

INCLINATIONS AND CHALLENGES OF GLOBAL RUBBER PRODUCTION



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ABSTRACT

The world trend of rubber production is on the increase with Thailand, Indonesia and Malaysia as the leading world producers. The general increase in rubber production in the world is in agrees with its demand growth. This may be due to an increase in world technology especially the automobile industries which require more of rubber as raw material. But the production and consumption of natural rubber show a declining trend than that of synthetic rubber. The price of natural rubber, once a major driving force in the exploitation of rubber has now become the disincentive to tapping turnout. With price sustaining at a low level, the livelihood of rubber farmers had been hard hit for a long period and makes their future uncertain. Many of the rubber farmers have left the industry looking for greener pastures. Those who stayed back demand a solution for the predicament they are facing.

Secondary data was used for analysing the trend of Rubber production. The study is based on secondary data collected from various sources such as articles published in journals, websites. Data regarding the quantity of rubber produced annually by 35 rubber producing countries in the world for 56 years from 1961 to 2017 is taken. CAGR and percentage share of each rubber producing countries were determined. For analyzing the price movements of natural rubber, price of rubber in the global market from 1990 to 2019 is taken and analyzed. For analysing the growth and consumption of synthetic rubber data's were taken from the period between 2000-2017.

The global production of natural rubber shows an increasing trend in the early period and declined over time. The production and consumption of synthetic rubber show an increasing trend than that of natural rubber which accounts to only 46 percent of the world consumption as compared to synthetic rubber consumption which is 54 percent of global consumption. Price of natural rubber in the global market is always fluctuating. Since 2012 there is a decreasing trend in the price of natural rubber in the global market that is US\$3.93 in 2012 decreased to US\$1.72 in the year 2019.

The outcome of this study has the potential to influence natural rubber production in the world. The low demand and price for natural rubber hit the livelihood of rubber farmers for a long period and makes their future uncertain and they demand a solution for the predicament they are facing.



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INTRODUCTION

Christopher Columbus first discovered natural rubber during his visit to South America in about 1493. It is an environmentally friendly cash crop grown in Africa and Asian Continents. The product is mostly consumed by Europe and America and was believed to have been domesticated in about 1876. It gained global awareness in 1913. Currently, Thailand, Indonesia, and Malaysia are the leading producers of natural rubber in the world. The global demand growth rate is about 3.4 percent annually. Natural rubber comes from various sources, the most common being the Pará rubber tree (*Hevea brasiliensis*), which grows in tropical regions. They typically reach 20-30 meters in height on rubber plantations and can produce commercial quantities of latex at about seven years of age, depending on climate and location. The economic life span of a rubber tree is between 10 to 20 years but may extend to 25 years in the hands of a skilled tapper and bark consumption.

Natural rubber is used for making products such as Tyres, Toys, Shoes, Gloves, Balloons, Some medical tubing, Elastic thread, and Glue. At the end of the rubber trees' useful life, the wood is used to make furniture. Once a major driving force in the exploitation of rubber, the price of natural rubber has now become the disincentive to tapping turnout. With price sustaining at a low level, rubber farmers' livelihood had been hard hit for a long period and made their future uncertain. Many of the rubber farmers have left the industry looking for greener pastures. Those who stayed back demand a solution for the predicament they are facing.

REVIEW OF LITERATURE

Chandry, George, and Raj (2010) indicated that in the pre-liberalization period (1976-1990) higher growth rate in the area, production, and productivity of rubber was recorded than that in the post-liberalization period (1991-2007) and is accompanied by relative instability. The factors that have explicitly contributed to the rubber sector's sustained growth are comparatively stable and remunerative price and a higher net farm income vis-à-vis other crops in Kerala. Raju (2016) discusses the factors behind the instability in Natural Rubber's price in both international and domestic markets. Instability analysis revealed that several factors like global recession and decline in crude prices have contributed to the volatility in prices during these periods also decline in oil prices and the subsequent decline in the prices of synthetic rubber were some of the factors that have contributed to the volatility and instability in natural rubber prices. Ramalingam and Vinitha (2017) inferred from the study that India is the sixth-largest producer of natural rubber in 2015 with a share of 4.7 percent of world production, and it is the second-largest consumer in the world. The annual growth rate of natural rubber production is the highest during the year 2008-09, and the annual growth rate for consumption is high in the 2009-10 year.



Regarding import and export, the computed CAGR for imports is 20.20 percent. However, the export shows a negative CAGR of 32.81 percent. Ziegler, A.D., M.F. Jefferson, and J. Xu (2009) reported the conversion of natural forests into rubber plantation and associated environmental issues in mainland southeast Asia, where rubber plantation covers five lakh hectares at present, and by 2050 it may be tripled. Romprasert (2009) examined the factors for monthly RSS3 future prices by taking crude oil prices as one of the variables. The obtained result showed that crude oil price is the significant variable in determining the future price. An increase of 1 percent petroleum prices will increase the RSS3 price to 0.0227 percent.

RESULTS AND DISCUSSION

WORLD PRODUCTION OF NATURAL RUBBER

In one form or another, Rubber has been used since the times of old, evidence of its use going back 2,000,000 years or more. In those days, the substance was derived naturally from the rubber tree. Individuals would then use it to make balls and to waterproof handmade buckets, pails, and more. Every year approximately 4 million tons of natural rubber are produced to make more than 50,000 different products that we use daily worldwide. In 2018, world production of natural rubber (NR) accounted for 13.960 million tonnes, an increase of 4.6 percent from 13.350 million tonnes on a year-to-year basis.

Meanwhile, the world demand recorded an increase of 5.2 percent, year-to-year, amounting to 14.017 million tonnes in 2018 (Association of Natural Rubber Producing Countries). The study is based on secondary data collected from various sources such as articles published in journals, websites. This paper discusses the trends in the production of natural rubber in the world with the help of data collected from websitefactfish.com. Analyzing the trend of Rubber production data regarding the quantity of rubber produced annually by 35 rubber producing countries in the world from 1961 to 2017 is taken. CAGR and percentage share of each rubber producing countries were determined. For analyzing the price movements of natural rubber from 1990 to 2019, data were collected from the website indexmundi.com.



Table 1: Natural Rubber Production in the World (in tonnes)

Year	Thailand	Indonesia	Vietnam	India	China	Malaysia	Ivory Coast	Philippines	Guatemala	Burma	Others	Total
1961	186,100 (9)	693,200 (33)	78,100 (4)	26,992 (1)	3,900 (0)	789,679 (38)	82 (0)	3,700 (0)	3,500 (0)	13,209 (1)	298,872 (14)	2,097,334 (100)
1971	316,300 (11)	780,946 (26)	37,500 (1)	92,200 (3)	52,400 (2)	1,318,610 (44)	13,493 (0)	7,000 (0)	5,000 (0)	13,417 (0)	375,304 (12)	3,012,170 (100)
1981	507,700 (14)	963,238 (26)	43,578 (1)	153,100 (4)	127,700 (3)	1,510,221 (41)	23,464 (1)	23,800 (1)	11,900 (0)	15,835 (0)	343,947 (9)	3,724,483 (100)
1991	1,162,242 (23)	1,328,172 (26)	64,563 (1)	329,600 (6)	296,353 (6)	1,257,200 (24)	71,482 (1)	180,705 (4)	18,488 (0)	14,900 (0)	409,645 (8)	5,133,350 (100)
2001	2,522,508 (34)	1,607,460 (22)	312,600 (4)	631,000 (9)	477,437 (6)	882,000 (12)	127,923 (2)	264,042 (4)	59,407 (1)	36,200 (0)	474,531 (6)	7,395,108 (100)
2011	3,348,897 (29)	2,990,200 (26)	789,635 (7)	800,000 (7)	750,852 (7)	996,337 (9)	238,717 (2)	425,705 (4)	339,233 (3)	147,300 (1)	602,149 (5)	11,429,025 (100)
2015	4,466,063 (34)	3,145,398 (24)	1,012,750 (8)	950,696 (7)	816,103 (6)	722,122 (6)	350,000 (3)	398,137 (3)	359,349 (3)	208,741 (2)	651,884 (5)	13,081,243 (100)
2016	4,490,549 (34)	3,307,142 (25)	1,035,333 (8)	954,986 (7)	815,938 (6)	673,513 (5)	453,000 (3)	362,626 (3)	332,755 (3)	221,670 (2)	659,396 (5)	13,306,908 (100)
2017	4,600,000 (33)	3,629,544 (26)	1,094,519 (8)	964,733 (7)	817,366 (6)	740,138 (5)	580,000 (4)	406,984 (3)	318,447 (2)	236,748 (2)	672,908 (5)	14,061,387 (100)
CAGR (%)	6	3	5	7	10	-	17	9	8	5	1	3

Source: Consolidated from www.factfish.com

Note: Other countries include Sri Lanka, Nigeria, Liberia, Mexico, Cameroon, Gabon, Ghana, Ecuador, Guinea, Bolivia, Cambodia, Congo de, Peru, Central Africa, Papua, Bangladesh, Congo, Colombia, Brunei, Timor-Leste, Guinea-Bissau, Costa Rica, Singapore, Dominican.

The figures shown in the brackets represents the percentage share of each country towards the global production of natural rubber.



The Global Production of natural rubber has increased considerably in the last 56 years, from 1961 to 2017. It is found from Table 1 that Thailand, Indonesia, Vietnam, India, China, Malaysia, Ivory Coast, Philippines, Guatemala, and Burma are the top ten rubber producing countries in the World. These countries alone contribute 95 percent of the total Natural rubber production in the world. Among these nations, Thailand contributes 33 percent of world production, followed by Indonesia 26 percent, Vietnam 8 percent and India 7 percent, etc. In the year 1961, Thailand contributed 9 percent to global production, which is increased to 33 percent in 2017. Indonesia's contribution was 33 percent to the global production in 1961, which decreased to 26 percent in the year. Ivory Coast stood first with a 17 percent growth rate from 1961 to 2017 and Malaysia shows a negative growth rate in CAGR terms. The global production of natural rubber shows a CAGR of 3 percent from the year 1961 to 2017.

WORLD PRODUCTION OF SYNTHETIC RUBBER

Synthetic Rubber has come of use for less than a hundred years. Synthetic rubber plants were built worldwide after 1945, primarily in North America, Japan, and Europe. In 1960, synthetic rubber was more than that natural rubber for the first time. Synthetic rubber has maintained this lead since then. Table 2 shows the production and consumption of synthetic rubber from 2000-2017.

Table 2: Global Production and Consumption of Synthetic Rubber

Year	Production in thousand metric tons (TMT)	Consumption in thousand metric tons (TMT)
2000	10,870	10,830
2001	10,483	10,253
2002	10,906	10,679
2003	11,414	11,117
2004	11,979	11,693
2005	12,025	11,731
2006	12,700	12,434
2007	12,829	12,576
2008	12,285	12,173
2009	11,488	11,228
2010	13,277	13,225
2011	14,091	13,856
2012	14,081	13,964
2013	14,201	14,164
2014	14,083	14,267
2015	14,507	14,564
2016	14,845	14,834
2017	15,051	15,189
CAGR (%)	2	2

Source: www.statista.com

Production of synthetic rubber shows an increasing trend that is from 10,870(TMT) in 2000; 13,277(TMT) in 2010 and 14,460 (TMT)in 2015 it reaches 15,051(TMT) in the year 2017. The Production of synthetic rubber shows a compounded annual growth rate of 2 percent from



2000 to 2017. In the case of consumption also there is an upward trend. In the year 2000, the consumption of synthetic rubber was 10,830 (TMT), which moves to 13,225(TMT)in the year 2010 and reaches 15,189 (TMT) in the year 2017. The CAGR of consumptions shows an increase of 2 percent.

NATURAL RUBBER VS. SYNTHETIC RUBBER

Comparing natural rubber and synthetic rubber is not necessarily apples to apples. Each has its own uses based upon its specific properties. Some may prefer the natural rubber properties over those of synthetic rubbers; it has been agreed upon that overall, natural gum rubber outperforms synthetic rubber in a majority of applications. However, natural rubber cannot be particularized for specific functions in the ways that synthetic rubber can be, meaning that each product has its benefits over the other. As compared to natural rubber, synthetic rubber is costlier than natural rubber that is natural Rubber / Synthetic Rubber Price Ratio is 68.1per cent. The production and consumption of synthetic rubber show an increasing trend than that of natural rubber, which accounts for only 46 percent of the world consumption compared to synthetic rubber consumption, which is 54 percent of global consumption.

Natural rubber is harvested from trees that are grown on plantations. This makes it a natural product and ecologically friendly, benefitting the environment in many ways. The latex is obtained from the trees and then processed into natural rubber sheets. It has high tensile strength, meaning its ability to be stretched and then return to form is very high. It is resistant to wear from chipping, cutting, and tearing. It has only moderate resistance to damage from heat, light, and the O-Zone. At other times, it can be very susceptible to these things. It can be known to degrade rapidly, especially under extreme conditions. The natural rubber has a quality known as “tack,” meaning that it adheres well to itself and to other materials. Natural rubber is used in such products as adhesives, contraceptives, and latex balloons.

Synthetic rubber is produced using petroleum-based materials. This means that it is not a natural product, and its production can have some detrimental effects on the environment, including the depletion of the Earth’s natural resources. The trade-off is that it is a longer-lasting material, thus decreasing its necessity to be reproduced. The percentage of synthetic rubber consumption is 54 percent of the global rubber consumption. Despite this, the demand for synthetic rubber is very high, which keeps production rates high. It is higher resistance to abrasion—superior resistance to heat and the effects of aging. Resistant to flame grease and oil is possible. It is flexible at low temperatures. As it is produced artificially, it is easier to produce, though this does not mean it is cheap. It need not be produced in a particular region or at a particular time of year and does not rely on the weather. Resistant to electricity is another possibility. There is variation between synthetic rubbers. Different kinds of synthetic rubbers are produced using different materials and are used for more specific applications. Synthetic rubber, which is more challenging, less elastic, and more durable, is extensively used for various purposes, such as for making vehicle tyres and hose pipes and even artificial hearts to waterproof gaskets. USA, China, EU, and Japan are the primary producers of synthetic rubber in the world.

PRICE OF NATURAL RUBBER IN THE GLOBAL MARKET

Natural Rubber is a vital agricultural commodity, which is used for manufacturing a wide range of products. It is used in automotive, consumer goods, manufacturing, and medical industries. The supply of natural rubber in the international market control is in few countries like Thailand, Malaysia, and Indonesia. Natural rubber and synthetic rubber are substitutes to use in certain



products, so when the tight supply of natural rubber price trend up, the amount of synthetic rubber is increased, the market position of the two are complementary. Table 3 shows the price of natural rubber in the global market from 1990 to 2019.

Table 3: Price of Natural Rubber in the Global Market

Year	Price (US\$/Kg)	AAGR (%)	Year	Price (US\$/Kg)	AAGR (%)
1990	0.83	-23.85	2005	1.32	-0.75
1991	0.83	0	2006	2.07	56.82
1992	0.83	0	2007	2.23	7.73
1993	0.85	2.41	2008	2.79	25.11
1994	0.91	7.06	2009	1.43	-48.75
1995	1.8	97.8	2010	3.34	133.57
1996	1.48	-17.78	2011	5.42	62.28
1997	1.23	-16.89	2012	3.93	-27.49
1998	0.74	-39.84	2013	2.98	-24.17
1999	0.64	-13.51	2014	2.29	-23.15
2000	0.68	6.25	2015	1.74	-24.02
2001	0.57	-16.18	2016	1.46	-16.09
2002	0.67	17.54	2017	2.35	60.96
2003	1.06	58.21	2018	1.76	-25.11
2004	1.33	25.47	2019	1.72	-2.27

Source: www.indexmundi.com

Table 3 shows that the price of natural rubber in the global market is always fluctuating. In 1990, the price of rubber was US\$ 0.83, which increased to US\$2.07 in the year 2006. From 2006 there was an increasing trend up to 2011 except in the year 2009. From 2012 there is a decreasing trend in the price of natural rubber in the global market that is US\$3.93 in 2012 decreased to US\$1.72 in the year 2019.

CHALLENGES IN NATURAL RUBBER PRODUCTION

The global rubber industry has always been concerned over the fluctuating supply and spiralling prices of natural rubber (NR). Natural rubber is a highly valuable biomaterial in contrast with other bio-polymers. It cannot be replaced by other synthetic materials for many vital applications like heavy-duty truck or bus and aircraft tyres, as well as many latex products. As such, it is the first choice for heavy-duty radial truck tyre manufacturers, primarily because of its physical, mechanical properties and excellent adhesion to steel cord. Production of natural rubber in the last couple of years especially was affected by unfavorable prices. The decrease in prices coupled with high labor costs and shortage of skilled laborers compelled farmers to minimize harvesting days, reduce the application of fertilizers and other inputs and stay away from proper maintenance of trees and increased imports due to inverted duty structure are harming the industry, which needs to be addressed.

Natural rubber prices have declined significantly in the last year, both in the domestic market and the international market. During the period 2014-15, domestic natural rubber prices for RSS 4 came down to an average of Rs.132.6 per/Kg. It is to be mentioned that the average



price in 2013-14 was Rs.166.0 per kilogram. Global production of synthetic rubber fell by 1.5 percent during the 12 months ended December 2014. A variety of factors have contributed to the instability in prices. The economic slowdown in the developed and developing countries, a sharp fall in crude oil prices and subsequent decline in synthetic rubber prices, and depreciation in the currencies in natural rubber exporting countries have all contributed to the decline in natural rubber prices in the producing countries.

The shift towards palm oil in some of the Southeast Asian countries had its tell-tale effects on NR supply. It was about two decades ago, palm oil emerged as the cheapest source of edible oil and has been garnering much attention since then. Today, it is the largest produced, consumed, and traded edible oil in the global markets. Land-use change associated with the expansion of industrial-scale oil palm plantations in three regions of Indonesia (Sumatra, Kalimantan, and Papua), in Malaysia, and in Papua New Guinea, was documented using Landsat images that were visually interpreted to create a region-wide map of 22 different land cover types spanning three temporal periods (1990 to 2000, 2001 to 2005 and 2006 to 2009/2010). In 1990, there were approximately 3.5 Mha of industrial oil palm plantations in the three countries, which had expanded to 13.1 Mha hectares by 2010. This direct conversion of plantation crops such as rubber to oil palm was more common, affecting the production of natural rubber.

A severe fall of the productivity per hectare of rubber is due to a constant fall in natural rubber prices, coupled with high labor cost, which has forced many of the growers (75 percent small and marginal farmers) to keep away from tapping. Production of natural rubber in India and Malaysia has declined significantly during the last couple of years because of rubber prices' uncertainty. The contribution of natural rubber production by Malaysia in 1961 was 38 percent of the world rubber production, which declined to 5 percent in the year 2017. Synthetic rubber is a close substitute for natural rubber. Both products are used to produce the desired properties needed in rubber end products and tyres. The decline in oil prices has boosted the production of synthetic rubber. World consumption of Synthetic rubber also has increased substantially in the last 15 years. From 108.30 lakh tones in 2000, Synthetic rubber consumption increased to 142.52 lakh tones in 2014. The share of synthetic rubber in the total consumption in 2014 stood at 54 percent. Synthetic rubber is a by-product of the oil industry. The producing and consuming industries are in general closely related and dominated by large and global enterprises. Synthetic rubber is a petroleum-derived product and manufactured by the polymerization process in chemical plants. Prices of synthetic rubber are influenced by the prices of crude oil. Lack of availability of skilled labor is also a serious problem faced by rubber cultivators.

CONCLUSION

This paper attempt to analyze the trend of world rubber production from the year 1961 to 2017. The global production of natural rubber shows an increasing trend in the early period and declined over time. The major ten countries producing rubber are Thailand, Indonesia, Vietnam, India, China, Malaysia, Ivory Coast, Philippines, Guatemala, and Burma. Among these nations, Thailand contributes 33 percent of world production, followed by Indonesia 26 percent, Vietnam 8 percent and India 7 percent, etc. In the year 1961, Thailand contributed 9 percent to global production, which is increased to 33 percent in 2017. Indonesia's contribution was 33 percent to the global production in 1961, which decreased to 26 percent in the year. In CAGR terms, Ivory Coast stood first with a 17 percent growth rate from 1961 to 2017, and Malaysia shows a negative growth rate. Production of natural rubber in the last couple of years especially was affected by unfavorable prices. From 2012 there is a decreasing



trend in the price of natural rubber in the global market that is US\$3.93 in 2012 decreased to US\$1.72 in the year 2019. As compared to natural rubber, synthetic rubber is costlier than natural rubber that NR/SR Price Ratio is 68. 1 percent. The production and consumption of synthetic rubber show an increasing trend than that of natural rubber, which accounts for only 46 percent of the world's consumption compared to synthetic rubber consumption, which is 54 percent of global consumption. The decrease in prices coupled with high labor costs and shortage of skilled laborers compelled farmers to minimize harvesting days, reduce the application of fertilizers and other inputs and stay away from proper maintenance of trees and increased imports due to inverted duty structure harming the sector which needs to be addressed.

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