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Overview of Indonesian Current Issue and Government Strategy on the Rubber Commodity

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ABSTRACT

Indonesia is the second-largest producer of natural rubber in the world. Indonesian rubber is the only commercial source of natural rubber production, which represents nearly half of the total world rubber production due to its unique mechanical properties, such as tear resistance, Indonesia's rubber production conditions can represent the world's rubber.

The world price of natural rubber has been declining for a few years ago so that millions of Indonesian rubber farmers were affected the most significantly. Therefore, the Indonesian central government takes many strategic steps to increase the selling value of natural rubber and can improve the welfare of farmers and the community. To date, there has been no indication of the success of the government's move because it is still in its initial stages. Therefore, the study of current issues occurring around enterprises, communities, and farmers combined with a theoretical approach is critical to help predict the effectiveness of government measures.

This paper provides a general overview of the current situation of the rubber industry in Indonesia today. The research uses logical-theoretical research, analytical research, and observatory research approach. The adoption of the logical-theoretical approach was the cumulative previous research and theories about the Indonesian rubber industry, government regulations, and domestic also global reports on Indonesian rubber commodities. The policy review section contains the most updated law, regulation, procedure, administrative action, and practice of governments by using the literature study and analytical approach.

The adaptation of the observatory research strategy was to investigate a few playing rubber enterprises in Sumatra and Kalimantan islands, also non-governmental organizations of rubber farmers, to know what is the real situation in the market without government opinion intervention. The ultimate result of this approach serves in the issue analysis section. A secondary observatory approach is carried out together with government agencies as the policymaker provided in the problem-solving analysis section.

INTRODUCTION

Domestically, rubber is the essential commodity in Indonesia after crude palm oil, coffee, and cocoa. Indonesian rubber commodities play a very crucial role in contributing to the state income, foreign exchange income, employment opportunities, providers of critical industrial raw materials, biological resources for environmental preservation, and main crops for climate change mitigation. Indonesian rubber is the second largest in the production and export value of total Indonesian plantation commodities after crude palm oil.

Rubber prices in the international market have remained low over the past few years. Indonesia, as one of the biggest rubber producers, faces a considerable impact on the national economy. As a consequence, the productivity and economic situation of nearly 2.5 million of Indonesian rubber farmers have declined amidst the weakening world natural rubber price (Central Bureau Statistic, 2017). If it continues, it can plunge them into poverty.

Theoretically, the central government will set up the target of developing rubber plantations to increase Indonesian rubber farmers' welfare and support the nation to be the main production center for world rubber plantations. However, it seems that the government still faces many challenges and obstacles in overcoming the issue of sustainable rubber that balances the positive impacts on environmental, social, and economic aspects. Primarily, the welfare of Indonesian rubber farmers depends entirely on the central government as a policymaker, business people as the determinant of the purchase price, external parties as trading actors (exporters-importers), and world oil and rubber prices. These factors are vulnerable to influence price fluctuations that directly impact the economic conditions of small farmers.

Since the 1970s, the Indonesian government encouraged the rubber industry, which produced conventional products (natural rubber or raw rubber material), to switch to producing technical specifications because it was considered appropriate to increase the selling value. With the issuance of Presidential Decree No. 85, the Year of 1971, the aim of which is to encourage the transition of the conventional rubber industry to switch to the crumb rubber industry (rubber technical specifications for high-end industrial raw materials). Its implementation was marked by establishing a technical specification of rubber pilot plant as a conversion of re-milling factories in Indonesia to a Crumb Rubber factory. Indonesian technical rubber specifications are called Standard Indonesia Rubber. Since then, Indonesia's rubber processing industry has become more valuable and has become the main ingredient in the industry. The strategies and tasks of the central government were finally divided into the Minister of Agriculture, Industry, and Trade.

This paper will discuss four main points relating to issues and challenges faced by the Indonesian rubber committee, which are composed of the following: rubber commodity policy, stabilization of national rubber prices, rubber productivity, and the sustainability of the rubber sector. The sections will present three main parts: current issue analysis, problem-solving analysis of central government strategies, and analysis of regulations regarding rubber commodities along with the international agreement and ministerial strategies. The central part is an analysis of the government strategies to overcome the current sustainability rubber issue that happens in the past few years. At the end of the chapter, this study provides recommendations as a result of critical suggestions for the current issue based on specific data and information.

THE OVERVIEW OF INDONESIAN RUBBER INDUSTRY

General overview of Indonesian rubber industry

Indonesia produces mainly TSR20 and RSS3 rubber (mostly comes with quality IRR 5 Clones, IRR 118 Clones, IRR 42 Clones, and Natural Foam Rubber). Several locations in Indonesia become centers of rubber cultivation, most of which are in the islands of Sumatra, Kalimantan, Riau Islands with a total rubber commodity producer up to 300 more (Ministry of Trade Secretary-General, 2007; GAPKINDO, 2019)

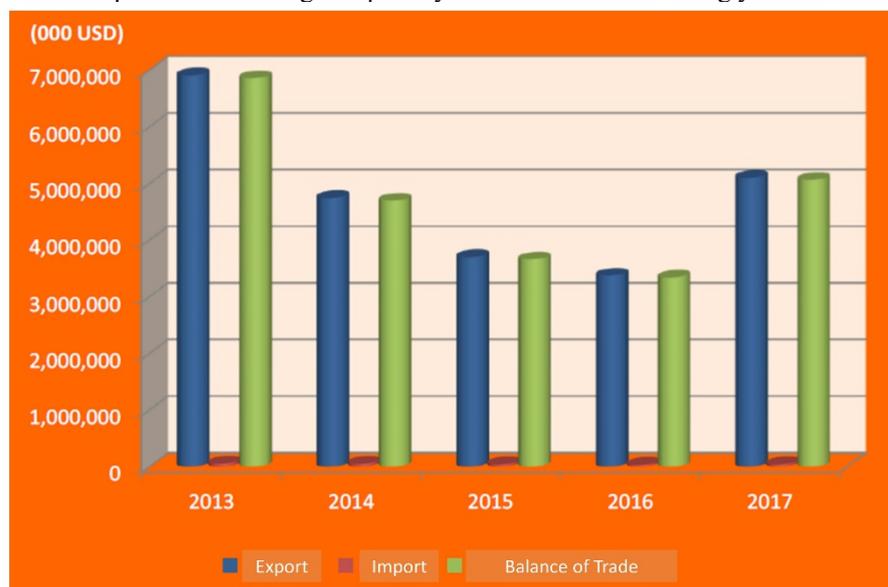
Smallholder farmers dominate the area of rubber in Indonesia. In the period 1980-2016, the total rubber plantation in Indonesia is 3.6 million hectares. The average area of smallholder rubber plantations reached 3.1 million hectares or 84.18% of the total area of rubber throughout Indonesia. While state-owned large estates are only 230 thousand hectares or 7.46%, and privately-owned large estates at 316 thousand hectares or 8.35% throughout Indonesia rubber plant area (Ministry of Agriculture Secretary-General, 2016).



Graph 1. RSS3 rubber price chart according to the Tokyo Commodity Exchange data 2017-2018, which determines the world rubber price (TOCOM, 2018).

The price of Asian rubber RSS3 commodity contracts in October 2017 dropped to 11.83% from September. As a result, throughout 2017, rubber prices have shrunk by 26.46% from the end of 2016 (refer to Graphic 1). At the same time, from 2018 to 2019, TSR20 also faces drop by 11,71% (SICOM, 2019). From the highest drop in 2018, rubber prices have fallen by almost 40%. According to the Ministry of Agriculture data, the projection results from multiple regression models, estimated rubber production will change in line with fluctuations in world rubber prices, but tends to decrease until 2022 with an average growth maximum only at 0.86% per year (Central Bureau of Statistics, 2017; Ministry of Agriculture, 2018; Ministry of Agriculture Secretary-General, 2016).

Indonesia's rubber trade balance declined between 2013 and 2016 then experienced a slight increase in 2017 (refer to Graph 2). Then until 2019, the price of rubber continued to plummet and is predicted to have an impact on decreasing the quantity of rubber in the following years.



Graph 2. Graphic on Development of Indonesia's Rubber Export, Import and Trade Balance, 2013 - 2017

The status of Indonesia's rubber trade

Indonesia's rubber commodity has many advantages, among which is its excellent standing in world trade. Generally, Indonesia's natural rubber production is around 80% for export and 20% for the domestic market. In 2017, Indonesia's top 5 natural rubber importer countries were the United States, Japan, China, India, and Korea. The export weight to the United States of America reached 589,375 thousand tons (19.69 % of the total export weight) with a value of US \$ 1004.44 million. The second rank in Japan and

China, with an export weight of 15.49% and 14.89% of the total export. This is followed by India and South Korea with a total export weight of nearly 15%.

In addition to natural rubber, Indonesia also exports synthetic rubber products. In 2017, the top five importing countries for synthetic rubber in Indonesia were China, Singapore, Australia, New Zealand, and India. The weight of exports to China reached 84.38% of the total export weight. This was followed by Singapore, with an export weight of 6.4% of the total export weight. The following countries are Australia, New Zealand, and India, with a total export of around 10% of the total export weight. (Central Bureau of Statistics, 2017).

POLICY OVERVIEW

Rubber commodity is Indonesia's primary commodity, which became the second global largest producer. Therefore, Indonesia's rubber commodity is regulated and controlled by several ministries as each function (Ministry of Trade, 2019). The Ministry of Trade regulates the regulation package below governing the strategy for domestic-global trade and its management of rubber products.

Government regulations illustrate the central government's strategy for rubber commodities in Indonesia. This policy review section is a list of all legal regulations for industries to trading raw materials and finished materials for rubber products.

The following is the legal basis governing domestic trade, export and import activities for rubber commodities:

1. Ministry of Trade Regulations of the Republic of Indonesia Number 779 the Year of 2019 concerning the implementation of agreed export tonnage scheme for the natural rubber commodities (Expired)
2. Law of the Republic of Indonesia Number 7 the Year of 2014 concerning trade
3. Law of the Republic of Indonesia Number 20 the Year of 2014 concerning standardization and conformity assessment
4. Law of the Republic of Indonesia Number 5 the Year of 1999 concerning monopoly and unfair business competition
5. Law of the Republic of Indonesia Number 10 the Year of 1995 concerning customs
6. Indonesian National Standard Number 06-2047-2002 Concerning Quality Standards for Processed Rubber

The laws governing planting strategies, disciplining rubber commodity planting methods, environmental protection, labor protection is regulated in the Ministry of Agriculture. Below are the existing laws and regulations to be used as a reference for the Ministry of Agriculture's strategy in raw rubber production.

1. Ministry of Agriculture Regulations Number 132 / Permentan / Ot.140 / 12/20134.1 /Ot.140/11/2011 Concerning Good Rubber (*Hevea Brasiliensis*) Culture Guidelines
2. Law of the Republic of Indonesia Number 12 the Year of 1992 concerning Cultivation Systems Plant
3. Law of the Republic of Indonesia Number 18 the Year of 2004 concerning Plantations

Rubber regulations in Indonesia are very minimal. Although it is Indonesia's largest commodity, the central government has not divided it into the special commodities section. Millions of Indonesian rubber farmers' welfare and fate depends on government regulations, but the government has not yet regulated the special protection of rubber farmers.

Rubber commodity legal basis in Indonesia are only regulated by the ministry of trade and the ministry of industry, while the ministry of agriculture takes a small portion in regulating rubber plantation and farmer protection. Logically, the Indonesian central government focuses on increasing the number of product production and sales rather than the sustainability of the rubber on the environment and socio-economy.

ISSUE ANALYSIS

The current issue of Indonesia's rubber industry

The prediction of demand for rubber commodities will continue to increase throughout the world, which will cause a shortage of natural rubber supply. It is estimated that global demand for natural rubber will increase to 16.5 million tons by 2020, and it is predicted that there will be a shortage of natural rubber in the world of around one million tons (Council of European Union, 2011). However, in recent years, substituted natural rubber with synthetic rubber has caused the price of natural rubber to decrease due to increased use of synthetic rubber for low-end industry purposes. This scenario will affect the social and economic conditions of the Indonesian people because, generally, Indonesian rubber production is small

farmers-owned land.

1. Low productivity issues. Indonesia as the second-largest producer in the world, but in terms of productivity, Indonesia is only in the fifth position in Southeast Asia. Indonesia has the most extensive rubber area in the world at 3.4 million hectares. On a per hectare basis, local rubber productivity is still less than production in Malaysia and Thailand.
2. Low-quality issue. Indonesian rubber is known as poor quality rubber, compared to Malaysian and Thai rubber. So far, many rubber processing products are maintaining low because they are mixed with chemical contaminants, which also raises environmental issues.
3. Weaken of down streaming of rubber products due to lack of technology, infrastructure, and other supporting facilities. The supporting industrial technology in question includes the availability of energy and adequate distribution facilities.
4. Low quality of human resources skills. The biggest problem that hinders the success of every commodity in Indonesia is the lack of labor's knowledge and information.
5. Inconsistent government regulations. In some sections, local government regulations are unclear and not well distributed in the field. So this ambiguity reduces the interest of new rubber farmers in the context of regenerating rubber farmers. The government regulation is only a discourse; for example, in some areas, there are problems with the disbursement of aid funds for rubber rejuvenation. (Ministry of Industry, 2013; Nurhafifah, 2011; Putranto, 2012).

ANALYSIS OF GOVERNMENT STRATEGIES

Specifically, since 1971, the central government's strategy has been to divide the tasks and responsibilities in carrying out rubber development in order to increase the production and quality of Indonesia's natural rubber, in the following terms: The Ministry of Agriculture is in charge and responsible for the development of rubber plants, both large rubber plantations, and community rubber. The Ministry of Industry has the duty and responsibility for the development of rubber processing equipment/industries, to be directed at the industries that are most effective and efficient in producing natural rubber that meets the requirements and quality demanded by the world market. The Ministry of Trade is responsible for conducting research and development to determine the quality and standard of rubber that must be produced by Indonesia in order to meet the requirements and quality required by rubber-consuming countries (GAPKINDO, 2019).

Problem-solving strategies

This section will discuss the analysis of central government strategies that were studied through a causal-comparative and theoretical research approach to describe how the plan of the central government to deal with the current sustainable issues of rubber.

1. The Indonesian central government, through the Ministry of Agriculture, prepared several strategies to increase the national rubber purchase price. The plan is divided into three master plans, short term, medium term, and long term, as follows.
 - a. Short-term strategy by regulating the volume of rubber exports to control rubber stocks in the international market. In 2019, the Indonesian government will reduce 98,000 tons of rubber exports to the world market. This year, 2019, the Ministry of Agriculture has budgeted IDR 47 billion (US\$ 3,32 million) for the rejuvenation of 6,000 hectares of rubber plantations.
 - b. Medium-term strategy by increasing domestic rubber uptake. One of them is through the use of rubber as an addition to asphalt. As a quick response of global rubber price decline, the government through the Ministry of Public Works and Public Housing and Perkebunan Nusantara II Limited Company buy rubber directly from farmers with prices above IDR 9,000 (US\$ 63 cents) per kilogram. The agenda for medium-term action and program:
 - Restructuring and optimizing old-tech factories, efforts to increase the stabilization of crumb rubber prices
 - Implementing policies by providing incentives to farmers to rejuvenate rubber trees, encouraging rubber production technology
 - Applying and monitoring Indonesian National Standards for processed rubber
 - Developing partnerships and cooperatives of farmers, traders, and manufacturers in improving the quality of processed rubber
 - Increasing the participation of the crumb rubber industry in the community rubber rejuvenation program
 - Increasing and encouraging investment in the rubber processing industry, such as the automotive radial tire industry.

- c. Long-term strategy by increasing plantation productivity through a replanting program. The Directorate General of Estate Crops is preparing superior seeds of estate crops through the 500 National Superior Seed program, namely the preparation of 500 million stems of superior plantation seeds in the five years to 2024. The replanting program is carried out selectively and not for all rubber plantations. However, it still considers the area of rubber land nationally, including for food crops and horticulture, so that rubber prices remain high. Based on the national agenda, the central government set long-term programs following:
 - Increasing exports of high value-added rubber products (compounds, technical rubbers)
 - Encouraging companies to increase production capabilities of high performance, heavy-duty and off-road radial tires for domestic and export purpose
 - Improving the ability of national rubber engineering production.
2. The government is increasing control and fostering the utilization of natural resources for the rubber plantation business to maximize its potential through improving the management structure. Furthermore, Plantation Company Development Patterns through various patterns are (a) Plantation Cooperative Business Patterns, (b) Investor Cooperative Joint Venture Patterns, (c) Cooperative Investor Joint Venture Patterns, (d) Build, Operate and Transfer Patterns, (e) State Savings Patterns, investors build a garden and/or factory and then transferred to the cooperative, and (f) Implement plantation business licensing is regulated by Decree of the Minister of Forestry and Plantation Number: 107 / Kpts.II / 1995, then revised by Decree of the Minister of Agriculture and Plantation Number: 357 / Kpts Hk-350/5/2002 concerning Guidelines for Plantation Business Licensing (Damanik, 2012).
3. In 2019, the Ministry of Agriculture reduced the development of budget allocation for cocoa and palm oil to provide an additional allocation for expanding the development of rubber commodities. The government has reduced the cocoa commodity budget by around 30% compared to 2018. While the government decreases the fund allocation to the palm oil by 50% from 2018. Rubber commodities received more than 50% state funding allocation, with the aim of intensification, rejuvenation, and land expansion. According to the Director of Annual Crops and Refresher of the Ministry of Agriculture, rubber commodities in 2019 will be started to develop in eight provinces production centers: namely Aceh, West Sumatra, Riau, Jambi, South Sumatra, South Kalimantan, West Kalimantan, and East Kalimantan.

Strategy for developing sustainable rubber plantations

In the government's effort to improve the quality, production, and productivity of rubber plants in environmentally friendly method, the central government through the Ministry of Agriculture promulgated Ministry of Agriculture Regulation Number: 132 / Permentan / OT.140 / 12/2013 concerning Guidelines for Good Agriculture Practices on rubber (*Hevea brasiliensis*). This guideline is the result of joint research by the national Rubber Research Center and other research institutions that contain ways of planting rubber to produce superior quality and quantity also environmentally friendly. The chapters discussed are rubber cultivation such as growing requirements, clone recommendations, seed quality and seed quality standards, land preparation (manually, mechanically, and chemically), intercropping patterns between rubber, harvests and material materials, supervision and physical valuation of the garden for maintenance such as pest control management. (Ministry of Agriculture, 2014).

Unfortunately, Indonesia has not yet issued a sustainable rubber production program economically and socially, although the government continues to develop it through various programs such as price stabilization, Good Agriculture Practices on rubber, and protection of small farmers, it is still not evenly distributed nationally. The obstacle is that until now, there are still monopolistic practices of trade, ambiguous and uncertain government regulations, weak government institutions, and poor quality of human resources skills. Thus, environmentally friendly rubber planting practices are hampered by the imbalance of farmers' economy status.

The role of NGOs and IGOs to government strategy

The Indonesian Rubber Company Association (GAPKINDO) is a joint association of rubber commodity companies throughout Indonesia. The purpose of this association is to develop and increase the production, processing, and marketing of Indonesian natural rubber as one of the valuable export products in Indonesia. The members of the association consist of rubber plantations (state-owned, national private or foreign-capital), processors, exporters, traders, and buyer's representatives.

Thirteen Asian countries produce 91% of the world's rubber, which is incorporated in an intergovernmental organization called The Association of Natural Rubber Producing Countries (ANRPC). The role of ANRPC in Indonesia is a ministerial-level organization or policymaker to set

national strategies to address Indonesia's and global sustainability issues in collaboration with GAPKINDO.

Indonesia, as part of the International Tripartite Rubber Council, a consortium of three rubber producing countries (Thailand, Indonesia, and Malaysia), plays an essential role in the performance of world rubber trade. In this era of globalization, the agreement of ITRC members is fundamental to be able to maintain Indonesian rubber prices in a decent range and benefit local farmers.

RECOMMENDATION

As a review of this study, the following is a brief description of the recommendations for the Indonesian governmental and non-governmental organizations, the Indonesian rubber agribusiness actors' organization, also for foreign agencies on policy directives and important operational programs.

1. Increased productivity of rubber plantations. Currently, the productivity of rubber plantations is still low due to low-productive old rubber plants, low-quality seedlings, lack of land rehabilitation, weak maintenance, overused chemicals, and weak pest management systems. The instant operational step is to refine plant material to the superior clones, and the right method to optimize the productivity of rubber plantations in Indonesia' geographical area are: a) the use of planting materials that are uniformly high-yielding clones, the composition of clones and balanced age, as well as the placement of clones in the appropriate agroecosystem; b) the application of cultivation techniques that include soil management, fertilization with the correct dose, frequency, and method of application, and control of white root fungus disease; c) application of exploitation systems according to the physiological characteristics of the clones and control of tapping channel drought; and d) rejuvenation of less productive gardens. (Boerhendhy & Amypalupy, 2010)
2. Support of research agency locally and comprehensively. The central government, through the Ministry of Agriculture, can regulate the support of national research institutions such as the National Research and Development Agency to develop technology research and cooperation with foreign agencies. At present, the challenges that arise at this time the performance of various institutions related to the provision of technology are generally still low due to various obstacles, mainly limited funds and professional staff, as well as the work structure of each related institution/agency. The role of the central government is significant in terms of policy support, and the availability of funds is needed to fix the condition of this strategic factor.
3. Development of agriculture extension. This strategy requires the cooperation of policymakers from the Ministry of Agriculture for the revitalization and extension program. So far, the training program has been running smoothly, but it is insignificantly growing due to the issue of funding limitations and the number of extension supervisors in the field. Recommendations that can be realized are to make agricultural extension workers a list of national legal jobs that can receive a national minimum wage, the procurement of a system of short and long-term work contracts. The central government soon should pull this issue as the main priority agenda based on the national mission, and the Ministry of Agriculture's mission is to improve the quality of Indonesian human resources.
4. The formation of institutional or cooperative economic farmers. Farmer institutions are generally formed in the form of farmer groups or farming communities but function independently and out of a network so that the vision and mission of each group are different. The limitation of the existing farmer groups is the limited budget, facilities and facilities, technology, information, education, instructional staff, and access to communicate with the government or policymaker. Meanwhile, GAPKINDO has been impulsive to favor local rubber farmers. Legally, this recommendation might be applied directly by the private sector and foreign institutions to form Non-Governmental Organizations or educational research institutions (Refer to legal basis: Government Regulation of The Republic of Indonesia Act Number 59 the Year of 2016 Concerning Community Organizations Established by Foreign Citizens and Act Number 11 the Year of 2019 concerning the National System of Science and Technology) in the framework of: rubber plantations extension, farmer communication media, private sector for investment in rubber production environment, and research into the development of natural and human resources.
5. Support government policies on rubber quality and sustainability that favor development, economy, community, and the environment equally. Supporting government policies, both central and regional, is the most strategic factor playing a significant role in creating optimal conditions for the implementation of sustainable rubber plantation development in Indonesia. Expected policy support, especially in improving and preparing quality human resources, providing funds for programs such as counseling and fostering farmers, providing subsidized interest loans for farmer's working capital, infrastructure development, and supporting infrastructure for productivity. The

government has experienced many failures in the implementation of programs in the field, for example, the failure of the rubber plantation revitalization program launched by the central government due to the problem of failure to disburse funds from state-appointed banks. In short, the role of the central government is as policymakers and strategic direction makers. In contrast, the role of the local government must be actively involved as the initiator and facilitator to establish policies that support commodity development programs. (Damanik et al., 2009).

This recommendation aims to accelerate the achievement of national development goals while ensuring the sustainability of rubber plantation development in Indonesia. Supporting factors are the involvement of educational institutions, private sector, farmer's cooperation who are willing to work in rubber development, consistency of the state finance department in supporting funding of rubber plantation development programs, political consistency and government policies (central and regional governments), which cover planting, labor enforcement, production and quality improvement, trade, and industrial policies (Damanik, 2012).

CONCLUSION

Indonesia still faces many challenges and obstacles in its rubber production. Indonesia is the second-largest producer in the world after Thailand, but in terms of productivity, Indonesia is only in the fifth position in Southeast Asia. The value of rubber commodities and world rubber prices are declining, causing many social and economic issues. The central government, through the Ministry of Industry, is committed to increasing the value-added of natural rubber through down streaming, because its potential can be widened as raw material for various industrial sectors.

Strategic factors that influence the development of rubber plantations in Indonesia are the availability of technology, human resources skill, policy support, rubber plantation area, land productivity, and national and regional farmer economic institutions. These strategic factors are in moderate condition and lead to optimal conditions due to the declaration of plantation revitalization in Indonesia.

To realize the achievement of national development goals and maintain the sustainability of the development of rubber plantations in Indonesia requires: first, support and consistency of government policies (central and regional levels) -this policy covers production and quality improvement policies, trade policies, revitalization policies, and industrial policies. Second is the cooperation of rubber producer organizations and other non-governmental organizations to comply with government policies. Third, Improve the quality of human resources through extensions, information dissemination, training, and grouping at regional and national rubber farmer organizations.

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REFERENCES

- Boerhendhy, I. and Amypalupy, K. (2010). Optimalisasi Produktivitas Karet Melalui Penggunaan Bahan Tanam, Pemeliharaan, Sistem Eksploitasi, Dan Peremajaan Tanaman [*Productivity Optimization of Rubber Through the Use of Plant, Maintenance, Exploitation System, And Planting*]. Jurnal Litbang Pertanian, 30(1), 2011. Jakarta. Retrieved from <https://media.neliti.com/media/publications/123000-ID-optimalisasi-produktivitas-karet-melalui.pdf>
- GAPKINDO (2019). *Rubber Price TSR 20 2019*. Rubber Association of Indonesia. Retrieved from <https://gapkindo.org/id/harga-karet>
- Ministry of Trade Secretary-General (2007). *Gambaran Sekilas Industri Karet [Overview of the Rubber Industry]*. Ministry of Trade. Jakarta
- Ministry of Trade (2019). Decree of the Minister of Trade of the Republic of Indonesia Number 779 the Year of 2019 Concerning Implementation of the Agreed Export Tonnage Scheme for The Natural Rubber Commodities. Jakarta. Retrieved from http://jdih.kemendag.go.id/backendx/image/regulasi/12040457_salinan_Kepmendag_779_Tahun_2019.pdf

- Central Bureau of Statistics (2017). *Indonesian Rubber Statistic, 2017*. Catalog: 5504002. Republic of Indonesia
- Council of European Union (2011). *International Rubber Study Group Publication*. CELEX: 22011X1008(01). Official Journal of the European Union.
- Damanik, S., Indrawanto C, Aedan K. (2009). Model Pengembangan dan Kelembagaan Jarak Pagar, Teknologi Jarak Pagar. [*Jatropha Development and Institutional Model, Jatropha Technology*] Plantation Research and Development Center. Jakarta.
- Damanik, S. (2012). Pengembangan Karet (Hevea Brasiliensis) Berkelanjutan Di Indonesia [*Rubber Development of Sustainable in Indonesia*]. Perspektif Vol. 11 No. 1 /Juni 2012. pp 91 - 102 ISSN: 1412-8004. Bogor. Retrieved from http://perkebunan.litbang.pertanian.go.id/dbasebun/asset_dbasebun/Penerbitan-20141207121138.pdf
- Ministry of Agriculture (2014). Pedoman Budidaya Karet (Hevea Brasiliensis) Yang Baik. [*Guidance on Good Agriculture Practices on Rubber (Hevea Brasiliensis)*]. Ministry of Agriculture Directorate General of Plantation. ISBN 978-979-1109-68-0. Jakarta
- Ministry of Agriculture (2014). Analysis of Rubber Trade Performance 2018. Agricultural Data and Information System Center. ISSN: 2086-4949. Jakarta
- Ministry of Agriculture Secretary-General (2016). Outlook Karet Komoditas Pertanian Subsektor Perkebunan [*Agricultural Rubber Commodity Outlook Plantation Subsector*]. ISSN:1907-1507. Ministry of Agriculture Data and Information Center
- Ministry of Agriculture (2018). Outlook Rubber 2018. Agricultural Data and Information System Center. Jakarta
- Nurhafifah, Siregar E.B.M., and Siregar T.H.S. (2011). Rubber Commodity Development Strategy in South Tapanuli Regency [*Rubber Commodity Development Strategy in South Tapanuli Regency*]. Agrica (Agribusiness Journal of North Sumatra) Vol.4 No.2 / October 2011. North Sumatra.
- Putranto R. A. (2012). Bioteknologi Tanaman Karet untuk Indonesia [*Rubber Plant Biotechnology for Indonesia*]. SIBAGHE/CIRAD Lavalette. University of Montpellier, France. Retrieved from <https://www.researchgate.net/publication/291348638>

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