

Actors' Roles in Gambir Commodity Development in Pakpak Bharat, North Sumatra Province

Aryanto Tinambunan¹, Hamdani Harahap², Subhilhar³ and Heri Kusmanto⁴

Abstract

Gambir is one of the largest plantation commodities in Indonesia. Indonesia is one of the largest gambier exporting countries in the world. In 2018, Indonesia's gambier exports reached 18,000 tons with a value of US\$ 50 million. As the most important exporting country, Indonesia controls more than 80 percent of the gambier market share in the world. One of the largest gambier producing areas in Indonesia is located in Pakpak Bharat Regency, North Sumatra Province. Pakpak Bharat Regency supplies 80% to 90% of the national gambier production. This study uses mixed methods research, which is a research approach that combines elements from qualitative and quantitative research methods in one study. This approach allows researchers to utilize the strengths of each method to gain a more complete and in-depth understanding of the phenomenon under study. The data used in this study are primary data and secondary data, primary data collected through interviews and secondary data collected from various sources including data from the Central Bureau of Statistics (BPS) at the District and Provincial levels. The results showed that farmers who depend on gambier cultivation and agro-industry have not obtained maximum results. recorded for the gambier agro-industry sector did not experience significant development, despite the trend of developing gambier as a superior commodity whose planting area and production are increasing and are predicted to continue to increase until 2016. In gambier development activities, there are several problems that often arise, namely related to the problems of capital, marketing, cultivation and processing.

Keywords: *Commodities, Indonesia, Gambir.*

INTRODUCTION

The agricultural sector is a dominant sector in the Indonesian economy, both because of the large number of people working in the sector, and because of its large contribution to the Gross Domestic Product (GDP). According to BPS (2020), Indonesia's Gross Domestic Product at constant prices in 2019 amounted to IDR 1,355 Trillion. Furthermore, among other agricultural sectors, the plantation sector contributed IDR 112,522.10 billion (13.11 percent) of the total Gross Domestic Product of the agricultural sector. The contribution of the agricultural sector is lower than the manufacturing industry and trade, hotels and restaurants, but greater than the mining, electricity, gas and clean water, building, transportation and communication, finance, real estate and corporate services, and other services. With the development of agro-industry in the future, the contribution of the agricultural sector in general and plantations in particular is expected to continue to increase significantly.

Gambir is one of Indonesia's plantation commodities whose main market is export. According to BPS (2019), Indonesia's gambier exports in 2018 reached around 18,000 tons with a value of US\$ 50 million. As the most important exporting country, Indonesia controls more than 80 percent of the gambier market share in the world (Evalia et al., 2012; Sidik & Apriani, 2019). India is the main export destination in addition to Bangladesh, Japan, Malaysia, Pakistan, Singapore and several other countries (Figure 1).

¹ Faculty of Social and Political Sciences, Universitas Sumatera Utara, Medan, Indonesia

² Faculty of Social and Political Sciences, Universitas Sumatera Utara, Medan, Indonesia, Email: r.hamdani@usu.ac.id, (Corresponding Author)

³ Faculty of Social and Political Sciences, Universitas Sumatera Utara, Medan, Indonesia

⁴ Faculty of Social and Political Sciences, Universitas Sumatera Utara, Medan, Indonesia

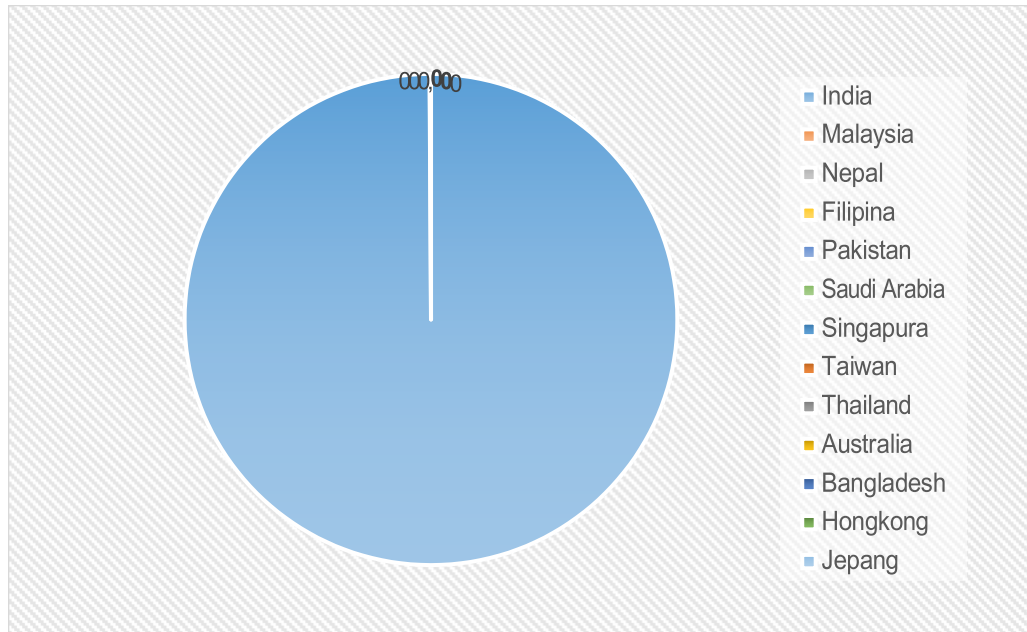


Figure 1 Indonesian gambier exports by destination country in 2022

Figure 1 shows Indonesia's gambier exports by destination country in 2022. On the other hand, although Indonesia is the largest producer and exporter of gambier in the world, in international trade, India is listed as the country that exports gambier to various countries. This is because Indonesia only exports raw gambier to India. With little or no processing, gambier of varying quality is exported by exporters to India. India then reprocesses and re-exports to various countries (Manalu & Tri, 2019).

Over the past five years, there has been a steady increase in the volume of gambier exports followed by an increase in the average export price. The increase in volume followed by an increase in price indicates an increase in world demand for gambier. Therefore, as the main export destination country for Indonesian gambier which then re-exports gambier products to various countries, India continues to increase the volume of its gambier imports to Indonesia, while other export destination countries show different trends. In Indonesia, the main producer of gambier is West Sumatra. West Sumatra supplies about 90 percent of Indonesia's total production. From BPS publications (2019), it is known that gambier is also cultivated in several other provinces, namely North Sumatra, Riau and South Sumatra. The center of gambier production in North Sumatra is Pakpak Barat Regency. In addition, gambier plants are also found in several other districts such as in Dairi Regency. In Pakpak Barat Regency, gambier producers are Sitellu Tali Urang Jehe District, Salak District, Kingdom District and Pergetteng - getteng Sengkut District (Sebayang, 2019).

According to (Ermati, 2004), although gambier farming is profitable, it is not necessarily able to improve the welfare of farmers' lives when viewed from the analysis of the feasibility of gambier farming. This is thought to be caused by various problems such as the weak bargaining position of gambier farmers due to the closed price information of gambier, thus positioning gambier farmers only as price takers. On the other hand, gambier development is also faced with various problems such as processing, marketing and institutional aspects.

Table 1. Plantation area and production of plantation commodities in Pakpak Barat Regency in 2022.

No.	Commodities	Crop Area (ha)	Production (ton)
1	Gambir	1.101	1.003,1
2	Frankincense	666	443,1
3	Sweet Skin	185	29,76
4	Cocoa	147	36,9

5	Coffee	824	744,13
6	Rubber	445	764,6
7	Coconut	48,62	4,5
8	Palm Oil	1.973	2.881,2
	Total	7.990	3.793

Source: BPS Kabupaten Pakpak Bharat (2024)

Table 1 shows that the size of the gambier community is the largest commodity out of a total of 8 commodities in West Pakpak District, North Sumatra Province. Several studies illustrate that there are several problems associated with gambier commodities, which have led to the non-development of gambier commodity businesses both at the farmer level and regionally. Gambier processing technology is still simple, even though it has been traded for a long time (Gumbira-Sa'id, 2009; Rahima et al, 2022; Sidik & Apriani, 2019a; Suryani & Nurmansyah, 2019). Gambier is still sold as "raw gambier" and there is no product variation. The bargaining power of Indonesian gambier entrepreneurs is still low.

Theoretical Framework

Gambier Commodity and Development in Pakpak Bharat

Gambier is one of Indonesia's smallholder plantation commodities that has high economic value and has future commercial prospects given its various uses. In Indonesia, gambier has lived in a golden age and became a leading commodity. In the early 19th century, gambier had become one of the commodities traded in Europe (Putri, 2013). After World War II, gambier ceased to be an important export product traded in the international market.

The future development of gambier in Indonesia, especially in Pakpak Bharat Regency, North Sumatra, is still promising, given its various uses and Indonesia's role as a major world producer (Atman & Misran, 2015; Banurea, 2012). Along with all these supporting factors, there are many challenges and obstacles in developing various aspects of this commodity. Furthermore, intense participation from stakeholders, government, farmers, researchers, investors, and traders in management ranging from cultivation techniques, processing, trade, and institutions is needed (Sidik & Apriani, 2019b). Thus, it is expected that gambier will turn into a superior commodity in the future (Fauza, 2014).

Gambier (*Uncaria Gambier* (Hunt.) Roxb) is a type of shrub widespread in tropical areas such as southern Asia, Africa and South America that has high economic value. In Asia, gambier is known to grow in Indonesia and Malaysia. Gambier from Indonesia is mostly intended as an export commodity. Currently, Indonesia is listed as a supplier of more than 80% of the world's gambier needs and more than 80% of the gambier production comes from West Sumatra, so that West Sumatra is designated as a barometer of national gambier production apart from North Sumatra Province (Afrizal, 2009).

This plant has chemical content obtained from gambier extract through the process of pressing leaves and twigs which are then sedimented, molded and dried as shown in Figure 2 Gambier extract contains various chemical compounds that are useful for antioxidants (Suharman, 2018a). However, the content that is most often utilized from gambier extract is the content of polyphenolic compounds in gambier extract in the form of catechins and tannins. These two contents then provide economic value because they are used as raw materials for the pharmaceutical industry such as toothpaste, cosmetics, leather tanning, dyes, and food industry ingredients (Jastra & Atman, 2016).

In gambier cultivation activities, there are 3 (three) types of gambier plant varieties that are widely planted in Indonesia, especially in Pakpak Bharat Regency, namely Cubadak, Shrimp, and Riau gambier types (Jastra & Atman, 2016a). Among the three types, the Udang type is the type of gambier that has the highest yield and is classified as quality 1, while the highest catechin content is owned by the Cubadak type. Research and development from the cultivation sector is very influential on the development of gambier commodities. The amount of research from the cultivation sector is expected to be able to provide an overview for gambier cultivators to increase the productivity of their gambier plants.

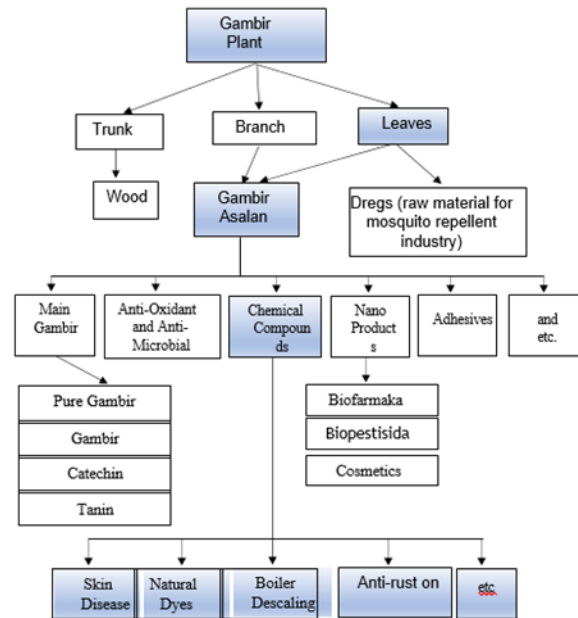


Figure 2 Diagram of market potential and uses of gambier.

Source: Suharman (2018)

Figure 2 shows the processing of gambier, this can be done through the development of an integrated gambier refining industry so that the quality produced is uniform and Waferblock gambier is obtained that meets SNI standards or gambier products that meet the needs of the export market (Gumbira-Sa'id et al., 2010). This can be seen from Figure 2 of the gambier industry tree which shows the utilization of all parts of gambier. The utilization of gambier as a source of income for farmers will be more profitable if processing activities are not only limited to the production of semi-finished gambier or processed into other derivative products that have higher economic value.

Gambir as one of the smallholder plantation commodities is the leading commodity of Pakpak Bharat Regency which supplies 80% to 90% of the national gambier production (Sebayang, 2019). Even according to Idrus (2012), it was noted that the gambier agro-industry sector did not experience significant development, despite the trend of developing gambier as a superior commodity whose planting area and production are increasing and are predicted to continue to increase until 2016. In gambier development activities, there are several problems that often arise, namely related to the problems of capital, marketing, cultivation and processing (Asben, 2008; Dhalimi, 2006; Evalia et al., 2012).

The low quality of gambier and the habit of mixing gambier with other ingredients are closely related to the aspect of technological limitations in the development of gambier processing agro-industry. The quality of gambier, which is an absolute requirement to compete in the international market, requires special attention through technological improvements in the gambier production process in gambier agro-industry SMEs (Sa'id et al., 2010). The development of industry-oriented gambier products (catechin and tannin products) must be supported by institutions so that the gambier produced is in accordance with the SNI issued by the government (Nasution, 2015). In addition to technological improvements for the production process, improving the quality of gambier is also closely related to raw materials and is supported by a good evaluation and reporting system (Sa'id et al., 2010). On the other hand, it is also expected that the implementation of various strategies from the results of studies on gambier development such as expanding the gambier market and increasing the added value of gambier in order to increase local government revenues and farmers' income from gambier export trade activities (Sa'id et al., 2010).

Actors and Gambir Commodity Development in Pakpak Bharat

Research on gambier commodity development in Pakpak Bharat uses a qualitative descriptive approach, which emphasizes in-depth exploration of a phenomenon. Qualitative descriptive method is research by describing systematically, factually and accurately about the conditions and phenomena that occur (Myers, 2019). One of the analysis processes of this research uses Actor-Network Theory, which is expected to explore actors carefully and unhurriedly to determine the actors and their changes in the gambier commodity development model in Pakpak Bharat Regency. By using the ANT method, the actors involved are identified and can be analyzed for their existence, roles, functions, and responsibilities (Bussular et al., 2020).

Data collection was conducted in two ways, namely by collecting secondary data and primary data. Secondary data collection by conducting literature reviews from various literature sources and benchmarking on gambier development to assist the analysis and conclusion process. Meanwhile, primary data collection is in the form of interviews and Focus Group Discussions (FGDs) with informants related to the development of gambier commodities in Pakpak Bharat Regency. The stages in conducting this research used the principles of Actor Network Theory as described in the literature review. Basically, the ANT approach focuses on findings in the field by using observation to trace the problem. Then, after the problem has been found, an analysis is carried out that focuses on each actor involved (Crawford, 2020b).

METHOD

This research uses mixed methods research, which is a research approach that combines elements of qualitative and quantitative research methods in one study. This approach allows researchers to utilize the strengths of each method to gain a more complete and in-depth understanding of the phenomenon under study (Creswell, 2014). This research was conducted in Pakpak Bharat Regency, North Sumatra Province. The Pakpak Bharat Regency where this research was conducted was determined purposively, based on the consideration that it has great potential for the development of gambier commodities.

The data used in this research are primary data and secondary data. Primary data was collected through direct interviews with respondents/informants, selected experts and observations at the research site. Data collection methods were conducted through interviews, discussions (FGDs), questionnaires and field surveys. Meanwhile, secondary data was collected from various sources including data from the Central Bureau of Statistics (BPS) at the District and Provincial levels, the Agriculture Office, Bappeda, the Cooperative Office and the BUMD PD Pakpak Agro Lestari (PAL) in Pakpak Bharat District. Complete types and sources of data as shown in table 2.

Table 2 Data Types and Sources

No	Analysis method	Variable	Data Type	Data Source
1	The role of actors in gambier commodity development			
	Analyse actor network	The role of each stakeholders	Primary data	Results interview and survey results
2	Gambir commodity development model			
	Analysis dynamics system	Data that related with the sub system agribusiness and network Marketing	Secondary data and data primary data	Department Agriculture, Bappeda, Koperindag, BPS, BUMD PD PAL, respondents and FGD

FINDINGS

Identification of Actors

After conducting the identification process from secondary and primary data collection, there are several stakeholders in the development of gambier commodities in Pakpak Bharat Regency, including: Gambir Farmers, Gambir Cultivation and Processing Production Facilities Providers, Gambir Traders (Local

Traders/Agents, 'Toke' or District Level Gambir Traders, Belawan Port Gambir Traders, West Sumatra Gambir Traders, BUMD PD PAL, Companies and Exporters), Executive and Legislative (Village Government, Pakpak Bharat District Food Security & Agriculture Office, Pakpak Bharat District Office of Cooperatives, MSMEs, Industry and Trade, Pakpak Bharat District Research and Development Planning Agency, Pakpak Bharat Regional Head, Pakpak Bharat Regional House of Representatives), Pharmaceutical Companies, Processing Companies, Research Institutions, Consumers, and Local Communities.

The actors involved above have their own roles and responsibilities. The roles and responsibilities of each actor are listed in table 3. Gambir farmers are the main actors in gambir production. Farmers are responsible for planting, caring for, and harvesting gambir trees and producing raw materials that will be processed further. Production facility providers sell the materials and tools needed for gambir cultivation and processing. Traders are individuals or groups who buy gambir from farmers in large quantities to sell to processing companies or other parties. Traders play an important role in connecting farmers and processing companies.

Table 3 Roles and Responsibilities of Gambir Commodity Development Actors in Pakpak Bharat

No.	Actor	Roles & Responsibilities
1	Gambir Farmers	Gambir cultivators, processors and producers
2	Gambir Cultivation Production Facilities Provider	Provision of production facilities for gambir cultivation
3	Gambir Processing Production Facility Providers	Provision of gambir processing production facilities
4	Local Trader (Local Agent)	Gambir collectors and distributors in the vicinity of the gambir's area
5	District Level Gambir Merchants	Gambir collectors and distributors at the district level
6	Belawan Port Gambir Traders	Containers and distributors of gambir at Belawan Port
7	West Sumatera Gambir Traders	Containers and distributors of gambir from West Sumatra
8	Pakpak Agro Lestari Regional Public Company (Perumda PAL)	Gambir collectors and distributors
9	Exporter Company	Containers, distributors and sellers of gambir to the international market
10	Village Government	Regulator and facilitator of gambir processing infrastructure
11	Pakpak Bharat Food Security & Agriculture Office (Tangpan Office)	Regulator and facilitator of gambir processing infrastructure
12	Pakpak Bharat District Office of Cooperatives, MSMEs, Industry and Trade (Dinas Koperindag)	Regulator and facilitator of gambir processing infrastructure
13	Pakpak Bharat Regional Research and Development Planning Agency (Bappelitbangda)	Regulators, planners, gambir developers and researchers
14	Head of Pakpak Bharat Region	Regulators and policy makers of gambir development
15	Pakpak Bharat Regional House of Representatives (DPRD)	Aspirators and decision makers on regional policies
16	University/Research Institution	Gambir researchers and developers
17	Pharmaceutical Company	Consumers/processors of gambir materials for derivative products
18	Processing Company	Processors of gambir into flour/powder that is ready to be sold to the market
19	Consumers	Gambir user
20	Local Community	Influencers on demand, support, or social and cultural aspects related to the gambir industry

Source: Researcher

Traders distribute and market gambir products to local, regional and international markets. Processing companies take raw gambir from farmers or collectors, and then process it into finished products such as gambir powder/flour or various other forms that are ready to be sold to the market. The government and

DPRD have a role in regulating and supporting the development of gambier commodities through policies, regulations, and agricultural and industrial development programs. Universities or related research institutions are involved in research and development related to cultivation, processing, or other innovations in the gambier industry, providing new knowledge and technology to farmers and companies. Consumers are those who use gambier products, such as in the cosmetic, pharmaceutical, food, or other industries. Local communities living around gambier farming areas have a role in influencing demand, support, or social and cultural aspects related to the gambier industry.

Networks/Relationships Between Actors

All actors interact and contribute to the development of gambier commodities in Pakpak Bharat Regency, forming a value chain that is essential for the growth and sustainability of the industry (Sociology & Collier, 2012). There are various kinds of relationships between actors in gambier commodity development.

Partnership Relationships

In the gambier business, there are many partnerships between actors. Gambier farmers cooperate with local traders/collectors who live around their farming areas. Some farmers borrow funds from traders with the agreement that the gambier harvest is sold to the trader. At the time of sale, a deduction is made from the loan. Some collecting traders also have agreements with farmers to stock gambier every week. There are certain days that are agreed upon for the collection of gambier to be sold.

Procurement of Equipment

Farmers cooperate with cultivation and processing production facilities providers in the provision of gambier development materials and equipment. Farmers also ask the village government and related agencies to facilitate the necessary equipment, especially in processing gambier. The village government and district government provide support every year in the development of gambier through the provision of processing production facilities such as press tools, and gambier boiling pots.

Government Regulation

The Pakpak Bharat District Government has established a partnership with farmers in terms of determining the right regulations and policies for the development of gambier commodities as one of the regional superior products. The local government through the Food Security and Agriculture Office, as well as the UMKM Cooperative Office of Industry and Trade, and the PMPTSP Office also play a role in regulating the production, distribution, and sale of gambier, one of which is through the determination of regional superior products and the policy of providing assistance to support the development of gambier in Pakpak Bharat. The central government through related development centers regulates gambier quality standards, and several ministries/institutions provide incentives to gambier industry players.

Distribution and Sales

Traders or distributors engage with processing companies to buy gambier in bulk and distribute it to local and international markets.

Communication Network

Actors in gambier enterprises communicate through various media, such as in-person meetings, mobile phones, social media, and other digital platforms.

Information and Resource Flow

Information about market demand, new farming techniques, or regulatory changes flows between actors. Resources such as gambier seeds, fertilizers, pesticides, and cultivation/processing equipment also flow within the gambier commodity development network.

Power and Influence

Actors who have more resources or knowledge may have more influence in the network. Exporting companies have more power in determining the price of gambier because they are directly related to the international market and thus know the real price of gambier commodities. Processing companies also have great influence because they have advanced technology so that they can process gambier into other products with higher selling value.

Although some actors have more power or influence than others, in the ANT perspective, no actor is more important than another (Sharifzadeh et al., 2013). All actors, both human and non-human (such as technology), are considered to have an equal role in shaping the network and creating complex relationships.

Analysis of Inter-Actor Connections

The ANT (Actor - Network Theory) approach is a theoretical framework that helps understand the relationships and interactions of actors (entities such as individuals, organizations, and technology) in the formation of networks (Waniak-Michalak & Michalak, 2019). In the development of gambier commodities in Pakpak Bharat, the connections between actors are very diverse as follows:

Gambir Farmers

Farmers are physically connected to gambier plants as well as production facilities for gambier cultivation and processing. Cultivation production facilities used by farmers include hoes, machetes, trimming machines, pesticide spraying tools, fertilizers and pesticides. Processing production facilities used by farmers include gambier processing houses, pans, press tools, axes, basi - basi / hammer chisels, water reservoirs, scissors, pans, furnaces, press tools, buckets, molds, drying tools, buckets, firewood, burlap, drying plastic, spoons, lighters, gloves, and ripi (drying containers).

In carrying out their work, farmers interact with other farmers to share knowledge and information on cultivation, processing and marketing as well as the price of gambier. Farmers also interact with the local community about price information and agricultural production facilities. In the provision of production facilities, gambier farmers interact with traders of materials and tools needed in their business. When there is assistance, socialization and research on gambir, farmers interact with the government, DPRD, and research institutions. Farmers interact with traders in selling and marketing gambir. In addition to interacting directly (face-to-face) with other parties, gambier farmers have also used communication media such as mobile phones to get information about prices, demand for gambier, and assistance provided by the government related to gambier development.

Merchants

Traders are physically connected to gambier farmers through direct purchase. Traders are also physically connected to the vehicles and equipment used to collect gambir from farmers. Traders have social relationships with gambier farmers, as well as relationships with other traders in the wider network. Traders interact with processing companies in specific sales. Traders also interact with consumers who buy products in small quantities and for direct consumption purposes. Traders use communication technologies such as telephone and text messaging to connect with gambier farmers, other traders, exporters and processing companies. Wholesalers use digital platforms to monitor prices and demand.

Processing Company

Processing companies are physically connected to the gambier purchased from traders. Processing companies use processing facilities to process gambier into finished products. Processing companies have relationships with traders as the main suppliers of raw materials. Processing companies also have connections with other parties in the processing and distribution industry. Processing companies use modern processing technology to convert raw gambier into finished products. Processing companies also connect with the market through digital platforms to monitor trends and demand for gambier.

Local Government, Local Councils and Universities/Research Institutes

Physical connections between local governments and research institutions are formed through their physical locations, such as government offices, laboratories, and campuses. Social connections are formed through direct interactions between government officials and researchers, meetings, discussions and collaboration on joint research projects. Technological connections are formed through the exchange of data, information and the use of communication technologies to coordinate activities. These networks are not only formed from physical and social factors, but also involve technological objects such as email, project management systems and online collaboration platforms. In their interactions, local governments, local parliaments and universities/research institutes form a mutually influential network for the exchange of knowledge, resources and support in addressing common problems, such as the development of evidence-based public policies.

Local Government and Gambier Farmers

The connection between local government and gambier farmers can be seen as a network that involves physical, social, and technological aspects. Physical connections are formed through the geographical location where gambier farmers are located, as well as the location of government offices related to agriculture and local economic development. Social connections are formed through direct interactions between government officials and gambier farmers, meetings at agricultural forums, workshops, and face-to-face communication. These connections also involve social and cultural practices that shape relationships between actors. Technological connections can be seen in terms of the use of agricultural technology, such as the use of agricultural apps, geographic information systems (GIS), or social media to share information on the latest agricultural techniques, market opportunities, and agriculture-related issues.

Local Government and Local Communities

Local governments and local communities are connected through social, physical and technological connections. Government centers, administrative offices, and other public facilities (such as health and education centers) are physical elements that form the network of connections between local governments and local communities. Government officials, such as district heads, subdistrict heads or village heads, are social actors who engage in relationships with local citizens. The government forms a network of social connections with community leaders, community groups and communities that play a role in decision-making, public service delivery and policy implementation. The use of communication technologies, such as social media and online platforms, is used by local governments to communicate with local communities directly. Information on policies, development projects and governance changes can be passed on through technological connections.

Local Government and Traders

Traditional markets, trading centers, and commercial areas are the physical points that connect local governments and merchants. Infrastructure such as roads, public transportation, and parking facilities also form a physical network that enables interaction between these two groups. Government officials responsible for trade regulations and business licenses interact with traders in regulating requirements, licensing, and legal compliance. Both parties also engage in trade organizations or community forums that facilitate collaboration and information exchange. Local governments use technology platforms to facilitate communication between merchants and relevant government agencies. Technological connections established between local governments and merchants include online business registration systems, trade license applications, and policy announcements through digital channels.

Using the ANT approach, physical, social, and technological connections are not just linear relationships between actors, but form dynamic networks that influence each other to form complex relationships (Siakwah, 2017). The ANT approach makes it possible to see that the relationships between actors do not only involve social interactions or physical connections, but also involve technology and other objects that form complex networks. This analysis helps understand how connections shape the dynamics of relations among different actors in the gambier commodity development network (Latour, 2005b). The flow of information and knowledge occurs through communication channels that connect all the actors above (Edward, 2016).

According to Lin & Wang (2014) in ANT analysis, actors interact, influence each other, and form a dynamic network that facilitates the flow of materials, information and knowledge in the gambier supply chain.

DISCUSSIONS

Networks and connections between actors change over time (Siakwah, 2017). Various external factors influence these changes, and certainly have an impact on gambier commodity development.

Network and Connection Change and Transformation

Over time, networks and connections have undergone major transformations due to technological developments, globalization, and social dynamics. Some of the changes that can be seen include:

Growth of Social and Digital Networks; information and communication technologies have changed the way people interact and communicate. Social media, messaging apps, and collaborative platforms have enabled people to connect more easily and quickly, overcoming geographical boundaries (Muniesa, 2015). In the past, gambier farmers interacted and communicated face-to-face with other parties, sometimes taking longer to sell their gambier. In recent years, along with the development of mobile phones, farmers are connected more quickly and easily with traders so that once the gambier is dry, it can be sold directly to traders. The development of price information and market demand is now more quickly and easily known by farmers, traders and other parties with the digital network.

Economic Globalization; the growing dependence on global trade has created more complex supply chain networks. In other words, firms and countries are interconnected through various stages of production and distribution (Law, 1992b). Indonesia is one of the largest gambier exporting countries in the world, although the country of record is India. Indonesia has a large role in the gambier supply chain in the world.

Increased Mobility; advances in transportation and infrastructure have opened the door for greater mobility of people and goods, thus expanding human and economic networks. In gambier distribution, the availability of good transportation and infrastructure accelerates the process of distributing gambier from farmers to consumers.

External Factors and Their Effects

External factors such as regulatory changes or global market conditions have a significant impact on networks and connections in gambier commodity development.

Regulatory Changes; changes in national or international regulations, for example regarding data privacy or international trade, affect the way networks and connections operate. Stricter regulations can limit access or change the dynamics of interactions. In gambier farming, there are regulations regarding the quality and grade of gambier. Similarly, in global trade, there are export regulations that govern the distribution of goods from one country to another. These regulations sometimes change, resulting in changes to networks and connections in gambier development.

Global Market Conditions; fluctuations in global economic conditions, such as recessions or changes in trade policies, can affect the flow of trade, investment and collaboration across countries (Bledin & Shewmake, 2004). This can force changes in business networks and economic connections. During Covid 19, which affected the entire economy of the country, the number of gambier imports from abroad decreased dramatically. This affected the demand for gambier in the country including Pakpak Bharat gambier as data from BPS, gambier production declined in 2019.

Impact on Gambier Commodity Development

Changes in networks and connections due to both internal and external factors affect gambier commodity development. Changes in access to global markets due to changes in regulations or economic conditions lead to changes in the demand and supply of gambier (Alexander & Silvis, 2014). Reduced demand or changes in the supply chain affect the price and production of gambier.

Strong networks and connections support collaboration in research, innovation and product development. If these networks are disrupted, there is a slowdown in progress in developing new gambier-based products. Digital transformation provides greater access to information on agricultural techniques, marketing, and management that can support the development and diversification of gambier products. Digital transformation encourages the development of gambier commodities to be wider and faster. In conclusion, changes in networks and connections over time are influenced by external factors such as regulation and global market conditions. These changes can affect gambier commodity development through impacts on markets, collaboration, innovation and access to information.

CONCLUSION

Gambier is Pakpak Bharat's leading commodity that deserves to be developed because it can increase people's income and welfare. In the development of gambier commodities, many actors play a role including Gambier Farmers, Providers of Gambier Cultivation and Processing Production Facilities, Gambier Traders (Local Traders / Agents, 'Toke' or District Level Gambier Traders, Belawan Port Gambier Traders, West Sumatra Gambier Traders, Perumda PAL, Companies and Exporters), Executive and Legislative (Village Government, Pakpak Bharat District Food Security & Agriculture Office, Pakpak Bharat District Cooperative, UMKM, Industry and Trade Office.

The policy of increasing farmers' resources through additional land and increasing the yield of gambier land is not able to increase farmers' income. This is because gambier production is not only determined by the resources owned by farmers, but also the productivity of farmers. The policy of improving processing technology through accelerating drying time and increasing gambier yield is able to increase farmers' income even though it is relatively slow. Farmers' income is greater than expenditure in 2045, which means that technology policies are very slow to improve farmers' welfare. The policy of increasing farmer productivity through increasing farmer knowledge and motivation is relatively insignificant in changing farmers' per capita income. Farmer income initially increases until 2038, but then decreases thereafter. The policy to improve the quality of gambier is quite capable of increasing farmers' income, although it has not been able to reach the welfare level. This policy also results in a more sustainable impact on farmers' income.

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