

LOW PRICES DRIVE NATURAL RUBBER PRODUCERS INTO POVERTY

An overview of sustainability issues and solutions in the rubber sector



Commissioned by

Fair Rubber Association, Cologne/London
Sustain, Burlington VT

Aidenvironment
Barentszplein 7
1013 NJ Amsterdam
The Netherlands
+ 31 (0)20 686 81 11
info@aidenvironment.org
www.aidenvironment.org

Aidenvironment is part of Stichting AERA,
registered at the Chamber of Commerce of
Amsterdam in the Netherlands,
Chamber of Commerce number 41208024

Contents

Executive Summary	5
Zusammenfassung	7
Introduction	9
1. Profile of the natural rubber sector	9
1.1 Natural rubber and its applications	9
1.2 Supply and demand	10
1.3 Price dynamics	12
1.4 Natural rubber value chain	12
2. Sustainability issues	13
2.1 Poverty among smallholders	14
2.2 Low wages and poor working conditions for rubber tappers	15
2.3 Deforestation and land conflicts as opposed to climate change mitigation	16
2.4 Commercial risks for the rubber industry	16
3. Addressing sustainability issues in rubber supply chains	17
3.1 The Fair Rubber Association model	17
3.2 Complementary actions in responsible rubber sourcing	20
References	23

Executive Summary

This study has been commissioned by the Fair Rubber Association (FRA) and one of its members, the natural condom producer Sustain. The FRA is a multi-stakeholder association striving for the improvement of the working and living conditions of the primary producers in the natural rubber and latex sector by applying the principles of Fair Trade. At the same time it supports environmentally friendly rubber production. This report aims to increase awareness within the rubber industry, the public sector and development communities regarding the ecological, social, and economic challenges in the rubber sector. It also offers insights into potential solutions to overcome these challenges.

Natural rubber is a product with many applications and with high price volatility

The appealing characteristics of natural rubber make it an important material for many products, ranging from products for the automotive industry (which represents 70% of global demand) to gloves, tubes, balloons and condoms.

Picture 1: Drying of Ribbed Smoked Sheets ^a



In past decades, the international demand for natural rubber has driven a steady expansion of industrial and smallholder plantations. However, as a result of the declining rubber prices since 2013, the total land area under rubber has decreased in the most important producing countries. Asia represents more than 90% percent of the total area under rubber cultivation and 80% of world production. The largest consumers of rubber are China, EU, USA, India and Japan.

The world market prices for natural rubber have fluctuated strongly since 2000. In 2001 prices reached their lowest level in 30 years, while they reached historical peaks in 2008 and in 2011. Since then prices have decreased again quite drastically and are expected to remain low in the coming years. This is the result of maturing trees in Asia, the slowing pace of China's economic growth, declining growth in rubber demand, and low oil prices.

Some persistent sustainability issues exist

The current low prices pose important challenges to rubber producers. Current prices are too low to cover the costs of production - both for plantations as well as for small-scale rubber producers. This usually results in reduced field maintenance, reduced harvesting and lack of respect for quality norms. Locked into their rubber plantations and often deprived of alternative income opportunities small-scale producers are pushed further into poverty. There is evidence that under the prevailing poor market conditions, smallholders convert their farms to more profitable crops such as palm oil trees, despite the sometimes high costs involved. Indebted smallholders may be forced to sell their land with severe consequences for their livelihood as a result. Other structural causes for poverty among rubber smallholders are low productivity, and poor market access.

Low rubber prices also have an impact on the wages of rubber tappers at large-scale estates or at smallholder farms. Companies and smallholders struggle to pay tappers a minimum wage, let alone a living wage. In addition to wage issues, several studies have revealed serious issues in working conditions at rubber plantations in various countries. Typical issues include inadequate safety standards, inappropriate use of toxic chemicals, discrimination and structural long working hours, child labor and issues with migrant workers.

^a All pictures in this report carry a copyright. Copyright © 2016 Martin Kunz (FRA). All rights reserved.

The rapid expansion that took place in 2008 and 2011 resulted in a variety of environmental and social issues including illegal deforestation and land right conflicts, although in the current market expansion is infrequent. On a positive note, using rubber trees in reforestation programs offers clear benefits for climate change mitigation as rubber trees are relatively effective in carbon sequestration compared to other tree crops.

Sustainability issues pose material risks to the industry

Sustainability issues in rubber production pose material risks for reputation and security of supply. Companies are increasingly held responsible for the conditions under which their sourced products are produced. With increasing attention for the root causes of deforestation and rural poverty, the rubber sector will most likely receive more attention. Increasingly, sustainable production and sourcing are on the agenda of tire manufacturers and industry platforms.

But it is not only reputations that are at stake. The ‘boom and bust’ dynamics in rubber supply and demand can affect future security of supply. Low rubber prices, which sometimes are equal to or even lower than the costs of production, put pressure on overall supply. Farmers start to convert their rubber plantations to other more profitable crops. Low prices and the resulting low wages create a shortage of rubber tappers, who choose to work in more remunerative sectors. There is a risk that divestments related to the current low prices could result in new price peaks in the long-term.

The industry needs to engage in responsible sourcing

The Fair Rubber Association (FRA) offers a one possible solution to the main sustainability issues by combining FSC certification with traceability and the payment of a Fair Trade Premium to rubber smallholders and plantation workers. This allows producers to cover costs of production or improve working and living conditions and gives buyers the assurance that the main social, environmental and economic risks are mitigated. Companies can also use the FRA logo on their products.

Complementary activities that the industry can undertake include:

- Mapping the supply base through to production – know where product is sourced,
- Identifying sustainability risks in the supply chain,
- Developing sourcing policies and engaging with suppliers to resolve issues (e.g. by monitoring, capacity building or co-investment),
- Investing in inclusive business models and smallholder support programs.

Picture 2: Smallholder showing an end-product



Zusammenfassung

Diese Studie wurde vom Fair Rubber e.V. und einem seiner Mitglieder, dem Hersteller natürlicher Kondome Sustain, in Auftrag gegeben. Der Fair Rubber e.V. ist eine Multi-Stakeholder-Initiative, die die Arbeits- und Lebensbedingungen von Primärerzeugern von natürlichem Kautschuk durch die Anwendung der Prinzipien des fairen Handels verbessern möchte. Dieser Bericht will die Kautschukindustrie, den öffentlichen Sektor und an der Entwicklungszusammenarbeit interessierte Menschen und Gruppen für die ökologischen, sozialen und ökonomischen Probleme im Kautschukbereich sensibilisieren. Er zeigt auch mögliche Lösungen auf, um diese Probleme zu meistern.

Natürlicher Kautschuk ist ein Produkt mit vielen Anwendungen und mit hohen Preisschwankungen

Die einmaligen Eigenschaften von natürlichem Kautschuk machen ihn zu einem wichtigen Material für viele Produkte, von Gütern für die Automobilindustrie (die etwa 70% der globalen Nachfrage abdeckt) bis hin zu Handschuhen, Matratzen, Schläuchen und Kondomen.

Bild 1: Trocknen von Ribbed Smoked Sheets^a



In den vergangenen Jahrzehnten hat die globale Nachfrage nach natürlichem Kautschuk zu einer stetigen Expansion von industriellen und kleinbäuerlichen Plantagen geführt. Als Ergebnis fallender Kautschukpreise hat die Anbaufläche von Kautschuk jedoch seit 2013 in den meisten Produktionsländern abgenommen. Mehr als 90% der Anbaufläche und rund 80% der globalen Produktion von Kautschuk befindet sich in Asien. Die größten Kautschukkonsumenten sind China, die EU, die USA, Indien und Japan.

Die Weltmarktpreise für natürlichen Kautschuk haben seit dem Jahr 2000 stark geschwankt. 2001 haben die Preise das niedrigste Niveau in 30 Jahren erreicht, während es 2008 und 2011 historische Höchstpreise gab. Seither sind die Preise wiederum ziemlich drastisch gesunken und es wird erwartet, dass sie in den nächsten Jahren niedrig bleiben. Dies hängt mit den Bäumen in Asien zusammen, die jetzt Zapfreife erreichen, dem schwächeren Wirtschaftswachstum in China, dem abnehmenden Wachstum in der Kautschuknachfrage und niedrigen Ölpreisen zusammen.

Fortlaufende Nachhaltigkeitsprobleme

Die gegenwärtig niedrigen Preise stellen Kautschukproduzenten vor große Probleme. Sie sind zu gering um die Produktionskosten zu decken – sowohl für Plantagen als auch für Kleinbauern. Das führt oft zu einer Vernachlässigung der Baumpflege, zu geringeren Ernten und einer mangelnden Beachtung von Qualitätsnormen. ‚Gefangen‘ auf ihren Kautschukplantagen und häufig ohne andere Möglichkeiten zur Einkommenserzielung, werden Kleinbauern weiter in die Armut gedrängt. Unter den vorliegenden schlechten Marktbedingungen steigen einige Kleinbauern auf Feldfrüchte wie z.B. Ölpalmen um, die mehr Erträge versprechen, auch wenn eine solche Umwidmung mit hohen Kosten verbunden sein kann. Verschuldete Kleinbauern können sich gezwungen sehen ihr Land zu verkaufen, wodurch ihre Existenz bedroht würde. Andere strukturelle Armutsursachen bei Kleinbauern sind eine niedrige Produktivität und ein schlechter Marktzugang.

Niedrige Preise beeinflussen auch die Löhne von Gummizapfern auf großen Anwesen und in der kleinbäuerlichen Landwirtschaft. Unternehmen und Kleinbauern müssen sich sehr anstrengen um den Zapfern den Mindestlohn bezahlen zu können. Abgesehen von den Lohnproblemen zeigen mehrere Untersuchungen schwerwiegende Verstöße gegen Arbeitsrechte auf Kautschukplantagen in verschiedenen Ländern. Typische Probleme sind unzureichende Sicherheitsstandards, der unangemessene Einsatz gifti-

ger Chemikalien, Diskriminierung und eine dauerhafte Überschreitung von Höchstarbeitszeiten, Kinderarbeit und Probleme mit Arbeitsmigranten.

Die schnelle Expansion, die zwischen 2008 und 2011 stattfand, hat zu verschiedenen ökologischen und sozialen Problemen geführt, einschließlich illegaler Abholzung und Konflikten über Bodenrechte, auch wenn in der gegenwärtigen Marktsituation Ausweitungen selten sind. Auf der positiven Seite bietet die Verwendung von Kautschukbäumen in Aufforstungsprogrammen eindeutige Vorteile für die Abmilderung des Klimawandels, da Kautschukbäume im Vergleich mit anderen Bäumen besonders effektiv in der Bindung von Kohlenstoff sind.

Nachhaltigkeitsprobleme führen zu substanziellen Risiken für die Industrie

Nachhaltigkeitsprobleme führen zu substanziellen Risiken für die Reputation und die Versorgungssicherheit. Unternehmen werden zunehmend in die Verantwortung für die Bedingungen genommen unter denen die von ihnen genutzten Rohstoffe produziert werden. Wegen der wachsenden Aufmerksamkeit für die grundlegenden Ursachen von Entwaldung und ländlicher Armut, wird die Kautschukbranche sehr wahrscheinlich mehr Aufmerksamkeit erhalten. Eine nachhaltige Produktion und Beschaffung sind zunehmend auf der Agenda von Reifenherstellern und Branchenplattformen.

Aber nicht nur die Reputation steht auf dem Spiel. Die zyklische Dynamik von Angebot und Nachfrage von Kautschuk können die zukünftige Versorgungssicherheit beeinträchtigen. Niedrige Kautschukpreise, die gelegentlich auf Höhe oder sogar unterhalb der Produktionskosten sind, üben Druck auf das Gesamtangebot aus. Landwirte beginnen von Kautschuk auf Feldfrüchte umzusteigen, die höhere Erträge versprechen. Niedrige Preise und die sich daraus ergebenden niedrigen Löhne führen zu einem Mangel an Gummizapfern, die in besser bezahlte Sektoren wechseln. Es besteht ein Risiko das fehlende Investitionen aufgrund der gegenwärtig niedrigen Preise langfristig zu neuen Höchstpreisen führen.

Die Industrie muss auf eine nachhaltige Beschaffung setzen

Der Fair Rubber e.V. bietet *eine* umfassende Lösung zu den zentralen Nachhaltigkeitsproblemen, indem eine FSC-Zertifizierung mit einer Nachverfolgbarkeit und der Bezahlung einer Fair Trade Prämie an Kleinbauern und Plantagenarbeiter verbunden wird. Dies ermöglicht eine Verbesserung der Arbeits- und Lebensbedingungen und gibt den Käufern die Gewissheit, dass die wesentlichen sozialen, ökologischen und ökonomischen Risiken abgemildert werden. Die Firmen können zusätzlich das Fair Rubber Logo auf ihren Produkten nutzen.

Ergänzende Handlungsmöglichkeiten für die Industrie beinhalten:

- Die Kartierung der gesamten Lieferkette – Wissen, woher ein Produkt kommt,
- Die Identifikation von Nachhaltigkeitsrisiken in der Lieferkette,
- Die Entwicklung von Beschaffungsrichtlinien und die Zusammenarbeit mit Lieferanten um Probleme zu lösen (z.B. durch Kontrolle, Aufbau von Fähigkeiten oder Co-Investitionen),
- Die Investition in inklusive Geschäftsmodelle und Programme zur Unterstützung von Kleinbauern.

Bild 2: Ein Kleinbauer zeigt ein Endprodukt



Introduction

This research paper was commissioned by the Fair Rubber Association (FRA) and one of its members, the natural condom producer Sustain. The FRA is a multi-stakeholder association striving for the improvement of the working and living conditions of the primary producers in the natural rubber and latex sectors by applying the principles of Fair Trade, and at the same time supporting environmentally friendly rubber production. This report aims to increase awareness within the rubber industry, public sector and development community on the sustainability issues in the rubber sector. It also offers insights into potential solutions for these issues.

The research was conducted by Aidenvironment, a values driven consultancy in sustainable production and trade. The findings in this paper are based upon desk research. The first chapter provides an overview of the global natural rubber sector. The second chapter addresses the various sustainability issues and the risks they pose to the industry. The third chapter presents the solutions the Fair Rubber Association offers to overcome these issues and risks and presents related good practices in rubber sourcing.

1. Profile of the natural rubber sector

1.1 Natural rubber and its applications

Natural rubber has a number of appealing characteristics for a wide range of products. Its elasticity, heat resistance, resilience, toughness and water-resistance make it an important material for many products.¹ Natural rubber is produced by the rubber tree (*Hevea brasiliensis*)^b and is harvested in the form of raw latex.² Latex is a sticky milky colloid which is “tapped” by making an incision in the bark of the rubber tree and is collected in cups. Tapping starts in the fifth to seventh year after planting of the tree and continues for 25 to 30 years. If processed quickly enough and preserved in the right way, the latex can be processed into (liquid) latex concentrate. Latex concentrate is used for a variety of products including condoms, mattresses, gloves, and balloons – all so called ‘dipped’ products.³ Products based on latex concentrate represent less than 10% of the natural rubber market.⁴

Natural rubber use in tires

The automotive industry alone accounts for almost 75% of rubber demand and is the primary driver of changes in yearly rubber consumption. The proportion of natural rubber in the total amount of rubber used in tire manufacturing is approximately 30%, but varies by type of tire:

- Passenger cars: 20% - 50%
- Trucks: 50% - 95%
- Off-road, airplane: 100%

Substitution between natural and synthetic rubber in passenger cars depends on market prices and changes in technical specifications.

Latex can also be coagulated in a controlled environment and processed into block rubbers of different technical specifications/qualities or ribbed smoked sheets (RSS). These are used for products such as tubes, footwear and toys. If not processed quickly, latex coagulates naturally into so called lump or cup rubber. This is low grade and is primarily used in the tire industry. The automotive industry uses almost three quarters of all global rubber production, mostly for the production of tires.⁵ Collectively, in 2013 the top ten tire companies, with the biggest producers being Bridgestone, Michelin, Goodyear, and Continental, accounted for nearly 63% of the world’s tire sales.⁶

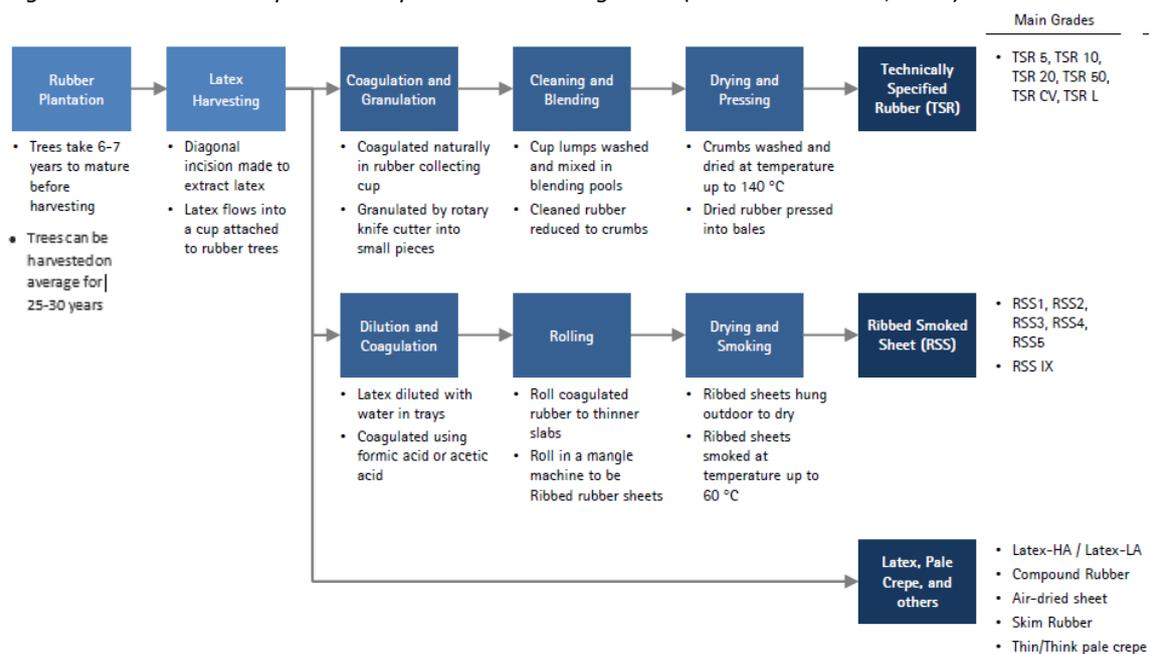
^b More than 1000 plants produce latex, but *Hevea brasiliensis* is the only one commercially viable

Natural rubber is often combined or used interchangeably with synthetic rubber which is derived from oil. The unique properties of natural rubber make it a critical component for certain products. Natural rubber is environmentally friendlier than synthetic rubber: it is a renewable resource, and rubber trees absorb CO₂ while petroleum (i.e. fossil material) releases CO₂ when processed. In this report the term rubber is synonymous with “natural rubber”. The term “synthetic rubber” is only used for non-natural rubber.

International trade statistics distinguish different types of rubber depending on the processing method.⁷ The following grades are widely used in international trade:

- **Natural rubber latex** refers to products made from latex concentrate, such as condoms, balloons or mattresses
- **Technically specified rubber (TSR)** refers to natural rubber which is graded based upon technical properties and divided into a variety of different grades, dependent on impurities such as dirt and ash content, plasticity, and color. It has applications such as hydraulic hoses.
- **Ribbed smoked sheets (RSS)**. This is crude natural rubber in the form of brown sheets obtained by coagulating latex with an acid, rolling in it into sheets, and drying the sheets with heat and smoke. Smoked sheets are graded on the basis of a visual assessment and used for footwear, tubes and tires.
- **Natural rubber in other forms** refers to natural rubber in compound form, air-dried sheets or skim rubber, generally used for tire production.

Figure 1: Natural rubber production process and main grades^c (Source: Accenture, 2014)



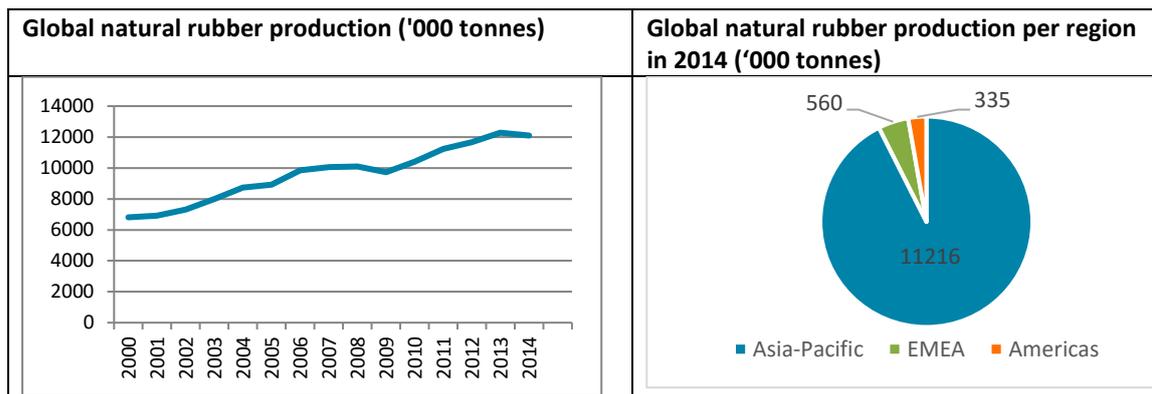
1.2 Supply and demand

In the last ten years, the international demand for natural rubber has driven a steady expansion of industrial and smallholder plantations.⁸ Between 2009 and 2013, natural rubber production grew at 5.5% per annum globally, with 90% of this growth originating from Thailand, Indonesia and Vietnam.⁹ In 2012, the total area under rubber production was 9.9 million ha.¹⁰ However, as a result of the declining rubber prices from 2013 onwards, total plantation areas in various countries such as Vietnam, Indonesia and

^c High grade RSS and TSR is collected in liquid form and processed into solid. Only cup lumps are ground and processed

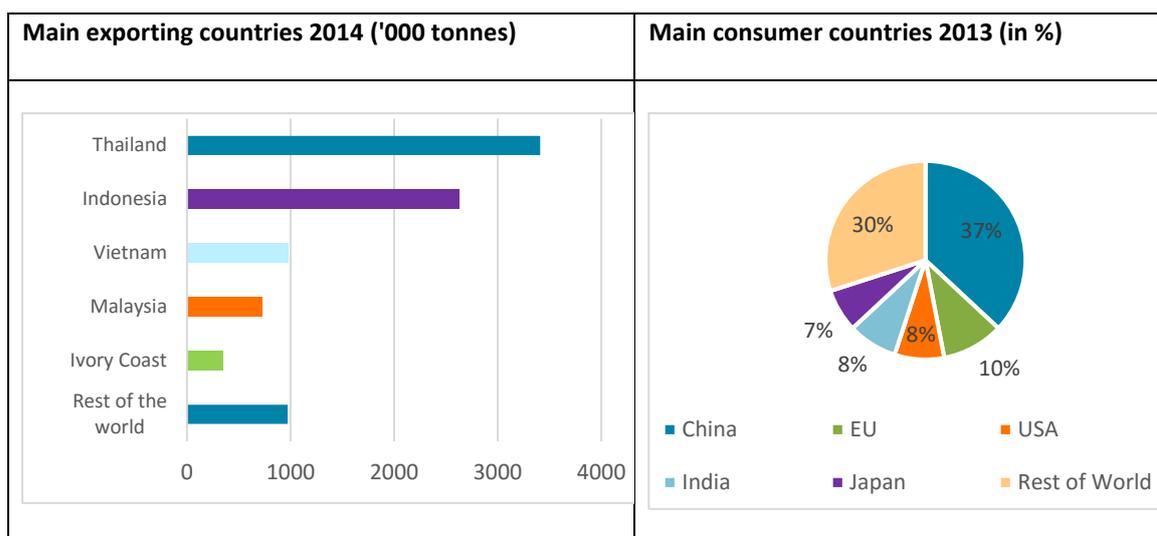
Malaysia have decreased.¹¹ In 2013, the total rubber production was at 12.3 million tonnes which dropped to 12.1 million tonnes in 2014. More than 90% percent of the total area under cultivation and 80% of world production is in Asia due to its favorable climate. The largest rubber producers in 2013 were (in order of size): Thailand (34% of world production), Indonesia (26%), Vietnam (8%), China (7%), India (7%), and Malaysia (7%).¹² The most important producing countries outside Asia are Ivory Coast, Nigeria, and Brazil but together these represent only a small fraction of global production.

Figure 2: Global natural rubber production between 2000-2014 and production per region (Asia-Pacific, Europe, Middle East and Africa (EMEA) and the Americas) in 2014. (Source: International Rubber Study Group)



The world's largest exporting countries of natural rubber in 2014 were Thailand (38%), followed by Indonesia (29%), Vietnam (11%), Malaysia (8%), and Ivory Coast (4%).¹³ The largest manufacturers of tires and other rubber products are in South-East Asia. The largest consumers of rubber in 2013 were China (37%), EU (10%), USA (8%), India (8%) and Japan (7%).¹⁴

Figure 3: Main exporting (source: Comtrade) and consumer countries of natural rubber (Source: Accenture, 2014)



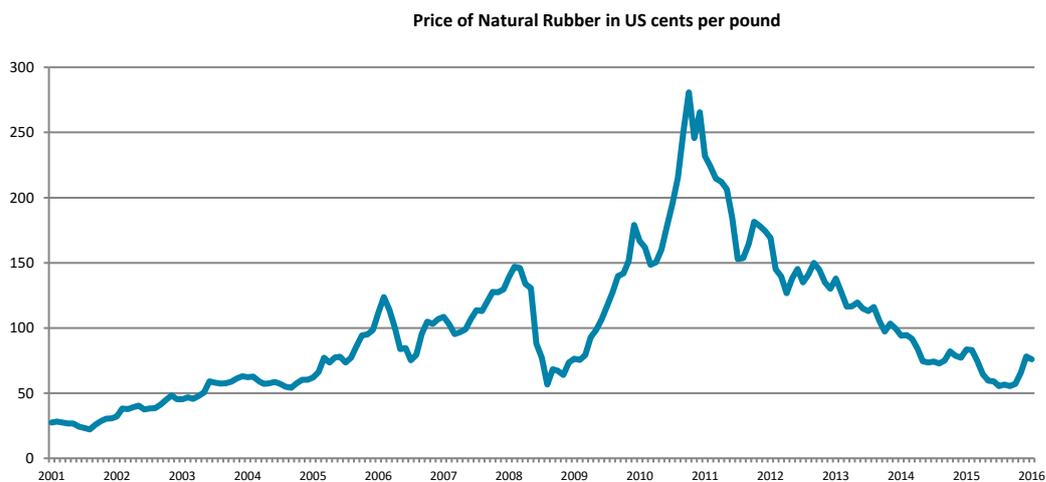
World consumption of natural rubber increased by 0.7% in 2015¹⁵ and is expected to increase by an average of 3.1% per year through 2024.¹⁶ Global demand is closely tied to the automotive sector as the tire industry accounts for around 70% of the total rubber consumption.¹⁷ Through substitution with synthetic rubber, the oil price also influences the demand for natural rubber. Global production of natural

rubber is expected to increase further as trees planted in the 2008 -2011 peak price period become productive. In combination with the slowing pace of China’s economic growth and a declining growth in rubber demand^d, the industry faces medium- to long-term structural over-production.¹⁸

1.3 Price dynamics

The Singapore Commodity Exchange is the main reference for rubber prices. Since crude oil is one of the main raw materials of synthetic rubber, there is a high correlation between the prices of crude oil, synthetic rubber, and natural rubber.¹⁹ The world market prices for natural rubber have fluctuated strongly since 2000. Structural issues that have an impact on the prices of natural rubber are related to supply and demand alterations, changing oil prices, uncertainty about economic cycles, weather, regulatory programs. In 2001 prices reached the lowest level in 30 years, while they reached historical price peaks in 2008, 2010, and in 2011. Natural rubber prices peaked during these periods as a result of increased demand caused by recession-linked low prices in 2009 and supply disruptions caused by El Niño – which resulted in low rainfall in the most important rubber producing countries in South-East Asia.²⁰ Since 2011 prices have decreased drastically (See figure 4) driven by oversupply and low oil prices. For example, in February 2011 smoked rubber sheets peaked at US\$ 280 cents per pound while by March 2016 prices had decreased to US\$66 cents per pound.²¹

Figure 4: Price development natural rubber (Ribbed Smoked Sheets) is US cents per pound (Source: Indexmundi)



The current market faces oversupply. According to the International Rubber Study Group (IRSG), the overcapacity gap is closing only very slowly and prices are expected to remain under pressure.

1.4 Natural rubber value chain

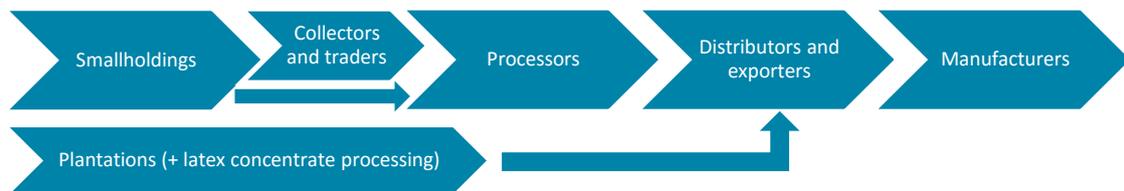
Rubber is produced in small and large-scale production systems.^e The majority of the world’s natural rubber is produced on small-scale farms. In the largest rubber producing countries, they dominate production; smallholders produce 93 % of rubber in Malaysia, 90 % in Thailand, 89 % in India and 85 % in

^d Another cause for the decline in prices are the in 2015 revised Chinese rules on natural rubber imports in favor of the use of recycled rubber.²²

^e A third system is wild harvesting, where ‘jungle’ rubber is collected in primary forest. It represents a minor share and is mainly applied in Brazil.

Indonesia.²³ Smallholder production systems can consist of either mono-culture plantations or agro-forestry systems. In agro-forestry systems rubber trees are grown together with other plants and trees which can produce food, medicine, timber and fibers. Large-scale plantations are generally mono-culture systems. They are either publicly or privately owned. In South-East Asia, private owners of rubber plantations include the large-scale (oil palm) plantation companies, tire manufacturers and local and international private investors.

Figure 5: Representation of the natural rubber value chain (Source: Aidenvironment)



Once the rubber is tapped, it is processed into latex, blocks or sheets. Large-scale plantations usually do this directly at a factory on or close to the plantation. Smallholders sell their latex either in liquid form or after it has coagulated naturally into cup lumps, or they process it into ribbed smoked sheets. In some countries, smallholders sell directly to processing factories. In some countries collectors/traders play an important role in ensuring the flow of natural rubber from the farm gate to the processing factories. Processing factories maintain either contractual or open market relationships with supplying collectors or farmers.

Picture 3: Collection of natural rubber



In small-scale production systems, the initial drying and/or smoking can be usually done either by the farmer or collectors before the rubber is transported to factories for further processing. However, most of the value added usually starts at the processing factories. Processors transform the rubber into standardized rubber products for export or domestic use. Manufacturers of rubber products often deal through brokers (exporters and importers) instead of dealing directly with the processors. Supply linkages between processors, brokers and manufacturers vary from historically stable to flexible and spot-market based. Some large plantation companies sell to manufacturing companies whilst other plantations are owned by companies that also manufacture the end product.

2. Sustainability issues

In the last decade the natural rubber industry has undergone rapid and fundamental changes. During the price peaks in 2008 and 2011 rubber plantations in countries such as Laos, Thailand, Vietnam, Cambodia, Myanmar, and China expanded by more than 1,000,000 ha.²⁴ This rapid expansion resulted in a variety of sustainability issues including illegal deforestation and land rights issues. Since then market dynamics have changed significantly. The current low market prices have a severe adverse impact on the incomes and livelihoods of smallholders and tappers.

This section will discuss some of the most prominent social, economic and environmental sustainability issues in the rubber sector. The issues are related to smallholder livelihoods, working conditions, deforestation and land conflicts. These sustainability issues pose material reputational and supply security risks as companies are increasingly held responsible for their entire supply chain.

2.1 Poverty among smallholders

Current low prices severely impact the business case for rubber producing smallholders and plantations and may be below the cost of production. The Association of Natural Rubber Producing Countries (ANRPC) has stated that for many of the small-scale rubber producers the current prices are so low that they will only incur losses if they continue to harvest natural rubber.²⁵ This usually results in reduced field maintenance and harvesting frequency and non-respect of quality norms (or in too frequent harvesting with a risk for mid-term productivity). Locked into their rubber plantations and often without alternative income opportunities smallholders are pushed further into poverty. Experience in Indonesia shows that under prevailing poor market conditions many smallholders, if they have the resources to make such investments, convert to more profitable crops. Smallholders who do not have these resources may be forced to sell their land – with severe consequences for their livelihood.

The price of rubber in Indonesia has fallen below the cost of production

The Indonesian Rubber Research Institute (IRRI) noted in 2015 that some estates that have stopped tapping rubber because they received US\$ 1.20 per kg whilst their production costs range between US\$ 1.30 to US\$ 1.50 per kg. Smallholder producers face difficult circumstances and have already started to convert to other crops.

Source: "Rubber distribution & pricing mechanism system in Indonesia"- IRRI presentation at the Global Rubber Conference in Vietnam (2015)

Other structural causes for increased poverty among rubber smallholders are low productivity and poor market access. Smallholders generally apply poorer cultivation and tapping practices and achieve lower yields than estates.²⁶ In Indonesia, smallholders have on average 33% lower yields than estates whilst in Malaysia, the difference is 9%.²⁷ Important causes for underperformance include the lack of access to high quality planting materials and lack of knowledge of good agricultural, harvesting and post-harvesting practices. In the next chapter we discuss opportunities to improve smallholder yields by applying better management and using improved varieties.

Picture 4: Tapping of natural rubber



Poor market access also affects smallholder's income. A case study in Indonesia, showed that farmers are generally unaware of the prices in the international markets when delivering their harvest at the processing factories.²⁸ This puts them in a weak negotiation position towards the collector, especially if they are indebted to them. Farmers are also often not aware of quality requirements and how this could affect prices. Quality at factory gate is often not tested which facilitates adulteration by collectors and

farmers (e.g. soaking cup lumps in water to increase its weight). This practice, common among Indonesian collectors, results in a lower quality of rubber. Consequently, factories anticipate such adulteration practices with all kind of other unethical practices. There is little trust in the supply chain and farmers generally do not emerge as winners. Experience in Indonesia shows that increased transparency and more direct trading relationships between farmers and factories could increase farmer net income by 10% to 15%.²⁹

2.2 Low wages and poor working conditions for rubber tappers

Low rubber prices also impact the wages of rubber tappers. Rubber tappers are daily or permanent workers at large-scale estates or at smallholder farms. The Indonesian Rubber Research Institute (IRRI)

Picture 5: Living conditions of a family employed in the rubber sector



investigated tapping wages compared to the legal minimum wages in Indonesia. Legal minimum wages are US\$ 6.20/day, while with the US\$1.50/kg FOB^f price in 2016 day-workers received only around US\$ 4.30/day.³⁰ It is likely that in other producing countries, companies and smallholders also struggle to pay tappers a minimum, let alone a living wage. If rubber tappers' wages are insufficient to ensure a decent living there is a clear incentive to look for work in other sectors, if available.³¹

Several studies have revealed serious issues in working conditions at rubber plantation estates in various countries. According to the United States Department of Labor (2010) natural rubber is produced with forced labor in Myanmar and with child labor in Cambodia, Indonesia, Liberia, Myanmar, and the Philippines.³² Instances of forced labor have been identified in Liberia. A combination of low wages and high harvesting quotas can also necessitate assistance from family members, including children. Research performed by various NGOs in the period of 2011 and 2012 has revealed many cases of basic labor rights violations. Typical problems include inadequate safety standards, inappropriate use of toxic chemicals, discrimination and persistent long working hours.³³

Poor working conditions of farmers and tappers in South-East Asia and Liberia

Research performed by DanWatch (2013) found instances of poor working conditions for rubber producers and smallholders in Indonesia and Malaysia. Violations of ILO conventions were identified, including freedom of association and the right to permanent contracts. Discriminatory practices for migrant workers were identified. Migrant workers were forced to leave their passports with their employers, earned less than the minimum wage, and received a lower salary for the same work compared to locals and did not receive personal protective equipment for handling toxic herbicides.

Similar instances were found in Liberia. Housing, health and safety standards, and sanitation facilities needed improvement. Improved monitoring was needed to address health and safety issues and to prevent child labor which was observed on the plantations.

^f FOB means Free On Board (FOB). This pricing term indicates that the cost of the goods, including all transportation and insurance costs from the manufacturer to the port of departure, as well as the costs of loading the vessel, are in the quoted price.

2.3 Deforestation and land conflicts as opposed to climate change mitigation

In the current market there is little incentive to expand rubber plantations. However, the expansion that took place at the end of the last decade caused serious environmental and social damage, notably in South-East Asia. Sourcing from these plantations can pose reputational risks to buyers.

Research has shown that the crop's expansion has particularly impacted biodiversity hotspots in the Mekong Delta, Indonesia, Malaysia and the Philippines.³⁴ For example, there is evidence of illegal deforestation of protected forest in Laos and Cambodia by Vietnamese rubber plantation companies around the beginning of this decade.³⁵ The conversion of tropical rainforest into large-scale mono-culture plantations has an important negative impact on biodiversity and results in erosion affecting the quality and quantity of ground- and surface water over a much larger area than the plantation.³⁶

The expansion of large-scale rubber plantations caused local communities to lose their land. In Laos, Cambodia and Myanmar several cases of involuntary loss were identified resulting in threats to food security, income and cultural traditions.³⁷ In these cases the land was ceded to plantation companies without the knowledge or consent of the people who lived on the land – and without compensation.³⁸ In these countries farmers were struggling to maintain their lands and forest in the face of growing pressures from investors and governments institutions to impose concessions. Both national and foreign companies were involved and several of these projects were financed by international banks.

Rubber plantations can also have important environmental benefits.³⁹ A study by the Rubber Research Institute of India showed that the carbon sequestration potential of natural rubber is greater than most tree species which are commonly used in reforestation programs.⁴⁰ This makes rubber an interesting tree crop if planted on degraded or non-forested land.

2.4 Commercial risks for the rubber industry

Sustainability issues in rubber production pose material risks for reputation and security of supply.

Companies are increasingly held responsible for their entire supply chain. NGO campaigns, consumer pressure and public sector interference have placed responsible sourcing higher on the corporate agenda in sectors such as palm oil, timber, pulp and paper, soy, cocoa and coffee. Reputational risks have been an important driver. In the rubber sector, awareness levels appear to be still relatively low. There can be several reasons for this including:

- rubber-based products are less consumer-facing than many food and garment products.
- the tire industry has for many years focused on other sustainability issues such as rolling resistance and recycling and less on responsible sourcing.
- the sector has been subject to less NGO attention than other sectors.

However, attention for sustainable production and sourcing in the rubber sector is increasing as is reflected in recent communication by some of the tire companies, the Sustainable National Rubber initiative (SNR-i) of the International Research Study Group and the multi-stakeholder partnership Smallholder Acceleration through Responsible Production and Sourcing (SHARP). Concerns related to rubber related sustainability issues such as livelihoods, food security, land grabs, environmental degradation,

living wages and labor conditions have gained visibility.⁴¹ Given the increasing attention to the root causes of deforestation and rural poverty, it is expected that the rubber sector will receive more attention in the public debate.⁴²

But it is not only reputations that are at stake. The ‘boom and bust’ dynamics in rubber supply and demand can affect the security of supply. Low rubber prices, sometimes equal to or lower than the cost of production, put pressure on overall supply. Farmers convert their rubber plantations to other more profitable crops such as palm oil, cassava, coffee and cocoa.

Picture 6: Environmental management in rubber processing deserves attention



Picture 7: Rubber plantation in Malaysia being converted into a palm oil plantation



In Indonesia, the low margins in rubber have stimulated communities to sell their land to oil palm plantations. Low prices and resulting low wages create a potential shortage of skilled rubber tappers, who choose to work in more remunerative sectors. Disinvestment in rubber plantations could restore the balance but could result in another unsustainable price peak as happened in 2000. Both producers and buyers would benefit from more stable prices.

There is a risk that history repeats itself: historically low prices in early 2000s and the result-

ing disinvestments of rubber growers are considered to be one of the causes for the unsustainable price peaks in 2008 and 2011. Supply after the periods of disinvestment could not keep up with increased demand.

3. Addressing sustainability issues in rubber supply chains

In the current market, rubber smallholders may be driven into poverty as a result of low prices, low farm performance and poor market access. Rubber tappers are confronted with low wages and poor working and living conditions. This situation is unlikely to change much in the near future and poses reputational and supply chain risks to companies sourcing rubber and latex. Facing increasing calls for corporate social responsibility, companies need to engage with their supply base and take steps to resolve these issues. This section describes how the Fair Rubber Association aims to support. It also presents some complementary actions in responsible sourcing.

3.1 The Fair Rubber Association model

The Fair Rubber Association (FRA) is a multi-stakeholder initiative that provides a platform for co-operation between rubber producers, buying companies and civil society organizations. Its main goal is “to contribute to improving the working and living conditions of rubber producers by applying Fair Trade

principles to products made from natural rubber". The FRA ensures that a Fair Trade premium is paid directly by the end users of the natural rubber to the primary producing partners, being associations of small rubber farmers, or rubber plantations. The FRA offers several services to its members and promotes specific solutions to realize its mission. The FRA provides a platform for collaboration between its members. Members with commercial interests and members with no financial interest but who are keen to support the concept of Fair Trade are part of the FRA. Through the FRA members discuss and share practices in helping disadvantaged rubber producers improve their working and living conditions. The FRA facilitates market linkages between buyers and producers. In 2016 the FRA cooperates with four producers in order to prevent dilution of Fair Trade benefits. It is, however, ready at any time to expand its supplier network, if demand for Fair Trade natural rubber increases.

Picture 8: Rubber tapper working at a FRA location



One of the key instruments FRA promotes is the payment of a Fair Trade premium to producers. The premium is set at € 0.50/kg of Dry Rubber Content, which usually is only a fraction of the price of the end-product. The premium is spent, without deductions, on improving working and living conditions and can therefore have an important impact for smallholders and workers. By paying a premium FRA-members ensure that pressing issues are addressed regardless of the rubber price. The FRA organizes the payment of the premium, and makes sure that a joint body of workers determines how the premium is spent (plantation managers are involved, as they own the land, but the final decision is taken by the workers). For smallholders, the additional premium ensures that the costs of production are covered and working and living conditions can be improved.

How the Fair Trade premium improved living conditions at Frocester Estate in Sri Lanka

At Frocester Estate in Sri Lanka the payment of a Fair Trade premium was used to improve the living and working conditions of rubber tappers living on the plantation. A pump and pipes were installed to provide 20 families with a safe water supply directly to their homes. A shelter on the plantation, used by the workers for changing and for meal breaks was renovated. The facility was upgraded with lockers (for work clothes), a separate eating area, and washing/toilet facilities.

Picture 9: A child making use of a communal shower which is installed thanks to the FRA premium



To learn more about the positive impact of the FRA on working and living conditions of rubber smallholders and workers, see http://fairrubber.org/en/success_stories.htm

All FRA-member suppliers must be certified by the Forest Stewardship Council (FSC) or an equivalent scheme. These suppliers comply with the social and environmental criteria of the FSC standard including

requirements for water quality, respect of land rights and the ban of highly hazardous chemicals. FSC does not certify plantations if they have been converted from forest after 1994; all FSC-certified converted land holdings were converted to rubber before the beginning of this century. The system includes an assurance model which gives buyers confidence that the FSC standard is respected. Social requirements address, amongst others, land rights, indigenous people rights, working conditions, and the rights of local communities. The FRA supports producers in obtaining FSC certification. The FSC certificate ensures that products can be traced from the rubber source through to the final product. This replaces many of the costs companies would otherwise need to make or build their own transparent and traceable supply chains. Members who pay the Fair Trade premium, have the option to apply the Fair Rubber logo on rubber products. The Associations' logo can be displayed on all products for which 100% of the natural rubber used is sourced under the FRA criteria. The logo signifies to consumers of labelled goods that the primary producers have received a premium and is used in combination with an established environmental standard.

Picture 10: Product carrying the FSC logo



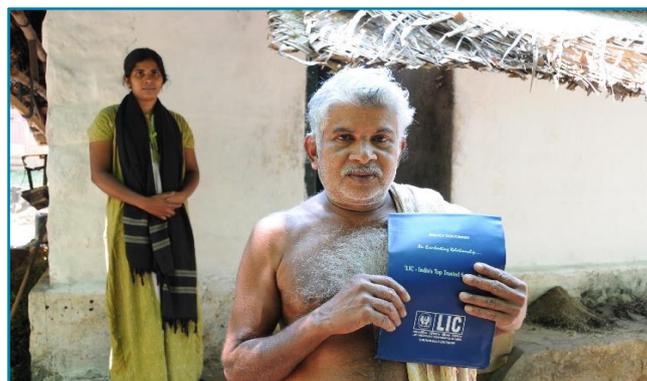
The fee to apply the logo is a maximum of €0.20/kg (less for larger volumes) which is in part used to finance the FSC audits of rubber suppliers.

Since the founding of the Fair Rubber Association in 2012, more than 300 metric tonnes of Dry Rubber Content have been traded in accordance with the FRA criteria. This has enabled, amongst other successes:

- Supply of clean drinking water to hundreds of families at plantations in Sri Lanka
- Expansion of the processing capacity of a smallholder association in Sri Lanka to enable more farmers to join
- Construction of a biogas unit to clean the water and to supply gas to a smoke house
- Development of the first private supplementary pension fund for rubber plantation workers in India

To promote sustainable supply, FRA pays or helps to pay (if requested) for the FSC audit costs for the FRA partner producers. FRA balances supplier capacity with demand for Fairly Traded rubber. To avoid oversupply, new suppliers are only accepted into the system if there is sufficient demand. FRA is ready to welcome new buyers and new suppliers to address structural sustainability challenges in natural rubber production and trade.

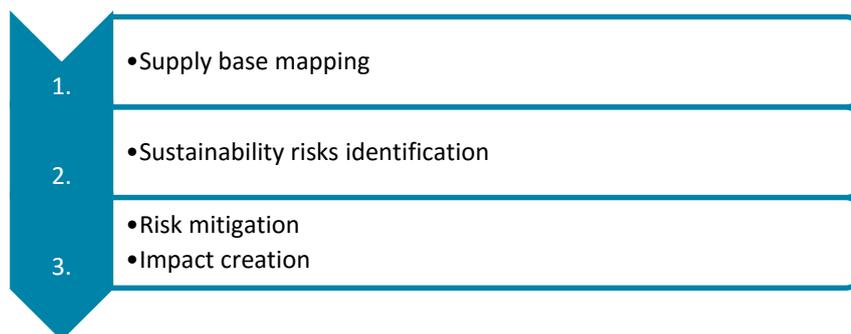
Picture 11: The first recipient of the supplementary pension fund in India



3.2 Complementary actions in responsible rubber sourcing

In addition to the FRA approach, companies can engage in more responsible sourcing practices. Responsible sourcing can reduce reputational risks or enhance brand value. It can also contribute to operational efficiency by identifying opportunities for cost reduction and process improvements and the creation of stronger supplier relationships. Figure 6 presents some steps rubber buying companies could undertake to improve their responsible sourcing practices.

Figure 6: Overview of actions rubber buying companies could undertake (Source: Aidenvironment)



Supply base mapping

The concept of ‘human rights due diligence’ as outlined in the UN Guiding Principles for Business and Human Rights requires companies to assess the human rights risks of their activities, including the risks which are present in their supply chains. Supply chain transparency is a prerequisite. The first step, therefore, is to map rubber or latex supply chains all the way back to the raw material source. Mapping the supply chain can be challenging especially when different intermediate actors are involved and there are many different types of rubber. To overcome these challenges, companies can imitate practices in other sectors, such as palm oil and cocoa where companies increasingly manage to map their supply chain to the individual producers.

Sustainability risk identification

After a company has mapped its supply base, the next step is to identify the sustainability issues or ‘hot spots’. Hot spots can relate to smallholder poverty, poor working conditions, deforestation or land conflicts as described in the previous section – or to other issues. The identification of risks can be done by desk research, stakeholder interviews and through field visits. Desk research and interviews with suppliers, industry experts, the NGO community, peer companies, and industry bodies help to identify potential sustainability risks. This should then be verified in the field. With a better understanding of sustainability risks, suppliers can be segmented by risk level.

Picture 12: Supplier visits will help to create a better understanding of possible issues and potential solutions



Risk mitigation and impact creation

Once the sustainability issues and risks have been identified, one need work towards solutions. There are several options to do this. An obvious option is to stop buying from a high-risk supplier. However,

there may be reasons not to do so, such as reliance for specific types and qualities offered by that supplier. Changing suppliers will neither resolve the sustainability issues. That requires a more pro-active strategy. Some possible strategies are described below.

Supply chain engagement

A buyer could engage with its suppliers to create awareness and commitment to solve sustainability issues. Supply chain engagement approaches can be built upon a compliance focus or a partnership focus or a combination of both. The former is based upon setting requirements to ban unsustainable practices (e.g. through a Supplier Code) and ensuring that compliance is respected (often via company or third party audits). This approach requires clear communication on expectations and proper monitoring.

The second approach is more collaborative and based on building trust, long-term supply chain relationships and possibly co-investment to meet certain key performance indicators. Effectiveness of such a strategy can be ensured through conducting regular collaborative performance assessments while sharing the responsibility of the results between supplier and buyer. Paying visits to suppliers can support supplier engagement processes. They help to obtain a better understanding of issues, potential solutions and required efforts, as well as to assess progress. The collaboration could also include the provision of resources and support such as capacity building. It is critical to have an approach that provides incentives for continuous improvement. With time, relationships can evolve into true partnerships with a joint responsibility for addressing the root causes of sustainability issues. The allocation of resources to improve the sustainability level of supply chains can be determined on the basis of the supplier segmentation and the expected leverage to mitigate these risks.

Michelin adopts zero-deforestation for rubber sourcing (June, 2016)

Michelin, one of the three largest tire companies adopted a zero-deforestation policy for its rubber sourcing. Its policy calls for respecting of local communities’ rights to reject plantations and barring sourcing of rubber from newly cleared forests. In the policy, primary forests as well as “high carbon stock” (HCS) and “high conservation value” (HCV) forests are off-limits for conversion. Since the zero-deforestation commitments of more than 75% of the palm oil sector, as well as major pulp and paper producers in tropical areas, it is the first major rubber sourcing company adopting this policy.

Source: Mongabay.com, June 13 2016, In an unprecedented move, Michelin adopts zero deforestation for rubber sourcing.

Figure 7: Tools to engage with suppliers on sustainability (Source: adapted from UN Global Compact & Business for Social Responsibility (2010 ⁴³))



When companies have to engage with many intermediate suppliers they may be confronted with the additional complications in creating transparency and influencing upstream practices. Companies can pursue a number of strategies to overcome these obstacles⁴⁴:

1. **Supply chain optimization.** Companies can take steps to shorten supply chains bypassing brokers and sourcing directly from factories or producers.
2. **Participate in industry collaborations.** Industry collaboration with other buyers can increase bargaining power when dealing with suppliers (and second or third tier suppliers) while reducing costs and sharing resources.
3. **Engagement in public policy.** A level playing field and equitable distribution of risks and costs can be achieved through influencing legal and regulatory frameworks.

Organize and train rubber smallholders in inclusive business models

In smallholder based supply chains, there are several opportunities for improving smallholder performance and the ability to earn a decent living. One option is to promote more stable and direct sourcing relationships between smallholders and rubber factories. If middlemen stand in the way for fair trading practices, farmers can be organized into groups or co-operatives. For example, to collectively organize transportation to factories. In preferred supplier programs, more emphasis could be given to product quality and corresponding market incentives. One could also organize training on topics such as quality management, good agricultural practices, harvesting, post-harvesting and financial literacy, possibly using participatory methodologies. Companies can also facilitate access to farm inputs including planting material, pesticides, and fertilizers or credit. Such investments can help to create more professional, profitable and resilient supply chains.

Picture 13: Training being organized for rubber smallholders



Companies can partner with NGOs, training institutions or public agencies in realizing these activities.⁴⁵ These organizations often have more experience in setting up programs. Finally, donor funding opportunities may exist to set up public-private partnership. For example, to develop smallholder inclusive supply chains or for landscape management.

Smallholder support projects in Indonesia

Swisscontact is an independent Swiss foundation, which focuses on international development whilst maintaining close linkages with the private sector. Their READ program, which took place in Indonesia between 2008 and 2012, supported the economic growth and business literacy of rubber farmers. The program resulted in 1546 farmers in 28 villages in the region of Aceh Tamiang (Indonesia) obtaining training in Good Agricultural Practices in rubber and more than twice as many received training in financial literacy. The program established six village nurseries. The project also organized farmers into groups and facilitated direct market linkages between these groups and the processing factories. As a result, 874 farmers stated they enjoyed an income increase of around 20-60%.

The Indonesian NGO Lambaga Gemawan in 2012-2013 supported more than 500 farmers in West Kalimantan. They established 14 farmer field schools and demonstration plots, ten farmer groups, provided training on Good Agricultural Practices, facilitated access to inputs and credit, created direct linkages between farmers and a rubber processing factory and built a price information system. The project resulted in higher yield, better quality and better prices to farmers.

References

- ¹ Greve, H. H. (2000), Rubber, 2. natural. Ullmann's Encyclopedia of Industrial Chemistry.
- ² Häuser, I., Martin, K., Germer, J., He, P., Blagodatskiy, S., Liu, H., Krauß, M., Rajaona, A., Shi, J., Pelz, S., Langenberger, G., Zhu, C. D., Cotter, M., Stürz, S., Waibel, H., Steinmetz, H., Wieprecht, S., Frör, O., Ahlheim, M., Aenis, T., Cadisch, G., (2015), Environmental and socio-economic impacts of rubber cultivation in the Mekong region: challenges for sustainable land use, CAB Reviews 2015 10, No. 027
- ³ Rubberboard. Properties and uses of natural rubber. Available at: <http://rubberboard.org.in/ManageCultivation.asp?id=196>
- ⁴ Rubberboard. Rubber cultivation. Available at: <http://rubberboard.org.in/ManageCultivation.asp?id=2>
- ⁵ European Tyre and Rubber Manufacturers' Association (ETRMA). European Tyre & Rubber Industry Statistics (2012), Available at: <http://www.etrma.org/statistics-2>
- ⁶ Bridgestone ranks as world's top tire producer again (2014), <http://www.rubbernews.com/article/20140908/NEWS/309089973> and Accenture (2015), Extracting value from Natural Rubber Trading Markets; optimizing marketing, procurement and hedging for producers and customers Available at https://www.accenture.com/t20150523T032721_w_/sg-en/acnmedia/Accenture/Conversion-Assets/DocCom/Documents/Global/PDF/Dualpub_6/Accenture-ATIOS-Publication-Natural-Rubber-Trading-Markets.pdf
- ⁷ Rubber sector profile (2012), available at: <http://www.moc.gov.kh/TradeSWAp/userfiles/Media/file/Projects/TDSP/Top%20Ten%20Products/2012-07-26%20Rubber%20Sector%20profile.pdf>
- ⁸ The Malaysian Natural Rubber Industry available at: <http://www.lgm.gov.my/greenmaterial/themalaysiannrindustry.pdf>
- ⁹ Accenture (2015), Extracting value from Natural Rubber Trading Markets; optimizing marketing, procurement and hedging for producers and customers
- ¹⁰ Warren-Thomas, E., Dolman, P. M., & Edwards, D. P. (2015), Increasing demand for natural rubber necessitates a robust sustainability initiative to mitigate impacts on tropical biodiversity. *Conservation Letters*, 8(4), 230-241.
- ¹¹ "Rubber distribution & pricing mechanism system in Indonesia" - IRRI presentation at the Global Rubber Conference in Vietnam (2015) and International rubber consortium limited. Available via: <http://www.irco.biz/>
- ¹² Accenture (2015), Extracting value from Natural Rubber Trading Markets; optimizing marketing, procurement and hedging for producers and customers
- ¹³ "Global Market Analysis for NR and SR: Challenges and Prospects for Growth" - IRSG presentation at Global Rubber conference 2015
- ¹⁴ Accenture (2015), Extracting value from Natural Rubber Trading Markets; optimizing marketing, procurement and hedging for producers and customers
- ¹⁵ IRSG (2015), Latest world rubber industry outlook now available from IRSG. Available at: <http://www.rubberstudy.com/news-article.aspx?id=5092&b=earlier-news.aspx>
- ¹⁶ IRSG (2015), Latest world rubber industry outlook now available from IRSG. Available at: <http://www.rubberstudy.com/news-article.aspx?id=5092&b=earlier-news.aspx>
- ¹⁷ Natural rubber. Available at: <http://www.fao.org/docrep/005/y4252e/y4252e05e.htm>
- ¹⁸ IRSG (2015), Latest world rubber industry outlook now available from IRSG. Available at: <http://www.rubberstudy.com/news-article.aspx?id=5092&b=earlier-news.aspx>
- ¹⁹ Khin, A. A., Mohamed, Z., & Hameed, A. A. A. (2012), The Impact of the Changes of the World Crude Oil Prices on the Natural Rubber Industry in Malaysia. *World Applied Sciences Journal*, 20(5), 730-737.
- ²⁰ Accenture (2015), Extracting value from Natural Rubber Trading Markets; optimizing marketing, procurement and hedging for producers and customers
- ²¹ World rubber prices, Available at: <http://www.indexmundi.com/commodities/?commodity=rubber&months=300>
- ²² Bloomberg (2015), World rubber demand slowdown to weigh on prices through 2020. Available at: <http://www.bloomberg.com/news/articles/2015-03-23/world-rubber-demand-slowdown-seen-weighing-on-price-through-2020>
- ²³ Fox, J. and Castella, J. (2013), Expansion of rubber (*Hevea brasiliensis*) in mainland Southeast Asia: What are the prospects for smallholders? *The Journal of Peasant Studies* 40(1): 155-170.
- ²⁴ Li, Z., & Fox, J. M. (2012), Mapping rubber tree growth in mainland Southeast Asia using time-series MODIS 250 m NDVI and statistical data. *Applied Geography*, 32(2), 420-432.
- ²⁵ "Global demand and supply outlook of NR: trends & prospects" -ANRCP presentation at the Global Rubber Conference (2015) in Vietnam
- ²⁶ Land grabbing, conflict and agrarian-environmental transformations: perspectives from East and Southeast Asia. (2015), Available at: http://www.iss.nl/fileadmin/ASSETS/iss/Research_and_projects/Research_networks/LDPI/CMCP_12- Bissonnette_and_De_Koninck.pdf and USAID (2007), A value chain assessment of the rubber industry in Indonesia. Available at: http://pdf.usaid.gov/pdf_docs/Pnadt492.pdf
- ²⁷ Warren-Thomas, E., Dolman, P. M., & Edwards, D. P. Increasing demand for natural rubber threatens tropical biodiversity.

-
- ²⁸ Aidenvironment (2011), Mobilizing markets in support of community agroforestry, The case for natural rubber and illipe nut from West Kalimantan, Indonesia. In assignment of Cordaid and Oxfam Novib
- ²⁹ These results were obtained by a Swisscontact project in Aceh as reported in Aidenvironment (2011), Mobilizing markets in support of community agroforestry, The case for natural rubber and illipe nut from West Kalimantan, Indonesia. In assignment of Cordaid and Oxfam Novib
- ³⁰ "Rubber distribution & pricing mechanism system in Indonesia"- IRRI presentation at the Global Rubber Conference in Vietnam (2015)
- ³¹ Executive Summary Finwatch report (2012), Available at: http://www.finnwatch.org/images/pdf/finnwatch_lu-onnonkumi_web.pdf
- ³² United States Department of Labor,(2010), 2010 List of Goods Produced by Child Labor or Forced Labor.
- ³³ Danwatch (2013), Behind the rubber label. Available at: <https://www.danwatch.dk/wp-content/uploads/2015/03/Behind-the-rubber-label.pdf> and Rubber production in Liberia. Available at: <http://verite.org/sites/default/files/images/DOL-WORKING%20CONDITIONS%20ON%20LIBERIAN%20RUBBER%20PLANTATIONS-FINAL-ADA%20COMPLIANT.pdf> and Liberia: Plantation expansion and the plunder of a content (2013), Available at: <http://worm.org.uy/articles-from-the-worm-bulletin/section1/liberia-plantation-expansion-and-the-plunder-of-a-continent/>
- ³⁴ Warren-Thomas, E., Dolman, P. M., & Edwards, D. P. (2015), Increasing demand for natural rubber necessitates a robust sustainability initiative to mitigate impacts on tropical biodiversity. *Conservation Letters*, 8(4), 230-241.
- ³⁵ Global Witness (2013), Rubber Barons. Available at: <https://www.globalwitness.org/en/campaigns/land-deals/rubberbarons/>
- ³⁶ Häuser, et al. (2015), "Environmental and socio-economic impacts of rubber cultivation in the Mekong region: challenges for sustainable land use" in *CAB reviews* and Hu H, Liu W, Cao M. Impact of land use and land cover change on ecosystem services in Menglun, Xishuangbanna, Southwest China. *Environmental Monitoring and Assessment* 2008;146:147–56.
- ³⁷ Fox, J., & Castella, J. C. (2013), Expansion of rubber (*Hevea brasiliensis*) in Mainland Southeast Asia: what are the prospects for smallholders?. *The Journal of Peasant Studies*, 40(1), 155-170.
- ³⁸ Global Witness (2013). Rubber Barons. Available at: <https://www.globalwitness.org/en/campaigns/land-deals/rubberbarons/>
- ³⁹ Moreira, A., Moraes, L. A., & Fageria, N. K. (2009), Potential of rubber plantations for environmental conservation in amazon region. *Bioremediation, Biodiversity and Bioavailability*, 3(1), 1-5.
- ⁴⁰ Annamalainathan, K., Satheesh, P. R., & Jacob, J. ECOSYSTEM FLUX MEASUREMENTS IN RUBBER PLANTATIONS.
- ⁴¹ IRSG (2013), Press release on sustainable natural rubber project. Available at: <http://www.rubberstudy.com/news-article.aspx?id=5057&b=earlier-news.aspx>
- ⁴² Warren-Thomas, E., Dolman, P. M., & Edwards, D. P. (2015), Increasing demand for natural rubber necessitates a robust sustainability initiative to mitigate impacts on tropical biodiversity. *Conservation Letters*, 8(4), 230-241 and Mongabay (2015), Growing need for deforestation-free rubber as tire demand destroys native forests. Available at: <http://news.mongabay.com/2015/04/growing-need-for-deforestation-free-rubber-as-tire-demand-destroys-native-forests/>
- ⁴³ UN Global Compact & Business for Social Responsibility (2010), Supply Chain Sustainability; a practical guide for continuous improvement. Available at: http://www.bsr.org/reports/BSR_UNGC_SupplyChainReport.pdf
- ⁴⁴ UN Global Compact & Business for Social Responsibility (2010), Supply Chain Sustainability; a practical guide for continuous improvement. Available at: http://www.bsr.org/reports/BSR_UNGC_SupplyChainReport.pdf
- ⁴⁵ <http://www.swisscontact.org/en/indonesia/projects/project-archive.html>

All pictures in this report carry a copyright. Copyright © 2016 Martin Kunz (FRA). All rights reserved.

