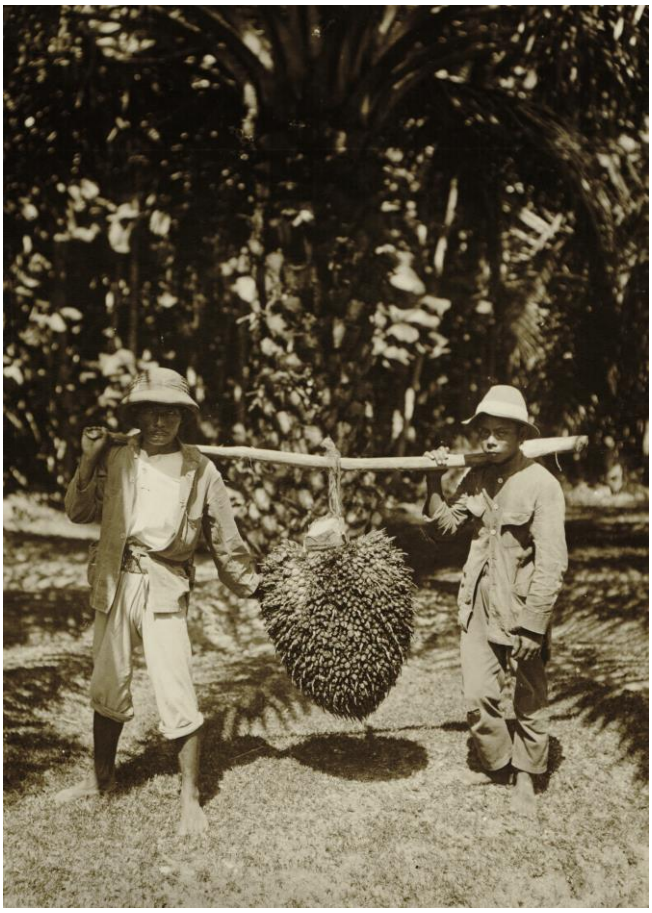
From East to West:

A value chain analysis of plantation rubber and palm oil from colonial Indonesia, 1900-1940



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Front page photograph: Two men carrying an oil palm fruit weighing 76 kilogrammes. Source: Leiden University Library, Digital Collections, KITLV 75062, 'Oliepalmtros van 76 kilo te Bangoen bij Pematangsiantar'. Retrieved from: https://digitalcollections.universiteitleiden.nl/view/item/890997. Accessed on 14 December 2020.

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1. Introduction

By the turn of the twentieth century, rubber and palm oil became important resources for the rapidly industrialising world. The mass production and mass consumption of consumer goods such as automobiles, margarine and soap instilled great demand for these two new resources. Within a few decades, colonial Indonesia – and the east coast of Sumatra in particular – became a major producer of both palm oil and rubber. The two plants thrived in the humid tropical climate of the Indonesian archipelago. In addition, the new crops could be easily incorporated in the plantation economy that already existed on the east coast of Sumatra, where European and American planters had grown tobacco since the middle of the nineteenth century. Both crops became part of a global value chain that spanned across the globe. Dutch colonial Indonesia had exported cash crops such as sugar, coffee, and tobacco for a long time, but rubber and palm oil were unique in that they stood at the basis of rapidly growing twentieth century industries. Most of the rubber and palm oil was headed to Europe and North America. However, an increasingly large part of the export was headed to other destinations in Asia, such as Japan, during the course of the 1920s and 1930s.

This thesis will focus on the organisation of the value chains of both rubber and palm oil in Indonesia, from their introduction to the archipelago around 1900 until the outbreak of the Second World War. In particular, it will reconstruct the value chains and analyse the value distribution in it. It will do this in order to get an idea of how much the industries contributed to the economy of colonial Indonesia. So, the aim of this thesis is twofold. Firstly, it will map the palm oil and rubber industries: how were these industries organised and how was trade structured? And secondly, it will use this information to draw conclusions about the value creation and value distribution within the chain and the influence that the chain had on the Indonesian economy.

The historiography on the plantation economy of colonial Indonesia is quite extensive. However, the role of palm oil in this plantation economy has received little attention, whereas there is a sizeable body of literature on rubber. I will discuss the relevant historiography in three parts. Firstly, I will shortly discuss the literature on the plantation economy of early twentieth century Indonesia and – in particular – that of East-Sumatra, where the majority of rubber and palm oil plantations were situated. Secondly, I will shortly discuss the literature on the rubber and palm oil industries in the West. Thirdly, several works of economic literature

will be discussed that are relevant to the plantation economy and the economic development of Indonesia.

By 1900, Indonesia already had a long history of plantation agriculture. Numerous works have been written on the plantations that grew coffee, sugar, tobacco, and tea throughout the archipelago. Allen and Donnithorne's work on Western enterprise in the region examines these plantations in the eighteenth and nineteenth centuries. They also elaborately expand upon the beginnings and growth of the rubber and palm oil industries in the Indonesian archipelago.[1] Another notable work that provides a valuable oversight on the plantation economy of early 20th century Indonesia is the work of Touwen. He describes and analyses the cultivation of several important plantation crops in the outer islands of Indonesia (all islands that are not Java). The focal point of his work is the dichotomy between the European and Asian modes of production. Whereas Europeans founded plantations on which they – amongst many other things – cultivated rubber and palm oil, indigenous peasants often grew the same crops on their own land, the so-called smallholder production.[2] This divide between two modes of production has been of interest of historians for a longer time. Historians such as Lindblad focussed on this dichotomy in an earlier article.[3] Pelzer's *Planter and Peasant* also features this dichotomy, although the emphasis of this work is put on how the plantations were able to dominate the region of East-Sumatra.[4]

Aside from the works that attempt to provide overviews of the economic activity in the archipelago, other historians have approached the early twentieth century plantations from a thematic angle. Houben and Lindblad's bundle features several articles that focus on the plantation labourers and their working conditions.[5] Gordon has also focussed on labour in the rubber plantations, not only in Indonesia but in all of South East Asia. He puts emphasis on how labourers were coerced to work on the plantations with legal means.[6] However, for the most extensive reading of labour conditions in the plantation society we need to turn to

[1] G.C. Allen and A. Donnithorne, *Western Enterprise in Indonesia and Malaysia* (Abingdon 1957).
[2] L.J. Touwen, *Extremes in the archipelago. Trade and economic development in the Outer Islands of Indonesia, 1900-1942* (Leiden 2001).
[3] J.T. Lindblad, 'Westers en niet-Westers economisch gedrag in Zuid-Oost Kalimantan, c. 1900-1940', *Bijdragen tot de Taal-, Land- en Volkenkunde* 142.2-3 (1986) 215-237.
[4] K.J. Pelzer, *Planter and Peasant. Colonial Policy and the Agrarian Struggle in East Sumatra 1863-1947* (The Hague 1978).
[5] V.J.H. Houben et al., *Coolie Labour in Colonial Indonesia. A Study of Labour Relations in the Outer Islands, c. 1900-1940* (Wiesbaden 1999).
[6] A. Gordon, 'Contract Labour in Rubber Plantations: Impact of Smallholders in Colonial South-East Asia', *Economic and Political Weekly* 36.10 (2001) 847-849 and 851-860.

Breman's *Koelies, Planters and koloniale politiek*. Breman focusses on the abysmal labour conditions that were so prevalent on the plantations of East Sumatra.[7]

If we want to connect the rise of the industries in the West to the plantation economy on Sumatra, we also need to look into the history of these Western industries and their connections to the colonies. American industry started playing an important role in the cultivation of plantation rubber early on. There is some literature that investigates the direct involvement of large American rubber firms on Sumatran plantations. Most notable are the plantations owned by the United States Rubber Company.[8] Goodyear Tire and Rubber Company also was an active player in the archipelago.[9] These works only provide a limited understanding of the value chain of rubber, however, they focus mostly on how the plantations were run and not on how the value chain was organised. The literature that exists on the American rubber industry can be divided into different types. On the one hand, there are some market studies that map the rise of the rubber market in the early twentieth century.[10] On the other hand, there are works that have investigated the history of rubber firms, such as of the United States Rubber Company mentioned earlier.[11] Both strands only offer limited information on the involvement of the companies in the plantation economy of colonial Indonesia.

In the case of palm oil, the margarine and soap industries were important buyers of the raw material. Schrover has investigated the rise of Dutch (and – in part – English) margarine producers from the late nineteenth century onwards. She describes both the corporate history as well as the labour relations over the period of almost a century, but neglects the events happening upstream in the value chain.[12] While there is a wide array of literature on companies that used palm oil in their production processes – such as Unilever – they rarely touch upon the

[7] J. Breman, *Koelies, planters en koloniale politiek. Het arbeidsregime op de grootlandbouwondernemingen aan Sumatra's Oostkust in het begin van de twintigste eeuw* (Leiden 1992).
[8] S. Yacob, 'Model of Welfare Capitalism? The United States Rubber Company in Southeast Asia, 1910-1942', *Enterprise & Society* 8.1 (2007) 136-174.
[9] M.J. French, 'The Emergence of US Multinational Enterprise: The Goodyear Tire and Rubber Company, 1910-1939', *The Economic History Review* 40.1 (1987) 64-79: 65-67.
[10] For example, see: M. French, 'Structural Change and Competition in the United States Tire Industry, 1920-1937', *The Business History Review* 60.1 (1987) 28-54.
[11] G.D. Babcock, *History of the United States Rubber Company: A case Study in Corporate Management* (Bloomington 1966).
[12] M. Schrover, *Het vette, het zoete en het wederzijdse profijt. Arbeidsverhoudingen in de margarine-industrie en in de cacao- en chocolade-industrie in Nederland 1870-1960* (Hilversum 1991).

sourcing of the commodity.[13] The same is done by Fieldhouse, who elaborately describes the overseas activities of Unilever, but largely ignores the role of palm oil.[14]

Aside from the literature historical literature on the plantation society of East Sumatra and on the Western industries that fuelled it, we need to look at some of the economic literature that is relevant here. Many economists have followed the structuralist school of thought and argue that structural characteristics in the world economy were pivotal to the economic position of developing countries. Prebisch and Singer, for example, argued that the terms of trade of developing countries – the prices of exports relative to the prices of imports – had structurally declined during the course of the nineteenth and early twentieth century. They argued that as incomes increase, the consumption of manufactured goods increases faster than that of primary commodities. Since developing countries were mostly dependent on the export of primary commodities, the prices of their exports declined relative to the prices of their imports. The primary commodities can be split into two categories: agricultural products and industrial inputs. The former are the least income inelastic and export dependence on these will lead to a greater decline in the terms of trade.[15] This would imply that colonial Indonesia – primarily an exporter of primary commodities – saw a structural decline in its terms of trade over the years.

Another notable structuralist theory is that of the *dual economy*. Paauw and Fei provided an extensive analysis of this dual economy. According to them, a separate economic circuit based on export agriculture and supporting services was founded by Western entrepreneurs in the colonies. These circuits had little to no interaction with the traditional agricultural economy of the local population. Rather, these firms were intimately connected with foreign business and economies through trade.[16] Lewis provided a more extensive view on this dual economy by noting the ways in which the enclave could contribute to the traditional economy. These contributions could either be positive or negative for the traditional economy. Positive examples include the enclave providing work for people from the traditional economy, buying goods from the traditional economy (demand linkage), creating infrastructure (backward linkage), contributing to the common good through taxation and helping spread new ideas or techniques (technological spillovers). Negative influences on the traditional economy include – among other things – land seizures, pushing traditional producers out of business and

[13] C. Wilson, J. de Iong transl., *Geschiedenis van Unilever. Een beeld van economische groei en maatschappelijke verandering* (The Hague 1970).
[14] D.K. Fieldhouse, *Unilever Overseas. The Anatomy of a Multinational 1895-1965* (London 1978) 264-282.
[15] M.G. Lutz, 'A General Test of the Prebisch-Singer Hypothesis', *Review of Development Economics* 3.1 (1999) 44-57: 44-45.
[16] D.S. Paauw and J.C.H. Fei, *The transition in open dualistic economies. Theory and Southeast Asian Experience* (New Haven 1973) 3-7.

creating a brain drain.[17] Kian-wie has provided the most extensive analysis of East Sumatra's economy through the lens of this dual economy. He argued that the plantation economy remained a plantation economy; its economic structure did not evolve any further.[18]

Another example of a structuralist theory is the *colonial drain* theory, which entails the idea that the colonial rule imposed a drain on the Indonesian economy that siphoned off wealth and income. Historians such as Maddison already argued during the 1980s that incomes remitted from Indonesia formed a significant portion of Dutch national income, especially during the late colonial period.[19] More recently, Gordon has estimated that the colonial surplus, payments transferred to the Netherlands, amounted to a sizeable 24 billion guilders between 1878 and 1939.[20] Van der Eng offered a much more critical interpretation of the colonial drain based on the country's balance of payments. He argued that its effect on Indonesia's pattern of economic development was negligible. Importantly, he argued that if profits and dividends over Western investments are considered a drain, this means that in the absence of these investments they would have been replaced by domestic Indonesian investments. Since it is unlikely that these domestic investments would be as high as the Western ones were, the latter simply filled a gap in the market that the Indonesians themselves could not fill.[21]

Since the 1980s, neoclassical theorists came to oppose the structuralists. They argued that economic development could best be achieved by focussing on export through free trade.[22] This export-led growth would lead to efficient use of comparative advantages, would avert rent-seeking, and would lead to other beneficial effect such as technology and knowledge spillovers.[23] Consequently, the economic growth that late colonial Indonesia experienced during in the first four decades of the twentieth century would have been unimaginable without free trade and freedom of investment. These investments were – after all – able to turn relatively unproductive regions, such as East Sumatra, into production centres of export products.[24] The

[17] W.A. Lewis, 'Development and Distribution', in: A. Cairncross and M. Puri, *Employment, Income Distribution and Development Strategy. Problems of the Developing Countries* (London 1976) 26-42: 26-29.
[18] T. Kian-wie, *Plantation Agriculture and Export Growth. An Economic history of East Sumatra, 1863-1942* (Jakarta 1977).
[19] A. Maddison, 'Dutch Income in and from Indonesia 1700-1938', *Modern Asian Studies* 23.4 (1989) 645-670.
[20] A. Gordon, 'Netherlands East Indies: The Large Colonial Surplus of Indonesia, 1878-1939', *Journal of Contemporary Asia* 40.3 (2010) 425-443.
[21] P. van der Eng, 'The 'Colonial Drain' from Indonesia, 1823-1990', *Economics Division Working Papers. Southeast Asia* 93.2 (1993) 1-48.
[22] B. Yaghmaian, 'An Empirical Investigation of Exports, Development and Growth in Developing Countries: Challenging the Neoclassical Theory of Export-Led Growth', *World Development* 22.12 (1994) 1977-1995. 1977-1978.
[23] T.I. Palley, 'The rise and fall of export-led growth', *Investigación Económica* 71.280 (2012) 141-161: 142-144.
[24] J.T. Lindblad, 'Colonial Rule and Economic Development: A Review of the Recent Historiography on Indonesia', *Jahrbuch für Wirtschaftsgeschichte / Economic History Yearbook* 36.1 (1995) 9-22: 17-18.

'colonial drain' debate is again relevant in this context, as economic historians such as Van der Eng – mentioned above – defended the neo-classicist side. He argues that the foreign investment and labour that were so prevalent in certain parts of Indonesia had enabled the economic growth that started there in the early twentieth century.[25] Others, such as Lindblad, acknowledge the role that foreign investments played in the economic development in the region, but underscore that its effect on economy as a whole was limited due to the outflow of profits among other things.[26] An important extension of the debate on the role of foreign investment in the colonial period is determining the size of these outflows of profits and dividends. Buelens and Frankema found extremely high rates of return on foreign direct investments in Indonesia during the 1920s, higher than those on investments in Europe.[27]

In order to analyse palm oil and rubber, this thesis will use Kaplinsky and Morris' interpretation of the value chain as an analytical tool. They argue that value chain analyses provide two important analytical insights. First is the insight into the organisation and coordination of the value chains. This entails several questions. Are the relations between producing firms governed by market forces or is there a certain degree of integration? If there is a form of coordination beyond market forces, is there a lead company that sets terms for the rest of the value chain? The second insight that the value chain analysis may grant us is an overview of the distribution of added value and income (or cost, depending on your perspective). These are two different things, seeing as a firm in a chain might add a certain amount of value but does not necessarily earn the same amount in income. Inequalities of income and added value like these are determined by entry barriers (such as trade policies) and economic rents (an advantage of one producer over another one in a different value chain).[28]

Several things need to be noted before we can apply the methodology outlined by Kaplinsky and Morris on the value chains of rubber and palm oil in the early twentieth century. Firstly, this thesis will not investigate the value chain of a single rubber or palm oil product. Instead, it will try to assemble an overview of both sectors. Consequently, the value chains of both sectors must be constructed on the basis of samples of individual chains and companies. The selection of these companies is further limited by the fact that few company records are available in the archives. This lack of archival material brings us to our second note, which is

[25] Van der Eng, 'The 'Colonial Drain' from Indonesia', 37-38.
[26] J.T. Lindblad, *Foreign investment in Southeast Asia in the Twentieth Century* (Basingstoke 1998) 205-209.
[27] F. Buelens and E. Frankema, 'Colonial adventures in tropical agriculture: new estimates of returns to investment in the Netherlands Indies, 1919-1938', *Cliometrica* 10 (2016) 197-224.
[28] R. Kaplinsky and M. Morris, *A handbook for value chain research* (2001) 25-36, 41-45. Retrieved from: http://www.fao.org/fileadmin/user_upload/fisheries/docs/Value_Chain_Handbool.pdf [Accessed on: 25 September 2020]

the overall lack of information and the difficulty of connecting the various firms within a value chain to each other. Again, this thesis will make use of sampling several companies in order to construe a value chain that is representative of the entire sector. Consequently, the information of two firms that were not related to each other might be combined to reconstruct a chain; advantages from several types of economic rents inherent to a specific value chain might not be represented accurately.

In order to answer the questions outlined above, this thesis will make use of a variety of primary sources. Firstly, the archives of so-called 'cultuurmaatschappijen' will be consulted. These were the firms that planted rubber and palm oil. The archives of several of these firms are held by the Nationaal Archief in The Hague, several other are held by the Leiden University Library. Secondly, reports by governments and other organisations offer us valuable insights into the organisation of the industries and the markets. Thirdly, records containing quantitative data on the import and export of both goods will be used. These data can be found in several different sources. National governments, for example, have kept records of trade in palm oil and rubber. These can provide insight into the growth and evolution of the industry and the trade. Lastly, contemporary works that have been digitised on Delpher will prove an important asset. Not only books that describe the trade in rubber and palm oil in the early twentieth century can be found on Delpher, there is also a large collection of journals that focus on trade in the Indonesian archipelago, such as the *Indische Mercuur*.

The reason for using such a wide array of different primary sources is the fact that the information on the palm oil and rubber value chains is limited. The value chains need to be pieced together with sources on the plantations and plantation economy on the one hand and with sources on the Western industries and firms on the other. However, not even these two primary sources combined are able to give a full view of the value chains. Therefore, the gaps are filled by estimates based on additional information from government reports, statistical data, and other – contemporary – literature. For example, trade records kept by the Dutch colonial government and the governments of countries importing the goods enable us to make an estimate of the volume and value of the trade in rubber and palm oil.

This thesis is divided into five parts. The first part describes the more technical characteristics of the two plants: how are they grown and processed, and how they came to be introduced to Sumatra. The second part will investigate how the plantations on Sumatra were organised. This includes an analysis of the role land, investment, and labour in the cultivation of the plants. In the third part, the value chain beyond the plantation is mapped. How, where, and in what quantities were rubber and palm oil shipped from East-Sumatra to the rest of the

world? And how were these trade patterns organised? Fourthly, I analyse the industries that consumed rubber and palm oil and how their demand shaped the value chain. More specifically, we will look at the degree of vertical integration within the value chain and how the value chains reacted to the economic crisis of the 1930s. In the fifth part, I will give an overview of where the value is added in the value chains and how the income is distributed along this value chain.

2. The fruits of an industrial society

Before we dive into the value chains of rubber and palm oil, it is useful to take a brief look at the characteristics of the two crops. This chapter will give an overview of how the plants are grown and how their fruits are processed. In addition, this chapter will also give a short history of the two plants preceding their introduction to the plantation economy of East Sumatra.

2.1 The origins of palm oil

The oil palm (*Elaeis guineensis*) originated in the coastal regions of West Africa. A lively regional trade in palm oil existed there in the eighteenth century. During the 1800s, many British traders became active in the palm oil trade in the region because the rapidly growing British soap consumption caused a rise in demand for fats and oils.[29] The consumption of soap grew explosively during the 1800s, which bore a great demand in fats needed for its production. Originally, European soap producers had looked to local sources of fat, such as olive oil and animal fats. However, in order to satiate the demand, the British increasingly looked overseas for animal fats from Australia, copra from Asia, and palm oil from Africa.[30] In the course of the 1800s, the uses of palm oil and palm kernels increased. Other industries, such as that of candle-making and the tin industry found new uses for these raw materials. More important, however, was the invention of margarine in 1870.[31] During the early twentieth century, palm kernels – and later on palm oil, too – became an important ingredient for this butter replacement. The margarine industry would become one of the largest buyers of palm oil and kernels in the twentieth century.[32]

The oil palm was introduced to the Indonesian archipelago when four seedlings were delivered to Buitenzorg on Java in 1848. Despite this early introduction to the region, it took another 50 years before the first large-scale plantations would be founded. The oil palm did spread to Sumatra and into Deli, the plantation-rich region of East Sumatra, but was only used for decorative purposes in gardens. Early attempts at growing the plant for commercial

[29] M. Lynn, *Commerce and Economic Change in West Africa. The Palm Oil Trade in the Nineteenth Century* (Cambridge 1997) 82-86.
[30] Wilson, *Geschiedenis van Unilever*, 18-20.
[31] C.W.S. Hartley, *The Oil Palm* (London 1967) 10-13.
[32] B. Veldekens, *Plantations in Indonesia and South-East Asia. Volume 1* (Leuven 1978) 168-169.

purposes failed, either due to problems in extracting the oil or not having the right materials for planting.[33]

2.2 The characteristics of the oil palm

The oil palm is a tropical tree and thrives in the warm and humid climate around the equator. The climate of East Sumatra is especially well-suited for the palm because the temperatures and the amount of rainfall there stay relatively stable throughout the year. The tree is planted in the coastal regions where the altitude is low and the temperature high. Once planted, it takes around four years before the oil palm starts bearing fruit and it reaches full maturity and its full fruit production after approximately twelve years.[34]

The oil is extracted from either the pulp of the fruit or the palm kernel. The fruit that is harvested from the palm tree contains both the pulp from which the palm oil is extracted, as well as the nuts from which the palm kernel oil is extracted. The original way of extracting palm oil, as it was performed in West-Africa, was to pick the fruit, boil it, and then leave it to dry and soften for several days. After that, the pulp can be beaten or treaded on in order to extract the oil. In this last process, the palm nuts are picked from the mashed pulp and taken apart to be cracked by hand in order to obtain the palm kernel.[35]

The processing of palm oil on the plantations was mechanised to a larger extent than the original African methods. The collected palm fruits were gathered on a small train and quickly transported to the processing factory. There, they were sterilised through heating and placed in a vacuum, in order to maximise the oil yield and to reduce the forming of free fatty acids. These acids start forming once the palm fruit is cut from the tree and are eliminated by heating the fruit. A streamlined harvesting and sterilisation process results in a lower acid content and a higher quality oil. The Sumatran palm oil reached a much lower free fatty acid content than the West African oil.[36] After sterilisation, the fruits were separated from the fruit stems in threshing machines. Then, the fruits were 'malaxated' under high pressures and high temperature in a centrifuge – a process which is meant to soften the fruit and release the initial

[33] Hartley, *Oil Palm*, 15-17.
[34] R. van de Waal, *Richtlijnen voor een ontwikkelingsplan voor de Oostkust van Sumatra* (Dissertation: Wageningen 1959) 41.
[35] I.E. Henson, 'A brief history of the oil palm', in: O-M. Lai, C-P. Tan, C.C. Akoh eds., *Palm Oil: Production, Processing, Characterization, and Uses* (Urbana 2012) 1-29: 17-18.
[36] Van de Waal, *Richtlijnen voor een ontwikkelingsplan*, 42.

oils. The remaining fruit is then put under a hydraulic press in order to extract the last of the oil. The oil is then heated again in order to separate dirt from it. The entire process required a variety of machines, most of which were invented and optimised over the course of the 1910s, '20s, and '30s.[37] The palm kernels are gathered by cracking the palm nuts. Kernels are not processed any further on the plantations themselves. Rather, the oil is extracted from the kernels in the countries of consumption.[38]

2.3 The origins of natural rubber

The *Hevea Brasiliensis*, stemming from the Amazonian rainforest, would grow out to be the most common latex-producing tree in the course of the nineteenth and twentieth century. The rubber trade remained small in size in the early 1800s, as the resource was hard to come by and its uses were limited to the production of shoes and boots. This changed in the middle of the century due to several innovations, such as the invention of vulcanisation. This opened up an enormous array of possibilities for using natural rubber.[39] Rubber became an important resource for all kinds of industrial machinery as well as everyday consumer goods, such as pneumatic tires. The growth in production possibilities unleashed a rubber boom and caused an enormous demand for latex from South America. At the height of this rubber boom in 1909, the Amazon rainforest would provided over 42.000 metric tonnes of rubber, most of which was destined for the United States. At the time, however, demand still greatly outstripped supply.[40]

Considering the enormous demand and the difficulty of obtaining rubber from the Amazon rainforest, it is no surprise that Western entrepreneurs were seeking more efficient ways of procuring rubber. In the 1870s, multiple shipments of *Hevea* seeds were sent from the Aamazon to Kew botanical gardens in London. From there, the few seedlings that successfully sprouted from all these seeds were transported to Ceylon (modern-day Sri Lanka) and then onwards to the botanical gardens in Singapore.[41] Most of the seedlings that stood at the basis of the plantation economy in East Sumatra came from Singapore and Malaya.[42]

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[37] H.N. Blommendaal, *De oliepalmcultuur in Nederlandsch-Indië* (Haarlem 1937) 59-85, 115. Retrieved from Delpher.
[38] Van de Waal, *Richtlijnen voor een ontwikkelingsplan*, 42.
[39] W. Beinart and L. Hughes, *Environment and empire* (Oxford 2007) 234-235.
[40] J. Tully, *The Devil's Milk: A Social History of Rubber* (New York 2011) 68-69.
[41] J. Loadman, *Tears of the Tree: The Story of Rubber – A Modern Marvel* (Oxford 2005) 81-97.
[42] W.J. van de Leemkolk, *De rubber-cultuur en de rubber-handel* (Batavia 1914) 7-8.

2.4 The characteristics of the rubber tree

Just like the oil palm, the rubber tree thrives at lower altitudes and was therefore planted on the coastal regions of Sumatra. The *Hevea* does not require a very fertile soil and is able to grow on most kinds of tropical soil.[43] It takes between five to seven years for the planted rubber tree to start producing latex. Once maturity is reached, the trees are regularly 'tapped'. This entails making incisions in the bark of the tree and collecting the latex that drips from them. On the plantations, the latex is then collected in large factories. A coagulant, a type of acid, is added which separates the latex into slabs of rubber and water. In most cases, the rubber slabs were then milled into long, thin sheets, after which they were hung to smoke in a smokehouse for several days. This process created the so-called 'ribbed smoked sheet' rubber, which was the most produced type of rubber on the Indonesian plantations. Another type of rubber that was produced on the plantations was rubber crepe. These were sheets that were milled more thinly than the ribbed smoked sheets were.[44]

It is important to note that the process of turning latex into rubber sheets or rubber crepe was not a complicated process. In contrast to the processing of palm oil, rubber processing required little capital investment and could be performed at home. Furthermore, there were no time constraints that inhibited trading semi-processed rubber sheets. This meant that the process could be performed by local Indonesian smallholders. It is no wonder then that a lively smallholder rubber industry sprung up in Indonesia alongside the plantation production. While smallholders were capable of producing and processing their own rubber, they were not able to reach the same quality standard that the plantations were able to reach. Smallholder rubber was generally contaminated with dirt and sand and of a lower quality than estate rubber.[45] The bulk of the smallholder production was remilled in Singapore into higher quality rubber sheets and exported from there.[46]

[43] Van de Waal, *Richtlijnen voor een ontwikkelingsplan*, 39.
[44] P.W. Barker, *Rubber: History, Production, and Manufacture* (Washington 1946) 4-13.
[45] A. Gordon, 'Dynamics of labour transformation: Natural rubber in Southeast Asia', *Journal of Contemporary Asia* 34:4 (2004) 523-546: 524-526.
[46] Touwen, *Extremes in the archipelago*, 179-180.

3. The plantation's factors of production

This chapter will investigate how the plantations in East-Sumatra were organised. It will do so by individually investigating the role of the three endowments: land, capital, and labour. By looking at these three factors we can determine three things. First, we can determine how they were obtained and how they were organised. Secondly, we can get an insight in what role they played in the value addition and how they were remunerated. In other words, how much value did the three factors of production add and how much did they cost. Each factor was provided by a different group of people. Land was originally owned by the local Sumatran rulers and given out on leases to European planters. The capital necessary for these land purchases, the planting of trees, and the raising of processing factories was provided by Western planters and investors. The labour necessary for the tapping of latex and the collection of fruits was provided by importing 'coolie' labour. Coolies were often coerced or tricked into this position and into staying on the agricultural estates.

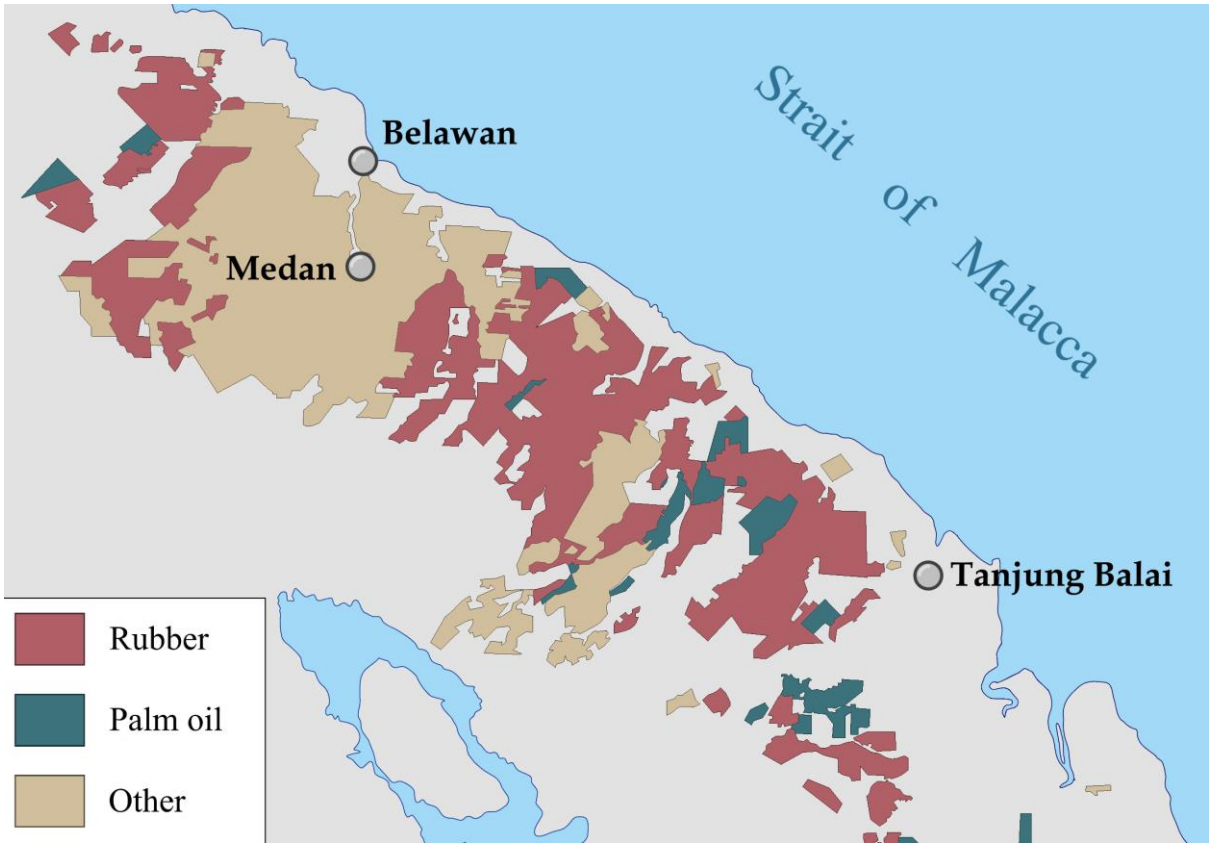
3.1 Land

The plantation economy in East-Sumatra was already well-developed by the time rubber and palm oil entered the scene in the early 1900s. The first tobacco plantations was established in 1863 and the following decades saw an explosive growth of plantations in the region. The first rubber plantings took place on land that was unsuitable for tobacco cultivation. But as planters began looking for alternatives to tobacco due to price drops in the late 19th century, more and more tobacco plantations became active in rubber planting.[47] As we can see in figure 3.1, the land used for rubber estates had grown explosively in the early years, but steadily continued to expand over the 1920s and 1930s. Palm oil estates experienced a similar explosive growth, albeit about a decade later.

As we have noted earlier, the rubber tree does not require a very fertile soil. Consequently, the first rubber plantings that took place in the region did so on land that was sub-optimal for the cultivation of tobacco. The pioneers in rubber planting were therefore mostly ex-tobacco planters that operated on the southern periphery of the tobacco planting areas. As the years passed, the southern part of East Sumatra saw an enormous influx of new

[47] Kian-wie, *Plantation agriculture and export growth*, 4-17.

plantation firms. Enormous rubber plantations were founded in Asahan, a region about 100 kilometres southwest of Medan.[48] As we have seen in the previous chapter, the soil qualifications for successfully growing palm oil are not very strict either, although highlands and marshlands are unsuitable for palm cultivation. The fact that palm oil was the last of the large plantation crops to be introduced further restricted its planting area. This explains why most palm plantations could be found far southwest of Medan.[49]



Map 3.1: the location of rubber and palm oil plantations in East Sumatra in 1932. Source: Adapted by author from: Koninklijk Nederlandsch Aardrijkskundig Genootschap, *Atlas van tropisch Nederland* (Batavia 1938) 12a.

The distribution of plantations can be seen in map 3.1; the heartlands of tobacco planting are centred around Medan, whereas the rubber plantations are mostly situated to the southwest.

[48] H. Blink, *Opkomst en ontwikkeling van Sumatra als economisch-geographisch gebied* (The Hague 1926) 112-114.
[49] G.F. Deasy, 'Localization of Sumatra's Oil Palm Industry', *Economic Geography* 18:2 (1942) 153-158.

Most of the palm oil locations were founded even farther to the southwest, in the region of Asahan.

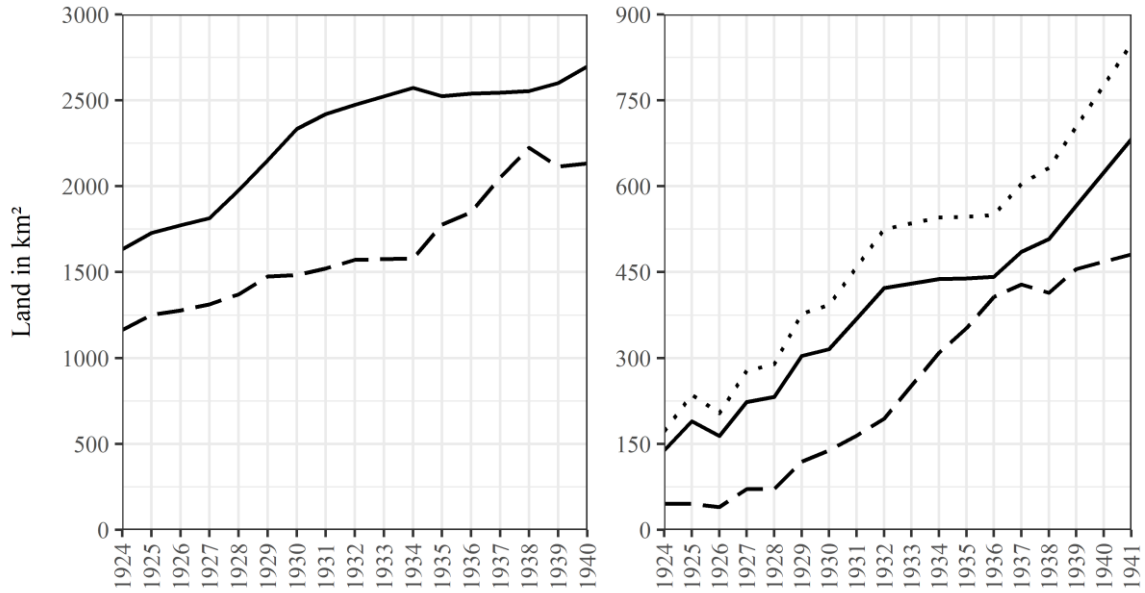


Figure 3.1: growth of rubber (left) and oil palm (right) plantation land in East Sumatra. The solid lines indicate the total land planted while the dashed lines indicate the land that is in production for each of the two crops. The dotted line in the palm oil graph is an estimation of the planted land that includes the lands of the Handelsvereeniging Amsterdam (HVA), whose plantings were not reported in the data source.[50] Source: A.V.R.O.S., *Statistiek van aanplant, produceerenden aanplant en productie van de groote cultures van Sumatra's Oostkust, Atjeh en Tapanoeli 1923-1941.*

The acquisition of land for plantations in the early tobacco-planting years had been arranged by contracts between the planter and the local ruler. Due to the region being sparsely populated at the time, these land leases were given under very favourable conditions, often for a period of 75 or even 99 years. However, these land concessions restricted the land available to the local population. Their traditional form of agriculture was made impossible by the terms of the concessions. In addition, the planters did everything they could to maximise their land ownership, sometimes through unlawful means. Meanwhile, the Dutch colonial government

[50] The estimates are based on one mention of the size of the palm oil plantings of the HVA just before the outbreak of the Second World War. These plantations were approximately 166 km² or 24% of the total planted land of the rest of the companies. This share has been extrapolated to earlier years. Note that this estimation is still slightly beneath the actual amount planted, several other companies did not report their plantings either. See: Nationaal Archief, The Hague (hereafter: NA) 2.20.32 Handelsvereeniging Amsterdam, inv. no. 12, Algemene Vergadering van Aandeelhouders 22 October 1948.

did make some attempts to defend the position of the local inhabitants. This could not prevent, however, that the access to land for the indigenous population severely diminished.[51]

By the time that the first rubber plantations started their operations in the region of East Sumatra, the Dutch colonial government had claimed a significant role in the issuance of land leases. The indigenous rulers did retain a say in the process and would do so throughout the pre-war period. In addition, the same local rulers were able to benefit greatly from granting concessions. The concession-holder was required to pay the *present-tanah*, a one-time tax upon receiving the land concession, as well as the *hasil-tanah*, a yearly rent on the leased land. The yields of both taxes primarily flowed to the local ruler, whereas the remainder was collected by the Dutch colonial government. The *hasil-tanah* formed a structural form of income for the local ruler. This yearly land rent often ranged between 1 and 1,50 Dutch guilders per hectare of land, but could also reach up to 3 guilders per hectare.[52]

The *present-tanah* was an important source of income for the local rulers and thereby created an incentive to issue as many land leases as possible.[53] The rate differed per local ruler and changed over the years. In the southern regions of East Sumatra, it ranged between 40 and 50 guilders as of 1916.[54] A similar value of 50 guilders per hectare was reported by other experts.[55] Some company records show a land value (excluding yearly depreciations) of 100 guilders per hectare.[56] Nonetheless, the value of land on the yearly reports of plantation firms was relatively insignificant in light of the total assets of the plantations. In the case of the Rubber Cultuur Maatschappij Amsterdam (RCMA), a large firm active in both oil palm and rubber planting, the company owned 91.065 hectares in 1930 which were valued at an approximate total of 1,4 million guilders. While this is a considerable sum, it is only a small

[51] K.J. Pelzer, *Planter and peasant*, 66-85.
[52] Estimate based on the land concessions in East Sumatra of several plantation firms: N.V. Sumatra Rubber Cultuur Maatschappij 'Serbadjadi', Batoe Sumatra Rubber Maatschappij, N.V. Rubber Cultuur Maatschappij 'Soengei Poetih', Kwaloe Rubber Company, N.V. Dolok Tabak Maatschappij, Cultuur Maatschappij Si Antar. See: Th.P.C.J. Op de Coul, *De geschiedenis der Naamlooze Vennootschap Sumatra Rubber-Cultuur Maatschappij "Serbadjadi" 1909-1938* (1938). Retrieved from: https://digitalcollections.universiteitleiden.nl/view/item/1050830 [Accessed on 8 October 2020]; Leiden University Libraries, Digital Collections (hereafter: LUL, DC), 'Jaarverslag der Naamloze Vennootschap Batoe Sumatra Rubber Maatschappij over het Boekjaar 1918'. Retrieved from: https://digitalcollections.universiteitleiden.nl/view/item/1154026 [Accessed on 8 October 2020]; Stadsarchief Amsterdam (hereafter: SA), 584 Inventaris van het Archief van Handels- en Cultuurmaatschappij van Heekeren en Co., inv. nrs. 4.17.1, 4.24.5, 4.20.1, 4.24.2, and 4.26.3. Retrieved from: https://archief.amsterdam/inventarissen/details/584/ [Accessed on 8 October 2020].
[53] Van de Waal, *Richtlijnen voor een ontwikkelingsplan*, 57-58.
[54] J. Tideman, *Simeloengoen. Het land der Timoer-Bataks in zijn vroegere isolatie en zijn ontwikkeling tot een deel van het cultuurgebied van de Oostkust van Sumatra* (Leiden 1922) 133. Retrieved from Delpher.
[55] Blommendaal, *Oliepalmcultuur*, 23.
[56] Leiden University Library, Special Collections (hereafter: LUL, SC), Oliepalmen Cultuurmaatschappij "Tanah Itam Uluh", Verslag over het boekjaar 1935.

share of the total value of the firm's assets, which stood a more than 40 million guilders. Even in the early 1910s, land did not play a significant role.[57]

If we want to get an idea of how these land rent costs relate to proceeds of the land, we have to look at the yield per hectare of both rubber and palm oil. Throughout the pre-war decades, the productivity of each hectare of plantation land quickly increased. In the case of rubber, the productivity per hectare more than doubled between 1924 and 1940, from approximately 340 kilogrammes of rubber to 807 kilogrammes. The increase of productivity of palm oil plantations was even more spectacular. One hectare of palm oil plantation produced – on average – around 840 kilogrammes of palm oil and 200 kilogrammes of palm kernels in 1924. By 1939, these numbers had more than tripled, to more than 3.000 kilogrammes of palm oil and 650 kilogrammes of kernels.[58] This increase was partly by seed selection. More important, however, is the fact that the yield of trees increases as they mature.[59] Because the plantations were all very new, the average age of the trees was quite low in the 1910s and 1920s. The average age increased trees increased over the years, resulting in greater yields. This explains the explosive growth of palm oil productivity. As we have seen in figure 3.1, palm plantation land grew explosively in the 1920s which dragged down the average age of trees. The growth stabilised somewhat during the 1930s, thereby the average age of the trees increased, which resulted in a higher average yield.

In sum, the issuance of land leases for plantations was an affair between the local rulers of East Sumatra on the one hand and the planters on the other hand. The Dutch colonial government was involved in the process and did set the terms, but was only partly successful in defending the position of the local population. In addition, the local population saw little of the money that their local rulers earned from issuing the land leases. Furthermore, while *present-* and *hasil-tanahs* proved to be quite significant to the local rulers in terms of income, they were likely not very significant to the planters as costs. However, before we can really place the role of land within the context of the value chain, we need to look at the role of capital and labour.

[57] LUL, SC, Rubber Cultuur Maatschappij 'Amsterdam' N.V., Verslag over het boekjaar 1910-1940.
[58] LUL, DC, A.V.R.O.S., *Statistiek van aanplant, produceerenden aanplant en productie van de groote cultures van Sumatra's Oostkust, Atjeh en Tapanoeli 1923-1940* (Medan 1923-1940). Retrieved from: https://digitalcollections.universiteitleiden.nl/view/item/1280994 [Accessed on 8 October 2020].
[59] J. Th. De Haan, *Cocos- en Oliepalmcultuur* (The Hague 1946) 30.

3.2 Capital

As I have already mentioned above, the role of capital was quite significant in the operation of the estates. In addition, we have seen that land in the province of East Sumatra required only a very limited amount of investment. Instead, much more capital had to be wielded in order to exploit the land, build roads and train lines, and build the factories that processed the rubber and palm oil. Firstly, we will look at the investment in oil palm plantations. As we have seen in the previous chapter, the process of extracting palm oil from the palm fruit required a variety of machines. The estimated average amount of investment per hectare of palm oil plantation was about 750 guilders in 1937. Only 50 guilders were meant for financing the necessary land. About 100 guilders per hectare were used for laying the railroad tracks that were necessary to quickly transport the palm fruits. Another 200 guilders were used for the factories and machinery, while about 400 guilders were used for developing the land – such as building roads, draining the land, and – most importantly –buying and planting the seedlings.[60] These numbers likely reflect the costs of investment per hectare for larger plantation companies, who can benefit from economies of scale, and are representative for the 1930s, when the economic depression had brought average investments down. The RCMA had investments that are reasonably similar to these estimates, but they were higher during the 1920s. However, this cultivation company was active in both rubber and palm oil planting.[61] The other oil palm plantations on which we have information had much higher investments. The Deli Olieslagerij had an investment of almost 1200 guilders per hectare in 1929.[62] The Tanah Itam Uluh plantation had even higher investments, reaching around 1500 guilders – of which 400 guilders were invested in factories and machinery – by the late 1930s.[63]

For rubber, we need to refer to the company records of several plantation companies, which show us that there are some differences in investment. Just like with oil palm plantings, most investments go to land development and planting, which could range toward a thousand guilders per hectare during the 1920s. Furthermore, the costs for acquiring land are similarly low, seeing as the present-tanahs would be roughly the same. The biggest difference is the fact

[60] Blommendaal, *Oliepalmcultuur*, 23.
[61] LUL, SC, Rubber Cultuur Maatschappij 'Amsterdam' N.V., Verslag over het boekjaar 1910-1940.
[62] LUL, SC, Deli Olieslagerij Maatschappij, Rapport du conseil d'administration 1929.
[63] LUL, SC, N.V. Oliepalmen cultuurmaatschappij "Tanah Itam Uluh", Verslag over het boekjaar 1927-1937.

that investments in buildings, factories, and machinery are much lower, ranging between 100 and 200 guilders per hectare in the 1920s, but falling below 100 guilders in the 1930s.[64]

In order to get a better overview of the two sectors in East Sumatra, we will now take a look at the total investments and the dividends that were paid over these amounts. The total foreign investments in the rubber and palm oil industries can be seen in table 3.1. By 1913, there were already sizeable investments in rubber in 1913, whereas the palm oil industry was still in its infancy.

Nationality	Rubber, 1913	Rubber, 1932	Palm oil, 1913	Palm oil, 1932
Dutch	40.716	143.927	58	53.572
British	42.218	105.374	0	3.738
American	1.990	74.854	0	0
French-Belgian	18.519	47.920	1.914	30.926
Swiss	945	3.508	0	0
German	0	3.660	0	3.405
Japanese	0	9.478	0	2.515
Other	1.169	7.945	0	0
Total	**123.347**	**396.666**	**1.972**	**94.156**

Table 3.1: investments in 1.000 Dutch guilders in rubber and palm oil in East Sumatra, sorted by nationality. Values are adjusted for inflation and shown in 1932 guilders. Source: De Waard, 'Oostkust van Sumatra', 257-258.

Less than twenty years later, in 1932, the rubber investments had risen to almost 400 million guilders, whereas palm oil investments had reached almost a quarter of that amount.[65] It is important to note that the 1932 was at the height of the Great Depression. It is likely that investments at the end of the 1920s were even higher. As we can see, the industry's investors

[64] LUL, DC, Jaarverslag van de Holland langkat rubber maatschappij n.v. 1938. Retrieved from: https://digitalcollections.universiteitleiden.nl/view/item/1205580#page/1/mode/1up [Accessed on: 21 October 2020]; LUL, DC, Verslag omtrent den toestand der Naamlooze Vennootschap Batoe Sumatra Rubber Maatschappij over het boekjaar 1921-1938. Retrieved from: https://digitalcollections.universiteitleiden.nl/view/item/1139571#page/1/mode/1up [Accessed on: 21 October 2020].

[65] J. de Waard, 'De Oostkust van Sumatra', *Tijdschrift voor economische geographie* 25.8 (1934) 255-274: 257-258. Retrieved from Delpher.

are very diverse. While about half the investors were Dutch in the case of both palm oil and rubber in 1932, important capital investments came from the United States, Great Britain and France.

Investments in both industries exploded over a period of nineteen years. The size of these investments was enormous, not only in an absolute sense but also in a relative one. It has been estimated that the value of all investments in Colonial Indonesia hovered somewhere around 4 billion guilders in the period from 1925 until 1935.[66] This means that the palm oil investments in East Sumatra made up about 2,5% of total investments in the colony. Even more impressive are the rubber investments in East Sumatra, which made up around 10% of total investments in colonial Indonesia in 1932. These shares underline the enormous economic importance of the region of East Sumatra and the plantation economy that emerged there.

Now that we have established the amount of capital that was invested in the rubber and palm oil plantations of East Sumatra, it is also relevant to take a look at the rents that were earned over this capital. Most of these rents came in the form of dividend that was paid out over the company's equity capital. Gaining insight into the dividend rates is important, because it shows us how the company's profits are distributed. One part of the profits is paid out in the form of dividends, while the remainder is reinvested in the company and therefore stays in the colonies. Of course, dividends may be paid to shareholders who reside in colonial Indonesia, which could mean those profits might be reinvested or spent there as well. However, for the purpose of this research, we will assume that the profits distributed through dividends were headed to shareholders residing in Western countries and – therefore – left the colony.

There exists a lively debate on the profitability of FDI in colonial Indonesia. One of the more recent contributions to this debate is an article by Buelens and Frankema, who give an estimation of the returns on FDI. Their contribution is all the more relevant because they based their estimate mostly on companies that were active in palm oil and rubber. They estimated an average annual return of 14,3 per cent in the period 1919-1928 and a return of -2,8 per cent in the period 1929-1938. However, these estimates include not only dividend pay-outs, but also capital gains.[67] Since the purpose of this thesis is to map the distribution of profit from the perspective of the product, not the investor, the speculative yields over stock are not relevant for us. In addition, Buelens and Frankema have based their estimate on a limited list of

[66] J.T. Lindblad, 'Foreign Capital and Colonial Development in Indonesia: A Synthesis', *Lembaran Sejarah* 14:1 (2018) 5-27: 10-11. Retrieved from: https://www.colonialbusinessindonesia.nl/en/publications [Accessed on 15 October 2020]
[67] Buelens and Frankema, 'Colonial adventures in tropical agriculture', 197-224.

companies listed at the Brussels Stock Exchange. The authors themselves also acknowledge that this sample size is limited, especially considering that there were about 2.850 companies active in the archipelago in 1930.[68]

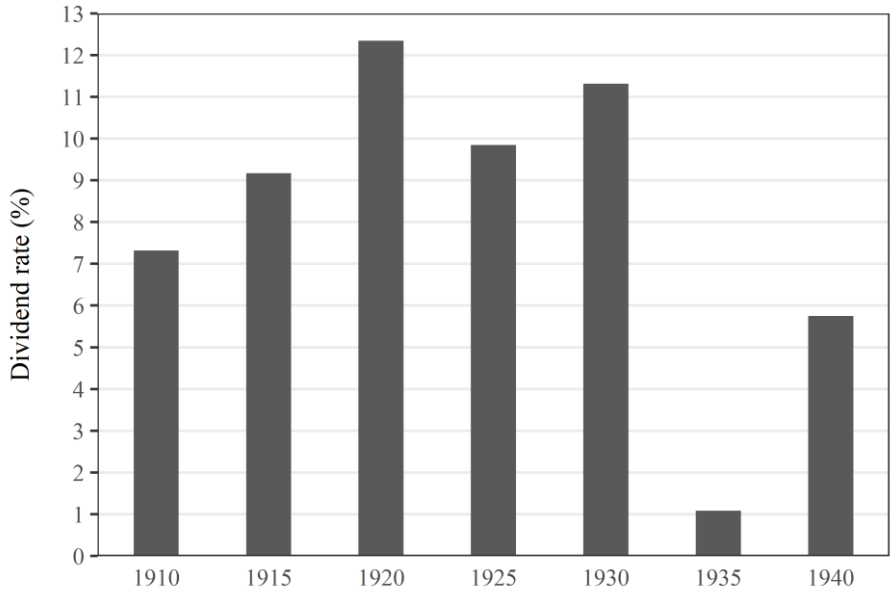


Figure 3.2: the dividend rate of companies active in rubber or palm oil cultivation in Colonial Indonesia. Dividend rates are weighted to the total equity of the company. Note that due to a delay between recording and publishing of the original source, these data reflect the results of their preceding year. Source: author's calculations based on 'CBI database ID', www.colonialbusinessindonesia.nl.

Therefore, we turn to another source for calculating the dividend rates: the Colonial Business Indonesia database. This is a dataset which contains thousands of data entries – such as equity value or dividend rates – on companies active in colonial Indonesia.[69] I selected all companies that were active in either rubber or palm oil planting. I could not, unfortunately, disaggregate the data into palm oil and rubber companies, nor could I differentiate between companies active in East Sumatra and elsewhere in the archipelago. Therefore, the reader should keep in mind that figure 3.2 only gives a superficial indication of the profitability of investing in rubber and palm oil planting business in all of Colonial Indonesia.

[68] Ibidem, 207.
[69] 'Foreign Capital and Colonial Development in Indonesia', Retrieved from: www.colonialbusinessindonesia.nl/en/ [Accessed on 15 October 2020].

Even though the number of entries that contain information on the dividend rates is limited, we are still able to get a sizeable sample. With the exception of the year 1910 (8 samples), all years had between 64 and 121 companies that listed their dividend rates. Note, however, that this concerns companies active in either rubber or palm oil planting, but many were also planting other crops such as tobacco, tea, coffee, or sugar. Figure 3.2 shows that the dividend rates increased significantly over the 1910s and stagnated at a high ten per cent or more during the 1920s. By 1935 – which shows the data recorded over 1934 – the dividend rate had plummeted to about one per cent. This is no surprise, considering it was at the near height of the economic crisis of the 1930s.

In conclusion, significant sums of capital were required to found a rubber or palm oil plantation in East Sumatra. However, these investments also proved to be very profitable and yielded dividend rates of over ten percent during the 1920s – and even higher gains if we also include capital gains. Divided rates were significantly lower during the economic crisis of the 1930s. Beyond the rents that were paid over the invested capital, the evolution of the invested capital itself is remarkable as well. Both industries saw an explosive growth of investments during the 1920s and 1930s, coming from a range of different Western countries. We can say for certain that both industries were quite capital-intensive, especially considering they were agricultural activities.

3.3 Labour

The third factor endowment we will discuss here is by far the most discussed of the three in the academic literature. The palm oil and rubber plantations emerged in a plantation economy that strongly relied on imported labour. At the time when the first planters came to East Sumatra in the 1860s, there was no labour force they could tap into. The region was sparsely populated and the local population could not be compelled to work under local law. Consequently, the planters turned to Java and China as sources for labour. The following decades saw the transportation of thousands of Javanese and Chinese to East Sumatra, as well as the conception of a legal structure that made this indentured labour possible. Several ‘coolie ordonnances’ were adopted that obliged labourers to work for a certain amount of years after they had

accepted passage to East Sumatra. In addition, a penal sanction enabled planters to forcefully punish those who would run away or who were unwilling to work.[70]

The tobacco plantations of the nineteenth century had initially relied Chinese coolies, who were recruited in their home country. By the turn of the century, almost 60.000 Chinese contract labourers were employed in East Sumatra, compared to about 30.000 Javanese workers. The number of coolies of other origins was negligible.[71] After 1900, Java became the main source of labour for East Sumatra. This meant that most of the labourers who toiled on the rubber and palm plantations originally came from Java.

The rise of these new plantations was responsible for a new steep rise in the population in East Sumatra in the early 1910s, as can be seen in figure 3.3. At its peak in 1929, 300.000 coolie labourers were employed on the plantations of East Sumatra. Up until this point, most of them were contract labourers, this meant that they had signed a three-year contract which they were forced to complete. Breaking the contract could be violently punished under the penal sanction. After 1930, however, planters quickly shifted to hiring 'free' labourers. On the one side this was a result of penal sanction being partly abolished in 1931, but more important was the onset of the Great Depression. 'Free' labourers signed contracts for one year, which gave the planters more flexibility.[72]

The numbers shown in figure 3.3 display the total coolie population of East Sumatra, including those working on tobacco, coffee, and tea plantations. In order to get a better idea of how many labourers worked on the oil palm and rubber plantations, we want to get an idea of how many labourers were required to cultivate one hectare of palm oil plantation. A commentator estimated in 1937 that a single labourer was required to work 2,5 hectares of oil palm plantation, which would equal 0,4 labourers per hectare.[73] There is a very limited amount of company records that can be used to verify this number, since most firms have aggregated their data on palm oil with that of rubber or other crops. However, data is available for the Tanah Itam Uluh plantation during the 1930s. In 1929, a year before the economic crisis, about 0,35 labourers were required to work one hectare.

[70] A.L. Stoler, *Capitalism and Confrontation in Sumatra's Plantation Belt, 1870-1979* (New Haven 1985) 25-29.
[71] Breman, *Koelies, planters en koloniale politiek*, 76-85.
[72] J.T. Lindblad, 'Coolies in Deli. Labour conditions in Western enterprises in East Sumatra, 1910-1938', in: Houben, *Coolie Labour in Colonial Indonesia*, 43-78: 65-67.
[73] Blommendaal, *Oliepalmcultuur*, 24.

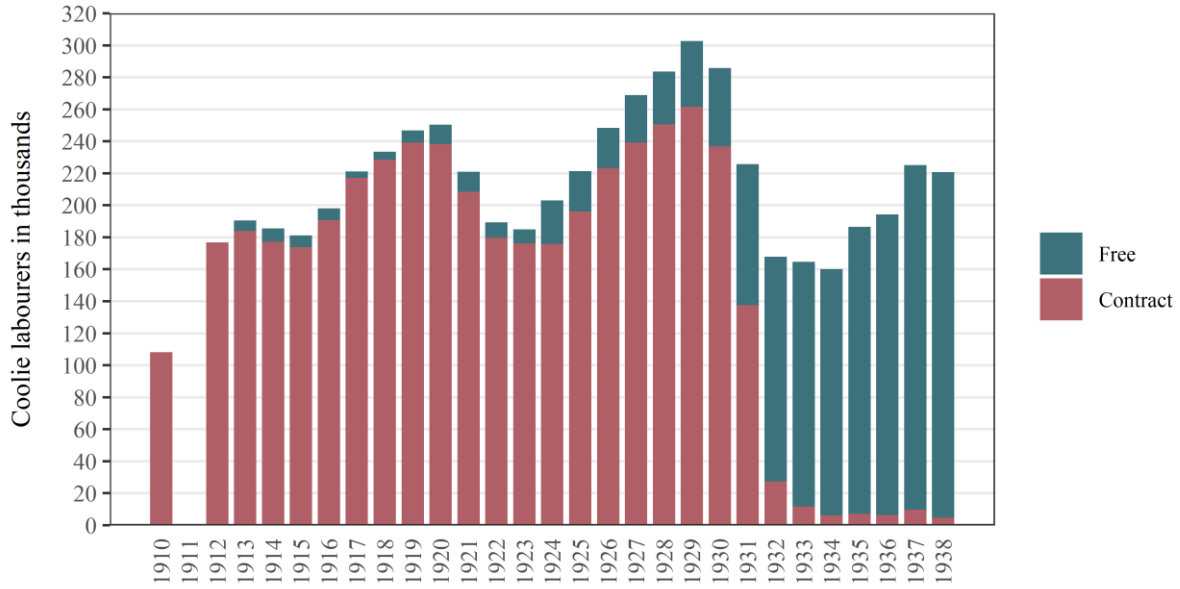


Figure 3.3: the number of coolie labourers employed in East Sumatra, separated in those who worked under a contract and 'free' labourers. Source: Lindblad, 'Coolies in Deli', 72.

The economic depression caused a strong dip in this ratio, reaching a low point of 0,16 labourers per hectare in 1932 before recovering to 0,33 labourers in 1936.[74] Tanah Itam Uluh was a relatively small plantation and a large portion of its planted land was still unable to produce during these years. Therefore, the estimate of 0,4 is quite credible, especially during economically fortuitous years of the 1920s. For rubber, the number was similarly low during the depression years, but somewhat higher during the 1920s. The Batoe Sumatra Rubber Maatschappij, a small rubber cultivating company, saw its number of labourers per hectare decline from 0,75 to 0,5 over the 1920s.[75] On the other hand, the RCMA saw an increase from 0,5 to almost 0,7 labourers per hectare over roughly the same period.[76]

We can extrapolate these numbers to get a picture of how many of the labourers shown in figure 3.3 worked on the rubber and palm oil plantations respectively. If we take an average of 0,6 labourers per hectare for rubber, we can estimate that about half the coolie labourers were working on the rubber plantations in 1924. This share had slightly decreased by 1929,

[74] LUL, SC, Oliepalmen Cultuurmaatschappij "Tanah Itam Uluh", Verslag over het boekjaar 1929-1936.
[75] LUL, DC, Jaarverslag der Naamloze Vennootschap Batoe Sumatra Rubber Maatschappij over het Boekjaar 1921-1938. Retrieved from: https://digitalcollections.universiteitleiden.nl/view/item/1154026 [Accessed on 8 October 2020].
[76] LUL, SC, Rubber Cultuur Maatschappij 'Amsterdam' N.V., Verslag over het boekjaar 1923-1929.

when an estimated 43% of the all coolies worked on the rubber plantations. The coolie labourers working on the palm plantations only made up three and four percent during the years 1924 and 1929 respectively.[77] Keep in mind that the total area planted with palm oil was about one seventh of the total area planted with rubber in 1929.

The Javanese that worked on the East Sumatran plantation were initially lured there by promises of land and riches, as well as by cash advances. The reality of working on the plantation was much more grim. Coolies were forced to make long days for very low wages. The housing that was provided for the labourers was poor and cramped. Diseases were widespread and mortality among all ages was high. The estate's supervisors not only used violence against their workforce in the case of disobedience, but they also actively promoted labourers to indebt themselves through gambling. As long as the coolies remained indebted to the estate and its supervisors they remained indentured as well. The fate of women on the plantations was particularly grim. There were much fewer women than men in the plantation society of Sumatra, and their wages were significantly lower too. They often had to resort to prostitution to make a living, or were coerced by men to do so.[78] The active intervention of the Labour Inspectorate of the Dutch colonial government since 1910 improved the situation somewhat. Death rates decreased, as did the incidents of violence and the high incarceration rates – eventually. By the 1930s, however, austerity cuts and the use of 'free' coolies – which were considered to have a normal relation with their employer – caused the Labour Inspectorate's effectiveness to deteriorate.[79]

Wages for coolies on the estate were set by two planters' associations, the Deli Planters Vereeniging and the Algemeene Vereeniging van Rubberplanters ter Oostkust van Sumatra (AVROS), which ensured that wages were equal across all of East Sumatra and competition among planters would be avoided.[80] Wages were generally low and little remained of their income after coolie labourers had paid for their monthly expenses. The income that did remain was often spent on gambling or other forms of entertainment.

[77] Calculations are based on data on planting area from: LUL, DC, A.V.R.O.S., *Statistiek van aanplant, produceerenden aanplant en productie van de groote cultures van Sumatra's Oostkust, Atjeh en Tapanoeli 1923-1941*.
[78] Stoler, *Capitalism and confrontation*, 29-35.
[79] Lindblad, 'Coolies in Deli', 51-71.
[80] Stoler, *Capitalism and confrontation*, 42.

Year	Daily wages in cash		Expenses for cheap food		Expenses for housing		Medical expenses		Total	
	Men	Wom.	Men	Wom.	Men	Wom.	Men	Wom.	Men	Wom.
1913	43,00	33,00	1,00	1,00	4,00	4,00	5,00	5,00	53,00	43,00
1920	54,00	42,00	29,00	29,00	6,00	6,00	9,00	9,00	98,00	86,00
1925	52,00	42,00	2,00	2,00	3,00	3,00	5,00	5,00	62,00	52,00
1928	59,00	45,00	2,00	2,00	3,50	3,50	4,00	4,00	68,50	54,50
1929	58,50	44,50	2,00	2,00	4,00	4,00	4,50	4,50	69,00	55,00
1930	57,50	44,00	1,00	1,00	5,00	5,00	4,00	4,00	67,50	54,00
1931	57,50	43,00	0,25	0,25	3,50	3,50	3,50	3,50	64,75	50,25
1932	52,25	37,00	0,25	0,25	3,50	3,50	4,25	4,25	60,25	45,00
1933	48,00	32,00	-	-	3,25	3,25	4,00	4,00	55,25	39,25
1934	48,00	30,00	-	-	2,50	2,50	3,50	3,50	54,00	36,00
1935	49,13	29,65	0,07	0,07	2,47	2,47	3,34	3,34	55,01	35,53
1936	49,89	28,57	0,07	0,07	2,18	2,18	3,01	3,01	55,15	33,83

Table 3.2: the daily costs of employing a coolie labourer in selected years in cents of the Dutch guilder. Source: *Indisch Verslag 1937 II. Statistisch jaaroverzicht van Nederlandsch-Indië over het jaar 1936*, 208.

Part of the income was provided in kind, rather than in cash. For example, workers received allotments of rice every month.[81] Table 3.2 gives an overview of the costs of employing a coolie labourer. This overview shows the wages and costs of labourers in the tobacco industry, but is representative for the palm oil and rubber industries as well. As has been stated above, the planters' associations set the wages for coolies collectively. In addition, the high labour mobility also made it unlikely that there were significant wage differences between plantations.[82] What table 3.2 shows is that the income of coolie labourers was very low, even when one incorporates the payments in kind – such as housing and subsidised rice. The costs of employing coolie labour were, therefore, very low. Especially in the case of rubber and palm oil, where only few coolies were necessary to work a single hectare of land.

[81] S. Sairin, *In the shade of the oil palm: Javanese plantation workers in North Sumatra* (Dissertation: Ithaca 1991) 98-102.
[82] Kian-wie, *Plantation agriculture and export growth*, 100.

3.4 Concluding remarks

As we have seen, the three factors of production played very different roles in the production of palm oil and rubber. Land was practically ‘up for grabs’ in the early planting years and relatively little costs had to be incurred to acquire it. Rubber and palm oil planters could rely on the existing labour system put in place by tobacco planters; cheap coolie labour could was imported on a mass scale from Java. The most profitable factor of the three by far was capital. While land rents were only a few guilders per year (apart from a sizeable initial present-tanah) and wages were not even a guilder per day, the returns on invested capital were much higher. Dividend rates exceeded ten per cent during 1920s and – despite a significant slump – quickly recovered halfway through the 1930s. The real returns for investors were even higher, when one incorporates capital gains in the calculation. This examination of the importance of the factors of production has shown the initial outlines of skewed levels of remuneration. In chapter 6, on the value chain of rubber and palm oil, a more detailed overview of the remuneration of the factors per kilogramme of produced good will be given.

4. Beyond the plantation

The linkage between the plantations of East Sumatra and the industries in the West can be divided in two parts. Firstly, there is the transportation of the goods from the plantation to the ports of East Sumatra, primarily Belawan. Secondly, we need to look at the transportation of the goods from those ports to different destinations around the world. This chapter will investigate the roles of the local transportation companies and the evolution of the port of Belawan on the one hand, and the patterns of trade of palm oil and rubber on the other hand. The last part of this chapter will attempt to integrate these two phases by looking at the organisation and the coordination of the trade within the value chain.

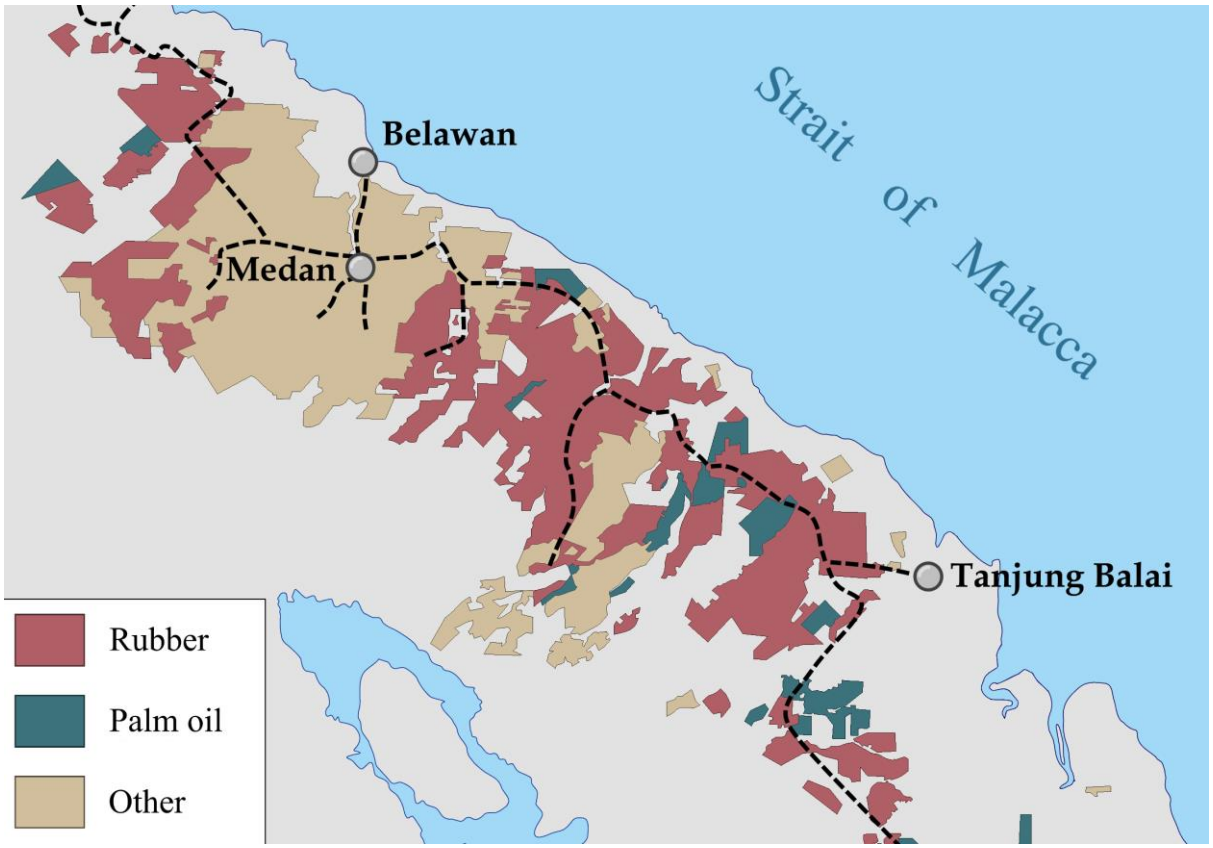
4.1 From plantation to port

As has been noted in the previous chapter, the upcoming rubber and palm oil plantations could build on the foundations of a plantation economy in East Sumatra that was already in place. This was also true concerning the infrastructure in the region, as the region saw the construction of several train lines at the end of the nineteenth century. Before the construction of a train network, transportation in the region had been abysmal: there was no authority in the region that actively maintained the roads. The presence of large tobacco plantations in the area provided the incentive of the foundation of the Deli Spoorwegmaatschappij (DSM) in 1886. The company's founder, J.T. Cremer, recognised the potential of the plantation economy and expected it to continue growing over the years.[83] The DSM and its network that emerged over the following decades were unique within the archipelago: it was the only private train company that emerged outside of Java.[84]

The DSM played a vital role in opening up the region of East Sumatra and operated on a total rail length of 553 kilometres by 1937.[85] The layout of the rail network, which can be seen in map 4.1, shows that the plantations of the area were the primary customer of the DSM's transportation services. DSM's services were not only limited to taking the crops to the ports. Rail transportation also played an important role in carrying construction materials for new

[83] J.T. Cremer, *Eenige inlichtingen over de Deli spoorwegmaatschappij* (Amsterdam 1883) 6-9.
[84] D. Marks et al., *Accounting for Services. The Economic Development of the Indonesian Service Sector, ca. 1900-2000* (Amsterdam 2009) 112-113.
[85] J. Weisfelt, *De Deli Spoorweg Maatschappij als factor in de economische ontwikkeling van de oostkust van Sumatra* (Rotterdam 1972) 62.

plantations as well as transporting large amounts of rice for the coolie labourers. In addition, the coolies themselves also had to be brought to and from the plantations.[86]



Map 4.1: the extent of the DSM's rail network in 1937. Railways are indicated by the black dashed lines. Source: adapted from LUL, Digital Collections, Kaart van het gouvernement Oostkust van Sumatra aangeboden door de Deli Spoorweg Maatschappij (1921).

Before rubber and palm oil were transported to the ports of Belawan and Tanjung Balai (or any of the other, smaller ports), they were delivered by the plantation up to the nearest train station. The rubber sheets were simply delivered by small trains on narrow gauge tracks or by trucks. The latex and palm oil that was transported was liquid and therefore harder to load. These liquids were pumped into large tanks on the DSM trains, either directly from a nearby factory

[86] Weisfelt, *Deli Spoorweg Maatschappij*, 92-96.

or from a truck carrying the liquids. In some cases, the DSM trains could switch to a palm plantation's own train tracks in order to approach the loading facilities.[87]

Whereas the DSM had a strong grip on the transportation market in the first decades of its existence, competition emerged from two sides in the 1920s. On the one hand, an increase in quality of roads and of motor vehicles had signalled the rise of transport by road. On the other hand, the Koninklijke Pakketvaart Maatschappij (KPM) started competing with the DSM with transport by sea. Whereas the new road transport companies mostly aimed at conquering a market segment of passenger transport, the KPM became fully engaged in freight transport along the coast. This impending competition war was only avoided because the two companies approached each other and set terms in order to split the market.[88] The deal between the DSM and the KPM can explain why the 1920s and 1930s saw a rise of the DSM freight rates, in real prices at least.[89]

The prices of transporting rubber and palm oil over DSM's rail network can be partially reconstructed at the hand of archival materials. From 1920 up until 1934, the DSM was able to maintain a relatively high price level, partly because of the favourable economic climate and partly because they had a monopoly on the market for regional transportation. Transport prices for rubber and palm oil were the same and ranged from 16 guilder cents per ton per kilometre (on a 25 km distance) to 8 cents per ton per kilometre (on a 150 km distance). These prices were revised downwards in 1934, under pressure of the economic crisis and the increased competition from the KPM and other transporters. The new prices came down to a range of 12 and 7 cents per ton per kilometre for the distances of 25 and 150 kilometres respectively.[90] Since the DSM was facing serious competition from the KPM and numerous road transporters, we may assume that the prices after 1934 were somewhat indicative for the other transporters too.

4.2 The port of Belawan

The port of Belawan was the most important port of East Sumatra since the rise of the plantation economy in the late nineteenth century. Its central position, only about twenty kilometres from

[87] H. Meijer, *De Deli Spoorweg Maatschappij. Driekwart eeuw koloniaal spoor* (Zutphen 1987) 46-47.
[88] Weisfelt, *Deli Spoorweg Maatschappij*, 97-98.
[89] Marks, *Accounting for services*, 117.
[90] NA, 2.20.11 Inventaris van het archief van de Deli Spoorwegmaatschappij (DSM), 1883-1970, inv. no. 154, Voorstel herziening goederentarieven, Mei 1934.

Medan – the centre of the tobacco planting activities – gave it an edge over other ports in the region. While those other ports, such as Tanjung Balai, also played a significant role in the late 1800s and early 1900s, Belawan had become dominant by 1930.[91] Apart from its central position, the designation of Belawan by the Dutch colonial government as the primary ocean port of the region in 1910 played an important part in its rise to prominence.[92] As a consequence, the relatively high harbour fees were lowered in 1924.[93] In addition, the Dutch colonial government invested in improving the port and its facilities. Ocean berths were built and extended during the interbellum years, in order to allow larger ships to moor. In addition, a series of large storage tanks that could hold liquid latex and palm oil were constructed in the course of the 1920s. These storage tanks largely replaced the individual drums in which palm oil was first transported and enabled a higher loading speed.[94] The port also expanded its number of warehouses, and numerous trading companies opened offices in Belawan.[95]

As the port grew in the early twentieth century and the production of the hinterlands increased, the number of ships that entered Belawan did so too. Through the yearly reports of the port of Belawan, we are able to get an insight in the number, tonnage, and nationality of ships in several years. In 1924, 1088 ship attendances were responsible for a tonnage of 4,3 million m³ of net cargo space. About three quarters of the cargo carrying capacity came from Dutch ships. Fourteen and seven per cent came from British and German cargo ships respectively, whereas only five per cent came from American ships. Note, however, that the number of British ship visits was very high, indicating that this concerns relatively small ships.[96] In 1930, the number of ship visits had gone up to 1522 ship attendances and the total net cargo space had increased to 9,8 million m³. The distribution of ship nationalities remained the same. The vast majority of ships was Dutch, followed by a large number of British ships. German and American ships retained a small share.[97] All the numbers above can tell us two things about the evolution of shipping in Belawan. First, the average ship size strongly increased over those six years, from an average of circa 4.000 m³ to 6.500 m³ of net cargo

[91] C. Airriess, 'Port-Centered Transport Development in Colonial North Sumatra', *Indonesia* 59 (1995) 65-91: 68-80.
[92] Weisfelt, *Deli Spoorweg Maatschappij*, 54-56.
[93] LUL, DC, Algemeene Vereeniging van Rubberplanters ter Oostkust van Sumatra, *Jaarverslag 1 juli 1924 – 30 juni 1925*, 26.
[94] Blommendaal, *Oliepalmcultuur*, 155-157.
[95] NA, Inventaris van de Memories van Overgave 1852-1962, 2.10.39, inv. no. 187: Sandick, L.H.W. van (resident), 128-130.
[96] LUL, SC, *Jaarverslag der Haven-Belawan 1924*.
[97] NA, Inventaris van de Memories van Overgave 1852-1962, 2.10.39, inv. no. 190: Suchtelen, B.C.C.M.M. van (gouverneur), 270-274.

space. This indicates that Belawan obtained a more important role as an ocean port over those years. The second thing it tells us is that Dutch shipping companies played a dominant role throughout the years, whereas American shipping companies – despite their growing imports of rubber and palm oil from the region – held a marginal role.

4.3 Rubber and palm oil across the world

From Belawan – and also from other ports in East Sumatra – rubber, palm oil, and palm kernels were shipped around the world. Beginning in the 1920s, the Dutch colonial government has recorded all exports from Indonesia, including their destination. This data can be used to get an idea of where the production from the plantations was headed. The exports of rubber and their destinations can be seen in figure 4.1.

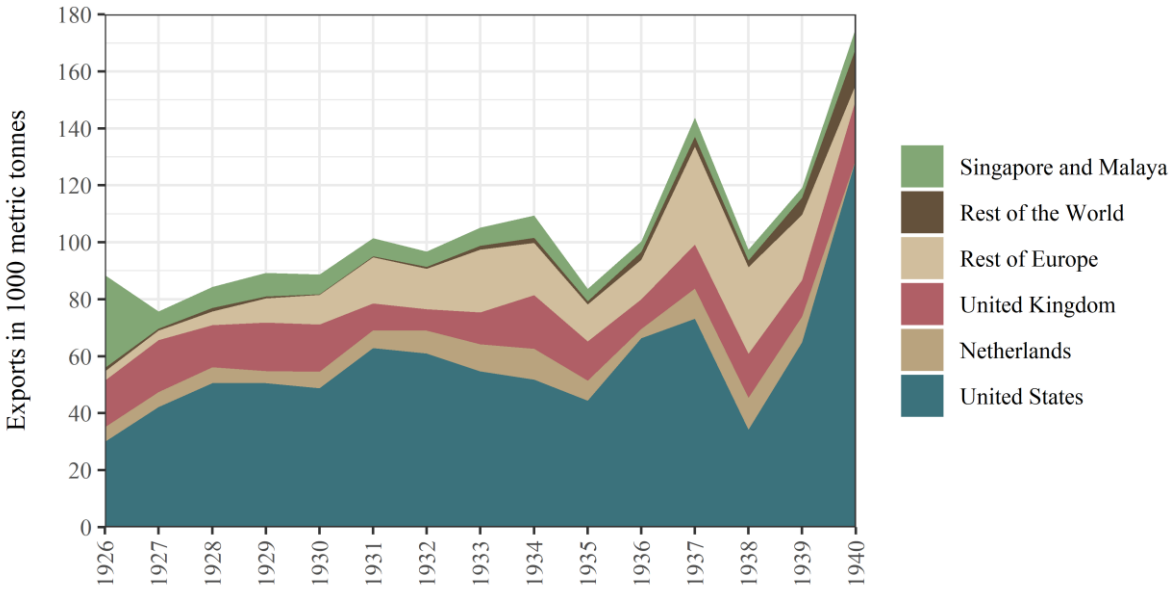


Figure 4.1: plantation rubber exports from Indonesia between 1924 and 1940, sorted by destination. Source: Centraal Kantoor voor de Statistiek (CKS), *Jaaroverzicht van den in- en uitvoer van Nederlandsch-Indië gedurende het jaar 1924-1940. Deel II* (Batavia 1925-1941).

While this data is very insightful, we must remember that it represents not only the plantation rubber exports; a clear distinction in the record keeping between plantation rubber and smallholder rubber (exports of which also reached great heights) is not made until 1934.

However, the data shown here likely does – for the majority – concern plantation rubber. Another limitation of this data is the fact that there was no distinction made in the records based on the origin of the exported rubber. However, the clear majority of this rubber was exported from Belawan or other East Sumatran ports (often around three quarters) but a significant portion came from other regions of the archipelago.

As we can see in figure 4.1, rubber exports only saw limited growth over the 1920s and 1930s. Most of its growth had taken place in the decades prior. It was only by 1939, at the onset of World War II, that the world wide rubber demand started peaking. The destinations of the plantation rubber remained quite similar over the years, too. The US was by far the largest importer of Indonesian plantation rubber, with the United Kingdom and the Netherlands coming in at second and third. As we can see, the majority of the plantation rubber was headed for either the US or Europe, whereas other destinations, such as those in Asia, played only a minor role.

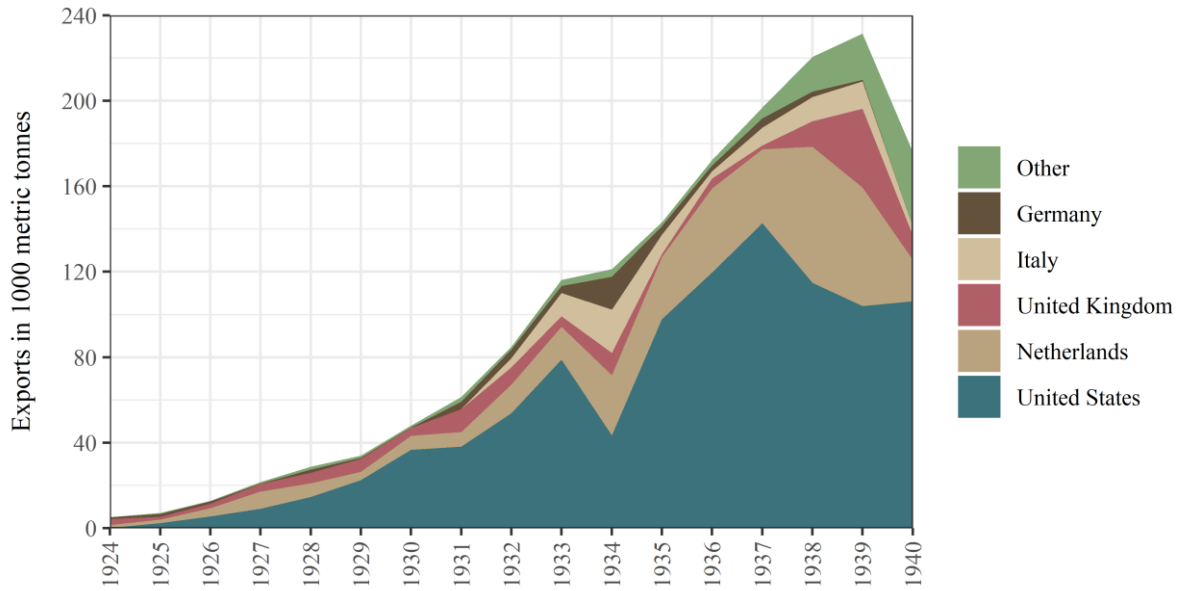


Figure 4.2: palm oil exports of Indonesia between 1924 and 1940, sorted by destination. Source: Centraal Kantoor voor de Statistiek (CKS), *Jaaroverzicht van den in- en uitvoer van Nederlandsch-Indië gedurende het jaar 1924-1940. Deel II* (Batavia 1925-1941).

The statistical records for palm oil are much more accurate in showing the exports of East Sumatra, simply because of the fact that the vast majority of the Indonesian palm oil was

cultivated there – around 80 per cent in 1937.[98] Consequently, the exports of all Indonesian palm oil are a quite accurate representation of the East Sumatran palm oil exports. In contrast to the rubber exports over the same period, palm oil exports grew significantly during the interbellum. As can be seen in figure 4.2, exports increased from around 5.000 tonnes in 1924 to over 200.000 in 1939, a fortyfold increase. Most of the palm oil exports were headed to the US. It was only by the late 1920s that the US gained this dominant position as an export destination. Before that, we can see that the Netherlands and the United Kingdom played an important role as importers of palm oil. These two countries, and especially the Netherlands, remained important throughout the 1930s as well. Other countries played only a marginal role, only Italy and Germany had any sizeable palm oil imports.

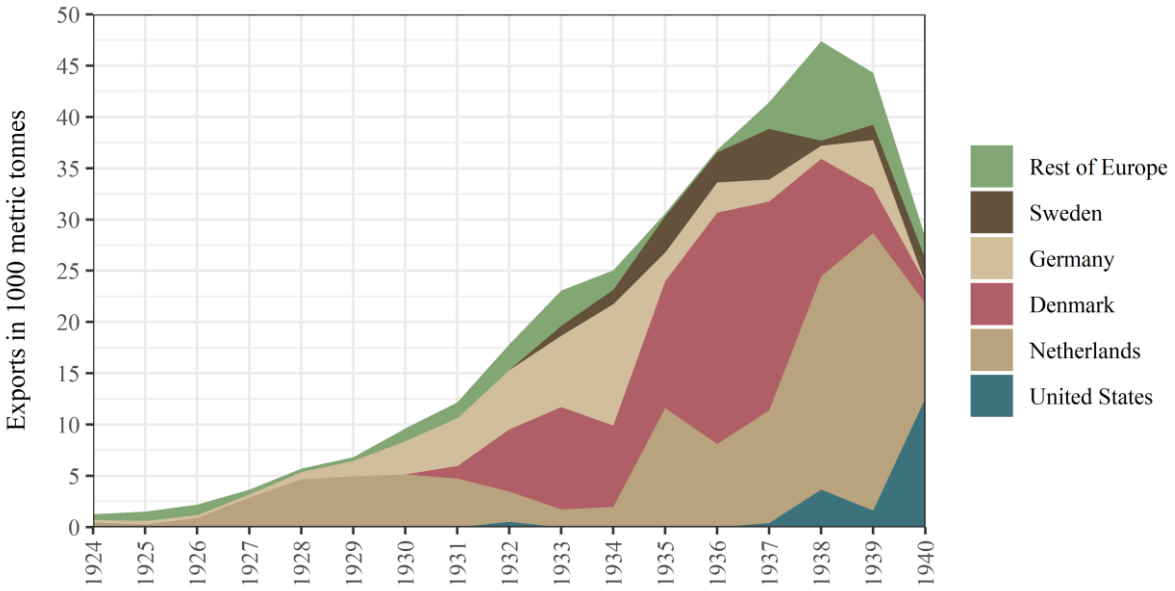


Figure 4.3: palm kernel exports of Indonesia between 1924 and 1940, sorted by destination. Source: Centraal Kantoor voor de Statistiek (CKS), *Jaaroverzicht van den in- en uitvoer van Nederlandsch-Indië gedurende het jaar 1924-1940. Deel II* (Batavia 1925-1941).

Lastly, the statistical records kept by the Dutch colonial government can also tell us something about the export of palm kernels, shown in figure 4.3. Because palm kernels are taken from the same tree as palm oil, the records are equally accurate in depicting the exports of East Sumatra and show a similar growth pattern between 1924 and 1940. However, the destination of these

[98] Deasy, 'Localization of Sumatra's oil palm industry', 153-154.

exports were vastly different. The US played practically no role as export destination of kernels before 1940. Instead, the Netherlands and Denmark played a dominant role. Interestingly, there were practically no exports headed for destinations outside of Europe, with the exception of the US.

4.4 The organisation of trade

Now that we have sketched an overview of the physical structure of the export chain from East Sumatra to Europe and North America, it is valuable to investigate the organisational structure, too. This organisation of export basically comes down to question of when or where the responsibility for or ownership over the goods is transferred. As shall be explained below, there were several forms of organisation in the trade. In some cases, transactions took place before the goods had even reached a port, whereas in other cases, the goods remained in the same hands due to vertical integration.

Initially, selling rubber and palm oil took place through a middleman, most famously by the Nederlandse Handelsmaatschappij (NHM). This trading organisation had initially been active as a creditor in the region of East Sumatra but started signing consignation deals with plantation companies in the course of the 1910s. In exchange for the exclusive rights to buy the harvest, the NHM offered the capital that was needed to get the plantations up and running. The NHM was able to acquire an important position within the rubber market, where it traded around ten per cent of the annual harvests between 1919 and 1925. During the same period, the NHM's share as a middleman in the palm oil trade was even more significant, as it traded forty per cent or more of the annual harvests. The rise of large plantation companies in the middle of the 1920s quickly brought an end to the role of the NHM in both the rubber and the palm oil market. Large plantation companies started trading directly with buyers in Europe and North America.[99]

In most cases, especially during the 1920s and 1930s, the produce was sold directly to buyers abroad. Sales contracts stipulated the price and quantity of the sale beforehand. There were two types of contract sales: 'free on board' (f.o.b.), which means that the costs of transportation and of insurance for the transportation is for the buyer, and 'cost, insurance, and

[99] C.J.M. Potting, *De ontwikkeling van het geldverkeer in een koloniale samenleving Oostkust van Sumatra, 1875-1938* (n.p., 1997) 198-210.

freight' (c.i.f.), which means that those same costs are for the seller.[100] Note that the buyer, in this case, can mean different persons. In the case of rubber, this was often be the company that processed the rubber. In other cases and especially in the case of palm oil, the Sumatran exports were traded on a bulk market, such as in Liverpool.[101] The difference between these two methods of sale primarily comes down to who bears the risks of price fluctuations in shipping and insurance costs. Because these contracts would be signed months or a year in advance, the costs of shipping and insuring the freights journey might change. In the case an f.o.b. contract, the buyer – who purchases the goods before they are shipped – bears these risks, whereas the seller bears these risks in a c.i.f. contract.[102] Consequently, the f.o.b. contract is more favourable for the seller – the plantation company – whereas the buyer of rubber and palm oil would prefer a c.i.f. contract. In the company reports of the RCMA and the Deli Maatschappij, two producers of rubber, we see a shift from primarily f.o.b. contracts to c.i.f. contracts in the late 1920s and early 1930s.[103] This reflects the shift from a seller's to a buyer's market. During the 1920s, demand outstripped supply, which meant that plantation companies had a relatively strong bargaining position and could sell under f.o.b. contracts. The economic depression of the 1930s flipped the market relations and enabled buyers to demand c.i.f. contracts.

Over time, another form in the organisation of trade became common, that of direct trade within an integrated value chain. Trade did not flow through middlemen or via bulk markets in these value chain. It was mostly large American tyre-producing firms that created value chains like these. They founded their own plantations – often in the form of subsidiary companies – in East Sumatra in the course of the early century. The integrated value chain that emerged in some rubber planting companies did not emerge in the palm oil industry before the Second World War. The process of vertical integration will be further discussed in a later chapter.

[100] G. Knop, *Handelstechniek. Leidraad bij de studie algemeene handelskennis. Eerste deel* (Zutphen 1921) 57-58. Retrieved from Delpher.
[101] S.B. Redecker, *Palm-oil industry of Sumatra and West Africa* (n.p. 1927) 8-9. Retrieved from: https://babel.hathitrust.org/cgi/pt?id=uiug.30112104065005 [Accessed on: 3 November 2020].
[102] F. Lorenzo, *C.I.F. and F.O.B. contracts* (Fifth edition: London 2012) 4.
[103] LUL, DC, *Verslag van den directeur der Deli-Maatschappij. 1920-1939*. Retrieved from: https://digitalcollections.universiteitleiden.nl/view/item/1236432 [Accessed on 2 November 2020]; LUL, SC, RCMA, Verslag over het boekjaar 1920-1939.

4.5 Conclusion

What we observe in the trade of palm oil and rubber from plantation land to the Western ports is a strong variety in trading patterns. Not only did the destinations vary greatly between rubber, palm oil and palm kernels, so did the organisation of the trade. Almost all of the produce was transported by the DSM and shipped through Belawan, but the point where a sheet of rubber or a litre of palm oil was transferred to a new owner could be at very different places within the chain – if such a transferral happened at all. The port of Belawan was the counterpart of Singapore, through which the majority of the smallholder rubber was traded. Singapore functioned as an intermediate port, where smallholder rubber was processed and from where it was exported to the West or Asia.[104] In contrast, Belawan merely functioned as a throughput port and connected the plantations of East Sumatra directly to the Western markets. The next chapter will build on these findings, as it will – among other things – analyse the degree of vertical integration in the value chains and try to explain why it did happen in the case of rubber but not in the case of palm oil.

[104] W.G. Huff, *The Economic Growth of Singapore. Trade and Development in the Twentieth Century* (Cambridge 1994) 203-207.

5 The demand side of the markets

By now, we have investigated the supply side of the rubber and palm oil markets, as well as the physical and organisational aspects of the value chains. We will now look at the demand side in the two value chains. This chapter analyses how the rise of Western industries – such as the tyre, margarine, and soap industries – fed the demand for rubber and palm oil from Indonesia. In addition, this chapter will look at how the demand side influenced the two value chains differently over the course of the pre-war decades. Firstly, a short overview of the major industries consuming rubber and palm oil (and kernels) during the early twentieth century will be given. Secondly, I analyse and explain the difference in the degree of vertical integration. Thirdly, the reaction of the value chains to the economic depression of the 1930s will be analysed.

5.1 Tyres, margarine and soap

By the late nineteenth century, oils and fats became an increasingly important resource in the Western world. The margarine industry – which emerged in the late nineteenth century – became one of the prime importers of palm oil and – especially – palm kernels in the twentieth century.[105] Whereas palm oil initially had a free fatty acid content that was too high for it to be used in the margarine production, this changed when the Sumatran plantations started dominating the market.[106] Firms from the Netherlands and Denmark last two countries would come to dominate the margarine market of northwest Europe.[107] The Dutch margarine manufacturers Jurgens and Van den Bergh started dominated their domestic market as well as the German and British markets in the early twentieth century. They would merge in the late 1920s with the British Lever Company to form Unilever.[108] Germany was an especially important production ground for the Dutch companies, the country produced the most margarine in Europe.[109] The Danish margarine production was mostly in the hands of Mønsted,

[105] I. Prodöhl, 'From Dinner to Dynamite: Fats and Oils in Wartime America', *Global Food History* 2.1 (2016) 31-50: 33-35.
[106] Redecker, *Palm-oil industry*, 8-9.
[107] A. Levene, 'The Meanings of Margarine in England: Class, Consumption and Material Culture from 1918 to 1953', *Contemporary British History* 28.2 (2014) 147.
[108] Schrover, *Het vette, het zoete en het wederzijdse profijt*, 58-79.
[109] K. Snodgrass, *Margarine as a butter substitute* (Stanford 1930) 219. Retrieved from: https://babel.hathitrust.org/cgi/pt?id=uc1.$b232781 [Accessed on: 6 November 2020].

who opened up several margarine factories in Great Britain at the turn of the twentieth century.[110] American margarine production grew in the same period as in Europe. By the 1920s, total margarine consumption stood at one-ninth of the total butter consumption in the country. Almost all of this margarine was domestically produced.[111]

The growth of the margarine industry in the countries mentioned above cannot be directly translated to the consumption of palm oil and palm kernels. As we could see in figures 4.2 and 4.3 in the previous chapter, palm oil exports to the US were very low in the 1920s and palm kernel exports to the US were practically non-existent. American producers based their margarine on other oils and fats, such as coconut oil and animal fats. Palm oil was only used in the production process of American margarine from the late 1920s onwards and played only a minor role.[112] Palm kernels were an important resource for the production of margarine in Germany and Great Britain, but held no exclusive position in the production process either.[113]

The other major buyer of palm oil and palm kernels was the soap industry. The largest soap manufacturer in Europe was the Lever Company, which sourced much of its palm oil and palm kernels from West-Africa and Congo.[114] In the middle of the 1920s, Britain was – due to its soap industry – the largest importer of palm oil in Europe.[115] Sources on the exact usage of palm oil in the soap industry are scarce, so it is difficult to tell what role it played in comparison to the margarine industry. It is certain, however, that the soap industry was the major consumer of palm oil in the 1910s and 1920s.[116] On the American market, the role of palm oil was much greater in the soap industry than it was in the margarine industry. Its use in soap production rapidly increased during the 1920s. About 86 million kilogrammes of palm oil were used to make soap in 1930, which is equal to about 12 per cent of the total oil and fat consumption of the industry.[117] The soap industry consumed four-fifths of the Indonesian palm oil imported to the US in 1930.[118]

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[110] K. Pedersen, P. Sørensen, and J. Strandskov, 'Otto Mønsted and the early margarine industry: Alliance capitalism a century ago', *Scandinavian Economic History Review* 48.3 (2000) 57-71: 62-65.
[111] Snodgrass, *Margarine*, 205-214.
[112] United States Tariff Commission, *Production and transportation costs of certain oils* (Washington 1932) 152. Retrieved from: https://babel.hathitrust.org/cgi/pt?id=uiug.30112085178181 [Accessed on 6 November 2020]
[113] Snodgrass, *Margarine*, 143-147.
[114] Wilson, *Geschiedenis van Unilever*, 268-274.
[115] H. Blink, 'De produktie en handel van palmolie, in het bijzonder van Sumatra's Oostkust', *Tijdschrift voor Economische Geographie* 19.9 (1928) 303-307: 304-305. Retrieved from Delpher.
[116] E. Fickendey, 'De vooruitzichten der oliepalmencultuur in Nederlandsch-Indië', *Economisch-statistische berichten* 10.515 (1925) 984-986: 984. Retrieved from Delpher.
[117] United States Tariff Commission, *Production and transportation costs of certain oils*, 130.
[118] Blommendaal, *Oliepalmcultuur*, 163.

While the uses of rubber were numerous and varied, the majority of rubber was used in the tyre industries. This was particularly the case in the U.S., where the industry was responsible for almost three quarters of the total American rubber consumption in 1937.[119] Much of these rubber imports originated from Indonesia; after all, the US was the most important destination for Indonesian rubber. Although there were many tyre firms around 1900, a few large manufacturers started dominating the market by the 1920s: B.F. Goodrich, Firestone, Goodyear, and U.S. Rubber. It is important to note that companies like these did not form the last link in the value chain, they were strongly dependent on car manufacturers such as Ford and General Motors.[120]

As we have seen in the previous chapter, Indonesian rubber exports to Europe were smaller than those to the US. However, the European rubber consumption was far from insignificant. In Great Britain, Dunlop maintained a strong grip over the market for both car and bicycle tyres.[121] Other large tyre manufacturers played an important role on the European continent, such as Michelin in France and Pirelli in Italy. There is, unfortunately, little information on their shares of the Western European market.

5.2 Vertical supply chain integration

During the interwar years, we can see a marked difference in the evolution of the value chain organisation of rubber and palm oil. Whereas we see a process of vertical integration happening in the former, there is no vertical integration in the latter. This section will analyse the involvement of rubber and palm oil consuming firms from the West in the plantation industry.

Already at a relatively early stage in the history of the Indonesian rubber plantations did American tyre firms start integrating backwards. Goodyear bought large plots of land destined for rubber planting in 1916.[122] The US Rubber company became active in East Sumatra already five years earlier. It founded a subsidiary company in 1911 and bought an existing tobacco plantation in the southeast of East Sumatra.[123] The primary reason for tyre

[119] P.W. Barker, *Rubber industry of the United States 1839-1939* (Washington 1939) 24. Retrieved from: https://babel.hathitrust.org/cgi/pt?id=uiug.30112101554274 [Accessed on 8 November 2020].
[120] French, 'Structural Change and Competition', 30-38.
[121] T. McGovern, 'Why do successful companies fail? A case study of the decline of Dunlop', *Business History* 49.6 (2007) 886-907: 886-890.
[122] French, 'The Emergence of US multinational Enterprise', 66.
[123] H. Blink, 'Sumatra's oostkust in hare ontwikkeling als economisch gewest. Een economisch-geographische en -historische studie', *Tijdschrift voor economische geographie* 9.2 (1918) 57-156: 127-128.

manufacturers to integrate backwards was to secure a continuity of supply and to avoid speculative price rises.[124] For Goodyear, who started planting relatively late, the insecurity of supply had become even more pressing due to the outbreak of World War I and the high demand for rubber. In addition, the fact that several of its major competitors had started planting in the Indonesia, but also in Malaya and French Indochina, provided another impetus.[125] The only form of backwards integration that took place in palm oil before the Second World War was by the British Lever company and did not take place in Sumatra. These attempts at integrating the supply of palm oil were motivated by the fear of being dominated by palm oil suppliers. Lever's most famous enterprise took place in Belgian Congo, where it founded several oil palm plantations in 1911.[126] Other soap and margarine manufacturers generally refrained from vertical integration in this period. In East Sumatra, there were no oil palm plantations owned by downstream manufacturers before the Second World War.

Scholars have argued that backward integration, by American companies at least, took place when there were problems with the supply of raw materials for an industry. This means that the greater the variety of sources for a raw material is, the lower the likelihood that a firm will attempt backward integration.[127] We have seen that the motivation of security of supply was definitely present in the case of the American rubber firms. The 1910s were characterised by strong volatilities in the supply and the prices of rubber, so it is no wonder that several firms took these steps. In addition, once a single firm has become active in rubber planting, it is more difficult for its competitors to not do so. In times of supply scarcity, firms who integrated backwards had an advantage over those who did not.

There are several factors, inherent to the production of soap and margarine, that prevented backwards integration from happening. Most important is the fact that palm oil can be substituted by other fats and oils. Its widespread cultivation did not *enable* the soap and margarine industry to appear, as was the case with rubber and the tyre industry. Rather, the soap and margarine industries created a market that facilitated the widespread cultivation of palm oil. By 1910, the production of margarine – and soap – could be based on a wide variety of animal, fish, and especially vegetable fats and oils.[128] This variety of input materials meant

[124] French, 'The Emergence of US Multinational Enterprise', 66.
[125] H. Allen, *The House of Goodyear. A story of rubber and modern business* (Cleveland 1943) 81-82. Retrieved from: https://babel.hathitrust.org/cgi/pt?id=uc1.$b663065. [Accessed on: 17 November 2020].
[126] Wilson, *Geschiedenis van Unilever*, 181-196.
[127] H.C. Livesay and P.G. Porter, 'Vertical Integration in American Manufacturing, 1899-1948', *The Journal of Economic History* 29.3 (1969) 495-496.
[128] K.E. Hunt, 'Grondstoffen', in: J.H. Stuijvenberg, *Honderd Jaar Margarine 1869-1969* (The Hague 1969) 29-75: 67-71.

that the worries of tyre producers – most notably the security of the supply – were not recognised by the manufacturers of soap and margarine. A shortage of one type of fat or oil did not pose a significant problem, because they could resort to other types. In addition, the prices of palm oil and palm kernels were not as volatile during the early planting years – that is, the 1910s and 1920s – as the rubber prices were.[129] This is most likely also a result of the substitutability of palm oil and palm kernels.

5.3 Weathering the economic depression

Another difference between the two value chains which merits some attention is the response to the economic crisis of the 1930s. The colonial Indonesian economy was especially vulnerable to the economic depression. It depended primarily on the exports of raw materials, which meant a Western slump in demand was quickly translated to a decrease in Indonesian exports. These effects were exacerbated by Dutch monetary policy. By letting the Dutch guilder remain on the gold standard until 1936, its value remained high and the Dutch – and Indonesian – export position remained weak.[130] However, when we look at the rubber and palm oil industries during these depression years, there is a striking difference. Whereas the exports of rubber stagnated between 1930 and 1936, as can be seen in figure 4.1, the exports of both palm oil and palm kernels tripled in volume during the same period – as can be seen in figures 4.2 and 4.3.

The plantation rubber industry was hit hard by the economic downturn. Figure 5.1 shows that prices in 1933 where less than a quarter of what they were in 1929. In addition, there was no rise in export volume that could provide some compensation for this decrease in prices. One of the weaknesses of the rubber plantation industry was the fact that it had to compete with an enormous smallholder rubber industry. Indonesian smallholder farmers cultivated rubber trees alongside their usual rice cultivation in order to get some extra cash income. Their mode of production proved to be more flexible in the face of plummeting prices – they could simply stop tapping latex if prices were too low. In addition, their production costs were often significantly lower than those of rubber plantations.[131]

[129] Hunt, 'Grondstoffen', 49; Also see figures 5.1 and 5.2.
[130] A. Claver and J.T. Lindblad, 'Going Bankrupt? Business Failure in Colonial Indonesia, c. 1870-1940', *Economics and Finance in Indonesia* 57.2 (2009) 139-157: 149.
[131] A. Coates, *The Commerce in Rubber. The first 250 years* (Singapore 1987) 271.

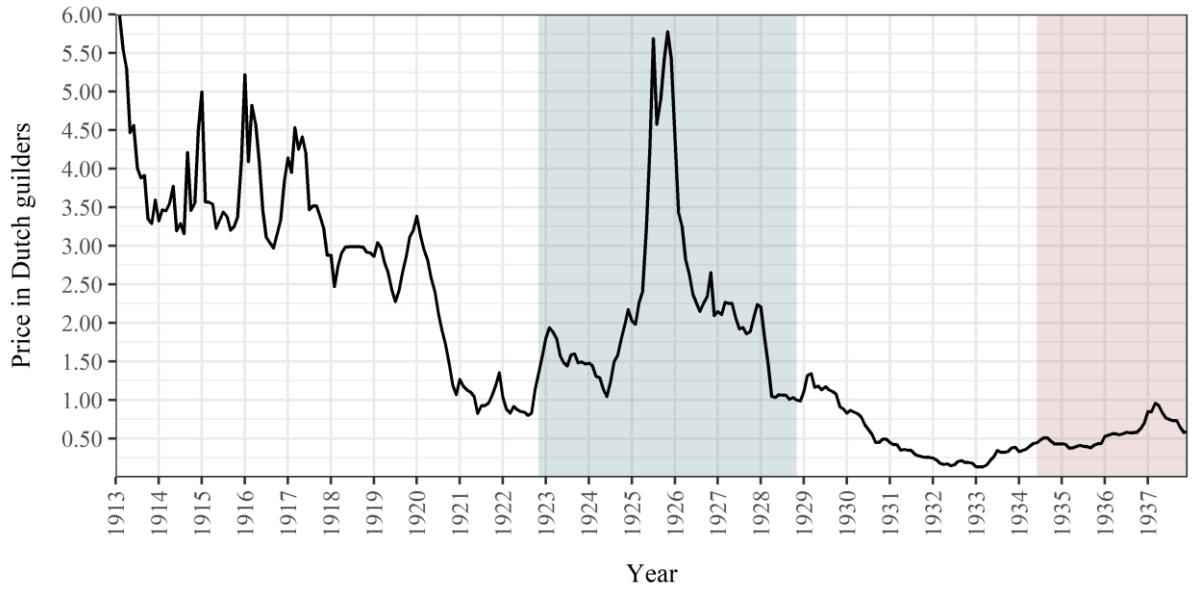

Figure 5.1: the price of 1 kg of rubber sheets in New York, converted to Dutch guilders.[132] The blue area indicates the period in which the Stevenson scheme was enforced. The red area indicates the period in which the IRRA was enforced. Source: P.W. Barker, *Rubber statistics 1900-1937. Production, absorption, stocks and prices* (Washington 1938) 43, 45.

In order to deal with the incredibly low prices, the major rubber producing countries devised a scheme that was meant to limit the production of rubber and thereby increase the prices. A similar scheme – the Stevenson restriction scheme – had been implemented during the 1920s in the British territories, which were responsible for three quarters of all rubber production at the time. While the rubber prices rose to high levels during the scheme, it also gave the non-restricted rubber producers in Indonesia the room to grow and obtain a large market share.[133] Figure 5.1 shows that rubber prices at the time of abolishment were as low as at the beginning of the scheme. The second scheme, the International Rubber Regulation Agreement (IRRA), became effective in June 1934 and was signed by the United Kingdom as well as the Netherlands and France, which meant that it covered almost the entire global rubber

[132] Prices before 1921 are deduced from an index number on wholesale rubber prices; Exchange rate remained stable at approximately $1 = 2.5 fl. until 1931. The US dollar depreciated in the years after. See: R. Edvinsson, 'Historical Currency Converter', https://www.historicalstatistics.org/Currencyconverter.html [Accessed on 5 November 2020].
[133] L.T. Ghee, 'Malayan peasant smallholders and the Stevenson restriction scheme, 1922-1928', *Journal of the Malaysian Branch of the Royal Asiatic Society* 47.2 (1974) 105-122: 117-119.

production. The agreement set quota for the maximum production of each of the rubber producing territories. These were set and regularly reviewed by the International Rubber Regulation Committee, which was made up of representatives from the rubber producing colonies and contained advisory positions for representatives of the rubber consuming industries.[134]

It is difficult to judge the effectiveness of the regulation scheme in increasing the prices. We can see in figure 5.1 that prices did increase in the late 1930s, but it is difficult to judge how much of this is due to the restriction of production and how much is due to the economic recovery in Western countries. The most important insight we can gain from this response to the economic depression is the fact that the plantation rubber producers were well organised and were able to have a considerable influence on their governments.

Whereas the developments in the rubber sector in response to the economic crisis have been well-documented and well-discussed in the historiography, the palm oil sector has gained much less attention. A striking difference can be seen in the Indonesian exports of the two products. Whereas rubber exports stagnated even before the implementation of the IRRA in 1934, palm oil and kernel exports continued on a trajectory of spectacular growth. Palm oil exports grew during the first few years of the depression due to the fact that it takes four years for the palm tree to start bearing fruit and a few more years to reach maximum production. The growth up to 1934 and even thereafter can partly be explained by this delay. But this is only a partial explanation because we have seen in figure 3.1 that the total plantation size quickly started increasing after the early 1930s. Planters continued to expand their production despite the low prices.

The palm oil sector did suffer under the economic downturn. Figure 5.2 shows that prices of palm oil dropped by more than two thirds between 1929 and 1934. Although prices for Sumatran palm oil were likely somewhat higher than depicted here, because the palm oil traded in Liverpool was mostly of a West-African origin. This product had a higher free fatty acid content and – therefore – a lower price than the Indonesian variant.[135]

[134] Barker, *Rubber: History, Production, and Manufacture*, 24-27.
[135] Redecker, *Palm-oil industry of Sumatra and West Africa*, 9.

Figure 5.2: the prices of 1 kg palm oil (black) and palm kernels (grey) in Liverpool, converted to Dutch guilders.[136] Note that the real prices of Sumatran palm oil were likely higher due to its superior quality. Source: Frank Fehr & Company, *Review of the oilseed, oil and oil cake markets for 1936* (London 1937) 47, 58.

While the response of palm oil producers did not result in a high-profile agreement, they did convene to form an agreement that set several terms in 1934. This 'Agreement respecting the sale of Sumatra and Malaya palm oil' was aimed at coordinating the sale of the palm oil by the largest producers in East Sumatra and Malaya. It set several terms, such as the central gathering of information on the sale of palm oil, coordinated and administrated by the HVA, and the right of priority for Malayan producers to sell in British territories – because they did not have to pay a tariff. The most interesting clause that can be found in the agreement is the one that sets a minimum price for the sale of palm oil. Only if a majority of producers voted to sell below the minimum, this could be changed. For the year 1934, palm oil was not to be sold under 6 guilders per 100 kilogrammes on a c.i.f. basis. As we can see in figure 5.2, however, the prices in Liverpool never reached this level (6 cents per kilogramme).[137]

[136] The exchange rate remained stable at £1 = 12 fl. until 1931. The British pound depreciated in the years after. See: Edvinsson, 'Historical Currency Converter'.
[137] NA, 2.20.01 Inventaris van het archief van de Nederlandsche Handel-Maatschappij (NHM), inv. no. 9334 stukken betreffende de tussen de NHM en andere cultuurmaatschappijen gesloten pool-overeenkomst inzake de verkoop van Sumatraanse en uit Maleisië afkomstige palmolie, 'Agreement respecting the sale of Sumatra and Malaya palm'.

So, we see a different reaction from the palm oil industry, a more restrained form of sector coordination, than from the rubber industry in the year 1934. Nonetheless, we have seen that the rubber plantation industry suffered more under the economic depression than the palm oil industry; prices plummeted at a similar pace between 1929 and 1934, but exports of palm oil skyrocketed compared to the stagnating rubber exports. One of the reasons for this difference was the competition of smallholder rubber production and the absence of such smallholder production in the case of palm oil. Whereas the plantation rubber exports stagnated during the crisis years, the total Indonesian rubber saw a significant increase between 1932 and 1934.[138] The share of exports that went to Singapore was primarily responsible for this increase and it was mostly smallholder rubber from the Indonesian outer provinces that was traded through here.[139] However, the rise of these smallholder exports was only short-lived and not large enough to explain all of the difference between the plantation rubber and palm oil exports.

Another explanation for the stagnation of the Indonesian rubber export is the fact that it served a different market. American production of motor cars and trucks plummeted from 5,6 million in 1929 to 1,4 million in 1932.[140] Automobiles had become more accessible to the general public in the course of the 1920s, but they were still a luxury item. It was no wonder that when the economic depression hit, the demand for these luxuries fell drastically. The soap market, which was responsible for the bulk of American demand for palm oil, did not see such a drastic fall in production. The total American consumption of fats and oils for the production of soap only fell by roughly 12 per cent.[141] In addition, the rapid increase of Indonesian palm oil exports after 1934 can be linked to droughts in the American Midwest, which caused livestock to perish and the production of animal fats to decrease. Consequently, American soap manufacturers had to turn to other sources of fat, such as palm oil.[142] The steady rise of the palm kernel exports throughout the economic depression – which was even somewhat more impressive than the rise of palm oil – can be linked to the European margarine industry. German imports from Indonesia increased during the crisis years and are reflected in a greater dependence on imported vegetable fats. An increased use of palm kernel in the production of

[138] Centraal Kantoor voor de Statistiek van het department van Economische zaken, *Indisch verslag II. Statistisch jaaroverzicht van Nederlandsch-Indië over het jaar 1930-1939* (Jakarta 1931-1940).
[139] Huff, *The Economic Growth of Singapore*, 194-195.
[140] National Automobile Chamber of Commerce, *Automobile Facts and Figures. 1934 Edition* (New York 1934) 5.
[141] United States Department of Agriculture, *The Fats and Oils Situation* (Washington 1939) 21-22. Retrieved from: https://babel.hathitrust.org/cgi/pt?id=uiug.30112107856285&view=1up&seq=515 [Accessed on: 16 November 2020].
[142] A. Kozlik and P. Diebold, 'The Demand for Fats and Oils in the Soap Industry', *Research Bulletin 311* (1943) 420-488: 474.

Danish margarine is likely the reason why exports to Denmark increased after 1930, because the overall consumption of margarine in the country actually dropped during the depression years.[143]

5.4 Conclusion

As we have seen, the downstream sections of the value chains for rubber and palm oil strongly differ. Whereas rubber was responsible for the entire tyre market, palm oil and palm kernels were competing with many other oils and fats to be used in soap and margarine production. Despite the similarities that the two products have shown on a plantation level, these differences were characteristic for both the development of the value chain as well as their reaction to the economic crisis of the 1930s.

[143] 'Boter en margarine', *Nederlandsch Landbouwweekblad* 5 (1935) 5.

6 A value chain of palm oil and rubber

This chapter will reconstruct the value chain of palm oil and rubber from Colonial Indonesia. In the previous chapters, the outlines of the value chains have already been sketched. These chapters have shown the different stages of the value chain, as well as their dynamics and organisation. Here, I will attempt to synthesise this information into one intuitive visualisation of the value chain. Before we move to the chains depicted in figures 6.1 and 6.2, we need to clarify two things. First, there is the fact that these visualisations are primarily based on one year: 1928. Because reconstructing this value chains is a rather laborious exercise, it is impossible to do this for multiple years within the scope of this thesis. The year 1928 is primarily chosen for reasons of data availability, as it is relatively well-documented. The year 1928 is just prior to the economic depression and plummeting prices of the 1930s, but still featured high rubber prices due to the rubber boom of the mid-1920s. In addition, palm oil plantings were still relatively young at this time and yields per hectare only kept on rising in the years thereafter. The second clarification concerns what these visualisations exactly represent. Figures 6.1 and 6.2 show the various costs of producing a finalised product. While these costs do give us an indication of how much value was added at which stage in the product, they are not the same. Kaplinsky and Morris argue that the difference between costs and value arises from production or chain inefficiencies. An example of this is using a large space for inventory: it does not add any value to the product but it does require a firm to incur costs.[144] Unfortunately, we do not have the data accurately distinguish the added value from the costs. However, another question is also important in the context of this exercise. If we define value as the worth of something at market prices, we must ask whether the costs incurred are an accurate reflection of these market prices. In the case of the palm oil and rubber plantations of East Sumatra, we may ask this question for the costs of coolie wages, for example. Since coolie labour was mostly coerced, the value added will likely exceed the costs. In other words, coolie wages would likely have been higher had they been set in a perfect market of demand and supply. Again, however, we lack the data needed to confirm this suspicion. Therefore, we will have to interpret the costs given in figures 6.1 and 6.2 as mere indications of the added value.

[144] Kaplinsky and Morris, *Handbook for Value Chain Research*, 84-85.

6.1 A value chain of rubber

The value chain of rubber, which can be seen in figure 6.1, gives us valuable insights into the division of costs and profits within a single kilogramme of rubber. It provides the opportunity to compare the role of the different factors of production analysed in chapter 3 in the total costs of a rubber tyre. One kilogramme of rubber tyre was sold in 1928 in the United States at the wholesale price of 5 Dutch guilders equivalent. Most of the value – about two thirds – was added in the process of turning rubber sheets into finished rubber tyres. The share of the plantation company in the price composition was less than a third of the final selling price. Of this third, the production costs made up just over half the costs. The profits after taxes were about 60 guilder cents per kilogramme. These profits are high because the demand for rubber in 1928 was still high due to the rubber boom. These profits strongly diminished in the following years.

As has been mentioned above, the data that is available on the values added and the price composition of products at this time is limited. The majority of the data come from the company reports of the RCMA.[145] The transportation costs are derived from the archives of the DSM.[146] The data on the rubber tyre production costs in the United States are derived from contemporary government reports.[147] Although this value chain case study is mostly based on the data of the RCMA, a lot of estimations had to be made. Coolie wages, for example, are estimated on the basis of 0,6 coolies working per hectare, a yield per hectare of 400 kilogrammes, and a daily coolie wage of 0,65 guilders. For the exact calculations, please refer to appendix A.

Figure 6.1 gives a valuable insight of where and how much costs are made, but also to whom the benefits flow. As we can see, the share of the costs that are dedicated to land rents are minute. We have already concluded in chapter 3 that the remunerations that were given for the use of land were marginal, but placing it in the context of the price of the final product confirms and emphasises this fact. The coolie wages, on the other hand, made up a significant share of the production costs of a kg of sheet rubber – almost half in fact. This means that the labour intensity in the production of plantation rubber was relatively high – compared to the capital intensity at least.

[145] LUL, SC, Rubber Cultuur Maatschappij 'Amsterdam' N.V., Verslag over het boekjaar 1928.
[146] NA, 2.20.11, inv. no. 154 and 170.
[147] Barker, *Rubber Industry of the United States*, 27, 33.

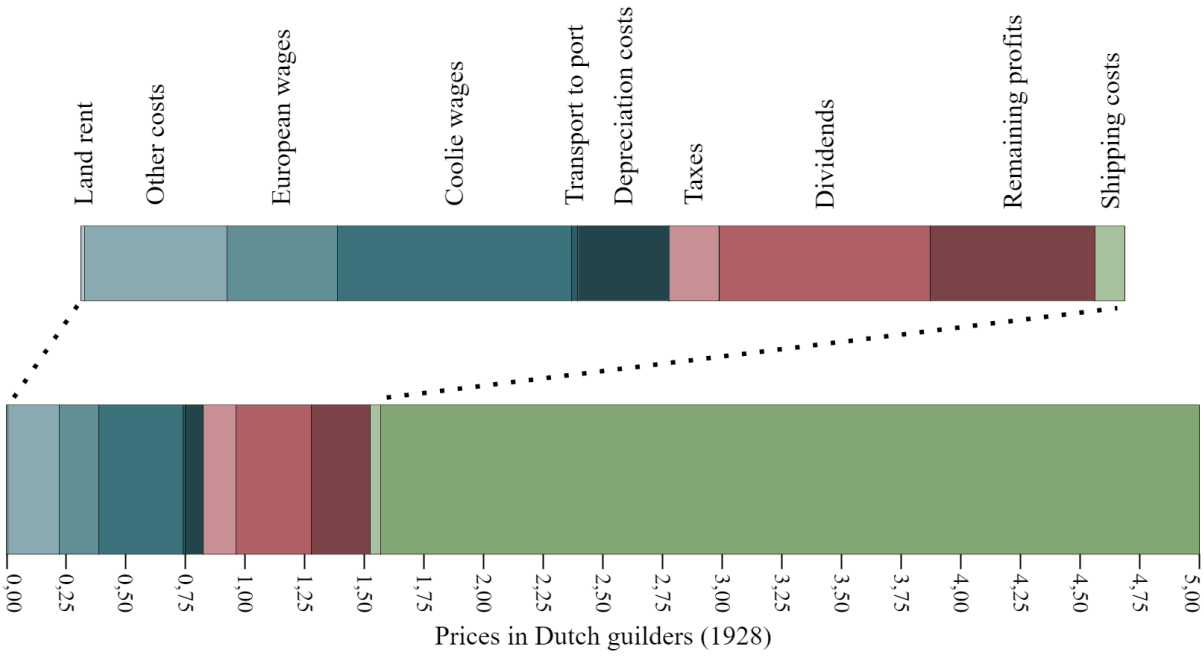

Figure 6.1: the price composition of one kilogramme of a finished rubber tyre in 1928. Data is mostly based on the RCMA. The colours shaded in blue are the production costs of rubber on the plantation. Other costs might have entailed other production costs as well as overhead costs. The red shades indicate the profits that the plantation company made (taxes are profit taxes). Shipping costs were usually borne by the tyre manufacturer, which has been shaded green. The unnamed green costs (which comprises two-thirds of the total costs) include – among other things – the cost of production of a tyre, profits, and overhead costs of the tyre manufacturer. Source: made by author, data taken from various sources.[148]

The share of coolie wages in the total production costs cannot be considered on its own, however, and needs to be compared to the other components. The share of European wages was significantly smaller, but still almost half that of coolie wages. This is significant when we consider that the RCMA in 1928 employed 150 coolies for every European employee. In

[148] Sources used: LUL, SC, RCMA, Verslag over het boekjaar 1928; NA, 2.20.11, inv. no. 154 and 170; Barker, *Rubber Industry of the United States*, 27, 33; United States Tariff Comission, *Summaries of Tariff Information. Volume 16* (Washington 1950) 123. Retrieved from: https://babel.hathitrust.org/cgi/pt?id=mdp.39015038672393&view=1up&seq=139 [Accessed on 25 november 2020]; Departement van Koloniën, *Rapport van het werkcomité voor het rubbervraagstuk* (The Hague 1931) 47. Retrieved from: https://www.delpher.nl/nl/boeken/view?query=rubbercultuur&coll=boeken&identifier=MMKB05:000037806:00051 [Accessed on 25 november 2020];

addition, the share of dividend pay-outs in the total costs was almost equally high as the coolie wages. The dividend rate was 15 per cent in 1928 and would decrease in the following years, but it had reached 25 per cent during the heydays of the rubber boom.[149] The coolie wages, as we can see in table 3.2, were actually lower the years preceding 1928.

What figure 6.1 convincingly shows us is the disproportionality of the remunerations. European employees and shareholders receive large pay-outs while the income of coolie labourers remains meagre. Little value flows to the Indonesians: transportation is arranged by Western companies, depreciation costs are used to finance capital goods that are provided by Westerners, and the remaining profits are reinvested into the plantation company – to be disproportionally distributed at a later time. In addition, this figure also shows us that the majority of the value creation in the rubber chain lay abroad, in the US. Indonesia was only responsible for a minor share of the cost of a rubber tyre.

6.2 A value chain of palm oil

The available data on palm oil-producing companies is much scarcer than that on rubber producing companies. In many larger rubber plantation companies, such as the RCMA, palm oil is produced on a small scale but reports only give limited information on its role in the company operations. There were several smaller companies that (almost) exclusively focussed on the cultivation of the oil palm, but their company reports are very brief or hard to come by. The Tanah Itam Uluh plantation company did publish quite detailed company reports, but its operations encountered numerous problems in 1928. Not only were their trees in a deplorable state, but it also stopped processing the palm fruit into palm oil by itself during that year.[150] Consequently, the value chain below will be reconstructed from the data of three companies: Tanah Itam Uluh, RCMA, and the Deli Olieslagerij – a plantation firm that solely focussed on oil palms.

The value chain of a kilogramme of palm oil is depicted in figure 6.2. One kilogramme of palm oil, together with several other resources, can be processed into 1,45 kilogrammes of yellow soap. Consequently, 0,468 guilders is the price at which this amount of this soap was sold in the US in 1928. Due to the difficulty of obtaining separated information and for the

[149] LUL, SC, RCMA, Verslag over het boekjaar 1928.
[150] LUL, SC, Tanah Itam Uluh, Verslag over het boekjaar 1928.

sake of simplicity in the visualisation and the estimation, the palm kernel yield has been included in the palm kernel yield. Palm kernel yields were generally a fifth of the palm oil yield, but were sold at a lower price. Consequently, the revenues are slightly inflated in figure 6.2 and the 'remaining profits' were – in reality – somewhat lower. As was the case with the value chain of rubber, many costs have been estimated. However, the information on palm oil is somewhat more detailed. For a more detailed overview of what these costs exactly entail and how they are estimated and calculated, please refer to appendix A.

As we can see in figure 6.2, the value chain of palm oil looks very different to the one of rubber. The production costs on the plantation compose well over half of the total costs, compared to barely a fifth in the case of rubber. The share of European wages is – just like in the value chain of rubber – about half that of the coolie wages

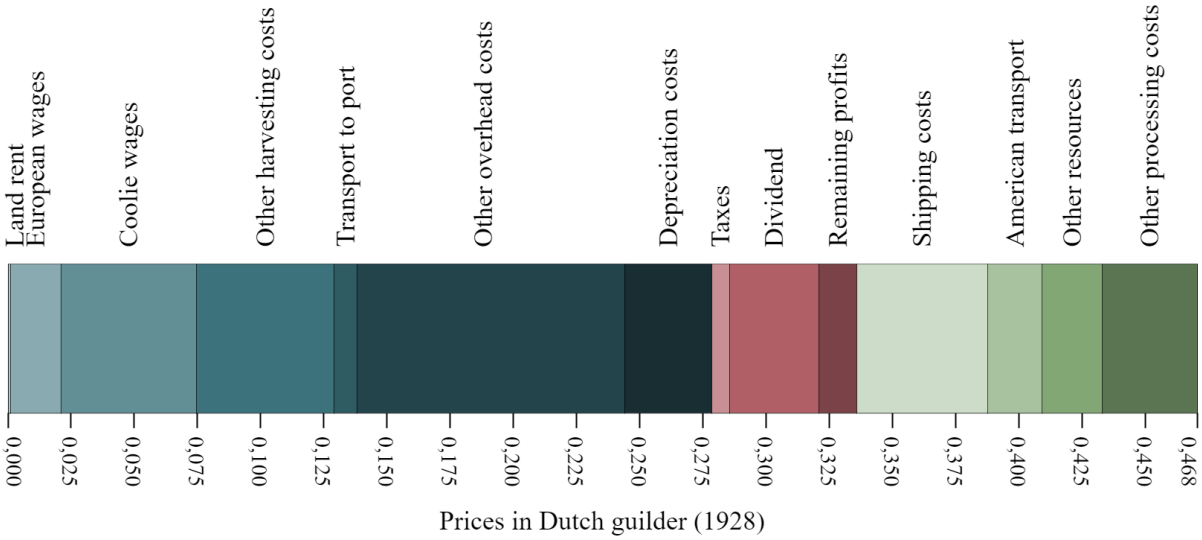

Figure 6.2: the price composition of 1,45 kg of yellow soap, the amount which requires 1 kg of palm oil input, in 1928. Data is based on a combination of reports from the Tanah Itam Uluh plantation, the RCMA, and the Deli Olieslagerij. Costs in shades of blue are the production costs on the plantation. Red shades represent the gross profits of the plantation. Shades of green are costs usually incurred by the importing party. Note that the costs for American transport represent the transport from New York to Chicago and are therefore not representative for soap sales on the American east coast. Source: made by author, data taken from various sources.[151]

[151] LUL, SC, N.V. Oliepalmen cultuurmaatschappij "Tanah Itam Uluh", Verslag over het boekjaar 1927, 1928, 1934; Leiden University Library, SC, Rubber Cultuur Maatschappij 'Amsterdam' N.V., Verslag over het boekjaar 1928; LUL, SC, Deli Olieslagerij Maatschappij. Rapport du conseil d'administration 1928; NA, 2.20.11, inv. no. 170, Aan den Voorzitter der Commissie van Bijstand in het belang van het Beheer der Haven

. It is more interesting, however, to see that the coolie wages – and European wages for that matter – contribute a much smaller share to the production costs of a kilogramme of palm oil than they do to a kilogramme of rubber. This can be linked to the higher capital intensiveness of the production of palm oil, which has been discussed in chapters 2 and 3. A plot of palm oil plantation requires fewer labourers and has a higher yield in terms of kilogrammes than a plot of rubber plantation does. Another interesting aspect of this value chain is the fact that the profit margins are much lower than in the case of rubber. The gross profits for the plantation are only about 5 cents and those of the soap manufacturer are even lower; likely less than half of the 'Other processing costs'. Dividends are – as a result – also much lower. The dividend rate in this value chain is only five per cent and is based on the Deli Olieslagerij.

As we have seen in the previous chapter, the prices of palm oil never reached the great heights that rubber prices did reach. It is no wonder, then, that the profit margins for palm oil were much more meagre. In addition, most of the planted trees were still relatively young in 1928. The Deli Olieslagerij reached a relatively high yield of 1800 kilogrammes in 1928, but most other plantations yielded around 1300 kilogrammes of palm oil and palm kernels that year. By the end of the 1930s, however, average yields in East Sumatra reached almost 4000 kilogrammes, which drove down the average costs per produced kilogramme of oil.[152]

6.3 Concluding remarks

The most marked difference between the value chains of palm oil and rubber can be found in the distribution of costs over the plantations and the additional processing in the West. The production of rubber sheets on the plantation are only a fifth of the total costs of producing a rubber tyre, whereas the production of palm oil on the plantations comprises about two thirds of the total costs of 1,45 kilogramme of soap. Consequently, the production of palm oil brings a significant share of the value addition to the Indonesian economy – to the Western enclave, at least. The production of rubber sees only a small share of the value addition taking place in

Belawan, 12 April 1924; United States Tariff Commission, *Production and transportation costs of certain oils*, 104; Kozlik and Diebold, 'The Demand for Fats and Oils', 456.

[152] A.V.R.O.S., *Statistiek van aanplant, produceerenden aanplant en productie van de groote cultures van Sumatra's Oostkust, Atjeh en Tapanoeli 1923-1941* (Medan 1923-1941).

Indonesia. Due to a lack of data, we are – unfortunately – unable to make the same comparison for the profits earned on both sides of the ocean. However, it is very likely that the profits earned over the production of palm oil in Indonesia were higher than those earned over the production of soap in the US. In the case of rubber, plantation profits were very high due to the rubber boom, which means that these might still have been higher than the profits earned over the production of a single tyre.

These value chains changed significantly over the years. For rubber, 1928 was still a boom year and featured high prices. Profits decreased in 1929 and plummeted in the years thereafter. The production costs, such as coolie wages and European wages, were also significantly lowered in order to deal with the decreasing revenues. It is likely that the share of plantation costs in the total costs of a tyre decreased, but this was mostly due to the decreasing profits. As we have seen in chapter 5, the demand for cars and rubber tyres also decreased significantly and likely pushed manufacturers to keep their costs low. The situation was different for palm oil. As we have seen in chapter 5, palm oil prices plummeted at a similar rate as rubber prices after 1929. However, Indonesian production and export strongly increased over these years, despite the economic crisis. Plantation companies had to lower their costs, but could benefit from the higher yields they obtained from their aging trees. The share of the plantation company in the total costs of a bar of soap likely decreased due to these austerity measures and the increased efficiency.

7. Conclusion

The aim of this thesis is twofold: to map the organisation of the value chains of palm oil and rubber on the one hand, and to analyse the value distribution, the corresponding remunerations, and the effects on the Indonesian economy on the other hand. As we have seen, the value chains of rubber and palm oil were directly and firmly connected to the rise of Western industries. Both rubber and palm oil production in East Sumatra were highly dependent on the growth of the American market, showing that the production of these materials was firmly integrated into the global market. The linkages to different Western industries were also the primary motor for some of the differences that emerged in the value chain over the 1920s and 1930s. Whereas the rubber plantations *enabled* the mass production and expansion of the tyre industry in the US and Europe, palm oil was one of the many sources of raw materials for the soap and margarine industries. This fact explains why American tyre manufacturers integrated backwards into the plantation industry and why the soap or margarine manufacturers did not. The effect of the economic depression was also largely dictated by the characteristics of the markets that rubber and palm oil served: whereas the sale of automobiles – a product of relative luxury – plummeted, the sale of soap and margarine – which were basic necessities – did not suffer nearly as much. These findings show the importance of analysing the plantations of rubber and palm oil from the perspective of their value chain. While they shared numerous similarities at the production level, the rest of their global value chain was completely different.

The second aim of this thesis is mapping the distribution of value creation and the corresponding remunerations, as well as placing these findings in the context of the Indonesian economy. Whereas the remunerations of invested capital and European wages were relatively high – although the dividend rate was lower in the case of palm oil – wages for coolie labourers made up only a relatively limited share of the total price of a kilogramme of either of the products. In addition, we see striking differences in the distribution of value along the chains of rubber and palm oil. The production of rubber made up only a marginal share of the total price of a kilogramme of finished rubber tyre. Most of the value creation in the value chain of rubber took place outside of Indonesia, in the US. In the soap value chain, the situations was the other way around: the majority of the value creation took place on the plantation in Indonesia, rather than in the US.

The rubber and palm oil plantation industries had various different effects on the Indonesian economy. We can argue that the effect of palm oil on the Indonesian economy was

more benevolent than the effect of rubber, simply because a greater share of the value creation took place in Indonesia. The production of soap resulted in more investments and economic activity in Indonesia than in the West. This was the other way around for the production of rubber tyres. On the other hand, if we interpret the findings through the lens of the Prebisch-Singer hypothesis, the effects of palm oil production are much more limited. Palm oil was a resource used for foodstuffs and basic consumer goods, which means that the price elasticity of demand was low – an increase in incomes would result in a modest increase in demand. Automobiles were an industrial luxury good and the demand for rubber was therefore more price elastic than that of palm oil. The effect of palm oil on the Indonesian terms of trade would therefore be more negative than that of rubber. However, this effect might have been offset by a difference in the growth of wages. Western wages generally rose faster than wages in the colonial and peripheral economies. This means that in the case of rubber tyres, the large share of the value creation that took place in the US grew quicker than the share that took place in Indonesia. The price of a rubber tyre therefore rose relative to the price of raw rubber, which pushed the Indonesian terms of trade down.[153] While this effect also had an influence on the value distribution in the palm oil chain, its effect on the terms of trade was more limited because most of the value creation took place in Indonesia.

Another way to interpret these findings is through the lens of the theory of the *dual economy*. The positive effects that an enclave could have on the traditional economy, as outlined by Lewis, were limited.[154] As we have seen in chapter 3, the share of income of coolie labourers that went to savings or their families in Java was negligible. Even though relatively sizeable shares of the value added went to employing coolie labourers, its effect on the Indonesian economy was small. An additional negative effect of the export enclave was that if exports were large enough, they raised the exchange rate and weakened the export position of the rest of the economy.[155] The most decisive positive effect that the plantation enclave had on the Indonesian economy was in the form of a backward linkage. The export economy generated the necessity for infrastructural improvements such as railroads, road networks, and ocean ports. While the effects of these improvements are hard to quantify, they undoubtedly left a positive economic impact on the region of East Sumatra. Another positive effect were the initiatives of Western companies of starting manufacturing plants in the archipelago. This was

[153] H. Bloch and D. Sapsford, 'Whither the terms of trade? An elaboration of the Prebisch-Singer hypothesis', *Cambridge Journal of Economics* 24 (2000) 461-481: 475-478.
[154] Lewis, 'Development and Distribution', 26-30.
[155] A.E. Booth, *Colonial Legacies: Economic and Social Development in East and Southeast Asia* (Honolulu 2007) 11-12.

a spillover effect of the large-scale cultivation of palm oil and rubber. Goodyear, for example, founded a rubber tyre plant on Java in 1935 because it was close to the rubber plantations and could serve the East Asian automobile market from there.[156]

The findings of this thesis are also relevant to the 'colonial drain' debate. The value chain reconstruction presented in chapter 6 allows us to quantify the outflow of dividends and profits from Indonesia to Europe and North America at a company level. Dividends and European wages formed a sizeable share of the price composition of both rubber and palm oil or kernels, although the dividends in the palm oil value chain were decisively lower. Many other costs, such as overhead and transport costs, were paid to other Western firms or spent on Western imports, meaning profits from these activities did not end up in the Indonesian economy either. While the quantifiable contributions of both palm oil and rubber production to the Indonesian economy – primarily in the form of coolie wages and land rent – were small, they made up a significantly larger share of the palm oil value chain than of the rubber value chain. This is simply a result of the fact that most of the value creation in the rubber chain took place outside Indonesia. Despite this difference, however, neither industry was responsible for a sizeable cash flow towards the Indonesian economy. However, this does not automatically mean the rubber and palm oil industries were a drain on the Indonesian economy. Van der Eng has a point in questioning whether these levels of production and trade would have been possible without the foreign investments in the East Sumatran plantation economy.[157] It seems unlikely that either the rubber plantation industry or the palm oil plantation industry could have grown to the size they were without foreign investments from the West. This especially true for the palm oil plantations, which were relatively capital intensive.

In the end, the era of large rubber and palm oil plantations of Western ownership was relatively short-lived. The Japanese occupation in 1942 was the first of a series of shocks for the Western plantation companies. It was followed by the war of Independence in the late 1940s and the eventual Indonesian nationalisation of Dutch companies at the end of the 1950s. During this time, many rubber estates went bankrupt or switched to palm oil production due to fluctuating prices and the advent of synthetic rubber. Smallholder rubber production became

[156] C. Rothe, 'Berichten van de Afdeeling Handelsmuseum van de Koninklijke Vereniging ,,Koloniaal Instituut". No. 141', *De Indische Mercuur. Weekblad voor Handel, Landbouw, Nijverheid en Mijnwezen in Nederlandsch Oost- en West-Indië* 62.52 (1939) 693-696: 694.
[157] Van der Eng, 'The 'Colonial Drain' from Indonesia', 32-33.

the dominant form of production after the Second World War. Large palm oil estates remained dominant in their sector until the late twentieth century.[158]

[158] J-F. Bissonnette and R. De Koninck, 'The return of the plantation? Historical and contemporary trends in the relation between plantations and smallholdings in Southeast Asia', *The Journal of Peasant Studies* 44.4 (2017) 918-938: 922-929.

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9 Appendix A: calculating the price components of a value chain

Below, the components of the value chains for rubber and palm oil, depicted in figures 6.1 and 6.2 respectively, will be explained. The company reports often do not give an overview of the different productions costs. Therefore, these have to be calculated and estimated. This appendix will show how these estimations have been made, why they have been calculated in this way, and what the limitations of those methods are.

9.1 Rubber (figure 6.1)

Land rent

The land rent (also known as *hasil tanah*) is calculated on the basis of a price of 1,5 guilders per hectare. As we have seen in chapter 3, the land rent often ranged somewhere between 1 and 1,5 guilders, but could reach up to 3 guilder per hectare. Hence, 1,5 guilders is estimated as an average price for the yearly land rent. In order to calculate how much land rent is paid per kilogramme of produced rubber, we divide it by the annual harvest per hectare in 1928, which is 400 kilogrammes.[159] This comes down to almost 0,004 guilders per kilogramme of rubber.

Other costs

Other costs entail costs that cannot be further identified through the company records and might include various overhead costs as well as additional production costs. It is calculated by subtracting all the separate identified costs from the total production costs.

European wages

The European wages are composed of two parts, the actual wages and the bonuses (*tantièmes*). The wages are calculated follows. The monthly wages of European employees ranged from 350 to 675 guilders.[160] The monthly sum of 512,5 guilders is taken as the average wage. This means that the total annual wages of all 139 employees together are 850,680 guilders. Since the RCMA was also active in some palm oil plantings and some small tea and coffee plantings, we cannot attribute all these wages to the production of rubber. Since the share of the revenue

[159] LUL, digital collections, A.V.R.O.S., *Statistiek van aanplant, produceerenden aanplant en productie van de groote cultures van Sumatra's Oostkust, Atjeh en Tapanoeli 1928.*
[160] T. Kian-wie, *Plantation Agriculture*, 101.

earned by selling rubber is 83 per cent of the total revenue earned in 1928, the total wages will be multiplied by 0,83. Then, this number will be divided by the total production of rubber over the same year, in order to get the costs of European employees per kilogramme of rubber. These costs amount to 0,095 guilders.

The bonuses have to be calculated in a much more roundabout way. The RCMA reports mention that the Netherlands Indies tax and the bonuses amount to 0,1754 guilders per kilogramme of rubber. This means that we can subtract the tax per kilogramme of rubber (which is 0,075 guilders, calculated below) which leaves 0,10 guilders. This means that the combined remunerations for European employees come down to 0,195 guilders.

Coolie wages

The coolie wages also have to be estimated in a rather roundabout manner, because the RCMA makes no specific mention of them in their reports. The daily costs of employing a coolie are taken to be 65 cents per day, slightly lower than the 1928 costs for a male labourer given in chapter 3, but higher than the wages for female labourers. This comes down to a monthly wage of about 19,5 guilders, which turns into an annual wage of about 234 guilders. We have also determined in chapter 3 that the average number of labourers to work one hectare of rubber plantation was 0,6 and that the yield per hectare was about 400 kilogrammes of rubber. This means that a single coolie is responsible for harvesting about 666 kilogrammes annually. So, we can divide the annual wage of a coolie labourer by the annual yield, which gives us the employment cost of 0,35 guilders per kilogramme.

Transport to port

The costs of transporting the rubber to the port of Belawan is calculated on the basis of the archives of the DSM. These estimations are based on a total freight load of 1000 kilogrammes and a distance of 100 kilometres. The base freight rate per metric tonne is 1,5 guilders, which means this is 0,0015 guilders per kilogramme. The transportation rate is 0,08 guilders per metric tonne per kilometre for rubber. We must multiply this by 100 for the distance and then divide by 1000 to get the rate per kilogramme. This brings us to a rate of 0,0095 guilders per kilogramme.

Depreciation costs

These costs reflect the depreciation of the value of the investments. The yearly depreciation rate is taken to be 5 per cent.[161] The RCMA's reports reveal that the total investment per hectare amounts to 1083 guilders.[162] If we take 5 per cent of this and divide it by 400 (the rubber yield per hectare) we come to a depreciation cost of 0,1375 guilders.

Taxes

The tax rate on profits in the colonial Indonesia was 12,5 per cent.[163] The share of the tax in the total costs of a single kilogramme of rubber is calculated as follows. First, the gross profits over one kilogramme are calculated. The necessary data can be found in the RCMA's report of 1929 (the reports of 1928 does not mention the production costs excluding bonuses and taxes, the report of 1929 does mention this for the previous year). The revenue over one kilogramme is 1,52 guilders, whereas the production costs are 0,78 guilders. When we also subtract the depreciation costs from the gross profits, we are left with 0,6021 guilders.[164] We then multiply this number by 0,125 (the tax rate of 12,5 per cent) to come to 0,0753 worth of profit taxes.

Dividend

The share of dividend is calculated by taking the total equity value of the RCMA and multiplying that by the dividend rate of 15 per cent. We then need to add 3 per cent to this amount to account for the dividend tax. Once we have done that, we multiply this amount by 0,83, which represents the share of rubber in all activities of the RCMA, and divide it by the total rubber production of 1928. This means that we make the following calculation: 18.433.000 * 0,15 * 1,03 * 0,83 / 7.461.521 = 0,3168. So, dividend payments and their taxes amount to approximately 0,3168 guilders.[165]

Remaining profits

[161] Departement van Koloniën, *Rapport van het werkcomité voor het rubbervraagstuk* (The Hague 1931) 47. Retrieved from: https://www.delpher.nl/nl/boeken/view?query=rubbercultuur&coll=boeken&identifier=MMKB05:000037806:00051 [Accessed on 25 november 2020]
[162] LUL, SC, RCMA Verslag over het boekjaar 1928.
[163] Departement van Koloniën, *Rapport van het werkcomité voor het rubbervraagstuk* (The Hague 1931) 47. Retrieved from: https://www.delpher.nl/nl/boeken/view?query=rubbercultuur&coll=boeken&identifier=MMKB05:000037806:00051 [Accessed on 25 november 2020]
[164] LUL, SC, RCMA Verslag over het boekjaar 1928.
[165] Ibidem.

The remaining profits are calculated by simply subtracting all costs explained above from the revenue per kilogramme of rubber. This means that from the 1,5218 guilders, we subtract a total of 1,2744, to come to a sum of 0,2474 guilders.[166]

Wholesale price of one kilogramme of finished rubber tyre in the United States

The wholesale price of one kilogramme of finished rubber tyre is inferred from contemporary US reports on the tyre industry. One report mentioned that the price of a so-called balloon tyre in 1928 was 11,78 US dollars. The same source also gives us the information to infer the weight of a single tyre, it mentions that a 1936 model car used 103,8 pounds of rubber, half of which was used for the tyres.[167] This means that a single tyre uses 103,8 / 2 / 4 = 12,98 pounds of rubber, equal to 5,89 kilogrammes. We also know that a single balloon tyre cost 11,78 dollars, which was equal to (11,78 * 2,49 =) 29,34 Dutch guilders.[168] Now we know how much a single tyre cost and how much rubber it contained, we can simply divide 29,34 by 5,89 to come to a cost of 4,9944 guilders per kilogramme of rubber tyre.

9.2 Palm oil (figure 6.2)

Because the value chains of palm oil and palm kernel oil cannot easily be split – after all, they come from the same fruit and many of the plantation costs are shared – the palm kernels are included in the palm oil value chain. Since the palm kernel yield is only a fraction of the oil yield, this leads to a minor (though not-negligible) distortion. As has been explained in chapter 6, the data for palm oil is based on a combination of company reports from the Tanah Itam Uluh plantation, the RCMA, and the Deli Olieslagerij. There is a considerable amount of data available for the first plantation company. However, this company did not process the palm fruit into palm oil for many years and is therefore not representative for the sector. Consequently, its data will be combined with that of the other two companies, who owned oil palm plantations, to create a more representative overview of palm oil production.

Land rent

[166] LUL, SC, RCMA Verslag over het boekjaar 1928.
[167] Barker, *Rubber industry of the United States*, 27, 33.
[168] Exchange rate taken from: R. Edvinsson, 'Historical currency converter'.

The land rent is calculated in the same way as in the case of rubber. A land rent of 1,5 guilders per hectare is divided by the yield per ha (1800 kg) which gives us the sum of 0,0008 guilders per kilogramme of produced palm oil. The yield per hectare is based on the production of the Deli Olieslagerij and is relatively high for the year 1928.[169] This is because the Olieslagerij had relatively old oil palms, which gave higher yields.

European wages

The European wages are based on a monthly wage of 512,5 guilders. On the Tanah Itam Uluh plantation, there were four Europeans employed to oversee 704 hectares of planted land.[170] This means that we can multiply the monthly wage by four and by twelve to get the total annual expenses on European wages (24.600). This can then be divided by 704 and by 1800, which gives us a the sum of 0,0194 guilders per kilogramme. We must note that the majority of the 704 hectares were not in production yet in 1928. There is, however, no rise at all in the number of European employees on Tanah Itam Uluh during the 1930s, when the productive hectares have increased significantly.

Coolie wages

Coolie wages are calculated on the basis of a pay of 65 cents per day and 0,4 coolies working per hectare of palm oil. This means that a coolie brings in 1800/0,4 = 4500 kilogrammes of palm oil annually. This means that if we divide the annual wage of 234 guilders by 4500, we get the cost of 0,052 guilders per kilogramme of palm oil.

Remaining production costs

In order to calculate the remaining harvesting costs, which comprise things such as intra-plantation transport and the usage of machinery for processing, we have to refer to the Tanah Itam Uluh report of 1927. The plantation's factory stopped processing palm fruits during 1928 , the report of that year thus gives a skewed view of the production costs. Unfortunately, what these costs exactly comprise is not explained in that year, we can only infer on the basis of the report of 1934.[171] If we divide the harvesting and processing costs of 1927 by the production of that year, we get a cost of 0,094.[172] Coolie wages need to be subtracted from this, as they

[169] LUL, SC, Deli Olieslagerij Maatschappij. Rapport du conseil d'administration 1928.
[170] LUL, SC, Tanah Itam Uluh, Verslag over het boekjaar 1928.
[171] Ibidem, Verslag over het boekjaar 1934.
[172] Ibidem, Verslag over het boekjaar 1927.

have a separate category. In addition, we need to add the costs of maintaining one hectare of plantation – costs which are also mentioned in 1927 company report. Finally, when we subtract the land rent costs (which also have their separate category), we are left with 0,053 guilders per kilogramme.

Transport to port

The costs of transporting the rubber to the port of Belawan is calculated on the basis of the archives of the DSM. These estimations are based on a total freight load of 1000 kilogrammes and a distance of 100 kilometres. The base freight rate per metric tonne is 1,25 guilders, which means this is 0,0013 guilders per kilogramme. The transportation rate is 0,075 guilders per kilometre for palm oil. We must multiply this by 100 for the distance and again divide by 1000 to get the rate per kilogramme. If we add the base freight rate, we are left with 0,0088 guilders per kilogramme.

Remaining overhead

The company reports of the Tanah Itam Uluh also mention the overhead costs. Overhead costs include factors such as building and vehicle upkeep, health care for coolies, and subscription costs of the AVROS. If we take the 1927 overhead costs and divide them by the total production of that year, we come to 0,1221 guilders. These costs still include the wages of European employees, so if we subtract those we are left with 0,1027 guilders.

Depreciation costs

Depreciation costs are calculated on the assumption that one hectare of palm oil plantation requires approximately 1200 guilders investment, as was the case with the Deli Olieslagerij.[173] The Tanah Itam Uluh had even higher investment per hectare. If we take an average of 5 per cent as the annual depreciation of capital, then the depreciation costs per kilogramme are 0,0333 guilders.

Taxes

Taxes are calculated on the basis of the gross profits of a kilogramme of palm oil. Gross profits are calculated by subtracting the production costs from the revenue. Because neither the reports of the Tanah Itam Uluh plantation nor the reports of the Deli Olieslagerij mention the selling

[173] LUL, SC, Deli Olieslagerij Maatschappij. Rapport du conseil d'administration 1928.

price of their product, we need to take this information from the RCMA reports of 1928.[174] The RCMA sells one kilogramme of palm oil for 0,3258 guilders. The production costs – taken from the Tanah Itam Uluh reports of 1927 – amount to 0,2366 guilders and the depreciation costs were 0,0333 guilders. This means that the gross profit is approximately 0,0559 guilders. The profit tax, which comes to 12,5 per cent of the gross profit, is therefore 0,0070 guilders.

Dividend

The dividend is calculated on the basis of 1200 guilders invested capital per hectare and an 1800 kilogramme yield per hectare. The Deli Olieslagerij had a dividend rate of five per cent in the year 1928.[175] Therefore, the dividend per kilogramme palm oil is 1200 * 0,05 / 1800 = 0,0333. To this, we then need to add three percent dividend tax, which brings us to a total of 0,0343 guilders.

Remaining profits

The remaining profits entail the share of the profits that does not go to either taxes or dividend. Consequently, this is calculated by subtracting these two from the gross profits. We then come to the amount of 0,0367 guilders per kilogramme.

Shipping costs

Shipping costs are calculated on the basis of a report found in the archives of the DSM. This report analyses the difference in the cost of exporting rubber and palm oil from Belawan and the competing port of Telokniboeng. While the report only mentions the transport costs to Liverpool in the case of palm oil, it also reveals that there are almost no differences in costs between transporting rubber to the US and to Europe. Consequently, it is assumed here that these costs are largely similar for palm oil as well. The costs of exporting 1800 kilogrammes of palm oil from Belawan to Liverpool are 80 guilders for cargo costs, 6,75 guilders for 'expedition' costs, and 3,60 guilders for port costs.[176] If we divide this total by 1800, we come to a shipping cost of 0,0502 guilders per kilogramme.

American transport

[174] LUL, SC, RCMA, Verslag over het boekjaar 1928.
[175] LUL, SC, Deli Olieslagerij Maatschappij. Rapport du conseil d'administration 1928.
[176] NA, 2.20.11, inv. no. 170, Aan den Voorzitter der Commissie van Bijstand in het belang van het Beheer der Haven Belawan, 12 April 1924.

American transport costs entail the costs of transporting the palm oil within the United States. Since the location of the soap producers strongly differed, these costs might be much lower for some. These costs reflect the transportation costs from New York to Chicago. They are approximately 0,38 cents of the US dollar per pound of palm oil.[177] If we divide this by 0,45 to get the price per kilogramme and then multiply this by 0,12 (to get the price of 120 grams of caustic soda) and then by 2,5 (the exchange rate to guilders) we get a cost of 0,0209 guilders per kilogramme.

Other resources

Other resources encompass the other raw materials that are needed to produce a kilogramme of soap. In this case, it concerns caustic soda. There were likely other materials used in the production process too, which means the real share of 'other resources' is higher in reality. The production of 1,45 kg of soap (the amount for which 1 kilogramme of palm oil is needed) requires 120 grams of caustic soda, to be bought at 0,035 US dollar per pound. This means that we need to divide the price of $ 0,035 by 0,45 (to get the price per kg) and then multiply it by 2,5 (to get the price in guilders). We then come to the cost of 0,023 guilders per kilogramme.

Other processing costs

The processing costs come down to the remainder of the costs that are not accounted for on the side of the soap manufacturer. The price of 1,45 kilogrammes of soap – the quantity which requires 1 kilogramme of palm oil input – was approximately 0,4568 guilders.[178] This means that if we subtract all the costs that have been calculated and estimated above, we are left with 0,0367 guilders per kilogramme. These costs include the production costs of soap as well as all the overhead and profits of the soap manufacturer.

[177] United States Tariff Commission, *Production and transportation costs of certain oils*, 104.
[178] Kozlik and Diebold, 'The Demand for Fats and Oils', 456.