Vertical Integration

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Vertical Integration in Agro-Industry: Eco-Friendly Gambier Products

Abstract. Introduction. *Textile dyeing on fabrics and clothing causes environmental pollution and health problems. There is an innovation of natural coloring using gambier in the Gambo Muba fabric industry and the garment industry in Indonesia. Gambier farmers supply natural dye raw materials. Then through the supply chain of the Gambo Muba fabric industry and the garment industry, it causes vertical integration in the gambier agro-industry. This study uses primary data from 39 vertically integrated companies in the gambier agro-industry, including the gambier rubber industry, the Gambo Muba fabric industry, and the garment industry. The data was then analyzed using descriptive qualitative.*

Purpose. *This study analyzes the relationship between vertically integrated industries, including the transaction costs between them, their impact of vertical integration on added value, and their profitability.*

Results. *Vertically integrated industries have low transaction costs. The impact of vertical integration on the gambier agro-industry adds to the chain of economic activities that can increase added value and profits.*

Conclusions. *The impact of vertical integration can reduce transaction costs, especially the supplier coordination cost component, distributor cost component, inter-company lobbying costs components. The benefits of vertical integration in the gambier agro-industry are increasing high added value, profit levels, decreasing environmental pollution, and agro-industry sustainability.*

Keywords: *vertical integration; added value; profit.*

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Вертикальна інтеграція в агропромисловості: економічні продукти гемберу

Анотація. *Фарбування текстилю на тканинах та одязі викликає забруднення навколишнього середовища та проблеми зі здоров'ям. Існує інновація природного забарвлення з використанням гамбіє у тканинній промисловості Gambo Muba та швейній промисловості в Індонезії. Фермери Gambier постачають природні барвники. Тоді через ланцюжок поставок тканинної промисловості Gambo Muba та швейної промисловості це викликає вертикальну інтеграцію в аграрній промисловості Gambier. Проаналізовано зв'язок між вертикально інтегрованими галузями, включаючи трансакційні витрати між ними, їх вплив вертикальної інтеграції на додану вартість та їх прибутковість. Доведено, що вертикально інтегровані галузі мають низькі трансакційні витрати. З'ясовано, що вплив вертикальної інтеграції може зменшити трансакційні витрати, особливо компонент витрат на координацію постачальників, компонент витрат дистриб'ютора, компоненти витрат на лобіювання між компаніями. Перевагами вертикальної інтеграції в аграрній промисловості Gambier є збільшення високої доданої вартості, рівня прибутку, зменшення забруднення навколишнього середовища та стійкість агропромисловості.*

Ключові слова*: вертикальна інтеграція; додана вартість; прибуток.*

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Formulation of the problem. The use of textile dyes in the clothing industry can cause significant soil pollution levels in the long term Kumar [24]; Toprak and Anis [39]. Textile dyeing waste is not very environmentally friendly and very dangerous Islam and Mostafa [19]. The process of making clothes not only causes soil pollution but also causes water and air pollution. The manufacturing process involves consuming large amounts of water, energy, and various chemicals that produce waste. Waste is not reprocessed and immediately being thrown away, causing environmental damage such as gas emissions, odors and water pollution Arachchige et al. [4]; Jaganathan et al., [20]; Mukherjee [26]; Paraschiv et al. [28]. Harmful dyes or chemical dyes release toxic gases into the environment, causing safety and health problems for humans and animals Akarslan and Demiralay [1]; Parvin et al. [29], causing severe skin problems such as irritation and allergies, digestive problems, and sometimes even cancer Alanezi [2]. There are more than 1,900 chemicals used in clothing production, of which the EU classifies 165 of them as hazardous to health or the environment Sajn [34]. From an environmental perspective, replacing synthetic dyes with natural dyes is a strategy to reduce pollutants and a new market and job opportunity Jordeva et al. [21].

The global issue related to the apparel or garment industry is that this industry is a pollutant industry that affects global environmental pollution. Both production and processing of raw materials are contributing factors to pollution Utebay [40]. To reduce this pollutant problem, the garment industry chooses materials to the dyes eco-friendly and begins to pay attention to the dyes used. Indonesia needs environmentally friendly natural dyeing alternatives. Thus, natural coloring innovations have begun, especially gambier coloring. Gambier is a kind of sap derived from extracts of leaves and twigs of the gambier plant. Gambier can be used for natural dyes for environmentally friendly textile products Failisnur [10].

The Gambier plantation produces gambier sap and has also been developed into a traditional fabric dye (which is named Gambo Muba jumputan cloth) in Musi Banyuasin district, Indonesia. The production of gambier plants produces dry gambier sap and liquid gambier sap. The use of liquid gambier for fabric dyes replaces textile dyes, where fabric dyes from gambier adhere firmly to fabric fibers, do not fade, are environmentally friendly, and do not cause skin cancer. Natural dyes from gambier are an alternative to imported synthetic dyes, producing reddish-brown, dark brown, black, green, or light brown colors if added with color-generating substances. Interestingly, gambier can be an alternative for natural dyes on fabrics and clothing with economic value, is environmentally friendly, and is safe for health. The relationship between the output of gambier sap which is used as an input for natural dyes in the fabric industry and the output of cloth used as input in the garment industry allows for vertical integration in the gambier agro-industry.

Analysis of recent research and publications. Vertical integration is a company strategy that controls raw materials from the upstream supply chain and downstream supply chain. Vertically integrated industries have raw material availability and control over the entire supply chain Andreou et al., [3]; Grant, [12]; Prasertwattanakul & Ongkunaruk, [30]; Zhang, [41]. Industries that perform vertical integration are not only to maintain their product chains but to achieve economies of scale and Grau & Reig [13]; Nadia & Cerquera [27]; Tey & Arsil [37]. Research Carillo et al., [7]; Hamdaoui & Bouayad [15] found a correlation between vertical integration and agro-industry performance Prasertwattanakul & Ongkunaruk [30] asserted that vertically integrated agro-industry has the advantage of monitoring product quality and quantity throughout the supply chain. In addition, vertical integration is also associated with transaction costs in industry coordination Benmehaia & Brabez [6]; Deng & Zhang [9].

Vertical integration describes the extent to which the company controls the production of inputs and distribution of outputs or finished products Vertical integration of agricultural products means that all activities from farming to processing are carried out by an entrepreneur or processing factory to increase added value. The factor that drives companies to do vertical integration is the flexibility of operations Priyadarshi & Routroy [32]. Internal vertical integration is a structural response to industry and market characteristics as a way for companies to compete effectively Ralston et al., [33] . Vertical integration should be considered from two points of view, namely internal benefits and costs and effects on competitive posture. Internal benefits affect the strategy's profitability, and strength in competitive posture allows the firm to be more responsive to changing market needs and move away from competitors Harrigan [17] .

The advantages of vertical integration are that companies can lower their transaction costs, vertically integrated companies can ensure stable inputs, correct market failures due to externalities by internalizing these externalities, companies can avoid government regulations, restrictions, and taxes, and create market power Carlton & Perloff [8]; Priyadarshi & Routroy [32].

Transaction costs in vertical integration are costs incurred by companies to carry out strategies to maintain an efficient supply chain. Transaction costs consist of supplier coordination costs, labor organization costs, managing distributor costs, commission, and fees Zulfiandri et al. [42].

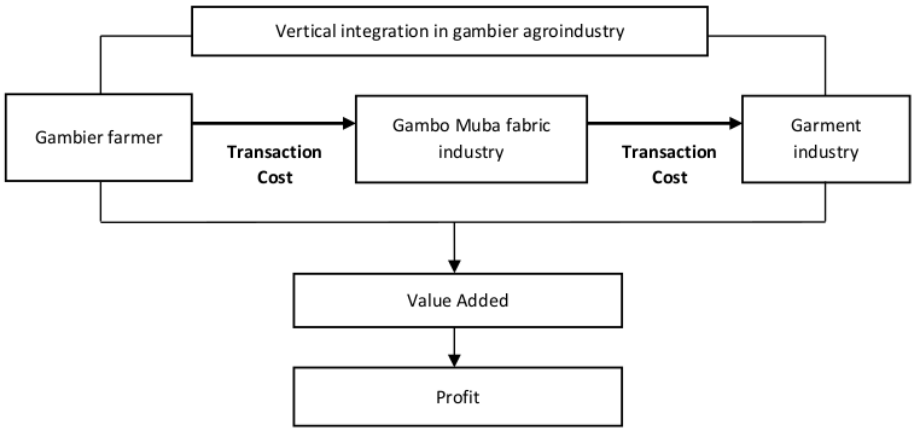

Figure 1 **– Conceptual Framework**

Source: formed by the authors

Vertical integration explains the existence of input-output linkages in the gambier agro-industry in Musi Banyuasin Regency, Indonesia. The output of gambier sap is the input for the Gambo Muba fabric industry. Then the output in the Gambo Muba fabric industry becomes the production input for the garment industry. The analysis of vertical integration of gambier agro-industry can be seen from the analysis of transaction costs. Transaction costs in vertical integration are costs incurred by companies to carry out strategies to maintain supply chains. Transaction costs consist of supplier coordination costs, labor organization costs, managing distributor costs, commission fees, and other fees. These costs are costs that arise when an exchange occurs. The behavior of vertical integration determines the performance of the gambier agro-industry, including added value and profit level.

Presentation of the main research material. This study analyzes vertical integration and its relationship to added value and profits in the gambier agro-industry. The gambier agro-industry in question is an industry with supply chain linkages to gambier agricultural products, including the gambier sap farming business, the Gambo Muba fabric industry using dyes from gambier sap, and the garment using the raw material for the Gambo Muba fabric industry. A total of 39 companies were selected using the side proportional random technique Kothari [23]. This research was conducted in Musi Banyuasin Regency in South Sumatra Province, Indonesia. The data used are primary data from the Gambier agro-industry that implements a vertical integration strategy. The overall description of the variables is shown in Table 1. The value of minimum, maximum, mean, and standard deviation will be analyzed empirically.

Table 1. **Descriptive Statistics**

Variable	N	Minimum	Maximum	Sum	Mean	Std. Deviation
Total Production Input (IDR)	39	2718,833	37070,813	572820,197	14687,697	9178,244
Total Production Output (IDR)	39	4200,000	59400,000	888565,000	22783,718	14635,048
Transaction Cost (IDR)	39	52,000	398,000	6951,500	178,244	102,742
Value Added (IDR)	39	2297,500	33034,834	561088,666	14386,889	9333,753
Price-Cost Margin (%)	39	7,04	64,70	1483,69	38,04	17,10

Source: Proceed Data, 2021

There is a product differentiation strategy undertaken by the company to differentiate products offered in the market. The differentiation of gambier products is shown in Table 2.

Table 2. **Descriptive of Gambier Product Differentiation**

Product	Frequency	Percentage of
Agricultural Products		
Liquid gambier sap	7	53,85
Solid gambier sap	6	46,15
Total	13	100,00
Products of Gambo Muba		
Fabrics Gambo Muba fabrics silk	2	15,38
Gambo Muba viscose fabric	5	38,46
Gambo Muba cotton rayon	6	46,15
Total	13	100,00
Garment Products		
Shirt	7	53,85
Blouse	2	15,38
Dress	3	23,08
Bomber jacket	1	7,69
Total	13	100,00

Source: Proceed Data, 2021

There are two types of gambier agricultural products, namely liquid and solid gambier sap products. Liquid gambier sap products are used for dyeing traditional fabrics in the Gambo Muba fabric industry, including Gambo Muba fabrics made of silk, viscose, and rayon cotton. Various products in the garment industry that use Gambo Muba fabrics are shirts, blouses, dresses, and bomber jackets.

Gambier products compete with products that use textile dyes. The price of environmentally friendly gambier products tends to be more expensive than textile dye products (especially textile dye tie-dye products). Gambier product differentiation occurs due to market demand for environmentally friendly products using natural dyes. This condition aligns with the opinion He & Deng [18] that companies must expand consumer segmentation and develop unique environmentally friendly products to meet these consumer demands.

Transaction costs on agro-gambier low because these industries to integrate vertically related upstream and downstream supply chain. Cost components such as supplier coordination costs, distributor costs, and inter-company lobbying costs are lost because the companies are integrated and interconnected. The results of this study are in line with research conducted by Deng and Zhang [9]; Klüppel [22]; Todorova [38] which state that the impact of vertical integration can reduce transaction costs. In addition to lowering transaction costs, vertically integrated companies can ensure stable inputs and company sustainability Carlton and Perloff [8].

In line with this, Priyadarshi & Routroy [32] analyzes vertical integration related to value added process of agricultural products in general, especially at various supply chain levels, and provides benefits to reduce environmental pollution and business sustainability in agro-industry. Gambier has a high added value as a raw material for the fabric and clothing industry. Added value is the added value of a commodity because it undergoes processing, storage, and transportation in the production process Asrol et al. [5]; Hadi et al. [14]; Hamidah et al. [16]. Value-added is the total additional cost due to the addition of a chain of economic activities or stages of production. This value-added component includes factor income components (wages, interest, rent, and profits) and depreciation. In the agro-industry there is a change from agricultural products to the processing industry. In addition to increasing the length of the chain of economic activities or production stages, it also increases the costs required for processing Samuelson [35]. One of the goals of agro-industry is to produce added value from agricultural raw materials in the production process.

Table 3. **Vertical Integration in Gambier Agro-industry**

Industry	Total Transaction Cost (IDR)	Value Added (IDR)	Price-Cost Margin (%)
Gambier Sap			
Minimum	52,000	2297,500	7,04
Maximum	215,000	2964,667	36,26
Total	1,312,000	34,869,670	-
Average	100,923	2682,282	21,90
Gambo Muba Fabric			
Minimum	81,000	16,617,500	53,63
Maximum	266,000	33034,834	64,70
Total	283117,703	1851,000	-
Average	142,385	21778,285	59,20
Garments			
Minimum	200,000	13921,667	22,46
Maximum	398,000	31281,537	40,85
Total	243101,293	3788,500	-
Average	291,423	18700,099	32,70
Gambier Agro-industry (Agriculture Gambier until Garment Industry)			
Minimum	52,000	2,297,500	7,04
Maximum	398,000	33,034,834	64,70
Total	561088,666	6951,500	-
Average	178,244	14386,889	38,04

Source: Proceed Data, 2021

This result is also related to Sanal and Kumar [36] alternative raw materials being the primary solution to develop agro products in India. In addition, Priscilla et al., [31] found that the use of alternative raw materials that are environmentally friendly, especially liquid waste, will improve the performance of the agricultural sector. A broader analysis carried out by Figueroa et al., [11] was related to the development of alternative raw materials creating forward and backward linkages to agro-industry. Price - Cost Margin (PCM) is an indicator of the company's ability to increase prices above production costs Lipczynski et al. [25]. In the gambier agro-industry, the highest profit level is found in the Gambo Muba fabric industry; this is because the cost component in the Gambo Muba fabric industry is lower than other industries. In addition, the output value of the Gambo Muba fabric industry is higher than that of the garment industry.

Conclusion. Vertical integration reduces transaction costs, especially supplier coordination costs, distributor costs, and inter-company lobbying costs are lost due to the impact of vertically integrated companies. Vertical integration in the gambier agro-industry provides the benefits of high added value, environmental pollution reduction, and agro-industry sustainability. The impact of vertical integration gives companies the ability to increase prices above production costs so that the level of profit in the gambier agro-industry is high.

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