Extracting Value from Natural Rubber Trading Markets
Optimizing Marketing, Procurement and Hedging for Producers and Consumers

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Executive Summary

In 2013, natural rubber constituted a 50 $bn. global market. Whilst lower prices have seen that value decline in 2014, the competitive price of natural rubber compared with synthetic rubber is expanding its use for manufacturing tires, medical products and other consumer goods. Whereas synthetic rubber producers are under pressure from the rise in hydro-carbons feedstock prices (given $100–$110/bbl average Brent price in 2013 and H1 2014) and a recovery of refining crack-margins, natural rubber producers have seen their market share expand further supported by depreciating ASEAN currencies. Sources of demand are shifting too. Traditionally dominated by the Organization for Economic Co-operation and Development (OECD) bloc of countries, it is demand from emerging markets, such as China and India, which have led over the last decade, achieving an average annual GDP growth rate of 8.9% (China) and 7% (India) between 2009 and 2013. The market shifted towards oversupply in 2014 driven by attractive plantation yields when the price of rubber peaked at c.5,400$/ton stimulating new planting. However, production rationalization in ASEAN and demand recovery in mature economies are expected to bring supply and demand into alignment towards the end of 2016.

To prosper in this evolving market, buyers and sellers of natural rubber must develop procurement, trading and marketing strategies that will enable them to extract the best value from volatile prices, evolving trade flows and changing contractual terms. Accordingly, this report provides an in-depth analysis of the fundamental structure of the natural rubber market. We have investigated trading activity on a spot, bilateral or exchange basis and assessed the impact of price discovery, price indexation and other contractual optionalities on buyers’ and sellers’ P&Ls. [Summary report structure on Figure 1).

Six and a half Million Tons [Mt] of natural rubber are estimated to have been traded bilaterally in 2013. However, this volume was predominantly indexed on prices from the main international rubber exchanges, i.e. Singapore Commodity Exchange (SICOM) and Tokyo Commodity Exchange (TOCOM), which represented only c.0.25 Mt or c.4% of bilateral trades. This highlights the imperative to understand the price discovery process at the main exchanges, as well as the level of liquidity through open interest, trading volume and churn rate. Doing so will deepen the understanding of pricing drivers and the potential for deviation away from supply and demand fundamentals. For example, the periodic spreads between TOCOM and SICOM, which peaked at c.33% in June 2013, created significant implications for buyers and sellers indexing long-term contracts on one exchange versus another. Such evolving market dynamics are prompting buyers and sellers to enhance their commercial strategy for procurement and marketing through four main activities: participation in the price discovery process, creating an optimal portfolio mix, advanced contract structuring, and hedging.

With an average annual volatility of c.35%, and limited levels of liquidity on main international exchanges as reflected in annual churn rates of c.30x on SICOM for instance, buyers and sellers will need to develop procurement and marketing functions that incorporate superior risk management capabilities to manage integrated margins. As market players increasingly rely on a more diverse mix of spot, exchange and bilateral contracts within their portfolios, and step-up their hedging and trading activities, the cost efficiency of front-to-back processes handling the end-to-end trade cycle will also be an important value lever.

In this report, we have summarized the main dynamics of the natural rubber trading markets and how they should lead buyers and sellers to re-engineer their commercial strategies, invest in procurement, marketing and risk management capabilities which will, in turn, allow buyers and sellers to optimize their manufacturing or production integrated margins. Our work with industry leaders – including tire and medical goods manufacturers as well as plantation owners and marketers – has demonstrated that these investments can translate into incremental earnings, further highlighting the need for market players to act.

Figure 1: Report Content Summary

Rubber Market Fundamentals

<table>
<thead>
<tr>
<th>Buyers / Consumers [Demand]</th>
<th>Imports</th>
<th>Exports</th>
<th>Trade Flow</th>
<th>Sellers / Producers [Supply]</th>
<th>Supply and Demand Balance</th>
</tr>
</thead>
</table>

Natural Rubber Trading Fundamentals

<table>
<thead>
<tr>
<th>Market Structure and Price Discovery</th>
<th>Spot</th>
<th>Bilateral</th>
<th>Exchange</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absolute and Relative Prices</td>
<td>Volatility</td>
<td>Correlations</td>
<td></td>
</tr>
</tbody>
</table>

Strategic Initiatives for Natural Rubber Buyers and Sellers

| Commercial | Operational |
| Market Fundamental Analysis | Trading Portfolio Development |
| Contract Structure Development | Operating Model Development |
| Hedging Strategy Development | Capabilities and Processes |
| | Tools and Systems |

Source: Accenture Analysis
Rubber plays a central role in the global economy, with major applications in the automotive, manufacturing, consumer goods and medical industries. The automotive industry alone accounts for c.76% of rubber demand and is the primary driver of changes in year-on-year rubber consumption [Figure 2]. Global rubber demand grew at c.5% per annum between 2009 and 2013 to reach 26.7 Mt, outpacing global GDP growth which averaged c.1.9% per annum during the same period.1 Rubber markets have historically been centered in the Asia Pacific region, which constitutes c.70% of natural rubber and c.60% of synthetic rubber consumption, with the ASEAN region alone accounting for c.75% of global production and c.87% of global natural rubber exports in 2013.2

Natural rubber and synthetic rubber compete for broadly the same market demand as there is a high degree of substitutability between the two commodities. However, the manufacturing processes and cost base for each type of rubber are linked to different cost structures and market fundamentals.

Natural rubber is produced as an agricultural product through rubber plantations in primarily tropical regions [Figure 9]. Synthetic rubber is manufactured as a by-product of petroleum refining through a petrochemical process.

Natural rubber prices peaked towards the end of 2010, owing to a rebound in demand from the recession-linked lows of 2009 and supply disruptions caused by the El Niño weather phenomenon which resulted in limited rainfall in the ASEAN region. With crude oil prices at $70-$80/bbl during this period, synthetic rubber enjoyed a cost advantage over natural rubber. This led to natural rubber’s share of total production dropping from 44% in 2008 to 42% in 2011 [Figure 5], and the natural rubber price premium over synthetic rubber prices to peak at c.$2,000/ton in January 2011 [Figure 4].

However, the period from 2011 to 2013 has seen sustained downward pressure on rubber prices. This was caused by a slowdown of demand and the chronic oversupply of natural rubber that resulted from the maturation of a high volume of rubber trees that were planted between 2005 and 2007, at a time of peak rubber prices (with rubber trees typically requiring 6-7 years to mature). However, with the unit cost of natural rubber closely tied to land leasing and labor costs, recent depreciation of ASEAN currencies against the US Dollar (c.-9% between Jan 2013 and July 2014)3 and improved plantation yield from better harvesting techniques (c.13% increase in plantation yield over the last 5 years) resulted in natural rubber cash margins partly resisting the downward price impact.

Figure 2: Total Demand – Natural and Synthetic Rubber (2013)

<table>
<thead>
<tr>
<th>Industry</th>
<th>Application</th>
<th>Natural Rubber Consumption Segments [%] (Million Tonnes)</th>
<th>Synthetic Rubber Consumption Segments [%] (Million Tonnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automotive</td>
<td>Vehicle Tires</td>
<td>c.70% 7.9</td>
<td>c.81% 12.5</td>
</tr>
<tr>
<td></td>
<td>Engine Belts, Insulators</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Basket, Seals, Strips etc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medical</td>
<td>Surgical Gloves</td>
<td>c.13% 1.5</td>
<td>c.2% 0.3</td>
</tr>
<tr>
<td></td>
<td>Syringes, Droppers</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Catheters, Caps, Teats etc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manufacturing</td>
<td>Conveyor Belts</td>
<td>c.9% 1.0</td>
<td>c.11% 1.7</td>
</tr>
<tr>
<td></td>
<td>Moldings, Linings</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tubes, Hoses, Mats etc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consumer Goods</td>
<td>Apparel, Footwear, Labels</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Foodstuff, Packaging</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sports Goods and Equipment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Consumption</td>
<td>100% 11.3</td>
<td></td>
<td>100% 15.4</td>
</tr>
</tbody>
</table>

Source: Accenture Analysis. Data Sources: Malaysian Rubber Board, China Rubber Industry Association, Thai Rubber Association. Used with permission.

1Data Source: World Bank Development Indicators
2Source: Accenture Analysis. Data Source: UN Comtrade Database, International Rubber Study Group (IRSG).
3Data Source: Bloomberg, Thomson Reuters
Figure 3: Key Characteristics of Natural Rubber and Synthetic Rubber

<table>
<thead>
<tr>
<th>Natural Rubber (NR)</th>
<th>Synthetic Rubber (SR)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Major Grades</strong></td>
<td></td>
</tr>
<tr>
<td>Ribbed Smoked Sheet (RSS)</td>
<td>Styrene Butadiene Rubber (SBR)</td>
</tr>
<tr>
<td>Technically Specified Rubber (TSR)</td>
<td>Isoprene Rubber (IR)</td>
</tr>
<tr>
<td>Butadiene rubber (BR)</td>
<td>Butadiene rubber (BR)</td>
</tr>
<tr>
<td>Nitrile Rubber (NBR)</td>
<td>Nitrile Rubber (NBR)</td>
</tr>
<tr>
<td><strong>Overview of Physical Properties</strong></td>
<td></td>
</tr>
<tr>
<td>NR has high flexibility, elasticity, tensile strength, relatively high resistance to oil and ozone</td>
<td>SBR has excellent resistance to abrasion, high temp., but relatively low resistance to oil and ozone</td>
</tr>
<tr>
<td>IR has similar properties to NR</td>
<td>BR has high elasticity, low-temperature flexibility</td>
</tr>
<tr>
<td>NBR has high resistance to oil and grease</td>
<td></td>
</tr>
<tr>
<td><strong>Major Applications</strong></td>
<td></td>
</tr>
<tr>
<td>Commercial / Passenger Vehicle Tires</td>
<td>SBR and IR have similar applications to NR</td>
</tr>
<tr>
<td>Surgical Gloves</td>
<td>BR is used as a blend component with NR</td>
</tr>
<tr>
<td>Engine Belts</td>
<td>NBR is used for oil and grease-resistant machine or engine parts, hoses</td>
</tr>
<tr>
<td>Consumers goods</td>
<td>Certain synthetic rubber grades have very specific uses such as pharmaceutical products</td>
</tr>
<tr>
<td>Footwear</td>
<td></td>
</tr>
<tr>
<td><strong>Tire Composition by Weight</strong>&lt;sup&gt;4&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>Passenger car 12–18%</td>
<td>Passenger car 20–35%</td>
</tr>
<tr>
<td>Commercial Vehicle 23–30%</td>
<td>Commercial Vehicle 10–20%</td>
</tr>
<tr>
<td><strong>Major Producing Regions</strong></td>
<td></td>
</tr>
<tr>
<td>c.75% of world production comes from ASEAN</td>
<td>SBR is the most common grade, forming 34% of synthetic rubber production</td>
</tr>
<tr>
<td>Major producing countries are Thailand, Indonesia, Vietnam, China, India, Malaysia</td>
<td>c.54% of SBR production is from the Asia Pacific region</td>
</tr>
<tr>
<td></td>
<td>Major producing countries are China, USA and Japan</td>
</tr>
<tr>
<td><strong>Cost Base Components</strong></td>
<td></td>
</tr>
<tr>
<td>Land leasing or acquisition costs</td>
<td>Feedstock price (Naphtha from Crude Oil, NGLs)</td>
</tr>
<tr>
<td>Fertilizer, seeds and other materials</td>
<td>Petrochemical process costs</td>
</tr>
<tr>
<td>Plantation yield and time to maturity</td>
<td>Storage and logistics costs</td>
</tr>
<tr>
<td>Labour costs</td>
<td></td>
</tr>
<tr>
<td>Processing costs</td>
<td></td>
</tr>
<tr>
<td>Storage and logistics costs</td>
<td></td>
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</tbody>
</table>

Source: Accenture Analysis. Data Sources: Rubber Manufacturers Association (RMA) [USA], Malaysian Rubber Board, International Rubber Study Group (IRSG). Used with permission.

 Concurrently, with synthetic rubber’s cost closely tied to the price of Naphtha (a derivative of crude oil and quoted globally in US Dollars), prices have been negatively impacted by the recovery of crude oil prices and refinery margins from 2011 [Figure 4]. This upward cost pressure, coupled with a shrinking supply of specific forms of feedstock, are causing substantial transformations in the production of synthetic rubber. A key example of this is Styrene-Butadiene Rubber (SBR), the most heavily traded form of synthetic rubber [Figure 3]. SBR exhibits chemical and physical properties similar to all grades of natural rubber, and is primarily produced from Butadiene, a by-product of Ethylene cracking (which is traditionally done using heavier hydrocarbons such as Naphtha for feedstock). However, with the increase of wet gas production from shale fields, there has been a shift towards using lighter Natural Gas Liquids (NGL) feedstock for Ethylene Cracking such as Ethane and Propane, which produce a much lower proportion of Butadiene as a by-product.<sup>5</sup> This shift has led to supply pressure on Butadiene and driven prices up in recent years along with an increase in associated crude oil prices (from $70–$80/bbl levels in 2009 to $100–$110/bbl in 2013). As NGL production expands further in the US and China, the synthetic rubber industry is expected to shift to alternative technologies for producing Butadiene, such as Butane Dehydrogenation, which are currently uneconomical due to their high capital costs.

<sup>4</sup>Average weight of tire for passenger car is 12kg; whilst tire for commercial vehicle is 56 kg according to US Department of Transportation (DOT).

<sup>5</sup>Using Naphtha feedstock produces between 6–7% Butadiene whilst Ethane and Propane typically only produce about 2–3%.
Crude oil prices are expected to remain between $80-$110/bbl levels for the next three to five years, and with a recovery in refining cracks to a c.$10-$15/bbl range, synthetic rubber’s cost base will remain under pressure in the short- to medium-term. Assuming rubber prices remain stable over the next two to three years, cash margins for natural rubber producers are likely to improve while those of synthetic rubber producers remain compressed. We expect that this will further support the expansion of natural rubber’s share of the overall rubber market from c.44% in 2013 to c.47% in 2016 [Figure 5]. In the following section, we investigate the drivers behind, and outlook for, supply and demand in the natural rubber market, and assess the impact of market fundamentals on natural rubber’s buyers and sellers more specifically.

Figure 4: Historical Prices [USD/t] and Reference Cost Drivers by Rubber Type [Rebased to 100]

Notes: ‘ASEAN FX Basket Index’ is calculated using an equally weighted basket of THBUSD, VNDUSD and IDRUSD, representing currencies of the major natural rubber producing countries Thailand, Vietnam and Indonesia respectively; ‘Dubai Crude Oil’ prices are based on the prompt month futures contract; ‘Dubai-Singapore Crack’ (‘DUB-SIN Crack’) refers to cracking refining margin of Dubai crude oil in Singapore; ‘Spread’ is calculated as the price of Synthetic Rubber – SBR 1502 CFR (Cost and Freight) North East Asia, subtracted from Natural Rubber – RSS3 SICOM FOB (Free-on-board) Singapore; ‘ASEAN FX Basket’, ‘Dubai Crude Oil’ and ‘Dubai-Singapore Crack’ are rebased to 100 as of 01-Jan-2008.

Source: Accenture Analysis. Data Sources: Thomson Reuters, Bloomberg. Used with permission.

Figure 5: World Rubber Production by Rubber Type [Mt]

Source: Accenture Analysis. Data Sources: Malaysian Rubber Board. Used with permission.
Global natural rubber consumption has grown at c.5% per annum between 2009 and 2013, driven primarily by China (Chinese GDP grew at an average of 8.9% per annum). OECD demand has remained flat over the same period, primarily as a result of a contraction in demand after the global financial crisis (OECD GDP grew at an average of 0.8% per annum between 2009 and 2013). As the global economy rebounded from the recession-linked lows of 2009, natural rubber consumption grew by c.15% year-on-year between 2009 and 2010, although the period between 2011 and 2013 saw a slowdown in consumption with growth at c.1.4% per annum.

In 2013, the Asia Pacific region led demand growth, with a c.5.8% year-on-year increase in rubber consumption, whilst American and European consumption contracted by c.8%. However, H1 2014 witnessed a revival in the automotive industry with car sales and vehicle replacement rates registering a moderate upturn in mature economies and strong growth in emerging economies (motor vehicles per 1,000 people were estimated to be 570 and 90 in the OECD block and China respectively in 2013), which support an anticipated partial recovery in demand for natural rubber. Based on our forecast, a moderate economic recovery in mature economies will lead to a partial revival of their automotive markets, while middle class expansion in emerging economies will support the growth of automotive, consumer goods and manufacturing industries. Overall, demand for natural rubber is expected to grow at c.3-4% per annum globally over the next 5-7 years.

Figure 6: Natural Rubber Consumption [Mt] and Historical Growth [%]

Notes: Europe figures based on Germany, France, Spain, and Italy.

Source: Accenture Analysis. Data Sources: Macquarie Research, Beijing Waterwood, International Rubber Study Group (IRSG). Used with permission.

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*Data Source: World Bank Development Indicators*
*Data Source: OECD Statistics*
*Data Source: Macquarie Research, "Natural Rubber Outlook: still heavy but not as bearish", Oct 2013*
*Data Source: Accenture Analysis. Data Source: International Rubber Study Group (IRSG).*
*Data Source: World Bank Development Indicators*
In US and Europe – Whilst demand for natural rubber slumped substantially due to a contraction in vehicle sales in the US in 2013, new vehicle sales grew by 3.7% in H1 2014 with July 2014 witnessing a 9.1% increase over July 2013. This sales momentum is expected to continue at least through to H1 2015 on the back of incentivized auto lending, but further long-term vehicle sales growth is likely to revert to the level of GDP growth forecasts. European vehicle sales also registered strong growth of 5.8% in H1 2014, but analysts and manufacturers expect a slowdown in 2015 as manufacturer discounts and government incentive programs – such as the cash-for-clunker program, which encourages consumers to trade-in old vehicles for newer fuel efficient ones - dry up. Hence, despite a strong start in H1 2014, the European Automobile Manufacturers’ Association (ACEA) revised its projections for vehicle sales growth in 2015 to a moderate 2.5-3%. Overall, both the US and Europe are expected to add limited incremental natural rubber demand over the next three to five years, with optimistic projections putting GDP growth at c.2% per annum for Europe and c.3% per annum for the US between 2014-2020.

In China and India – Over the past decade, China has emerged as the number one consumer and demand growth driver of natural rubber, with a three-fold increase in demand between 2000 and 2013. At c.4.2 Mt [Figure 6], Chinese consumption represented over 35% of total global consumption in 2013. Vehicle sales in China grew at 11% in H1 2014 over the same period in the previous year driven by Chinese consumers making advanced purchases in anticipation of government plans to introduce new regulations in 2015 that will curb car sales and tackle congestion and pollution. Regulations, expected to impose quotas on car ownership and license plate issuance, will primarily reduce vehicle sales in the major cities of Beijing, Shanghai and Guangzhou. However, sales momentum is expected to be resilient in emerging urban centers and in the automotive export industry. Overall, we expect that natural rubber consumption growth will sustain at c.6-7% per annum levels for the next three to five years. Simultaneously, India is expected to rapidly expand its natural rubber consumption footprint with consumption increasing two-fold to c.1 Mt between 2000 and 2013. Vehicle production and exports grew at c.13% and c.17% per annum respectively between 2004 and 2013, as several auto manufacturers set up bases in India in response to growing domestic demand, lower manufacturing costs, the availability of skilled manpower, the allowance of 100% Foreign Direct Investment (FDI), and a fully de-licensed export regime for the automotive industry. Although, an economic slowdown between 2010 and 2013 flattened vehicle sales and rubber demand, the change of government in 2014 has already led to signs of an economic revival with expectations of industrial and manufacturing reforms and a turnaround in consumer sentiment. Domestic car sales already demonstrated a reversal in momentum in Q3 2014, posting a c.6-8% increase over Q3 2013. Further, the Society of Indian Manufacturers (SIAM) revised its FY 2015 sales growth projections to between 5-10%, compared to a projection of flat sales made in H2 2013. Overall, it is expected that ongoing reforms, rising income levels and an expanding middle class will drive growth in the consumer goods and automotive industries. For these reasons we anticipate natural rubber consumption in India to grow at c.5-6% per annum over the next five to seven years [Figure 7].

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Figure 7: Natural Rubber Markets by Consumption [Mt] and Forecasted (year-on-year) Growth [%]

Notes: ‘Forecasted Consumption Growth Rate’ based on Demand Forecast Models for each market; ‘Other Asia’ figures based on Asia excluding China, India and Japan; ‘Europe’ figures based on Germany, France, Spain and Italy.

Source: Accenture Analysis. Data Sources: UN Comtrade, Macquarie Research, Beijing Waterwood, International Rubber Study Group (IRSG). Used with permission.
Supply Outlook

Between 2009 and 2013, natural rubber production grew at c.5.5% per annum globally, with c.90% of this growth originating from Thailand, Indonesia and Vietnam. Overall, given the availability of suitable climatic conditions (wet and tropical) for plantations, more than 75% of natural rubber production has been concentrated in the ASEAN region. In 2013, Thailand remained the largest producer of natural rubber, accounting for 34% of global production equivalent to 4.1 Mt, followed by Indonesia and Vietnam, accounting for 26% and 9% respectively (Figure 8). Production has been approximately evenly split between the TSR, RSS3 and other grades of natural rubber in 2013, with their respective manufacturing processes having a similar cost base (Figure 9).

As we further investigate the price discovery process of natural rubber and its impact on buyers and sellers’ approach to procurement and marketing operations, it is essential to review the supply dynamics in the ASEAN region, which represents c.87% of global seaborne exports.

**Thailand** – Production in Thailand grew at 5.9% per annum from 3.1 Mt to 4.1 Mt between 2008 and 2013 due to the Thai government’s encouragement of small landholders in southern Thailand to grow rubber trees between 2000 and 2007. The government’s targeted programs for rubber plantation led to a more than 50% increase between 2000 and 2013 in acreage under rubber cultivation, reaching 3.25 MHa in 2013 (Figure 10). However, between 2013 and 2014, due to the continued decrease in rubber prices, the Thai government decided to convert certain areas under rubber cultivation to palm oil, with a pilot project of about 3.25 MHa in 2013 (Figure 10). This is not expected to impact 2015-2016 production levels significantly, and will ultimately be driven by palm oil to rubber prices margin arbitrage, which will in turn drive the tree replacement program over the next two to three years.

**Vietnam** – With the objective of becoming one of Asia Pacific’s agricultural hubs, the Vietnamese government has been sponsoring rubber planting campaigns since 2001. Despite the downward trend in natural rubber prices between 2011 and 2013, the government maintained these measures and acreage is now expected to double to c.2 MHa by 2020. The government is further promoting advanced tapping techniques leading to the highest yield (1.75 t/ha) amongst all major rubber producing countries in 2013 (Figure 11). However, with rubber prices at historical lows, the Vietnamese Rubber Association has asked member countries to rationalize supply at the end of 2011 to support prices. Over the coming years, nationalist measures aimed at expanding the local rubber processing and manufacturing sector onshore are expected to lead incremental supplies to be absorbed locally.

**Figure 8: Natural Rubber Production [Mt], Historical Growth [%] and Rubber Plantation Area [MHa]**

![Figure 8](image)

**Key**

- **Country, Production CAGR (2004-2013) [%]**
- **Plantation Area (2013) [MHa]**
- **Production (2013) [Mt]**
- **Share of Global Production (2013) [%]**

**Note:** Plantation Area includes yielding and non-yielding (planted area with trees not at maturity) acreage.

*Source: Accenture Analysis. Data Sources: Office of Agriculture Economics (Thailand), India Rubber Board, China Rubber Industry Association, Association of Natural Rubber Producing Countries (ANRPC), Indian Rubber Board, International Rubber Study Group (IRSG), Used with permission.*

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16Source: Accenture Analysis. Data Source: Association of Natural Rubber Producing Countries (ANRPC).
17Data Source: Reuters, “Thai govt to aim for rubber supply cut to support prices”, Aug 2014
18Data Source: Reuters, “As Vietnam stretches rubber output, risk of price war grows”, Apr 2014
Figure 9: Natural Rubber Production Process and Main Grades (2013)

- Trees take 6-7 years to mature before harvesting
- Diagonal incision made to extract latex
- Latex flows into a cup attached to rubber trees
- Coagulated naturally in rubber collecting cup
- Granulated by rotary knife cutter into small pieces
- Cup lumps washed and mixed in blending pools
- Cleaned rubber reduced to crumbs
- Crumbs washed and dried at temperature up to 140 °C
- Dried rubber pressed into bales
- Coagulated naturally in rubber collecting cup
- Granulated by rotary knife cutter into small pieces
- Roll coagulated rubber to thinner slabs
- Roll in a mangle machine to be Ribbed rubber sheets
- Ribbed sheets hung outdoor to dry
- Ribbed sheets smoked at temperature up to 60 °C
- Latex diluted with water in trays
- Coagulated using formic acid or acetic acid
- Roll coagulated rubber to thinner slabs
- Roll in a mangle machine to be Ribbed rubber sheets
- Ribbed sheets hung outdoor to dry
- Ribbed sheets smoked at temperature up to 60 °C

Note: Share is based on proportion of Natural Rubber produced in Thailand (2013).

Source: Accenture Analysis. Data Sources: Transport Information Service (TIS) [Germany], Thai Rubber Association. Used with permission.

Figure 10: Evolution of Natural Rubber Producers by Plantation Yield [t/Ha] and Plantation Area [MHa]

Note: ‘Plantation Yield’ refers to 3-year average to account for seasonal fluctuations.

Indonesia and Malaysia – With the largest area under rubber cultivation at c.3.5 MHa [Figure 8], Indonesia has suffered from low production yields, producing less than Thailand, mainly due to aging rubber trees and outdated cultivation techniques in small-scale plantations. As a result, GAPKINDO (Rubber Association of Indonesia) - in collaboration with Disbun (Estate Crops Division of Indonesian government’s Department of Agriculture) and the Centre for Policy and Implementation Studies (CPIS) - initiated an education program focused on improving tapping techniques, and a tree replacement program with higher-yield planting materials. These initiatives led to yield increase by over 90% between 2000 and 2013 to c.1 t/Ha [Figure 11]. Further yield improvement is expected as the Ministry of Plantation Industries announced a commitment to yield improvement programs in 2013, with potential for up to c.50% further increase. This will support growth in production whilst additional demand from the local tire and consumer goods manufacturing industries will absorb part of this incremental supply in 2015–2017. In Malaysia, rubber production decreased 3.8% per annum between 2004 and 2013 primarily driven by an expansion of palm oil plantations. Malaysia was the first ASEAN country to start switching from natural rubber to crude palm oil, due to crude palm oil offering higher margins on a per hectare basis and oil palm trees requiring only three years as opposed to the five to seven years for rubber trees, all of which offer higher and quicker returns than natural rubber production. Malaysian exports have declined at c.3% between 2004 and 2013, making it a net importer of natural rubber to support the local glove manufacturing and automotive industries in 2011.

China and India – China and India’s production also grew to support domestic consumption, representing c.15% of global production in 2013. Areas under rubber cultivation in China witnessed a c.50% increase over the last decade from c.0.4 MHa to c.0.6 MHa. However, as rubber prices fell, cultivated area receded by c.11% between 2011 and 2013. Chinese production growth is expected to slow down with the government of the Yunnan province – host to over 75% of all new rubber plantations since 2000 in China - gradually withdrawing all plantation incentives between 2012 and 2013 to manage the ecological impact of the rapid growth of rubber plantations in less suitable landscapes. With a supply glut in the market, Chinese production is at best expected to grow at a modest 1-2% per annum through to 2017. In India, more than c.45% of all natural rubber trees are expected to become low-yielding or ‘aged’ by the end of 2014, leading to a drop in yield. New production is expected to come online in 2015 as trees mature from a planting exercise undertaken on fresh land in 2010, at a time of peak rubber prices. The Rubber Board of India further indicated its intent to refresh ‘aged’ plantations between 2016–2018 should market prices stabilize, implying the possibility of only an incremental supply for the next five to seven years and a resilient reliance on imports in the short to medium-term.

Looking ahead, buyers and sellers need to anticipate the emergence, resilience, or retreat of the main natural rubber demand and supply centers as this further influences trade flows and global market balance.
Trade Flows and Global Supply and Demand Balance

Buyers and sellers will need to anticipate changes in future trade flows in order to understand the impact these will have on their procurement or marketing strategies, and on the overall price level. China, the US and Europe together represented c.50% of global imports in 2013, with China’s share of global imports growing from c.20% to c.30% between 2004 and 2013. China and India, which accounted for c.90% of incremental global import trade flow between 2004 and 2013, are expected to capture a similar share of incremental imports in the period up to 2017.

The ASEAN region accounted for c.87% of natural rubber exports in 2013 [Figure 12]. It is likely to remain the primary exporter of natural rubber through to 2020 despite the oversupply that has triggered rationalization of rubber plantations and a switch to crude palm oil in producing countries such as Malaysia, Thailand and Indonesia. Thailand, Indonesia and Vietnam accounted for almost 100% of the incremental exports between 2004 and 2013. Vietnamese exports grew at c.7% per annum from 2004 to 2013 and compensated for the c.6% per annum reduction in Malaysian exports over the same period.

Rubber has witnessed significant price volatility over the past 5 years, averaging at c.35% on an annual basis with prices ranging from lows close to $1,000 in H2 2008 and highs close to $6,500 in H1 2011. This degree of price fluctuation has been reflecting the difficulties in achieving a stable market balance over the past decade [Figure 14]. Following a largely balanced market between 2004 and 2008, natural rubber witnessed a tight market up to 2011 and has since turned into an oversupplied market. In essence, the two year price surge in 2005–2007 prompted an increase in plantation area which, in turn, led to an oversupply situation beginning mid-2011, when trees in plantations started to reach maturity. Prices have since dropped sharply and are approaching a five year low in 2014, having dropped YTD almost 30% up to July 2014. The supply glut will be further sustained with high inventory levels on top of ongoing high production output [Figure 13]. Even with acreage rationalization expected in Thailand and Indonesia and a recovery in OECD and emerging market demand, the market is expected to continue remaining oversupplied through to 2016.

Within this market context, spot market prices are expected to continue favoring buyers until early 2016. It is now key to assess how buyers and sellers should structure their portfolio, procurement, and marketing strategies in order to best extract value from this anticipated market environment.

Figure 12: Global Trade of Natural Rubber: Major Exporters, Importers and Trade Flow (2013) [Mt]

Source: Accenture Analysis. Data Sources: UN Comtrade, Malaysian Rubber Board, Thai Rubber Association (TRA), General Department of Vietnam Customs. Used with permission.
Figure 13: Global Supply and Demand Balance – Inventory Level [Mt] and Market Prices [USD/t]

Source: Accenture Analysis. Data Sources: International Rubber Study Group (IRSG), Thomson Reuters, Economist Intelligence Unit (EIU). Used with permission.

Figure 14: Natural Rubber Prices in the Context of Market Supply and Demand Balance

Source: Accenture Analysis. Data Source: Thomson Reuters. Used with permission.
Natural Rubber Trading Fundamentals

Achieving cost-efficient procurement or revenue-maximizing marketing is a core strategic objective of buyers and sellers. Assessing the outlook for the supply and demand of natural rubber provides an initial view of the market’s balance, inferring forecasts for prices and trade flows, which can subsequently guide the future pricing of manufactured products or production planning. In addition, buyers and sellers can generate additional value by understanding the spot and term price discovery process and structuring a trading portfolio that optimizes price, volumetric optionality and exposure to market, liquidity and counterparties’ risks. In this section, we analyze the fundamentals of the price discovery process, portfolio structures and market liquidity in order to derive recommendations for optimal natural rubber marketing, trading and procurement.
Figure 15: Natural Rubber Market Structure for Price Discovery and Selected Trading Strategies

Selected Illustrative Examples

- **Carry Trade**: Natural rubber inventory trade strategy anticipating forward curve contango and delaying sell orders.
- **Joint-marketing Management**: Association of sellers to coordinate production auctioning or withdrawing to manage supply expansion or rationalization.
- **Physical Constraints**: Weather, tree-yielding, tapping and other physical constraints influencing time and cyclical volume of supply auctioning.
- **Speculator Short**: Naked short strategy based on an anticipated oversupply market balance or based on other macro-strategies (commodities portfolio, hedge, other).

Selected Illustrative Examples

- **Manufacturing Cycle**: Cyclical forward and spot purchases based on inventory threshold and planned manufacturing schedule.
- **Paper Hedging Long**: Manufacturer buyers hedging end products prices through long physical hedges which match products pricing cycles and level of costs pass-through or margin absorption.
- **Paper Hedging Short**: Forward position closure or buy-back based on targeted margins.
- **Speculator Long**: Either pure paper long strategy or with physical delivery to further resell on the spot or term market to leverage anticipated contango market.

*Source: Accenture Analysis*
Understanding the level of efficiency and transparency in the price discovery process is essential for any market participant seeking to define an optimal sourcing or marketing strategy. Similar to other commodities such as grain, wheat or edible oils, natural rubber price discovery has been driven by the players’ participation in the spot and term markets, which, in turn, have been providing a price reference for bilateral long-term contracts indexation. A high level of liquidity is essential to both spot and term markets, and is reflected by a high volume of transactions driven by a large number of counterparties trading directly or indirectly through brokers. Further analysis of the number of independent participants can provide an indication of the true level of market liquidity and the potential for trading strategies to distort market prices.

Natural rubber has been following the same evolutionary path of most commodity markets. The market started with long-term bilateral contracts for sellers to lock-in long-term SPAs (Sales and Purchase Agreements) as a way of backing their upfront investments in production assets. Later, as production assets expanded and volumes between buyers and sellers progressively diverged, imbalances arose which left excess volumes available for the spot market. Such transactions provided the basis for price discovery and portfolio flexibility, further attracting additional participants and creating a virtuous circle of price discovery. At the same time, exchange products were developed to meet hedging and risk management requirements that arose from buyers and sellers needing to lock-in month-to-year-ahead prices. As prices began to reflect market supply and demand fundamentals, buyers and sellers progressively shifted fixed-price long-term contracts to index-linked prices referencing spot indices or exchange-settled prices. However, in 2013, natural rubber bilateral trades accounted for an estimated c.75%-80% of the total physical market [Figure 16] exceeding by c.20% the levels observed on alternative commodity markets such as coal or crude oil. With bilateral trades relying on private price negotiations and specific structured terms, this significantly reduces the volume of transactions contributing to the price discovery process. As a result, spot and term markets – c.20-25% of physical transactions – represent a more constrained platform from which buyers and sellers can retrieve a price reference, in order to conduct their long-term bilateral trades. There are further concerns related to the liquidity of certain exchanges and the number of active market participants. Whilst the SHFE (Shanghai Futures Exchange) – home to an active natural rubber trading platform - has 200+ members, the AFET (Agriculture Futures Exchange of Thailand) has only 10 brokers and 2 traders as members, leading to a potential concentration of local producers with common trading strategies impacting liquidity through bid-ask spread volatility.

Understanding the fundamental structures of each market and how they can be leveraged to build an optimal portfolio is core to the commercial strategy of buyers and sellers. The objective will be to balance price competitiveness, volumetric flexibility, specification quality and operational reliability. In the following section, we further explore the characteristics of each market with a more extensive analysis of exchange markets, these being the core component of natural rubber price discovery.

Figure 16: Overview of Main Contracting Options for (Physical) Rubber Trading in Current Market

Source: Accenture Analysis. Data Sources: International Energy Agency (IEA), Platts, Clarksons, IHS, ISL, Thomson Reuters. Used with permission.
Bilateral Markets

c.75–80% of natural rubber physical transactions are executed through bilateral contracts, and reflect the historically direct relationship between buyers and producers. Buyers typically purchase from a selected list of suppliers whose natural rubber specifications such as dirt, ash, Nitrogen and volatile content matter are tested and approved internally. In the past such contracts would have been negotiated on a rolling fixed-price basis, but have since been largely indexed to exchange prices (e.g. SICOM) using the average closing price over the month prior to delivery further adjusted for a premium or discount based on quality. As such, bilateral contract volumes add little to the price discovery process.

Bilateral contracts can, however, be structured in multiple ways, offering buyers and sellers the means to optimize value through pricing, volumetric optionality, time optionality, quality penalties and other commercial terms [Figure 17]. Understanding each contractual option, and having internal valuation models to quantify its cost or revenue impact, is becoming the norm for certain sophisticated buyers aiming to leverage long-term contract terms to optimize their portfolios. As bilateral contracts lead to long-term credit risk exposure, buyers and sellers need to spread their positions carefully across different parties and avoid issues such as supply disruption or income losses. Examples such as small-scale Chinese buyers, who had committed to high fixed price contracts, defaulting on volumes of c.200 kt in 2008–2009 when prices reached close to $1,000/ton, further demonstrate the need for active management of counterparty risk.

Spot Market

Natural rubber spot transactions are expected to represent c.15–20% of the total physical market, with trades based on FOB Singapore or FOB Tokyo mirroring the locations of the major international exchanges. Whilst natural rubber has a shelf life of around three to five years, the trading market considers prime rubber to be under 12 months old. With relatively expensive storage costs equivalent to c.1% of the rubber prices per month, inventories have been limited. As a result, buyers have typically been relying on 7–10 day natural rubber inventories, creating a strong need for end-buyers on the spot market to mitigate potential short-term disruptions in their supply chain. As end-buyers need to reach out to multiple suppliers to fulfill short-term purchases, traders and brokers are often leveraged as intermediaries to aggregate the supply information flow and provide end-buyers with natural rubber matching their technical specifications, further expanding the number of active counterparties.

As buyers typically rely on bilateral contracts for the majority of their purchases – which are based on uncommitted volumes with or without flexible take-or-pay penalties – sellers may not be able to provide planned volumes due to production constraints. The spot market consequently becomes an important platform for managing supply security and to secure incremental supply needed, for example, from an increase in manufacturing activity.

Exchange Market

Exchange transactions form the basis of the natural rubber price discovery process. However, volumes physically settled and delivered on exchanges have been low with only c.0.25 Mt of physical settlements in 2013, while total natural rubber traded on long-term bilateral contracts were at c.6.5 Mt, effectively representing 26 times the former [Figure 18].

Given their core contribution to pricing either directly or indirectly through long-term contracts indexation, we have further investigated the mechanisms of the main natural rubber exchanges including the Singapore Commodity Exchange (SICOM) which is now owned by the Singapore Exchange (SGX), the Tokyo Commodity Exchange (TOCOM), the Shanghai Futures Exchange (SHFE), and the Agriculture Futures Exchange of Thailand (AFET) [Figure 19]. Whilst traded contracts on TOCOM and SHFE are limited to the RSS3 grade, SICOM contracts can be for both RSS3 and TSR20 grades. The TSR20 grade has gradually become the most heavily traded contract on the SICOM over the last five years, and is absent from major competing exchanges [Figure 21].

![Figure 17: Main Contractual Considerations for Natural Rubber Physical Bilateral Trades](image)

### Main Contractual Areas

- **Bilateral Contracts**
- **Pricing Terms**
  - Fixed / Indexation
  - Currency
  - Price Fixing Option
  - Volume Commitment
  - Tolerance and Take or Pay Penalties
  - Volume Call / Put Options
  - Time Options
  - Quality Options
  - Location / Incoterm Options
  - Other Advanced Options
- **Volumetric Terms**
- **Other Optionality Terms**

### Examples of Contract Structuring Terms

- Index on one Rubber Exchange Settled Prices averaged on a specific month (e.g. TOCOM)
- Denominate contract in non-USD producing countries currencies or exchange-related currencies – e.g. THB (Thai Baht), JPY (Japanese Yen), CNY (Chinese Yuan)
- Price Call Option available X months ahead of delivery for X days window which can be exercised to fix a price
- Committed base volumes per month or uncommitted volumes
- Volume tolerance band in Contract for X% of base volume with minimum and maximum thresholds tied to Take-or-Pay penalties
- Embedded Call or Put option to secure incremental or reduce base volume prior to delivery
- Swap option to shift volumes between certain months at the option of the buyer or the seller
- Options to deliver different grades such as RSS3, TSR20, with a pricing formula to incorporate quality differentials
- Option to fix delivery terms of sale and to nominate different delivery locations – e.g. EXW (Ex-Warehouse), FOB, CFR
- Other options to put a ceiling or cap to structure price under S-curve approach
- Termination option, exit option

Source: Accenture Analysis

24Source: Reuters, "China rubber importers default on shipments as prices slide", Mar 2014
26Source: Accenture Analysis. Data Source: UN Comtrade Database.
Notes: Global Natural Rubber Internationally Traded Volumes on long-term bilateral contracts refers to the total physical volume of natural rubber exported in the international market in 2013 under long-term contracts; Exchange Delivered Volumes refers to the sum of the physically settled natural rubber volumes in SHFE, TOCOM and the SICOM in 2013.

Source: Accenture Analysis. Data Sources: SGX, SHFE, TOCOM, Thomson Reuters. Used with permission.

**Table 1:** Global Natural Rubber Internationally Traded Volumes on Long-term Bilateral Contracts

<table>
<thead>
<tr>
<th>Country</th>
<th>Traded Volume [Mt]</th>
<th>Settled Volume [kt]</th>
<th>Major Contract(s)</th>
<th>Import Duty</th>
<th>Traded Unit</th>
<th>Number of Members</th>
<th>Major Shareholder(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHFE</td>
<td>c.6.5</td>
<td>c.0.25</td>
<td>RSS3, STR20</td>
<td>Yes</td>
<td>JPY/kg</td>
<td>c.20 Brokers, Traders</td>
<td>Mitsubishi, Nohon etc.</td>
</tr>
<tr>
<td>TOCOM</td>
<td>c.0.25</td>
<td></td>
<td></td>
<td>No</td>
<td>US cent/kg</td>
<td>c.12</td>
<td></td>
</tr>
<tr>
<td>SICOM</td>
<td>c.1.7</td>
<td>c.56</td>
<td>TSR20, RSS3</td>
<td>No</td>
<td></td>
<td>c.45 Brokers, Traders</td>
<td>Temasek Holdings</td>
</tr>
<tr>
<td>AFET</td>
<td>c.1.7</td>
<td>n/a</td>
<td></td>
<td>No</td>
<td>THB/kg</td>
<td>c.10 Brokers, 2 Traders</td>
<td>Thai Government</td>
</tr>
</tbody>
</table>

Note: ‘Traded Volume’ refers to total volume of all natural rubber contracts traded in 2013.

Source: Accenture Analysis. Data Sources: TOCOM, SHFE, SGX, AFET. Used with permission.
Figure 20: Representative Volumes on Major Exchanges (2013)

Notes: ‘Total Traded Volumes’ refers to sum of all natural rubber contracts on the exchange across all tenures; ‘TOCOM’ represents the RSS3 TOCOM FOB Tokyo contracts; ‘SICOM’ represents the sum of the RSS3 SICOM FOB Singapore and the TSR20 SICOM FOB Singapore contracts; ‘SHFE’ represents the RSS3 SHFE EXW Shanghai contracts.

Source: Accenture Analysis. Data Sources: SHFE, SGX, TOCOM. Used with permission.

Figure 21: Characteristics of Major Exchange Contracts

<table>
<thead>
<tr>
<th>Exchange Name</th>
<th>SGX SICOM</th>
<th>SGX SICOM</th>
<th>SHFE</th>
<th>TOCOM</th>
<th>AFET</th>
<th>AFET</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>RSS3</td>
<td>STR20</td>
<td>RU</td>
<td>RSS3</td>
<td>RSS3</td>
<td>STR20</td>
</tr>
<tr>
<td>Clearing Structure</td>
<td>Clearing option (USD)</td>
<td>Clearing option (USD)</td>
<td>N/A</td>
<td>Clearing option (JPY)</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Supply source options</td>
<td>RSS3 Approved producer</td>
<td>SIR20 / SMR20 / STR20 Approved producer</td>
<td>RSS3 or SCR WF</td>
<td>RSS3 Approved producer</td>
<td>RSS3 AFET Approved Factory</td>
<td>STR20 AFET Approved Factory</td>
</tr>
<tr>
<td>Delivery</td>
<td>FOB Singapore FOB Bangkok FOB Leam Chabang FOB Penang</td>
<td>FOB Singapore Warehouse Delivery</td>
<td>EXW Shanghai Warehouse</td>
<td>EXW Tokyo EXW Kanagawa EXW Chiba EXW Ibaragi EXW Aichi</td>
<td>FOB Bangkok FOB Leam Chabang [PAR]</td>
<td>FOB Bangkok FOB Leam Chabang [PAR]</td>
</tr>
<tr>
<td>Traded Unit</td>
<td>US cent/kg</td>
<td>US cent/kg</td>
<td>CNY/t</td>
<td>JPY/kg</td>
<td>THB/kg</td>
<td>THB/kg</td>
</tr>
<tr>
<td>Contract Months</td>
<td>12 consecutive months</td>
<td>12 consecutive months</td>
<td>N/A</td>
<td>6 consecutive months</td>
<td>7 consecutive months</td>
<td>7 consecutive months</td>
</tr>
<tr>
<td>1 lot</td>
<td>5 tonnes</td>
<td>5 tonnes</td>
<td>10 tonnes</td>
<td>5 tonnes</td>
<td>5 tonnes</td>
<td>5 tonnes</td>
</tr>
<tr>
<td>Delivery Unit</td>
<td>20 tonnes</td>
<td>20 tonnes</td>
<td>N/A</td>
<td>5 tonnes</td>
<td>20 tonnes</td>
<td>20 tonnes</td>
</tr>
<tr>
<td>Method</td>
<td>Physical</td>
<td>Physical</td>
<td>Physical</td>
<td>Physical</td>
<td>Physical</td>
<td>Physical</td>
</tr>
<tr>
<td>Type</td>
<td>Future &amp; OTC [Clearing]</td>
<td>Future &amp; OTC</td>
<td>OTC / forward</td>
<td>Future</td>
<td>OTC / forward</td>
<td>OTC / forward</td>
</tr>
</tbody>
</table>

Source: Accenture Analysis. Data Sources: SHFE, SGX, TOCOM, AFET. Used with permission.
Volumes traded on the SHFE have grown, with a substantial CAGR of 35% from 2004–2013, and the SHFE now represents the primary exchange accounting for almost 99% of the annually traded volume between the three exchanges.\(^2\) However, analysis of delivered volumes to the exchanges reveals that SHFE represented only 65% of the delivered volumes in 2013 with a significant portion of traded volumes driven by day-traders and speculators who are not engaged in physical trading [Figure 20]. As trading on the SHFE is restricted to onshore registered entities and is subject to import duties, TOCOM and SICOM have been largely used by international players for both direct trading and price indexation of bilateral physical trades. As we focus on pricing mechanics that impact international buyers and sellers, we have further analyzed the liquidity and pricing dynamics of TOCOM and SICOM [Figure 22]. Trading volumes have shrunk on TOCOM and SICOM from the highs of c.215 kt per day in 2006 to c.60 kt per day in H1 2014 [Figure 23]. A similar trend in volumes is seen for other commodities on the TOCOM, such as crude oil, gasoline, silver, gold, etc., reflecting the trend of domestic Japanese investors cutting down on commodities trading, while emerging demand centers such as China trade on onshore exchanges. With limited liquidity on both exchanges, we have further investigated the pricing dynamics of both exchanges and their correlation in order ultimately to assess the anticipated pricing impact of a TOCOM versus SICOM exposed portfolio for buyers and sellers.

Figure 22: Liquidity Analysis of Major Exchanges (2013)

Notes: ‘Traded Volumes on Exchange’ have been calculated for all natural rubber contracts traded on the exchange, across all tenures; ‘TOCOM’ represents the RSS3 TOCOM FOB Tokyo contracts; ‘SICOM’ represents the sum of the TSR20 SICOM FOB Singapore and RSS3 FOB Singapore contracts; ‘SHFE’ represents RSS3 SHFE EXW Shanghai contracts.

Source: Accenture Analysis. Data Sources: Thomson Reuters, SGX, TOCOM, SHFE. Used with permission.

Figure 23: Average Daily Volumes and Open Interest on SICOM and TOCOM

Notes: ‘Daily Average Open Interest’ refers to the volume of total outstanding futures contracts across all tenures held by the market participants on a given exchange, calculated as a daily average; ‘Daily Average Traded Volume’ refers to the total volume traded across all tenures on a given exchange, calculated as a daily average; ‘TOCOM’ refers to the RSS3 FOB Tokyo contracts; ‘SICOM’ refers to the sum of the TSR20 FOB Singapore contracts and RSS3 FOB Singapore contracts; 2014 data is YTD 1-Jul-14.

Source: Accenture Analysis. Data Sources: Thomson Reuters, SGX, TOCOM. Used with permission.
Market Price Dynamics

Absolute and Relative Prices

With SICOM and TOCOM representing the two main platforms for price discovery and price indexation, buyers and sellers need to carefully evaluate the most suitable exchange for their own contracts, taking into account local supply and demand factors and currency effects. For example, with the depreciation of the Japanese yen starting from Q1-13 following the introduction of ‘Abenomics’, an average discount of $325/ton arose on TOCOM compared to SICOM and lasted c.4 months through Q2-13 [Figure 24]. As a result, a rubber buyer who had priced their physical contracts off TOCOM would have saved an average of 11% from their quarterly natural rubber procurement costs compared to pricing them off SICOM.

Figure 24: SICOM and TOCOM Absolute Prices, Price Spread and JPYUSD Exchange Rate

Notes: ‘SICOM’ represents RSS3 SICOM FOB Singapore; ‘TOCOM’ represents RSS3 TOCOM EXW Tokyo; ‘SHFE’ represents RSS3 SHFE EXW Shanghai.

Source: Accenture Analysis. Data Sources: Thomson Reuters, Federal Reserve Economic Data [USA]. Used with permission.
In addition, as rubber prices also vary according to physical specifications, buyers and sellers need to optimize their choice of price indexation by considering a reference contract that matches the quality of sourced or sold natural rubber. However, it may be preferable to select a contract of a different quality but that is more liquid and therefore expected to better reflect fundamental market pricing. Quality price differentials remain highly non-linear and must be carefully investigated before developing pricing referenced on one product and adjusted for a quality premium or discount. This complex relationship between quality and price can be observed in the spread between TSR20 and RSS3 on SICOM with the latter historically trading at a premium due to additional smoking and rolling processes that improve product quality [Figure 25].

**Figure 25: Quality Spread between RSS3 and TSR20 on SICOM**

![Quality Spread between RSS3 and TSR20 on SICOM](image)

Source: Accenture Analysis. Data Source: Thomson Reuters. Used with permission.

**Volatility**

Buyers and sellers further need to manage price volatility which is typically high in soft commodities markets as a result of the impact of weather and agro-regulatory-driven measures in addition to general macroeconomic factors. With a weekly volatility of c.5.5% on the TOCOM rubber contract over the past five years yielding to an average annual volatility of c.35–40%, hedging will continue to emerge as a central component of risk management for buyers and sellers who aim to lock-in short-term manufacturing margins or marketing revenues [Figure 26]. However, the efficiency of hedging strategies will depend on the liquidity of the underlying exchange contract and the amount of basis risk between exchange and bilateral long-term contracts.

**Figure 26: Historical Weekly Volatility of Different Rubber Contracts and Benchmarks**

![Volatility Chart](image)

Notes: 5-day volatility on a 90-day rolling basis; 'CPO Malaysia' refers to Malaysian Crude Palm Oil front month rolling future; 'Brent Crude Oil' refers to Brent Crude Oil front month rolling future.

Source: Accenture Analysis. Data Source: Thomson Reuters. Used with permission.
Although a large number of producers may be exposed only to natural rubber, a number of buyers will be sourcing multiple commodities in different currencies (e.g. natural rubber in USD, diesel and electricity in EUR, petrochemicals in USD). As FX and commodities prices are correlated (Figure 27), a portfolio approach to risk management will require an understanding of the different correlations, quantifying the overall portfolio’s risks, and managing hedging in an integrated way. Producers need to consider the relationship between their cost base in their domestic currency and their revenue base tied to natural rubber prices in USD to assess correlations which can also evolve through time (Figure 28). With some producers also holding exposures to the palm oil market, a portfolio approach to risk management that incorporates cross-correlations may provide a superior approach to anticipate downside risks. This is even more relevant for traders and buyers who hold positions in a larger number of commodities.

Figure 27: Correlation Matrix of Natural Rubber, Selected Currencies, Crude Palm Oil and Brent Crude Oil (Jan–2013 to Jul–2014)

<table>
<thead>
<tr>
<th>Rubber</th>
<th>RSS3 SICOM</th>
<th>RSS3 TOCOM</th>
<th>USDTHB</th>
<th>USDJPY</th>
<th>CPO Malaysia</th>
<th>Brent Crude Oil</th>
</tr>
</thead>
<tbody>
<tr>
<td>RSS3 SICOM</td>
<td>1.00</td>
<td>0.92</td>
<td>(0.80)</td>
<td>(0.68)</td>
<td>(0.07)</td>
<td>0.16</td>
</tr>
<tr>
<td>RSS3 TOCOM</td>
<td>0.92</td>
<td>1.00</td>
<td>(0.60)</td>
<td>(0.70)</td>
<td>(0.04)</td>
<td>0.35</td>
</tr>
<tr>
<td>Currencies</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>USDTHB</td>
<td>(0.80)</td>
<td>(0.60)</td>
<td>1.00</td>
<td>0.42</td>
<td>0.20</td>
<td>0.13</td>
</tr>
<tr>
<td>USDJPY</td>
<td>(0.68)</td>
<td>(0.70)</td>
<td>0.42</td>
<td>1.00</td>
<td>(0.23)</td>
<td>(0.38)</td>
</tr>
<tr>
<td>Commodities</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CPO Malaysia</td>
<td>(0.07)</td>
<td>(0.04)</td>
<td>0.20</td>
<td>(0.23)</td>
<td>1.00</td>
<td>0.26</td>
</tr>
<tr>
<td>Brent Crude Oil</td>
<td>0.16</td>
<td>0.35</td>
<td>0.13</td>
<td>(0.38)</td>
<td>0.26</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Notes: Correlations have been calculated over an 18-month period, from Jan–13 to Jul–14; 'Brent Crude Oil' refers to Brent Crude Oil front month rolling future; 'CPO Malaysia' refers to Malaysian Crude Palm Oil front month rolling future.

Source: Accenture Analysis. Data Source: Thomson Reuters. Used with permission.

Figure 28: Rolling Correlation (90-day) of Rubber to Brent and CPO

Notes: Rolling correlation is calculated on a 90-day basis; 'TOCOM' refers to RSS3 EXW Tokyo front month rolling future; 'Brent' refers to Brent front month rolling future; 'CPO' refers to Malaysian Crude Palm Oil front month rolling future.

Source: Accenture Analysis. Data Source: Thomson Reuters. Used with permission.
Conclusions on Trading Fundamentals

Buyers and sellers need to structure their portfolios to achieve optimal risk-adjusted returns. This includes managing security of supply through long-term contracts, participating in the price discovery process through a mix of spot and term contracts, and managing price risk through rolling exchange term contracts for hedging. The selection of exchange contracts should be made with reference to liquidity volume, volatility and exposure to other factors (e.g. TOCOM and JPY currency movements). To further summarize the different parameters of available exchange contracts, TOCOM contracts present liquidity suitability with a churn rate of c.500x (2013), although it is more volatile on average given greater exposure to local currency effects with an average weekly volatility of c.4% (2013) [Figure 29]. On the other hand, SICOM is relatively less liquid with a churn of c.30x (2013), but remains a slightly less volatile platform. Buyers and sellers need to carefully consider these trade-offs as they structure their portfolios and design their commercial and operating capabilities to optimize their marketing, trading and procurement operations.

Figure 29: Relative Comparison of Volatility, Churn and Open Interest of Rubber Contracts between Exchanges

Notes: 'Daily Average Open Interest' refers to the volume of total outstanding futures contracts across all tenures held by the market participants on a given exchange, calculated as a daily average; 'Churn Rate' refers to Daily Traded Volumes / Delivered Volumes [x]; "Average Weekly Volatility" refers to the 5-day volatility calculated on a 90-day rolling basis, ‘TOCOM’ refers to the RSS3 FOB Tokyo contracts; ‘SICOM’ refers to the TSR20 FOB Singapore contracts; ‘SHFE’ refers to the RSS3 EXW Shanghai contracts; 2014 data is YTD 30-Jun-14.

Source: Accenture Analysis. Data Sources: Thomson Reuters, Bloomberg. Used with permission.
Strategic Initiatives for Buyers and Sellers

Buyers and sellers of natural rubber can improve earnings by enhancing the sophistication of their procurement, trading, marketing and hedging practices to best leverage evolving market dynamics. Achieving incremental earnings will depend on the ability to develop a commercial strategy that can optimize the portfolio structure and implement operating capabilities that will support the trading cycle’s processes with efficiency and adequate risk management.
Figure 30: Identified Strategic Initiatives for Natural Rubber Marketing, Trading and Procurement

Key Strategic Initiatives for Natural Rubber Buyers and Sellers

- Commercial Strategy
  - Market Fundamentals and Price Discovery Analysis
  - Trading Portfolio Strategy
  - Advanced Bilateral Contract Structuring
  - Hedging Strategy Development

- Operational Strategy
  - Optimal Operating Model for Procurement and Marketing
  - Capability Development and Process Mapping
  - Integrated and Scalable Systems and Tools

- Actively analyze market supply and demand fundamentals and price discovery mechanism to support trading strategy development
- Structure portfolio to optimize pricing and volumetric flexibility and manage market price, counter-party and volumetric risks
- Optimize contract structuring approach to define price indexation, swing and swap optionalities and other terms
- Develop hedging strategy to manage integrated margins from manufacturing based on end-products pricing structure or short-term cash obligations
- Setup operating model and transfer price structure to incentivize procurement or marketing function to optimize margins
- Develop front- to back-office capabilities to ensure cost-efficiency on all components of the trade cycle
- Setup a system architecture to integrate the information flow between trading, logistics, finance and risk management

Source: Accenture Analysis
Commercial Strategy Development

Market Fundamentals and Price Discovery

Whether buyers or sellers, developing an in-depth understanding of market supply, demand and pricing outlooks through fundamental research and price discovery process participation is core to the development of a sophisticated trading strategy. We actively work with our clients to develop short-to-long term supply and demand forecast models as well as more specific trading models that underpin optimized commercial strategies aimed at capturing market arbitrage and anticipated trading behavior. In one example, we were engaged by a client to help evaluate the robustness of their price discovery participation on a regional natural rubber exchange. One of the client’s primary goals was to develop an understanding of the bid and ask submission strategies of other major participants on the exchange. In order to do this, we monitored bid and ask quotes and analyzed the nature of players on two alternative regional exchanges. This led to the finding that volume orders submitted on one of the exchanges were aimed at lifting prices in anticipation of cyclical orders placed by buyers and traders. Further analysis helped us identify that low levels of liquidity at certain time periods on the exchange provided an important advantage to sellers, who leveraged their inventory quasi free-optionality to place and retrieve ask quotes. Leveraging this analysis, we worked with the client to shift price-discovery participation to the alternative exchange where higher liquidity reduced the volatility of bid-ask quotes.

Trading Portfolio Strategy

The trading portfolio needs to be optimized between spot, bilateral and term contracts depending on market dynamics, so that it allows buyers and sellers to benefit from periods of volatility while also ensuring security of supply and sales respectively. We worked with a consumer goods company to review their natural rubber procurement portfolio and to suggest alternative structures that would enhance production gross margin. Initial findings suggested a mismatch between product sales volumes and raw material procurement timing, with limited portfolio flexibility leading to higher working capital to manage inventory and further volatility in monthly gross-margins. Following an analysis of product manufacturing cycles and volumetric commitments, we proposed alternative swing and swap options on contracts to be renewed and a more integrated procurement execution; these recommendations ultimately yielded an attributable c.7% increase in production gross margin (manufactured product sales proceeds net of COGS) on the previous year.

Contract Structuring

Once the target portfolio is defined, long-term contracts need to be structured to create value from pricing, tenure, volumetric commitments and all other optionalities. We worked with a global tire producer who was historically exposed to SICOM prices through price indexation formulae and wanted to assess alternative pricing structures. Based on back-testing pricing models and forward-looking scenarios, we recommended a partial switch to TOCOM price indexation for contracts pending renewal, in anticipation of monetary easing in Japan based on historical SICOM – TOCOM price spreads. We further recommended a ‘Long SICOM Short TOCOM’ synthetic hedge to partly transfer the price exposure of existing contracts. As a result, the client benefited from widening spreads and saved c.$150-200/ton for their natural rubber over Q2-2013.

Hedging Strategy

Hedging should be leveraged as an effective means to protect manufacturing margins for buyers and short-term margins for producers. Hedging strategies need to be carefully developed in order to minimize basis risk between physical contractual positions which are price indexed and exchange contracts. As an example of an effective hedging strategy rollout, we worked with a medical products manufacturing company that wanted to enhance gross margin predictability. Reviewing its pricing structure identified that yearly fixed prices were applied to manufactured products while natural rubber was 80% sourced spot or on indexed contracts. We helped the company manage feedstock prices through an active monthly rolling hedging strategy that was split across two exchanges to manage basis risk. The following year, the company achieved a c.8% increase in EBITDA (earnings before interest, taxes, depreciation, and amortization) through a more stable COGS (cost of goods sold)-to-products price ratio.
Operational Strategy Development

Operating Model

Having a sound commercial strategy for natural rubber procurement or sales needs to be effectively supported by an appropriate operating model, which needs to be equipped to handle procurement or marketing through a trading-centric approach and be fully integrated with manufacturing or production planning. Providing this function with a Profit and Loss Center and an appropriate transfer pricing mechanism to manufacturing or production should be performed to further incentivize an optimal commercial strategy (Figure 31 and Figure 32).

Figure 31: High-level Operating Model Structure for Natural Rubber Consumers

Figure 32: High-level Operating Model Structure for Natural Rubber Producers

Source: Accenture Analysis
Capabilities and Processes

The trading, procurement or marketing corporate function needs to be effectively structured to manage the end-to-end trading cycle [Figure 33], including: front-office (or the part of the organization interacting actively with the market), middle-office (or the part of the organization focused on defining and monitoring the risk policy and managing various types of risk), and back-office (or part of the organization covering finance, accounting and treasury functions).

Systems and Tools

Finally, leading market players will leverage an efficient management of trade orders and positions reporting by utilizing leading CTRM (Commodity Trading and Risk Management) systems architecture and solutions. These will provide cost efficiency when handling a growing volume of trades whilst effectively capturing all terms of structured contracts and complex pricing. A high-level overview of a CTRM system landscape is provided here which highlights the interactions with other information flows [Figure 34].

Figure 33: Overview of Process Flow from Front to Back Office to Execute Rubber Trading Transactions

Figure 34: CTRM Process and System Landscape

Source: Accenture Analysis
Conclusions

The outlook for natural rubber supply and demand indicates continuing oversupply until mid- to end-2016. Producing and exporting countries are struggling to manage high inventories and large supplies from yielding plantations through rationalization measures such as those being implemented by Thailand and Indonesia. However, demand growth is expected to remain resilient in China and India through to 2020, and likely recovery in the developed markets of the USA and Europe is expected to bring overall demand more in line with supply in the medium to long-term, providing a more positive outlook on price recovery. However, as previous periods have shown, uncertainty about economic cycles, weather, and regulatory programs will continue to fuel market price volatility (anticipated to remain at c. 35% levels annually).

To manage this volatility, buyers and sellers must play an active role in the price discovery process and handle their procurement and marketing portfolios to anticipate price risks. Within natural rubber markets, exchange and spot trading are increasingly playing a central role in the price discovery process and pricing structures for long-term contracts, despite accounting for only c.20%–25% of total physical trades. Buyers and sellers have a significant opportunity to enhance their commercial strategies for procurement or marketing by actively managing their portfolio mix and contractual structures to benefit from price dynamics and relative spreads across different exchanges. However, not all exchange contracts are equivalent. Material changes in liquidity through churn rate and open interest can both impact bid-ask spreads and overall volatility. This should prompt buyers and sellers to carefully consider on which exchanges they should trade or rely on for price indexation. Further on, contractual optionality can be structured to match production uncertainty or manufacturing output variability, and ensure supply security and limited exposure to take-or-pay penalties or incremental sales and purchase activity on the spot market. Overall, an enhanced commercial strategy to natural rubber procurement or marketing can deliver gross margin gains of c.7–12%, providing an important source of incremental value generation.

Such an optimal commercial strategy will rely on a trading-centric operating model, backed by front-to-back office processes that ensure cost-effective management of the end-to-end trading cycle. The trading function will have to be integrated with product manufacturing or rubber production to actively manage integrated margins end-to-end.

Accenture helps organizations realize value from their interactions with commodities markets through procurement, marketing or trading by building trade valuation models, contract structures, hedging strategy, and operating capabilities and processes. Our approach is to provide an integrated view to marketing or procurement optimization through an initial in-depth analysis of market fundamentals that then translates into enhanced commercial strategies and operating capabilities. As commodities markets continue their evolution towards increased sophistication, we believe industry leaders will need to compete with enhanced trading strategies to further extract value from fluctuating market volatility and liquidity. As the natural rubber market follows the evolution of more mature commodities, large producing and purchasing organizations must act now to anticipate future market behavior through investments in their marketing and procurement functions.
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Ogan Kose is the Global Managing Director of Accenture Trading, Investment & Optimization Strategy which is part of Accenture Strategy Group. Overall, he has more than 15 years of experience helping commodity players with their earnings and risk management. His primary focus areas are commodity trading, risk management, investment evaluation and financial analysis, pricing, and commodity contract structuring. At Accenture, Ogan has worked with Global soft commodities traders to set up international trading operation starting from designing market entry strategy, operating model, business sizing, risk policy, risk capital and financing requirement for front, mid, and back office operation. He holds Bachelor of Science and Master of Science degrees in chemical engineering (Imperial College, London) and a Master of Business Administration from Georgetown University. He is a member of the Global Association of Risk Professionals and is a financial risk manager. He is based in London.

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Accenture is a global management consulting, technology services and outsourcing company, with more than 305,000 people serving clients in more than 120 countries. Combining unparalleled experience, comprehensive capabilities across all industries and business functions, and extensive research on the world's most successful companies, Accenture collaborates with clients to help them become high-performance businesses and governments. The company generated net revenues of US$30.0 billion for the fiscal year ended Aug. 31, 2014.


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