable to cope with unexpected demand, because the harvest of leaves produced is not large enough so that finding leaves to other farmers is also quite difficult and requires additional capital, but there are actors who are able to respond to unexpected demand, namely 26 actors, because these actors have large enough suppliers and large enough storage warehouses to accommodate gambier products. The unstable financial condition of some respondents means that value chain actors, especially farmers, are unable to meet unexpected demand. Meanwhile, actors with more stable financial conditions are wholesalers and exporters.

Based on the results of the analysis of the three variables, calculations were carried out using a Likert scale of 1-5 to determine the type of governance formed. After obtaining these results, the average percentage value of each variable is calculated, which can be seen in Table 3. Then the variables of low complexity, high codification, and high capability, so the type of governance formed is the market governance type.

Market governance is a type of governance where transactions are relatively simple. Information about products can be easily transmitted, costs are low, and actors are not bound by agreements because the main focus is the price of the product. In this study, the product produced by gambier value chain actors is only one, namely gambier bootch and information about product specifications is quite simple, the relationship between farmers and traders is transactional and dominated by market forces. Similar to research (Suryana et al., 2023) on value chain governance,

ISSN 2580-0566; E-ISSN 2621-9778
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the governance formed is market governance, this is because transactions in the value chain and information about production, processing and quality are still simple.

Gambier Value Chain Upgrading

Upgrading in the value chain is an effort to be able to deal with changes and market competition that occur so that actors are expected to continue to innovate products. According to (Gereffi & Fernandez-Stark, 2016) the success of upgrading is the combined result of government policies, institutions, strategic companies, technology, and human resource capabilities. Value chain upgrading analysis includes process, product, and function upgrading that are useful for increasing the ability of actors to face competition.

Product Upgrading

In the gambier value chain in West Sumatra, there is an opportunity for product upgrading. Value chain actors who have the opportunity to increase products are processing farmers. Similar to research (Wicaksana et al., 2022), product upgrading opportunities can be carried out by processors and food stalls. This is because the activities carried out by these actors are closely related to the handling of gambier products. Initially, processors carried out traditional gambier processing activities. Product upgrading that can be done by processors is to make several derivative products from gambier, not only in the form of processed gambier, but also can be processed into catechins, tannins, gambier tea and other products. This will create added value to gambier. This supports research (Mulyati & Indrawan, 2021) which states that to increase added value, product diversification is necessary.

Process Upgrading

Opportunities for process upgrading can be carried out by several actors in the gambier value chain in West Sumatra, such as farmers, intermediary traders, wholesalers, cooperatives, and exporters. Generally, farmers use traditional tools for processing gambier. Therefore, farmers can utilize modern technology and more efficient production methods to increase the yield and quality of gambier they produce. By adopting best practices in cultivation and processing, such as the use of more sophisticated processing machines, farmers can reduce production costs and waste, and increase overall productivity. In research (Irpandi & Akhmad, 2022) by creating modern pressing machines can speed up the pressing process when compared to using traditional tools. With new machines and technology, farmers can process gambier more efficiently, reduce waste, and increase product yield. Process improvement at the cooperative level can take the form of training and technology assistance, provide training to cooperative members on efficient and environmentally friendly gambier production and processing techniques. Similarly, according to research by (Sirajuddin et al., 2024), the adoption of modern agricultural tools and machinery and the application of the latest cultivation technologies can accelerate the transformation of traditional agriculture into a more productive and sustainable system. In addition, extension programs and training are very helpful in increasing knowledge and innovation adoption among farmers.

Function Upgrading

Function upgrading involves updating functions or abandoning old functions to improve production activities. Function upgrading in the gambier value chain can be done by providing processing facilities that are able to produce high-quality gambier in accordance with international

ISSN 2580-0566; E-ISSN 2621-9778
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standards. In a study (Putri et al., 2023) stated that the establishment of a gambier processing plant has helped increase the productivity and quality of gambier, and has a positive impact on the socio-economic conditions of agriculture.

Marketing Margin Analysis

Analysis of upgrading in the gambier value chain can be done using a quantitative approach, namely using marketing margins. This is closely related to the value-added activities of each actor indicated by the amount of costs incurred as a contribution to the functions performed. Measurement of added value in the gambier value chain includes marketing margin and farmer share. Margin analysis in the gambier value chain is carried out on each actor who plays a role in the marketing channel. The marketing channel in the gambier value chain consists of 3 marketing channels (Hardianti et al., 2020).

Farmers in channels 1, 2, and 3 sell gambier with the criteria of raw gambier or bootch gambier. The thing that distinguishes gambier products from farmers in each channel is the quality of the gambier product, which is seen from the level of water content, mixed ingredients, and the amount of catechins in gambier products, therefore the price for farmers in each channel is different. However, in reality, gambier products from farmers do not meet gambier quality standards because gambier value chain actors such as traders and cooperatives reprocess farmers' gambier products to get the desired results, such as re-drying. The quality of gambier according to SNI 01-3391-2000:

Table 10. The Quality of Gambier according to SNI 01-3391- 2000

Criteria	Quality I	Quality II
Water Content	14 max	16 max
Ash Content	5 max	5 max
Catechins	60 min	50 min
Insoluble in Alcohol	7 max	10 max
Insoluble in Hot Water	10 max	16 max

Source: SNI 01-3391-2000

The series of value chain activities begins upstream, namely gambier farmers harvesting gambier leaves and placing them in the processing house, then if the gambier leaves have collected a lot, the gambier leaves are ready to be processed into gambier extract.

Based on the analysis of the marketing margin of the gambier value chain, there are 3 marketing channels, where channel 1 has the largest total margin and total profit with a total margin of Rp 70,000 and a total profit of Rp 67,624, this channel is the longest channel. Channel 3 has the smallest total margin of IDR 63,000 and a total profit of IDR 61,867. This shows that the longest marketing channel, channel 1, has the largest total marketing margin. Channel 1 value chain actors are Farmers - Gathering Traders - Wholesalers - Exporters. Similarly, research (Amalia et al., 2024; Heliawaty et al., 2024) states that the longest marketing channel has the highest total margin when compared to the shortest marketing channel.

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Table 11. Marketing Margin of Gambier Products

Marketing institutions	Channel 1	Channel 2	Channel 3
	Cost/Price (Rp/Kg)	Cost/Price (Rp/Kg)	Cost/Price (Rp/Kg)
Farmer			
Selling price	40.000	43.000	47.000
Intermediary traders			
a. Purchase price	40.000		
b. Cost	1.243		
c. Selling price	57.000		
d. Margin	17.000		
e. Profit	15.757		
Cooperatives			
a. Purchase price		43.000	
b. Cost		900	
c. Selling price		57.000	
d. Margin		14.000	
e. Profit		13.100	
Wholesalers			
a. Purchase price	57.000	57.000	47.000
b. Cost	533	620	533
c. Selling price	75.000	75.000	75.000
d. Margin	18.000	18.000	28.000
e. Profit	17.467	17.380	27.467
Exporters			
a. Purchase price	75.000	75.000	75.000
b. Cost	600	600	600
c. Selling price	110.000	110.000	110.000
d. Margin	35.000	35.000	35.000
e. Profit	34.400	34.400	34.400
Total Margin	70.000	67.000	63.000
Total Profit	67.624	64.880	61.867

Farmer's Share Analysis

Farmer share can be interpreted as farmer revenue calculated from the comparison between prices at the upstream level and the final consumer. Based on the results of the research conducted, there are 3 marketing channels in the gambier value chain in West Sumatra.

Table 12. Farmer Share of Gambier Value Chain

Marketing Channel	Farm gate price (Rp/Kg)	Price at final level (Rp/Kg)	Farmer Share (%)
Channel 1	40.000	110.000	36,36%
Channel 2	43.000	110.000	39,09%
Channel 3	47.000	110.000	42,73%

ISSN 2580-0566; E-ISSN 2621-9778
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It can be seen in Table 12 that the highest farmer share value is found in channel 3, which is the shortest marketing channel, while the lowest value is found in channel 1 with the longest marketing channel. This is because in channel 3, farmers directly sell their gambier products to large traders, so that the price received by farmers is higher than the price at the intermediary level. In addition, shorter marketing channels can also reduce total marketing costs. In research (Ramadini et al., 2022) stated that the shortest channel has the smallest mutual marketing margin and the largest farmer share. The higher the price difference at the farm level with the final consumer level, the smaller the farmer share value. This can be reinforced by research (Elvin & Priatna, 2018) where the selling price of farmers with the selling price of marketing institutions to final consumers is not too large because the costs incurred are not too large. Similarly, research (Heliawaty et al., 2024; Sumartono et al., 2018) states that the existence of intermediary traders cannot be separated from the lives of farmers in the marketing system, because the existence of intermediary traders will reduce the price obtained by farmers when compared to farmers directly selling to large traders.

CONCLUSION AND SUGGESTION

In mapping the gambier value chain in West Sumatra, there are several main activities ranging from planting, harvesting, processing, drying, packaging, to sales, involving actors such as farmers, intermediary traders, cooperatives, wholesalers, and exporters. Gambir value chain governance is classified as a type of market governance with low transaction complexity, high codification ability, and high capability, where market information is strongly influenced by price factors. To achieve efficiency and sustainability, product, process, and function improvements in the value chain need to be carried out comprehensively through technology upgrades, product diversification, and production infrastructure development. Marketing margin analysis shows that although channel 1 has the largest total margin and profit, channel 3 has the potential to provide greater benefits to farmers with a higher farmer share, so strengthening these marketing channels can improve the welfare of gambier farmers. Based on the analysis of the gambier value chain in West Sumatra, it can be suggested that there is a need for institutional strengthening such as cooperatives to overcome financing problems. Increased added value through diversification of gambier products. The government also has an important role in supporting the creation of upgrading along the gambier value chain. The role of the government is as a liaison between each actor in the gambier value chain in realizing more formal and written cooperation activities. And the government also plays a role in providing appropriate technology that can be used by each gambier value chain actor.

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