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## The Nutmeg Value Chain in Indonesia

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### Abstract

Indonesia is one of the largest producers and exporters of nutmeg in the world market. Most nutmeg producers are smallholder farmers that still use traditional methods of processing. These methods inhibit the ability to improve market competitiveness and maximise the potential of the nutmeg industry. In this paper a value chain analysis is provided on the nutmeg industry in Indonesia to identify constraints faced by actors in the value chain. A lack of local government support, low productivity and quality, and a lack of access to information are several barriers that are identified. To address these issues, some strategies are suggested to improve the development of the nutmeg industry in Indonesia.

**Key words:** nutmeg, value chain, Indonesia, exports, smallholders

### Introduction

Indonesia is the largest exporter of nutmeg in the global market, accounting for 66 - 77 per cent of the total market requirements, depending on the year. Other major exporters are India, Netherlands, Vietnam and Germany (World Integrated Trade Solution, 2018). Initially, the nutmeg plants grew in Banda and Maluku Islands, however, they have spread widely and are now grown in many other provinces throughout Indonesia. Indonesian nutmeg is more oriented towards the export market than domestic consumption which places nutmeg as one of the high-value commodity exports that contributes to foreign exchange earnings (Supriadi, 2017). According to the Directorate General of Estate Crops of Indonesia (2019), the nutmeg industry plays an important role in terms of generating revenue for the country with an export value of around \$US120 million and an export volume of 20,202 tonnes in 2018. Moreover, Indonesian nutmeg production has increased during the period 2010 - 2019 by an average growth of 9.47 per cent per year (Pakpahan, Bermawie & Wiratno, 2019).

Even though Indonesian nutmeg is a superior spice that is export-oriented, it has not yet been able to optimise its market access and increase its competitiveness in the international market. As well, almost all of the nutmeg plantations in Indonesia are cultivated by smallholder farmers (99.3 per cent) and they use traditional methods of processing which increases the vulnerability to nutmeg contamination (Lawalata, 2019). The major contaminant in nutmeg is aflatoxin and it is the main barrier for the exporters to expand the market.

In this paper a value chain analysis of Indonesia's nutmeg industry is conducted to understand the characteristics and relationships among the actors involved, and the constraints that are faced by all

actors along the value chain. By identifying these issues, specific interventions and efforts can be made to maximise the value gained by the actors in each stage.

### The Indonesian Nutmeg Market

The three components of the nutmeg fruit are flesh, nuts, and mace (Figure 1). The highest economic values are the nuts and the mace which are generally sold in dry form (Figure 2). They can also be processed into oil as a value-adding process (Pratama, Harahap & Muhandri, 2019).

**Figure 1. Nutmeg fruits**



Source: Dinar, Suyantohadi & Fajar (2013)

**Figure 2. Dried nutmeg**



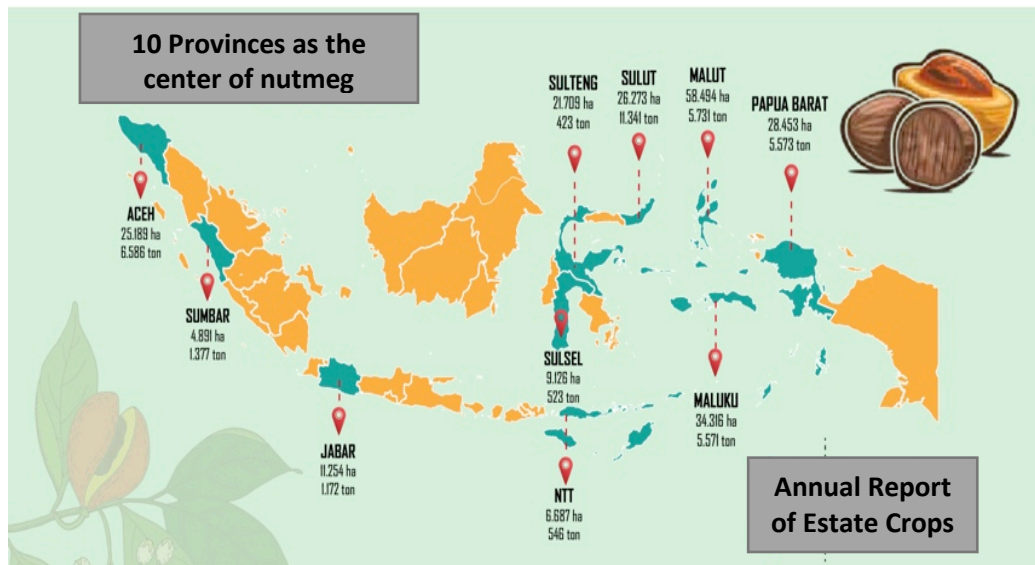
Source: Directorate General of Estate Crops (2019)

There are five main provinces in Indonesia that produce the largest proportion of nutmeg, North Maluku, Maluku, North Sulawesi, West Papua, and Aceh. Due to its potential value as an agricultural export product, the Indonesian government through the Ministry of Agriculture has encouraged farmers in other provinces to grow nutmeg in order to respond to the growing demand. Indonesia now has ten provinces producing nutmeg with a total production of 40,653 tonnes in 2019. Aceh produced 6,586 tonnes followed by North Maluku (5,731 tonnes) and West Papua (5,573 tonnes) respectively (see Figure 3). The total production of Indonesian nutmeg has increased over the past ten years with a growth rate of 4.04 per cent since 2011 (Figure 4). Total production of nutmeg reached a peak in 2018 of 44,063 tonnes (Directorate General of Estate Crops, 2019).

The volume of nutmeg exported to the world market from 2008 to 2019 has fluctuated, however, it has tended to increase over this time period (Directorate General of Estate Crops, 2019) (Figure 5). The highest export volume was 20,207 tonnes in 2018 because in the same year the total production of nutmeg was also the highest. In contrast, as shown in Figure 6, the export value of nutmeg does not follow the pattern of export volume. In 2016, the export value of nutmeg decreased significantly, even though the export volume was relatively stable in the same year. The export value experiences a fluctuating trend due to variability in the global nutmeg price and in the value of the Indonesian currency relative to the \$US (Pakpahan, Barmawie & Wiratno, 2019).

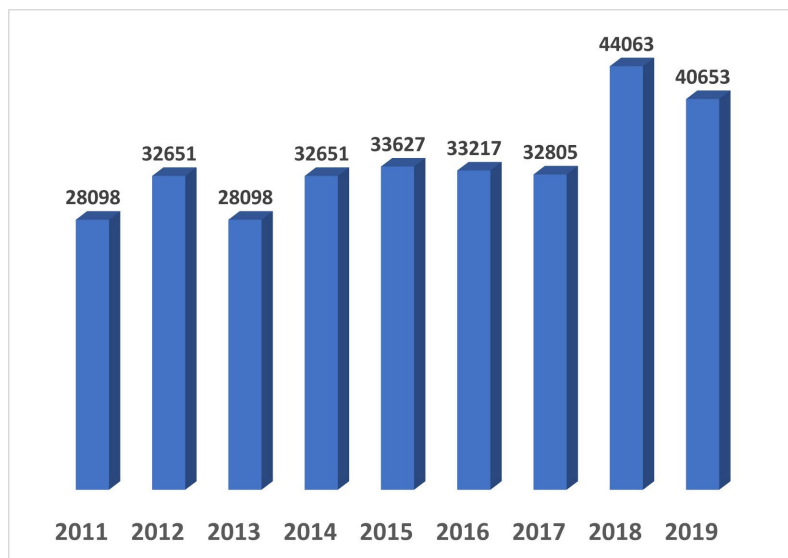
The increasing demand in the global market indicates that there is an opportunity for exporter countries including Indonesia to increase their nutmeg production for export. Moreover, Indonesian nutmeg has a distinction in terms of aroma and high oil yield. Ulfah, Hardjomidjodjo and Anggraeni (2019) showed that Indonesian nutmeg is competitive in all export markets, leading to expected growth in volume and market share.

Figure 3. The centre of nutmeg production in 10 Indonesian provinces in 2019



Source: Directorate General of Estate Crops (2019)

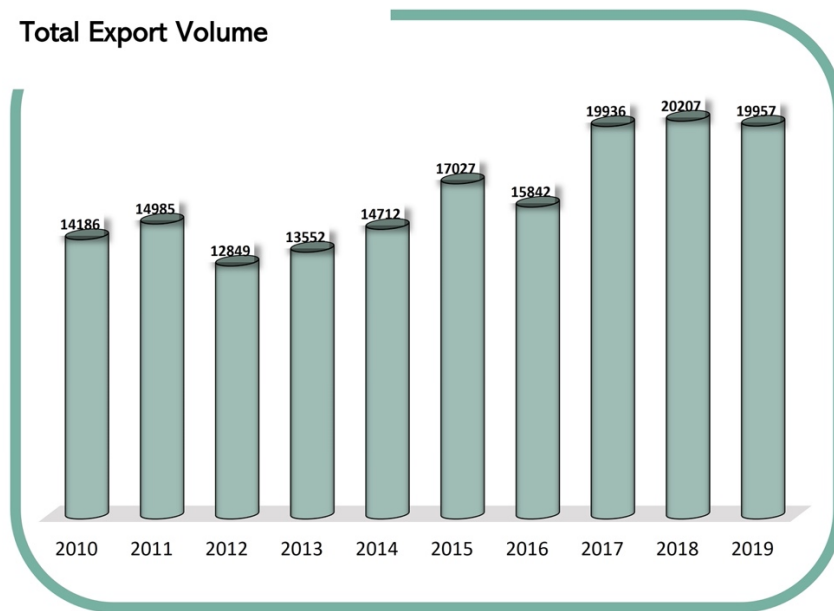
Figure 4. Total production of nutmeg in Indonesia, tonnes, 2011 to 2019



Source: Directorate General of Estate Crops (2019)

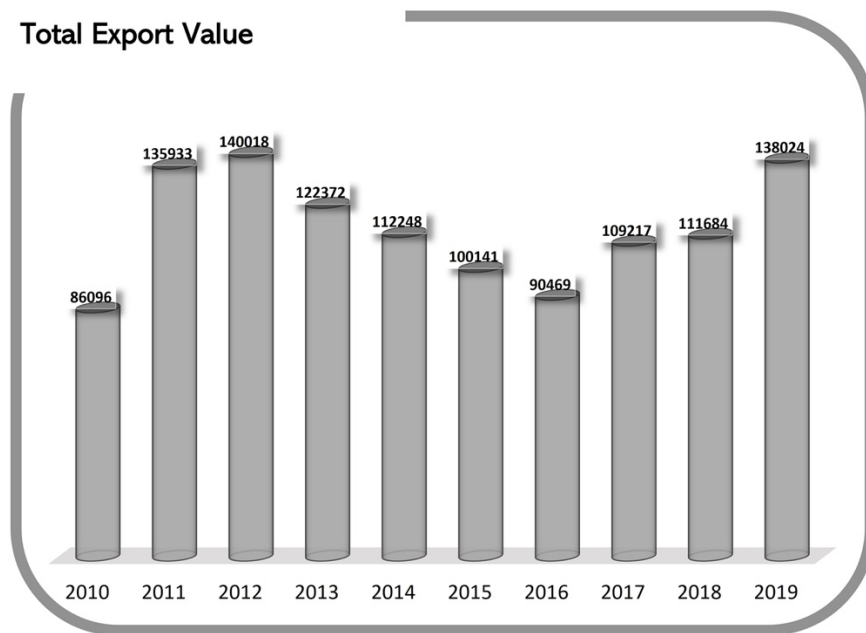
Indonesian nutmeg is exported mainly to the Netherlands and Germany, Vietnam, China, India, the United States, and Japan (Figure 7). The European Union is the most challenging market because of their strict rules for imports of agricultural products, especially regarding health aspects and food safety. Although the European Union imposes these regulations on imported products through non-tariff barriers, it is still one of the growing markets for Indonesian nutmeg. In 2019, the largest volume of exports went to the Chinese market with a volume of 3,784 tonnes and a value of \$US16.11 million, followed closely by Vietnam with 3,740 tonnes valued at \$US17.83 million.

Figure 5. Total export volume of Indonesian nutmeg, tonnes, 2010 to 2019

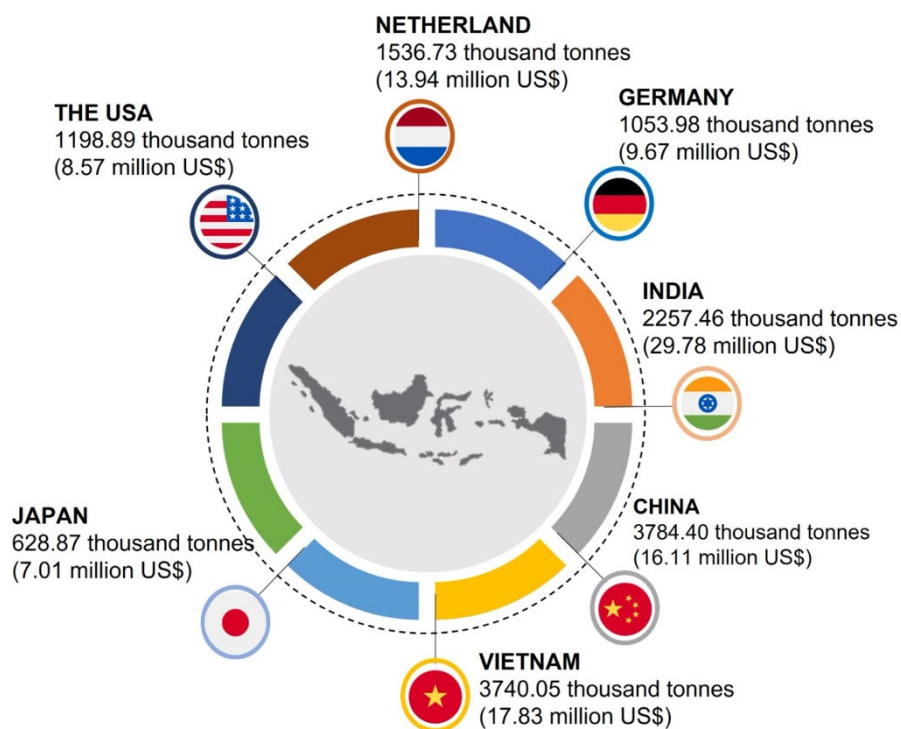


Source: Directorate General of Estate Crops (2019)

Figure 6. Total export value of Indonesian nutmeg, \$US, 2010 to 2019



Source: Directorate General of Estate Crops (2019)



Source: Directorate General of Estate Crops (2019)

## Mapping the Nutmeg Value Chain in Indonesia

### Actors in the Indonesian nutmeg value chain

The value chain for nutmeg consists of a number of main actors and also a range of supporting actors who are involved indirectly in the value chain. The way nutmeg reaches the customers is through several different channels depending on the targeted market. Nutmeg consumption for the domestic market is not as large as for the export market, so that, the actors involved in exporting are more complex compared to selling to domestic consumers. The nutmeg value chain map is illustrated in Figure 8. Further details of each actor and activities included in each stage are explained as follows.

**Input suppliers:** Inputs such as seeds, fertilisers and pesticides are provided to the farmers by local government agencies in each province. There is also training for farmers to achieve better yield and better quality of nutmeg. The training introduces Good Management Practices (GMP) for the farmers who are able to apply these practices from the early stage of cultivating.

**Farmers:** Most nutmeg plants are cultivated by smallholder farmers who still use traditional methods of processing. Farmer's activities start from planting, caring, harvesting, and post-harvest handling. Nutmegs can be harvested after seven years, and the plant continues to produce fruits until around 70 years of age (Pratama, Harahap & Muhandri, 2019). After harvesting the fruits, farmers will immediately separate the flesh/meat from the nuts inside covered with the mace. The flesh of the nutmeg fruit is sent to local home industries to be processed further. Meanwhile, the nuts and mace are separated by splitting them and beginning a drying process. The nutmegs (nuts) and mace should be dried immediately under the sun or fumed at 45°C to reduce their water content. This process takes 3-4 weeks until the water content reduces to 10–12 per cent (Supriadi, 2017).

**Home industry:** The flesh or meat of the nutmeg is used in local food industries on a small scale. Initially, the flesh was thrown out by the farmers as waste. More recently, through training from NGOs collaborating with local governments, local communities have started to produce different kinds of products from the flesh such as jams, juices, candies, and dried fruits. This shift has a positive impact on rural development as the local communities can earn more income for their households.

**Village collector traders:** Village collector traders collect nutmeg fruits from those farmers who want to sell the fresh nutmegs without processing them. Then, the collectors will continue the process of cutting, splitting, and drying.

**Wholesalers:** Farmers and village collector traders sell their dry nutmeg and mace to wholesalers located mostly in the capital city. The wholesalers sort the nutmegs by appearance and classify them by quality grade. If the nutmegs are broken, the price will be lower than for whole nutmegs. Wholesalers play an important role in the nutmeg value chain in Indonesia because they have market access regarding buyers from outside the island, exporters, as well as the shipment destination. They also have access to information such as price, demand, and quality needed for export markets. More importantly, wholesalers at the province level have a partnership with the exporters from big cities from Surabaya and Jakarta.

**Refiners:** The activity in this stage is turning nutmeg and mace into oil through the distillation process which has a high value. Nutmeg oil is used in the food sector and pharmaceutical industry.

**Exporters:** Before shipping the products (dry nutmeg, ground nutmeg, dried mace, and ground mace), the exporters must complete all the necessary documents relating to the regulatory requirements in importing countries. Several laboratory tests for the products have to be done before they are exported, to the European Union in particular. Nutmegs are exported only in the four types of primary form, and each of them has a different HS (Harmonisation) code according to the World Trade Organisation (Table 1).

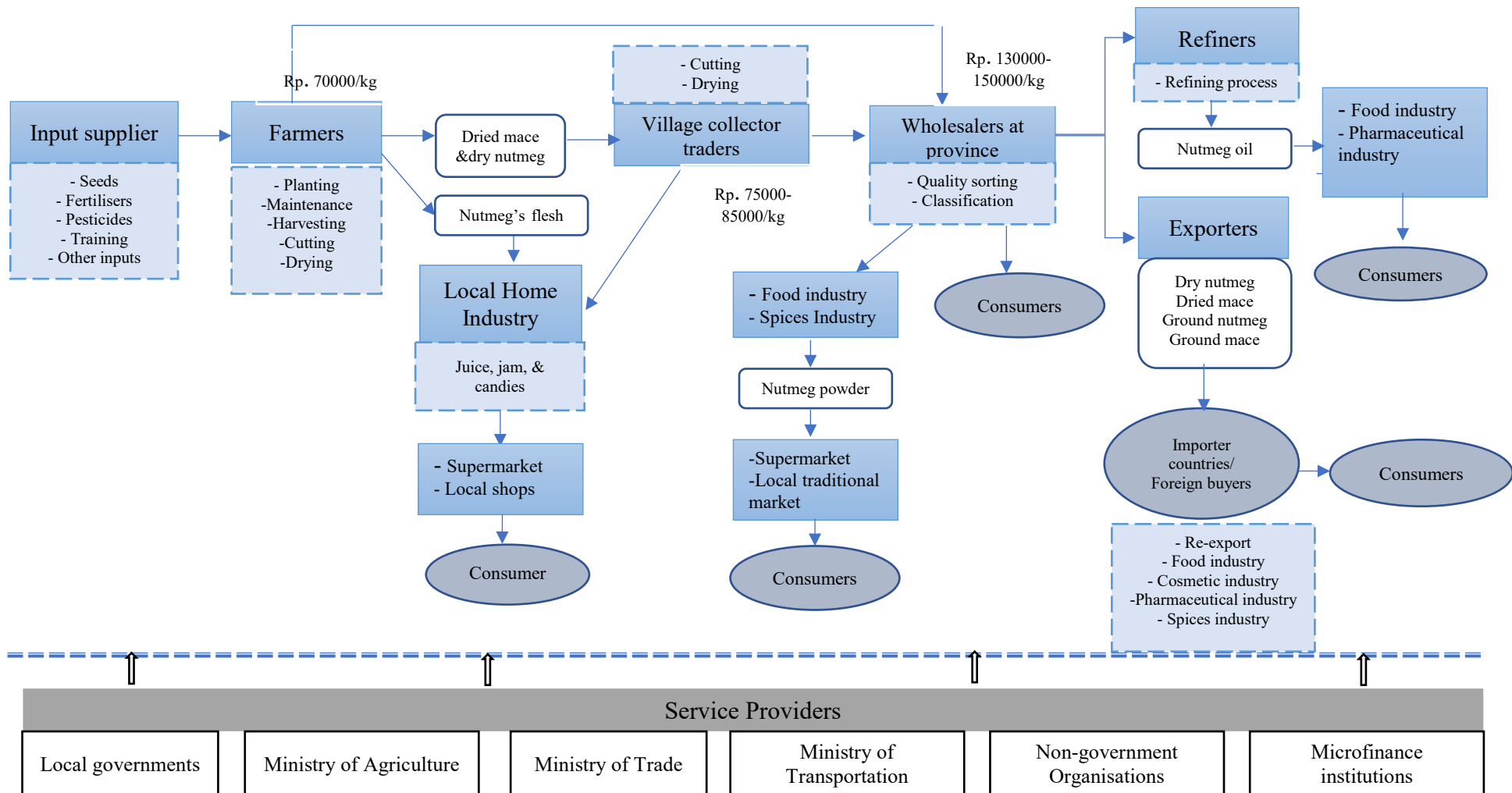
**Table 1. HS code for nutmeg**

HS Code	Description
09081100	Nutmeg, neither crushed nor ground
09081200	Nutmeg, crushed or ground
09082100	Mace, neither crushed nor ground
09082200	Mace, crushed or ground

Source: Dinar, Suyantohadi & Fajar (2013)

**Consumers:** Since Indonesian nutmeg is more oriented towards the export market, most final consumers are in the importing countries. There is little information about specific importing companies. The only company that has been mentioned in some papers is “Verstegen Spices”, a major company from the Netherlands that imports large amounts of nutmeg from Indonesia (Valencia, Kumaat & Rumagit, 2017). Little information is available as well about how nutmeg is processed to final consumers in importer countries. In the domestic market, nutmeg products made from the flesh such as jam, candies, and syrup reach consumers through local shops and supermarkets. Nutmeg oil and nutmeg powder are further processed in the food and pharmaceutical industries before they go to customers.

Figure 8. The nutmeg value chain in Indonesia



Source: Adapted from Jelliani & Raidayani (2020)



**Service providers:** There are several types of service providers that support the nutmeg value chain. Local government has a role in terms of developing rules, regulations and policies in each province. At the national level, the Ministry of Agriculture works together with the Ministry of Trade for developing strategic plans for potential agricultural products. The Ministry of Trade also facilitates exporters regarding export rules and policy. Regulations regarding shipment within Indonesia from one island to other islands, and shipping to other countries, is under the Ministry of Transportation.

Non-governmental organisations have also been associated with nutmeg industry development, including international organisations such as Sustainable Spice Initiatives (2021). Finally, regarding the financial sector, there are some private institutions that offer credit services to help agricultural sector production, particularly farmers when they face financial difficulties.

## Drivers of Value Chain Performance

### Logical drivers

The type and location of facilities are key drivers that have a significant impact on value chain performance due to their effect on responsiveness and efficiency (Chopra & Meindl, 2013). In the production of nutmeg, the two major facilities are the production sites of the farmers, and the storage sites owned by farmers, village collector traders, and wholesalers. Storage is the main driver that has an impact on nutmeg quality because the dried nutmeg needs to be collected and safely stored. Storage also allows traders to accumulate tradable volumes. Trading nutmeg in small volumes will not give significant profit. The location of storage also determines transportation costs. Village collector traders may need to travel to purchase harvested nutmeg from producers. They may also need to travel to the capital cities to sell dried nutmeg to buyers/ wholesalers. As the nutmeg farms are located in rural areas where there are no input suppliers, farmers may need to travel long distances to purchase inputs. Thus, the location of facilities has a significant impact on costs of production and marketing.

Nutmeg production in Indonesia has not yet met the quantities demanded in the market. The role of inventory in the nutmeg value chain is to ensure the supply is stored as a stock for future sales. Dried nutmeg can be stored in a long period of time as long as it is stored in a controlled storage room. As a highly valuable spice, many producers keep a stock of dry nutmeg, which is sold when they need money. Some village collector traders and wholesalers do the same thing to take advantage of price variations. They wait until the price is stable or even increases before selling off their inventory. Cycle inventory applies to the nutmeg value chain as most trading occurs in large volume/lots.

Transportation has always been a major concern for all actors in a value chain. The types of transportation in the nutmeg value chain are road transportation and sea transportation as Indonesia is an archipelago country. Road transportation such as trucks or minitrucks face difficulties regarding the poor condition of roads connecting districts to other districts. This is due to a lack of government attention and support for rural infrastructures. Another way to transport nutmeg from village collector traders to wholesalers at the province level is using inter-island boats. However, using sea transportation increases the cost of labour as there will be double handling. For example, there will be costs for loading the packaged nutmeg from trucks to the boats, and then unloading from boats to trucks, and again from trucks to the storage site. Weather conditions are also a consideration when it comes to sea transportation as the quality of the nutmeg may suffer if they are not well packaged.



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## Cross-functional drivers

**Product flow:** As shown in the nutmeg value chain (Figure 8), nutmegs are cultivated by smallholder farmers with the main activities from planting to post-harvest handling. Village collector traders are located in each production district, and they purchase nutmeg from farmers in the form of fresh nutmeg or dry nutmeg. They collect and store the nutmeg until the amount of nutmeg is sufficient to be sold to the wholesalers. This is to reduce the transportation cost. By selling the nutmeg on a large scale, it will maximise the capacity of trucks to transport the product. Some farmers do not sell their product to village collectors, but they sell the dry nutmeg that they have processed themselves directly to wholesalers. Farmers get a better price if they sell nutmeg directly to wholesalers if they can supply on a large scale. So, only farmers who have sufficient storage can sell in this way. Wholesalers will sort the nutmeg based on the classification of the quality, then they store the nutmeg for shipping out of the island to large buyers/exporters in Jakarta, Surabaya, and Manado. Different provinces have different regulations, so it depends on local governments to arrange how the products are shipped and requirements to comply with the business procedures. Nutmeg that is going to be exported has to be tested at accredited laboratories and these certificates have to be attached as one of required documents. The laboratory test uses the Indonesian National Standard SNI 0006:2015 as guidance.

For local consumption, nutmeg products that are made from nutmeg flesh such as jam, candies, and syrup are distributed to local supermarkets and local shops. Nutmeg oil and powder are used for food industry and pharmaceutical purposes.

**Information flow:** In the nutmeg value chain, the flow of information in terms of supply and demand conditions should connect all the actors. The exporters have a contract with buyers in importing countries. Thus, they know the amount of nutmeg needed to be sent at particular times. They do not place an order to the village collectors because normally nutmeg can be produced the whole year. However, the information regarding nutmeg quality has only been exchanged between the wholesalers and exporters. The buyers will inform the wholesalers about the requirements of nutmeg that can be exported considering the quality. However, maintaining and improving nutmeg quality is important information that needs to be shared with farmers to ensure that Indonesian nutmeg can be accepted in the global market.

The information regarding feedback from customers is more likely going only to downstream actors, such as wholesalers at the capital city. Mostly, this kind of information does not reach farmers and village traders. As a result, this can be a threat to the Indonesian nutmeg trade because farmers do not know that quality is important for export products.

**Financial flow:** The financial flow started from farmers purchasing inputs such as seeds, pesticides, and fertilisers from the suppliers. Another financial flow comes from the purchasing of nutmeg from village collector traders to smallholder farmers. The price of nutmeg is relatively stable, and it tends to increase over time. However, most farmers do not have access to global price information of nutmeg. Thus, they often receive less than the actual market price.

The profit margin from farmers who sell their product to village collectors is different to those who sell nutmeg directly to wholesalers. An analysis done in South Aceh district by Jelliani and Raidayani (2020) calculated that farmers who sell to the wholesalers directly obtained a margin of 12.57 per cent compared to farmers who sell to village collectors with a margin of 11.87 per cent. However, there was some missing information in their analysis which makes it difficult to make an exact comparison.

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## Major Constraints in the Nutmeg Value Chain in Indonesia

The major constraints that can be identified in the Indonesian nutmeg value chain are grouped into several themes.

### Low productivity and low quality

The increasing production of Indonesian nutmeg is due to expanding land areas planted to nutmeg. However, productivity has not shown significant improvement yet, with the average productivity less than 500 kg per hectare of land (Pakpahan, Bermawie & Wiratno, 2019). This is because there is a lack of understanding and awareness by farmers in applying proper cultivation methods. According to Juwita, Tsuchida & Munarso (2018), commonly nutmeg plants are planted with narrow spacing around 3m x 3m, and with a random male-female ratio. The ideal planting space is 10m x 10m, and the recommended male-female ratio is 1:10.

Even though overall production of Indonesian nutmeg has increased over the past ten years, nutmeg production in some provinces in Indonesia have experienced difficulty. For example, nutmeg from Maluku Province is produced by small-scale farmers in remote areas which face limited access to inputs and services for basic production and post-harvest handling (Prudencio & Fellow, 2011). These conditions have limited farmers' capacity to rehabilitate crops, maintain trees, and handle pest attacks which, consequently, inhibit their ability to increase nutmeg production.

Furthermore, low quality is another common barrier that occurs along the value chain of nutmeg. Triwibowo and Falianty (2018) found that constraints related to quality are mainly caused by poor handling during harvesting, processing, and distribution. Technically, the nutmeg quality depends primarily on the drying process because if the water content of this product is high, it will trigger the growth of the toxin produced by *Aspergillus flavus* which leads to lower quality nutmeg (Triwibowo & Falianty, 2018). Beside the drying process, storage humidity is also another factor that can possibly cause the growth of mould in the nutmeg and lead to poor nutmeg quality. Another barrier is lack of access to finance which has resulted in pressure on farmers to sell their nutmeg early before the nuts are mature or properly dried, which further affects the nutmeg quality.

### Traditional customs

When it comes to applying a proper method of cultivation, there is a constraint related to traditional customs. For instance, in some areas in West Papua, since trees were inherited throughout generations, there are beliefs that nutmeg trees are the form of their ancestors (Juwita, Tsuchida & Munarso, 2018). Cutting the nutmeg trees/branches means cutting the hands of their ancestors. While pruning the nutmeg trees is an important activity to support the productivity of the trees to produce more fruits, farmers are reluctant to do so.

### Access to information

Difficulty in accessing market information such as price information, potential buyers, and global demand has an impact on farmer's profit. Despite vast global demand, the nutmeg price at the farm gate is relatively low and is not differentiated by quality which results in low returns received by farmers (Prudencio & Fellow, 2011). Farmers have no bargaining power to negotiate with village collectors, and they just sell the nutmeg based on the offered prices from the buyers because they do not know the current market situation and prices.

In addition, access to information regarding exporting nutmeg is only accessible to the wholesaler. Information about customer feedback is another point that has not gained attention in terms of farmer's involvement. Hence, farmers are less aware of their product's quality and safety with respect to contaminants.

### **Nutmeg contaminants**

From the exporter's perspective, the nutmeg contaminant *Aflatoxin* is one of the main barriers to exporting nutmeg. *Aflatoxin* is a major toxin that causes nutmeg to be rejected by importer countries. Aflatoxin contamination is caused by poor management processes along the value chain.

From 2009 to 2016, Indonesia received 46 notifications from the Rapid Alert System Food and Feed (RASFF) regarding aflatoxin, with the highest rejection cases mainly from European markets around 9-10 cases (Wahidin & Purnhagen, 2018). The rejections were caused by aflatoxin levels found in the nutmeg that were above the standard of SPS requirement from targeted markets. In global trade, SPS requirements are classified as non-tariff barriers that influence the flow of the export products to importer countries. The rejection of Indonesian nutmeg by importers has a negative impact on the whole supply chain.

### **Regulations and policies**

A lack of local government attention to this sector has resulted in unilateral market control by traders and lack of market power of farmers because there are no clear policies and regulations in the nutmeg trading system at the local level. This condition has an impact on farmer's profit since they do not have any bargaining power in the trade (Ulfah, Hardjomidjodjo & Anggraeni, 2019). Without regulations about pricing, farmers are unable to achieve a sustainable profit because the village collectors have controlled the prices.

Moreover, policies and regulations that are conducted and formulated at the national level by the Ministry of Agriculture cannot be implemented properly at the province level. This is because nutmeg production is scattered in different provinces throughout Indonesia with each region having different unique and specific aspects that need to be taken into consideration, such as geography, demography, socio economics, and cultures (Endyana et al., 2020).

### **Suggested Interventions**

#### **Developing nutmeg-based enterprises**

Looking at its market potential, nutmeg has a good prospect of becoming a sustainable agricultural industry. Since nutmegs are exported only in the form of a raw material, turning the nutmeg industry from a small-scale traditional industry into small and medium enterprises for nutmeg oil production is a possible development. UD. Permata Bunda in South Aceh is an example of a case study project about developing a nutmeg oil production process (Darma et al., 2021). The result shows that the activity efficiency increased particularly in terms of time and cost. This study recommended that the model that they analysed can be further developed in other provinces.

Apart from increasing livelihoods through business activities, developing good strategies along with its prospects of value adding products is more likely to help community empowerment in a production region. Given its wide distribution it will also support and promote rural development in Indonesia. Before developing this sort of new business however, several analyses are needed at an early stage

such as market feasibility analysis, market opportunity criteria, the availability of infrastructure, and financial feasibility. Government involvement becomes necessary in terms of providing training to improve skills and transfer knowledge and developing formal regulation that supports the transformation of the industry.

### **Transformation through technological assistance to improve nutmeg quality and productivity**

As mentioned, a key problem in nutmeg quality is an infection of harmful fungi that produce *Aflatoxin*. Fresh nutmeg beans are vulnerable to *Aflatoxin*, so nutmeg beans must be dried as soon as they are harvested. In the traditional method, nutmegs are dried under the sun, and it is hard to know whether they are properly dried or not. Good Management Practices (GMP) need to be introduced to farmers to reduce this risk. Taking advantage of the enhancement of technology can assist in the improvement of nutmeg quality and productivity. For instance, using technology to measure the temperature in the drying process to ensure that nutmegs are dried properly. Storage is also important in terms of maintaining nutmeg quality after being dried. Temperature and humidity control in storage is needed to prevent fungal infection. Improving nutmeg quality is important as it is a key determinant in nutmeg pricing and a requirement to meet import market standards.

A pilot project led by Ollop Company in Hila Village, Maluku, has proven how transformational methods can improve nutmeg quality. The company has had a positive impact on farmers in terms of transforming cultivation technology and nutmeg processing, as well as changing farmer's orientation towards sustainable nutmeg industry for increasing farmer's welfare (Siwalette et al., 2018).

### **Improving access to information**

Globalisation and market liberalisation has created opportunities and competitiveness in international markets. In the case of Indonesian nutmeg, maintaining and improving nutmeg quality will increase the competitiveness of Indonesian nutmeg. Farmers have to be provided with all information regarding export requirements such as quality standards so they will be aware of the quality of the nutmeg that they produced.

Moreover, improving access to information can help farmers regarding price information and market access. Farmers can receive better prices if they have access to pricing information and can potentially expand their market if they are able to access a greater number of potential buyers. Hence, they can improve their profit and income. It is vital for the local government to ensure that farmers receive the necessary information. Another way to improve information access is increasing support through assistance for local actors and providing opportunities to exchange knowledge among farmers. Government can play a role in ensuring that all information about market access and supply demand is available and transparent to all actors in the value chain.

### **Diversification of new export markets**

A study by Purba, Yusufi and Hestina (2018) using the Revealed Comparative Advantage (RCA) method shows that Indonesian nutmeg has both a comparative and competitive advantage in export markets and overall, the performance of nutmeg products from Indonesia has improved. However, they also pointed out that there was weakening competitiveness for the European Union market (Purba, Yusufi & Hestina, 2018). Further, the disruption in global trading due to the Covid-19 crisis has taught many industries that they should not be dependent on particular markets. Thus, diversification of new export destination markets for Indonesian nutmeg is important to reduce reliance on the existing markets. Diversification has also an advantage in terms of a risk management strategy when it comes

to uncertainty in the world market. The Indonesian government could facilitate support for the nutmeg industry in this area by establishing trade agreements with other countries.

### Public and private support

To improve the value chain, the government should take a role in formulating legal and formal regulations particularly with regard to sales. This is necessary to ensure that pricing and quality measurement in sales activities are properly applied in the nutmeg trading system from the level of farmers/producers to wholesalers.

Public and private support through improving public infrastructure can help the improvement of the value chain. Better infrastructure is one of the key elements that can help producers to lower production costs (Chopra & Meindl, 2013). Infrastructure, such as roads in rural areas where the nutmeg production is located, has often received less attention from the government. As transportation is a crucial driver in value chain activities, it is believed that improving infrastructure can support the value chain to perform better.

In addition, the evidence has shown that most nutmeg farmers have limitations in technical knowledge about nutmeg plantation and processing (Prudencio & Fellow, 2011). The public and private sectors can support this industry through facilitating training and capacity building for farmers. These supports will assist farmers to improve nutmeg production and quality as well as increasing Indonesian nutmeg competitiveness in the international market. An example of such a collaboration project is the Sustainable Cocoa Production Program with the aim at addressing problems in the Indonesian cocoa production. This partnership has been established since 2012 in 19 districts in the area of Sulawesi and Sumatra and involved Indonesian government agencies working with private businesses such as Armajaro and ADM Cocoa (Atika et al., 2018).

### Conclusion

Nutmeg is one of the high value export commodities from Indonesia that contributes to export earnings. As an export-oriented product, it is important to improve nutmeg quality in order to increase competitiveness in the global market. Analysing and identifying problems that occurred in the nutmeg value chain can lead to potential solutions to the issues that all the actors face in every stage. The main issues are low productivity and quality due to poor postharvest management and handling, a lack of access to information, and lack of regulations and policies that can support the industry such as quality standard and nutmeg trading systems in the local level. If these problems are solved by effective interventions and support, all actors in the value chain will be better off, increasing nutmeg competitiveness in the world market, improving farmer's livelihood, as well as enhancing rural development on a broader scale.

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