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Coffee beans special handling: analysis the cost of hinterland freight transport

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Keywords: coffee beans, freight transport, hinterland transport, logistics, transportation cost.
Abstract: Indonesia has the second largest coffee plantation in the world, but as an exporter, Indonesia has a lower comparative advantage than its competitors. Internal transportation costs play a significant part in this issue. In previous research on internal transportation costs, maintaining the quality of the commodity during transportation and what resources are needed to maintain it has not been explicitly discussed. Coffee beans categorized as hygroscopic are not included in the perishable commodity category. Hence, special handling is not required in the transportation, but this process may decrease its quality. This research aims to determine the structure of transportation costs in coffee bean export in West Java. It considers the resources (costs) related to the special treatment required to maintain quality. Thus, the quality of the commodity can be maintained until it reaches Tanjung Priok Port. This research used the Activity-based Costing method, which is claimed to be more accurate than traditional costing. The results are that in the hinterland transport for the coffee export, apart from the cost of travel, handling at the port, and loading and unloading, shippers pay special treatment costs, namely packaging and containers, so that the quality of the coffee can be maintained. The special treatment costs required are 80% of the total transportation costs from the processor to the consolidation point/dry port and 26% of the total transportation costs from the consolidation point/dry port to the Tanjung Priok Port.

1 Introduction

Indonesia has the second largest area of coffee-producing plantations in the world. Still, as a coffee exporter, it is only the fourth largest. This represents the potential for re-development of the coffee industry if productivity can be increased [1]. The trade performance of Indonesian coffee products in terms of competitiveness compared to other countries such as Colombia, Vietnam, and Brazil has the lowest RCA value. The RCA (Revealed Comparative Advantage) measures the country's competitive strengths for exporting goods. It means that Indonesia has a lower comparative advantage compared to other countries [2-5]. Several researchers have studied the factors that can influence export activities. They state that there is a relationship between internal freight transportation costs and export competitiveness [6-10]. Freight transportation costs have an impact on international trade, whereas increasing freight transportation costs harm exports [11-15].

To maintain competitive status, companies must be able to provide high-quality services/products in the shortest time at the lowest possible cost [16]. Accurate cost information is essential for every aspect of the business to deliver lower costs, influencing pricing policies and performance reviews [17]. One factor influencing competitiveness and income is price, where one of the price-makers at the farmer, trader and exporter level is transportation costs (Figure 1).

Coffee commodities are hygroscopic, which means they can absorb water molecules from their environment [18]. [19] states that damage to goods can occur during pre-processing, processing and packing, storage, transportation and marketing. [20] stated that coffee beans are easily exposed to various microbial contaminants during cultivation, harvesting, processing, transportation and storage. Humidity levels and room temperature can influence the increase in water content during coffee bean storage, which can cause damage [21]. Humidity is one of the factors causing fungal contamination in coffee [22]. [23] stated that Ochratoxin A can grow on dry coffee beans if the coffee beans are stored in an environment with a relative humidity balance higher than 87%. Rapid temperature changes affect humidity and trigger condensation, which, if not handled properly, will cause fermentation [24].

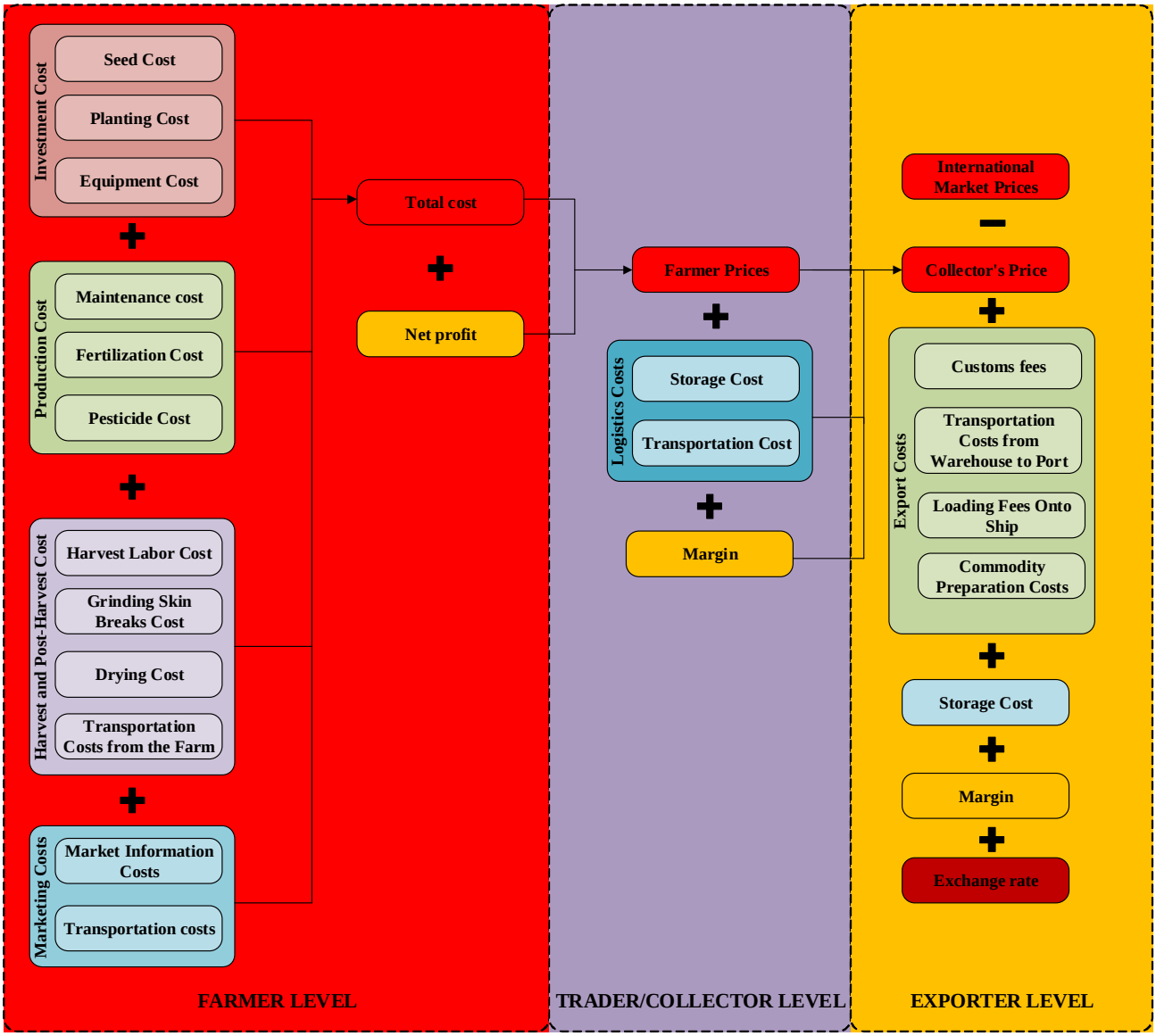

Figure 1 Cost structure and factors forming coffee prices
(Source: Indonesian Competition Commission, 2020)

Condensation is a change in state from gas to liquid. Condensation of a container occurs when the walls of the container become cooler than the dew point of the air inside. Factors influencing condensation include temperature, air space, ventilation, product moisture content and container care/use [25]. Water droplets formed due to condensation inside containers can cause severe damage to the cargo [26]. Requirements for the quality of coffee beans have been stipulated in International Standards and National Standards (SNI 01-2907-2008), which consist of several criteria, including no live insects, no foul smell or mold, the maximum water content of 12.5%, and maximum impurity content 0.5%. In Indonesia, hinterland transportation coffee beans for export uses dry containers, whereas transporting coffee using containers requires paying attention to the temperature factor. The container's temperature during transportation is similar to the warehouse temperature so it can affect the quality of the coffee beans; therefore, a temperature stabilization method is needed.

Therefore, we state our research question as follows: What is the freight transportation cost structure model in coffee bean export activities in West Java that considers resources (costs) related to special handling needed to maintain quality in the transportation process so that the quality of the commodity can be achieved and maintained until the Tanjung Priok Port under the FOB contract. The freight transportation system in this research only examines hinterland transportation because most coffee export contracts use Free On Board (FOB) contracts (Interview results, 2022).

2 Literature review

Research related to freight transport, especially for grain commodities, has been carried out by [27-30] for soybean commodities in Brazil and [31] for coffee commodities in Peru. In previous studies, researchers did not discuss explicitly how to maintain the quality of the commodity during the freight transport process and what resources are needed to maintain the quality of the commodity during the freight transport process. Because coffee beans are not included in the perishable commodity category, the freight transport process does not require special handling. This is certainly different from research that examines freight transport for commodities that fall into the perishable commodity category, such as that carried out by [32] for orange commodities, [33] for fresh fish commodities and [34] for banana commodities, which in their research includes additional resources (costs) required to maintain the quality of these commodities in the transportation process, which can consist of the use of refrigerated containers or deterioration costs/time value.

[33] presented a freight transportation cost structure model consisting of travel costs and deterioration costs/time value related to fresh fish commodities. [35] presents a freight transportation cost structure model consisting of travel, port, and loading and unloading costs. [36] presents a freight transportation cost structure model of travel costs and vehicle utilization. [27] presented a freight transportation cost structure model consisting of travel, loading, and unloading costs. [29] present a freight transportation cost structure model consisting of travel, port, and loading and unloading costs. [32] presents a freight transportation cost structure model consisting of travel costs, port costs, deterioration costs/time value, and special handling costs for citrus commodities. [30] present a freight transportation cost structure model consisting of travel, port, and loading and unloading costs. [37] present a freight transportation cost structure model consisting of travel, loading, and unloading costs.

3 Methodology

3.1 Indonesian context

Coffee is one of the grain commodities produced by plantations, which plays a vital role in economic activities in Indonesia and is one of Indonesia's export commodities, which is quite important as a foreign exchange earner besides oil and gas [38-41]. Arabica coffee accounts for around 63% of the international coffee trade, and Robusta coffee around 37% [42].

West Java is the fourth largest Arabica coffee-producing center after North Sumatra, Aceh and South Sulawesi. In West Java, Arabica coffee is slightly more dominant, 59% of the total area and 54% of the total production of smallholder coffee plantations [43]. The Arabica coffee business in West Java is included in the sustainable category. Still, efforts need to be made to improve performance and maintain the sustainability of the Arabica coffee business, one of which is looking for breakthroughs to increase farmers' income [43].

Bandung Regency is the largest coffee-producing region in West Java (32%). [44] stated that coffee commodities have a role in the regional economy, where they are the leading or basic sector at both the Pangalengan District and Bandung Regency levels. Geographically, the Mount Malabar-Pangalengan area of Bandung Regency has a height of 1,400–1,800 meters above sea level, air temperature of 15-21 C, and rainfall of 2,000 mm/year. These conditions, including land and climate, are very suitable for Arabica coffee productivity [1].

Several things caused the fluctuation in the volume of Indonesian coffee exports; the General Chair of the Association of Indonesian Export Companies (GPEI) stated that the reason the performance of non-oil and gas exports to several countries failed to reach targets last year was because the prices of products from Indonesia were not competitive. The cost of authentic Indonesian coffee is higher than that of foreign coffee because some Indonesian coffee is produced by farmers who grow crops in hard-to-reach or remote areas [45]. Factors that influence the quantity of Indonesian coffee exports are the coffee export price (Free On Board price) [46]. This was also stated by [47], where the price of coffee exports had a significant negative influence on the volume of coffee exports to Germany.

3.2 Hinterland freight transportation flow

The area of Coffee Plantation in South Bandung - West Java is 3,179.65 Ha (Table 1), where each hectare of plantation area can be planted with 2,500 coffee trees, and each tree can produce 4 kg of Coffee Fruit. The time between flowering and fruit ripening for Arabica varieties in Coffee Plantations in South Bandung - West Java is around seven months. Ripe coffee fruit is known as "Coffee Cherries", a product from farmers to be sold and sent to processors.

Table 1 South Bandung-West Java Coffee Commodity Area

Forest Management Unit Section Area	Coffee Commodity Area (Ha)
Banjaran	944.93
Cililin	36.09
Ciparay	677.77
Ciwidey	319.29
Pangalengan	484.79
Tambak Ruyung Barat	359.66
Tambak Ruyung Timur	357.12
Total	**3,179.65**

(Source: Perum Perhutani, 2022)

Coffee Cherries purchased by processors from farmers are processed by separating the coffee beans from their skin and the fruit flesh and drying them from their initial water content; all coffee beans must be separated from their

fruit and dried. There are three techniques used to process coffee: the dry process, or "natural", the wet process (and washed), and a hybrid process called the semi-washed method, or "pulped natural". The coffee produced from this process is called green beans, which becomes an export commodity from processors or exporters.

Figure 2 Map of the coffee farm area in South Bandung-West Java, consolidation point and export ports

We have collected data on activities, productivity, resources, transport facilities, and infrastructure used at the farmer to port levels. Because the plantation location is limited, the freight transport flow from the plantation to the Tanjung Priok Port must go through several stages, and the modes used are shown in Figure 3.

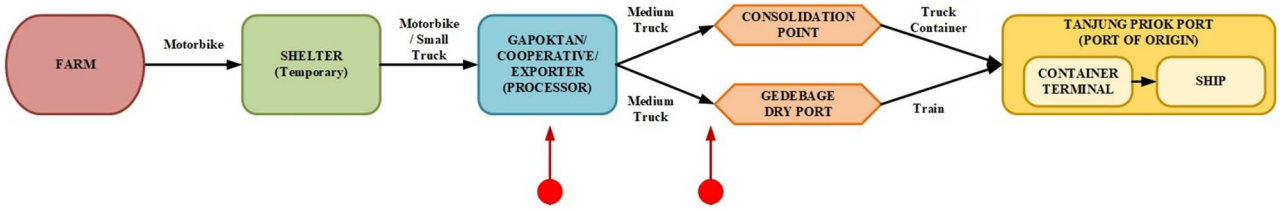

Figure 3 Hinterland freight transport flow for coffee export activity in West Java

3.3 Cost model

Because the coffee commodity is not sensitive to time with a shelf life of >1 year [24] and social, environmental and economic aspects are not taken into consideration by coffee business actors [48], this study does not consider the value of time and external costs. This research focuses only on operational costs because coffee business actors bear these costs.

In this freight transportation cost structure model special handling needs to be included in the freight transportation cost structure model for coffee commodities because this cost is one of the costs that must be incurred/charged (becoming a factor in forming transportation costs) so that the quality of the coffee bean commodity is not damaged/maintained during the transportation process. This is due to the hygroscopic nature of coffee and the presence of condensation [18-24,26,49]. The environmental conditions of coffee producers in West Java, which geographically have an altitude of 1,400-1,800 meters above sea level and an air temperature of 15-21 °C. In contrast, geographically available ports have an altitude below the producers, with temperatures air above the producer, so there is the

potential for condensation to occur during the transportation process.

The freight transportation cost structure model from the farm (i) to the port of origin (j) for coffee beans is as follows (1):

$$C_{ij} = C_r + C_t + C_p + C_b + C_q \quad (1)$$

Where:

C_{ij}: Freight transportation cost from the farm (i) to the port of origin (j),

C_r: Highway Travel Costs (USD/Ton/Km),

C_t: Train Travel Cost (USD/Ton/Km),

C_p: Goods Handling Costs at the Port (USD/TEU),

C_l: Loading and unloading costs if more than one mode is used (USD/Ton),

C_h: Special Handling Cost (USD/m^3).

4 Results

4.1 Analysis of hinterland freight transportation

Following Figure 3, data collection and processing are adjusted to the freight transportation stages: Stage 1: Farm to shelter, Stage 2: Shelter to processor and stage, 3: Processor to Tanjung Priok Port. Apart from that, some special handling is required in several stages, as illustrated by the red dots. Freight Transportation costs are obtained from interviews and document reviews from coffee business actors. The costs obtained from these processors, exporters, and dry port managers are converted to 1 IDR, which is 0.000065 USD.

4.1.1 Phase 1: Farm to shelter

Table 2 details that the mode of freight transportation that can be used to transport coffee cherries from the coffee plantation to the shelter is a motorbike (see Figure 4) with certain modifications. This is because the type of road used is along an unpaved route with a width of 1 to 2.5 meters, with the distance traveled varying between 30 to 60 minutes according to the plantation area.

Table 2 Characteristics mode and transportation cost from the farm to the shelter

Mileage	± 3 Km
Traveling time	30 - 60 Minutes
Infrastructure Pavement Type	Unpaved, with a width of 1 - 2.5 meters
Type of Facility	Motorbike
Carrying Capacity	160 Kg/Trip
Freight costs	0.033 USD/Kg

Figure 4 Transportation mode from the farm to the shelter (Source: Bintoha Perkoci, 2022)

4.1.2 Phase 2: Shelter to processor

Table 3 details that two alternative modes of freight transportation can be used to transport coffee cherries from the shelter to the processor, namely a small truck (Colt Pickup) and motorbike with the type of road along the paved route (50% asphalt, 50% concrete).

Table 3 Characteristics mode and transportation cost from the shelter to the processor

	Alternative I	**Alternative II**
Type of Facility	Motorbike	Small Truck (Colt Pickup)
Carrying Capacity	80 Kg/Trip	1,500 Kg/Trip
Freight costs	4.87 USD/Trip	22.75 USD/Trip

4.1.3 Phase 3: Processor to Tanjung Priok Port

Tables 4 and 5 detail that in the freight transport process from the processor to Tanjung Priok Port, there are 2 choices. The first is from the processor to the consolidation point using a CDE truck because the characteristics of the road to and from the processor do not allow container trucks to pass through. From the consolidation point, the process of consolidating the cargo from the CDE truck into the container truck is carried out, after which the container truck will carry the cargo to the Tanjung Priok Port. The second alternative is to use a train, where from the processor to the Gedebage Dry Port using a CDE truck and from the Gedebage Dry Port, the process of consolidating the cargo from the CDE truck into a container is carried out, which the container will then carry cargo to the Tanjung Priok Port by train. The Gedebage Dry Port is also used as a consolidation point.

Table 4 Characteristics mode and transportation cost from processor to consolidation point/ Gedebage Dry Port

Type of Facility	CDE truck
Carrying Capacity	2 Tons/Trip
Freight costs	52 USD/Trip
Loading Services	6.5 USD/Trip
Unloading Services	6.5 USD/Trip
Special Handling (Packaging)	6.5 USD/Packaging
Special Handling (Plastic Pallet For Container)	48.75 USD/Trip

Table 5 Characteristics mode and transportation cost from Consolidation point/Gedebage Dry Port to Tanjung Priok Port

	Alternative I (Truck)	**Alternative II (Train)**
Type of Facility	Truck with 20 ft Container	Train with 20 ft Container
Carrying Capacity	19.2 Tons/TEU	19.2 Tons/TEU
Freight costs	234 USD/TEU	39 USD/ TEU
Loading Services	13 USD/ TEU	13 USD/ TEU
Stuffing Costs	-	26 USD/ TEU
Stuck costs	-	3.25 USD/ TEU/day
Pasoso terminal to Port	-	39 USD/ TEU
Special Handling (plastic pallets, containerboard and silica gel)	300.30 USD/TEU	300.30 USD/TEU

4.2 Analysis of hinterland freight transportation cost

Apart from the transportation costs explained in point 4.1, other costs are identified, including handling costs, special handling costs and other related costs at the Tanjung Priok Port.

Table 6 Transportation cost at the Tanjung Priok Port

Custom Clearance Export	409.50 USD/TEU
Surcharge	56.87 USD/TEU
Quarantine Handling	175.50 USD/TEU
Fumigation	97.50 USD/TEU

To answer the research questions, cost calculations were carried out using the Activity Based Costing (ABC) method because the Activity Based Costing (ABC) method is claimed to be more accurate than traditional costing methods. Apart from this, the Activity Based Costing method has few applications in freight transportation activities [16], so it can be a reference for enriching information.

The calculation of freight transportation costs from the plantation to the processor is based on the estimated annual coffee plant production. Where the estimated Coffee Cherries production is based on the productivity of the plantation area, 1 (one) Ha of plantation can be planted with 2.500 coffee trees, where each coffee tree can produce 4 kg of Coffee Cherries.

Freight transportation costs from the farm to the processor are based on the estimated annual coffee plant production, where transportation from the plantation to the shelter is by motorbike, while from the shelter to the processor using two available alternatives as in Table 7, after grouping based on activity level up to with the cost driver, the transportation costs from farm to processor are obtained as in Table 8.

Table 7 Allocation of the activity costs to the cost objects (Farm – Shelter – Processor)

Activity level	**Activity**	**Cost Driver**	**Number of Cost Drivers**
Units	Coffee Cherries Production	Production Volume	31,796,500
Batches	Transportation “Farm – Shelter”	Number of Trips	198,728
	Transportation “Shelter - Processor “ (alternative 1)	Number of Trips	397,456
	Transportation “Shelter – Processor” (alternative 2)	Number of Trips	21,198

Table 8 Total Transportation Cost (Farm – Shelter – Processor)

Activity	**Total Cost**
Transportation From Farm to Shelter (Travel Cost) “C_r”	1,033,386.25 USD
Transportation From Shelter to Processor (Travel Cost - alternative 1) “C_r”	1,937,599.22 USD
Transportation From Shelter to Processor (Travel Cost - alternative 2) “C_r”	482,246.92 USD

The calculation of freight transportation costs from the processor to the consolidation point/dry port is done based on the estimated green beans production from the processor, where every 1 kg of cherries can produce 0.2 coffee beans. Transportation from the processor to the consolidation point/Gede Bage dry port uses a CDE truck, as in Table 9. After grouping based on activity level up to the cost driver, the transportation costs from the processor to the consolidation point/Gede Bage dry port are obtained as in Table 10 and Figure 5.

Regarding special handling costs, the process of exporting coffee from West Java, especially Bandung district, is carried out by providing special packaging to the product using multilayer recyclable polyethylene plastic (PE) and Gunny suck materials with a capacity of 60 Kg/packaging. (Figure 6). Plastic pallets are added as a base for the truck container to prevent product damage due to condensation during transportation. The use of resources related to special handling is a cost that the exporter must bear, so it must be calculated as an expenditure.

Table 9 Allocation of the activity costs to the cost objects (from processor to consolidation point/dry port)

Activity level	Activity	Cost Driver	Number of Cost Drivers
Units	Green beans Production	Production Volume	6,359,300
Batches	Transportation From processor to Consolidation Point/Gedebage Dry Port	Number of Trips	3,180
	Special Handling (Packaging)	Number of Packaging	105,988
	Special Handling (Plastic Pallets for container)	Number of Trips	3,180
	Unloading	Unloading Quantity	3,180
	Loading	Loading Quantity	3,180

Table 10 Freight Transportation Cost (from processor to consolidation point/Gedebage dry port)

Activity	Total Cost
Transportation From processor to consolidation point/Gedebage dry port (Travel Cost) "C_r"	165,341.80 USD
Special Handling (Packaging) "C_h"	688,924.17 USD
Special Handling (Plastic Pallets for container) "C_h"	155.007.94 USD
Unloading "C_l"	20.667.73 USD
Loading "C_l"	20.667.73 USD

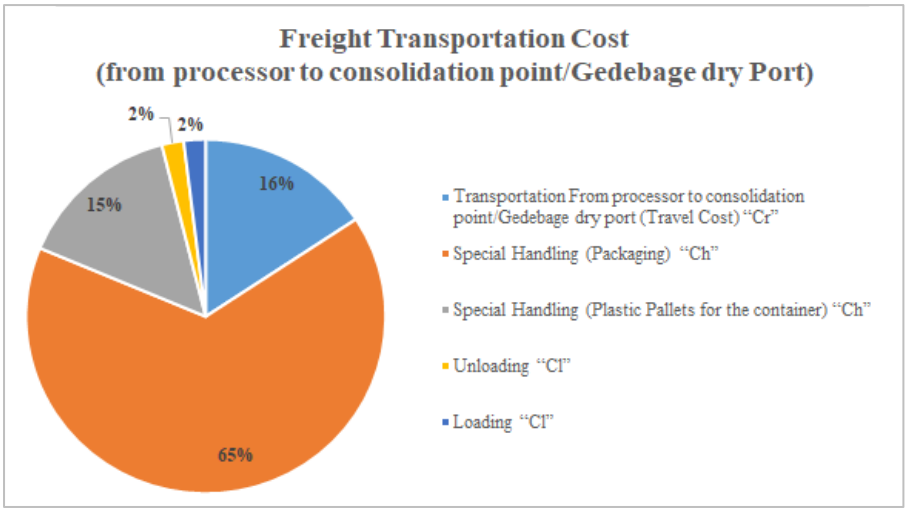

Figure 5 Freight Transportation Cost (from processor to consolidation point/Gedebage dry port)

Figure 6 Special handling (packaging)
(Source: Bintoha Perkoci, 2022)

Calculate transportation costs from the consolidation point/dry port to the port of origin based on estimates of green bean production from the processor, which can use two available alternatives, container trucks or trains, as shown in Table 11. After grouping based on activity level up to cost drivers, transportation costs are obtained from the consolidation point/dry port to the port of origin as in Table 12 and Table 13, Figure 8 and Figure 9.

Regarding special handling costs, in the transportation process from the consolidation point/dry port to the port of origin, to prevent product damage due to condensation that occurs during the transportation process, this is done by adding plastic pallets as a base for the container, lining the inside of the container with containerboard, and use of silica gel (Figure 7). The use of resources related to special handling is a cost that the exporter must bear, so it must be calculated as an expenditure.

Figure 7 Special handling for containers
(Source: Bintoha Perkoci, 2022)

Table 11 Allocation of the activity costs to the cost objects (from consolidation point/dry port to Port of origin)

Activity level	Activity	Cost Driver	Number of Cost Drivers
Units	Green beans Production	Production Volume	6,359,300
Batches	Transportation From Consolidation Point to Tanjung Priok Port (Alternative 1 "Truck")	Number of Trip Containers (TEU)	331
	Transportation From Gedebage Dry Port to Tanjung Priok Port (Alternative 2 "Train")	Number of Trip Containers (TEU)	331
	Special Handling (plastic pallets, containerboard and silica gel for container)	Number of Trip Containers (TEU)	331
	Loading	Number of Trip Containers (TEU)	331
	Custom Clearance Export	Number of Trip Containers (TEU)	331
	Surcharge	Number of Trip Containers (TEU)	331
	Quarantine Handling	Number of Trip Containers (TEU)	331
	Fumigation	Number of Trip Containers (TEU)	331

Table 12 Total Transportation Cost (from consolidation point/dry port to Port of origin) Alternative 1 "Truck"

Activity	Total Cost
Transportation From Consolidation point to Tanjung Priok Port (Travel Cost) "C_r"	77,503.97 USD
Special Handling (plastic pallets, containerboard and silica gel for container) "C_h"	99,463.43 USD
Loading "C_l"	4,305.78 USD
Custom Clearance Export "C_p"	135,631.95 USD
Surcharge "C_p"	18,837.77 USD
Quarantine Handling "C_p"	58,127.98 USD
Fumigation "C_p"	32,293.32 USD

Table 13 Total Transportation Cost (from consolidation point/dry port to Port of origin) Alternative 2 "Train"

Activity	Total Cost
Transportation From Gedebage Dry Port to Tanjung Priok Port (Travel Cost) "C_t"	35,522.65 USD
Special Handling (plastic pallets, containerboard and silica gel for container) "C_h"	99,463.43 USD
Loading "C_l"	4,305.78 USD
Custom Clearance Export "C_p"	135,631.95 USD
Surcharge "C_p"	18,837.77 USD
Quarantine Handling "C_p"	58,127.98 USD
Fumigation "C_p"	32,293.32 USD

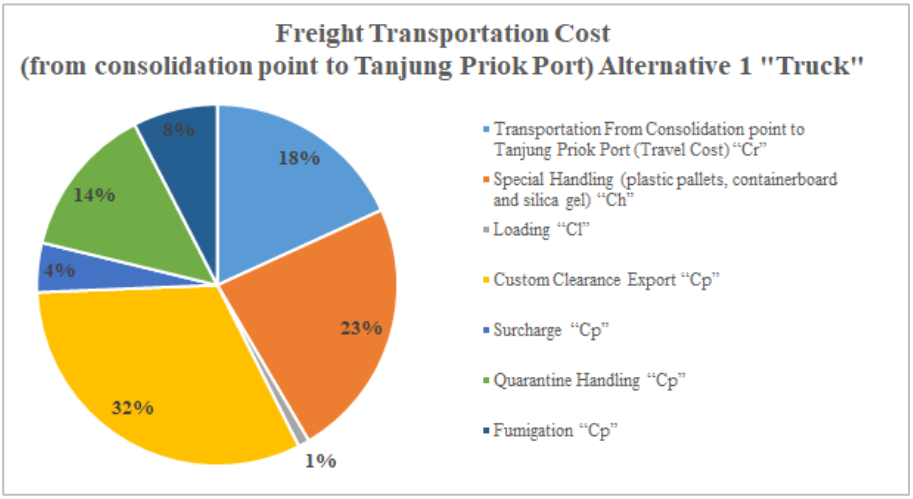

Figure 8 Freight Transportation Cost (from consolidation point to Tanjung Priok Port) Alternative 1 "Truck"

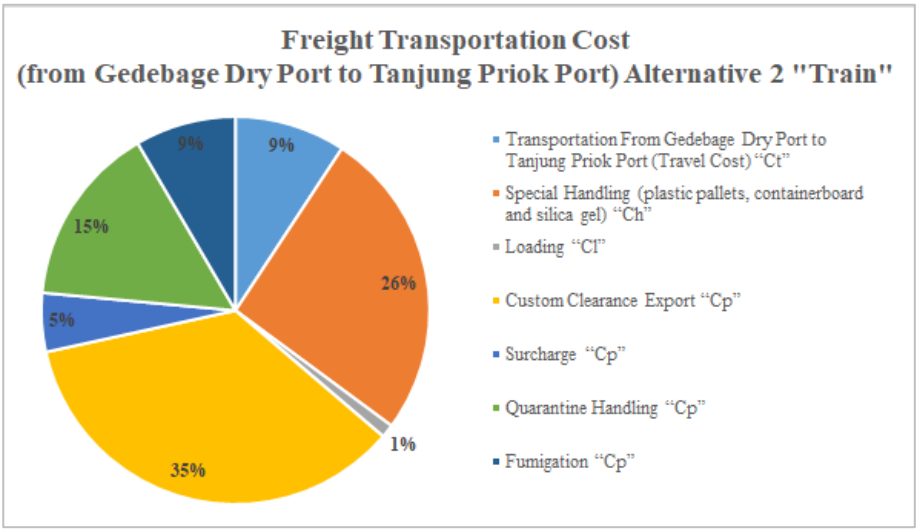

Figure 9 Freight Transportation Cost (from Gedebage dry port to Tanjung Priok Port) Alternative 2 "Train"

From the results obtained, it can be seen that in the transportation process from farm to processor, the transportation costs that arise are only related to travel costs. In contrast, in the transportation process from processor to consolidation point/Gedebage dry port, the shipper must bear transportation costs consist of costs. Travel costs are 16%, special handling costs related to packaging are 65%, special handling costs related to containers (plastic pallets for container) are 15% and loading and unloading costs are 4%. These packaging costs arise because of the export destination. They will differ from domestic deliveries, where the packaging required for domestic deliveries is more straightforward.

In the transportation process from the consolidation point/Gedebage dry port to the Tanjung Priok Port, the transportation costs that must be borne by the shipper using truck mode consist of travel costs of 18%, special handling costs related to containers (plastic pallets, containerboard and silica gel) of 23%, loading and unloading costs of 1% and the rest is port fees. Likewise, the train mode consists of travel costs of 9%, special handling costs related to containers (plastic pallets, containerboard and silica gel) of 26%, loading and unloading costs of 1% and the remaining port costs.

5 Discussion

To answer our research question, 'What is the freight transportation cost structure model in coffee bean export activities in West Java which considers resources (costs) related to special handling needed to maintain quality in the transportation process so that the quality of the commodity can be maintained until it reaches Tanjung Priok Port under FOB contract', the results of this research are that in the hinterland freight transport process for exporting coffee commodities, apart from travel costs, container handling costs at the port, and loading unloading costs, exporters must pay special handling costs to ensure the quality of the commodity Coffee can be maintained at the port of origin and protected from condensation, where these costs consist

of special handling costs for packaging and special handling costs for containers including plastic pallets, containerboard and silica gel.

In the freight transport process from the processor to the consolidation point/Gedebage dry port, the special handling costs required are 80% of the total transportation costs. This is related to the packaging costs of 65% and the special handling costs associated with the container of 15%. While in the transportation process from the consolidation point/Gedebage dry port to the Tanjung Priok Port, for the mode of transportation by truck or train, the special treatment costs related to the container are 23 to 26% of the total transportation costs. The difference is because the travel costs using trains are 46% cheaper than using trucks.

So even though the green beans commodity is not a perishable goods commodity, in the freight transport process, it is necessary to include costs related to activities required to maintain the quality of the goods (special handling) so that the freight transport process does not cause a decrease in quality/damage to the goods due to condensation and the green beans commodity hygroscopic in nature. Special handling costs arise when the product is green beans, starting from the shipping process from the processor to the Tanjung Priok Port. Regarding the choice of mode, train travel costs are slightly cheaper than trucks; this is in line with research results [50-52].

6 Conclusion

The main concern of this research is to provide information regarding the need for special handling costs in transporting green beans for export purposes so that it can be a consideration for business actors. To achieve this goal, we calculated freight transportation costs; from the calculation results, it was found that in green bean transportation activities for export purposes, expenses related to travel, loading and unloading costs, handling costs at the port, and special handling costs were required.

This research contributes to theory and practice. In terms of theoretical contribution, our study confirms that even though green beans are not a *perishable goods* commodity, the transportation process needs to include costs related to activities required to maintain the quality of the goods (special handling), where up to now the costs of maintaining the quality of the goods have been focused only on *perishable goods commodities.* In terms of practical contribution, our research provides information to coffee exporting business actors that the special handling costs incurred by business actors are pretty large, around 80% of the total transportation costs during the transport process from the processor to the consolidation point/dry port and around 23% to 26% of the total transportation costs during the transport process from the consolidation point/dry port to the port of origin, so business actors need to look for other alternatives to be more efficient.

Transportation using trains is more efficient than highways. Besides, it can reduce traffic flow volume, highway congestion and emissions. Therefore, the government should reactivate the railway line from Gede Bage to Tanjung Priok and carry out unique strategies so that trains from Gede Bage Dry Port to Tanjung Priok Port can be more attractive to coffee business actors. This research has limitations. One of the limitations is that this research does not consider various alternative tools or methods that can be used to maintain the quality of goods (special treatment) so that the transportation process does not cause a decrease in quality/damage to goods such as the use of Fantainers.

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