

**AN ANALYTICAL STUDY OF INDIAN RUBBER INDUSTRY: A STUDY OF FACTORS CLOSELY ASSOCIATED WITH THE RUBBER INDUSTRIAL UNITS.**

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**ABSTRACT**

In this research paper, factors closely associated with rubber industrial units in is analysed. They are (1). Production of different forms of Natural Rubber (NR) in India. (2). Consumption of different forms of Natural Rubber (NR) in India. (3). Prices of different grades of natural Rubber (NR) in India. (4). Import of different forms of Natural Rubber (NR) to India. Here we are attempting a national level analysis rather than a state level because only by undertaking a national level analysis, we are able to assess the impacts more correctly and specifically. Moreover, a national level analysis gives us a clearer picture of all factors especially in the case of ‘the prices of Natural Rubber’ (NR), one of an important factor which affects the rubber industry.

**Keywords:** Natural Rubber, Rubber Industry, Solid Block Rubber, Latex Concentrates (drc), Rubber Imports.

**1. INTRODUCTION**

In this research paper, factors closely associated with rubber industrial units in India is analysed. They are (1). Production of different forms of Natural Rubber (NR) in India. (2). Consumption of different forms of Natural Rubber (NR) in India. (3). Prices of different grades of natural Rubber (NR) in India. (4). Import of different forms of Natural Rubber (NR) to India. Here we are attempting a national level analysis rather than a state level because only by undertaking a national level analysis, we are able to assess the impacts more correctly and specifically. Moreover, a national level analysis gives us a clearer picture of all factors especially in the case of ‘the prices of Natural Rubber’ (NR), one of an important factor which affects the rubber industry.

**2. METHODOLOGY AND DATA**

The present study is based on secondary data. Secondary data was collected from various issues of Indian Rubber Statistics, Rubber Board, Kottayam. The data collected was analyzed by using ANOVA Test to know the difference between variables. Correlation Test is also used in the study. The statistical analysis was done with the help of computer using appropriate software.

**3. PRODUCTION OF DIFFERENT FORMS OF NATURAL RUBBER (NR) IN INDIA**

In this section, production of different forms of Natural Rubber (NR) in India is studied. An analysis of rubber production data in India assumes much relevance to the rubber industrial units. Here we are analyzing the Production of different forms of Natural Rubber (NR) in India at the end of each year (Tonnes) from the year 2005-06 to 2015-16 using table, diagram and one factor ANOVA. These are presented below.

**Table. 1: Production of different forms of Natural Rubber (NR) in India at the end of each year (Tonnes)**

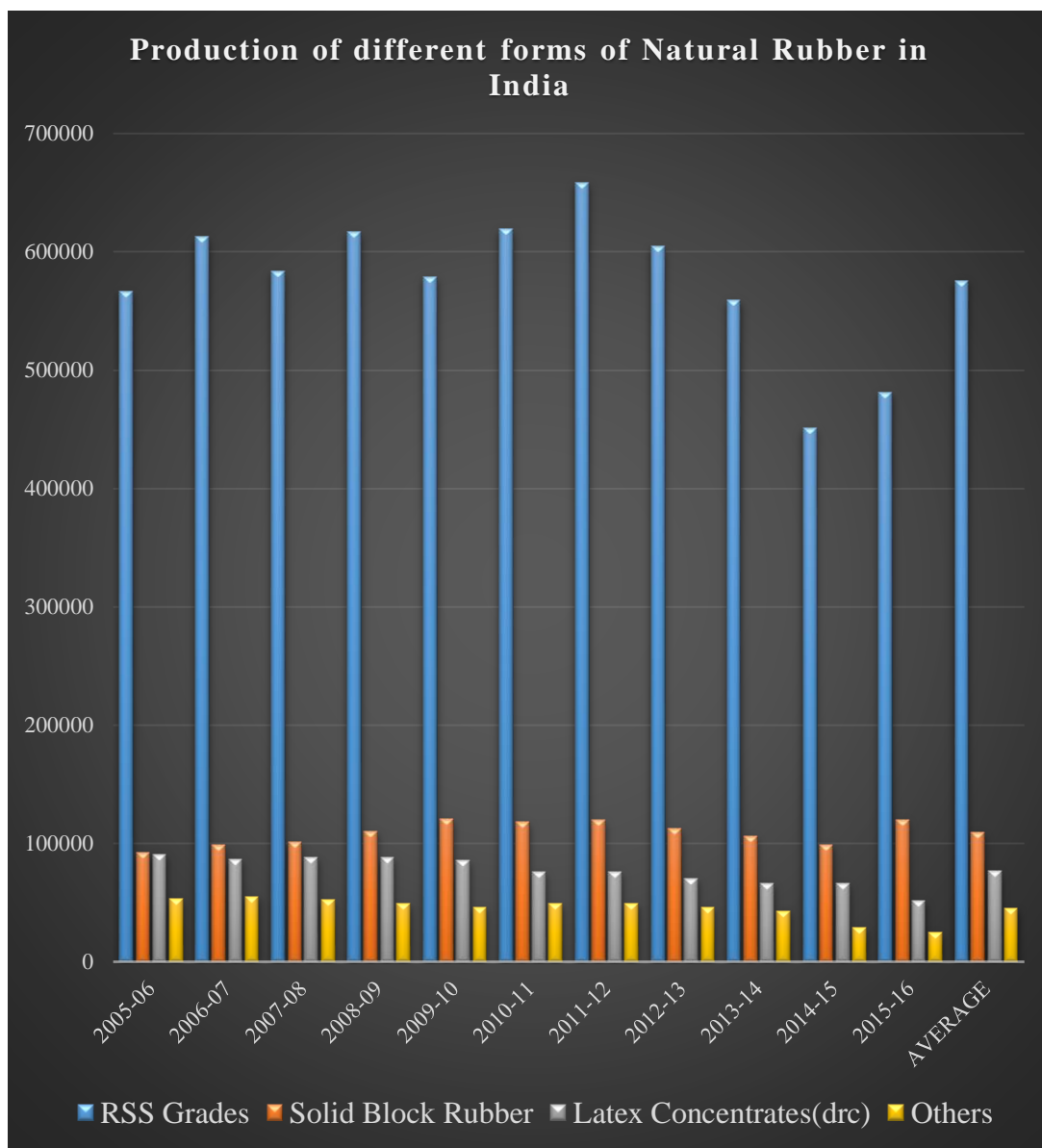
Year	Types				
	RSS Grades	Solid Block Rubber	Latex Concentrates(drc)	Others	Total
2005-06	566445	92540	90950	52690	802625
2006-07	612735	98500	86780	54880	852895
2007-08	583875	100705	88305	52460	825345
2008-09	617125	110275	88070	49030	864500
2009-10	578650	120780	85760	46210	831400
2010-11	618960	117830	76065	49095	861950
2011-12	658200	119815	76490	49195	903700
2012-13	604550	112560	70320	45620	833050
2013-14	559120	106045	65895	42940	774000
2014-15	451090	98865	66520	28525	645000
2015-16	481435	120253	51431	24697	677817
AVERAGE	575653.184	108924.3949	76962.40057	45031.14	806571.1

*Source: Indian Rubber Statistics, Rubber Board, Kottayam (various issues)*

From the above table it is clear that in the 2005-06, the quantity of RSS Grades produced in the country was 566445 tonnes, Solid Block Rubber 92540 tonnes, Latex Concentrates 90950 tonnes and others 52690 tonnes, by aggregating a figure of 802625 tonnes. In the year 2010-11 figures for the RSS Grades in rubber production in the country were 618960 tonnes, Solid Block Rubber 117830 tonnes, Latex Concentrates 76065 tonnes and others 49095 tonnes, by

aggregating a figure of 861950 tonnes. Similarly, in the year 2015-16 the figure further reduced and for the RSS Grades in rubber production in the country was 481435 tonnes, Solid Block Rubber 120253 tonnes, Latex Concentrates 51431 tonnes and others 24697 tonnes, by aggregating a figure of 677817 tonnes. This highlighted the fact that Natural Rubber production in the country is not encouraging. This is explained with the help of the figure below.

**Figure 1**



*Source: Indian Rubber Statistics, Rubber Board, Kottayam (various issues)*

**Table 2: ANOVA of Production of different forms of Natural Rubber (NR) at the end of each year**

Rank	Mean Growth	n		
2	1.01626	11	RSS Grades	
1	1.17705	11	Solid Block Rubber	
5	0.84621	11	Latex Concentrates	
4	0.85464	11	Others	
3	0.94869	55	Total	
ANOVA table				
Source	SS	df	F	p-value
Treatment	0.945346	4	11.92	0.000
Error	0.991118	50	Result	Significant
Total	1.936464	54		

*Source: Computed from Indian Rubber Statistics, Rubber Board, Kottayam (various issues)*

Now it is imperative to examine the growth rate in production of different forms of Natural Rubber (NR) in India using the statistical test ANOVA. Anova value is 11.92, P Value 0.0000, ( $p < 5\%$ ), result significant. Therefore, the Null Hypothesis ( $H_0$ ) formulated in this regard is rejected. That is, there is significant difference in the growth rate to the production of different forms of Natural Rubber. Growth rate is evident for the Solid Block Rubber and RSS Grades rubber.

#### **4. CONSUMPTION OF DIFFERENT FORMS OF NATURAL RUBBER (NR) IN INDIA**

In this section, consumption of different forms of Natural Rubber (NR) in India is studied. An analysis of rubber consumption data in India assumes much relevance to the rubber industrial units. Here we are analysing the consumption of different forms of Natural Rubber (NR) in India at the end of each year (Tonnes) from the year 2005-06 to 2015-16 using table, diagram and one factor ANOVA. These are presented below.

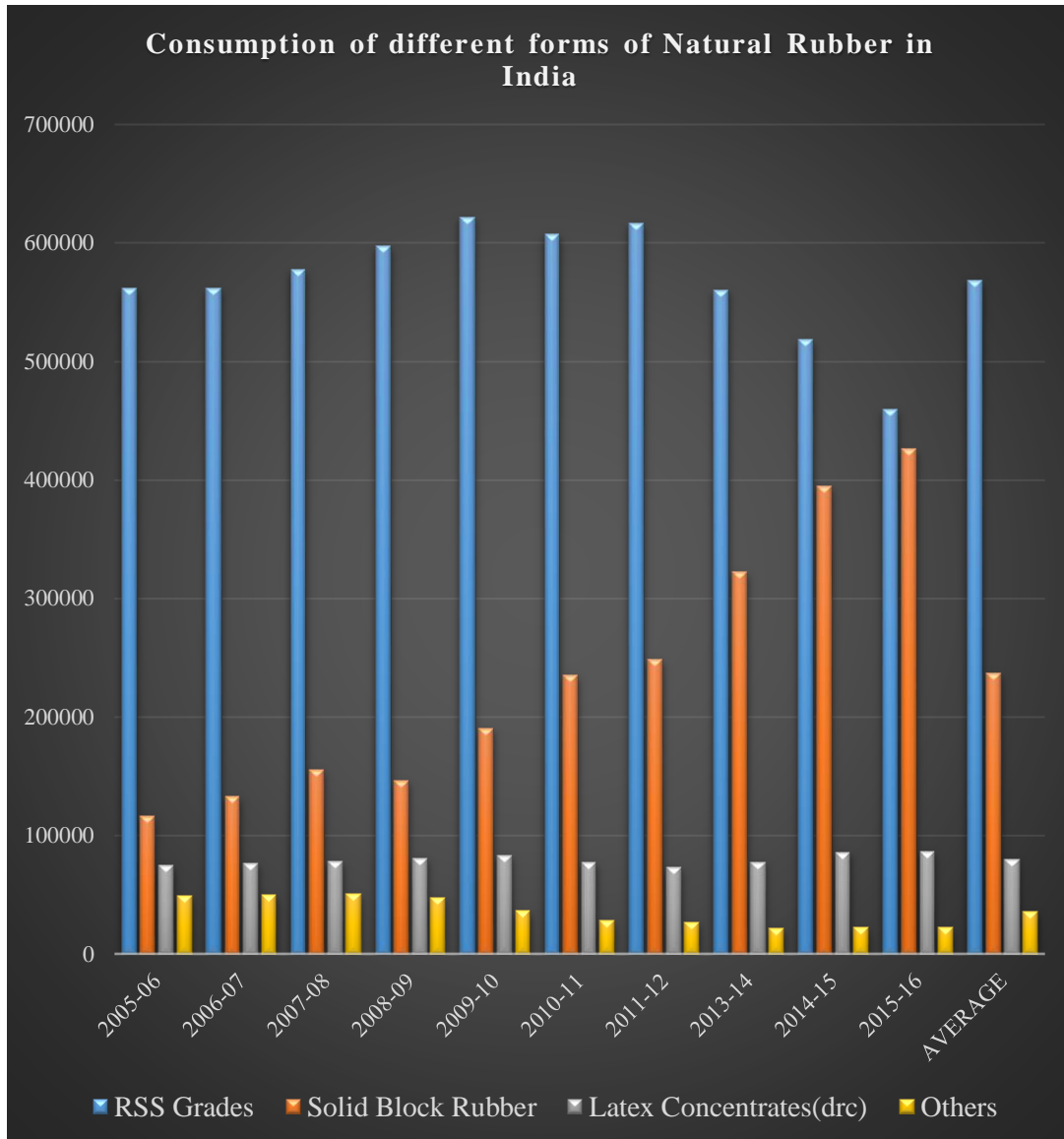
**Table 2: Consumption of different forms of Natural Rubber (NR) at the end of each year (Tonnes)**

Year	Types				
	RSS Grades	Solid Block Rubber	Latex Concentrates(drc)	Others	Total
2005-06	561655	115840	74670	48945	801110
2006-07	561580	132755	76190	49780	820305
2007-08	577635	155670	77715	50435	861455
2008-09	597440	146060	80520	47700	871720
2009-10	621435	190545	82515	36070	930565
2010-11	607455	235130	77380	27750	947715
2011-12	616215	248285	73190	26725	964415
2013-14	560230	322250	77515	21525	981520
2014-15	518440	394240	86005	22225	1020910
2015-16	459570	426215	86530	22100	994415
AVERAGE	568165.5	236699	79223	35325.5	919413

Source: Indian Rubber Statistics, Rubber Board, Kottayam (various issues)

From the above table it is clear that in the 2005-06, the quantity of RSS Grades consumed in the country was 446150 tonnes, Solid Block Rubber 82850 tonnes, Latex Concentrates 72595 tonnes and others 36615 tonnes, by aggregating a figure of 638210 tonnes. In the year 2010-11 figures for the RSS Grades in rubber consumption in the country were 607455 tonnes, Solid Block Rubber 235130 tonnes, Latex Concentrates 77380 tonnes and others 27750 tonnes, by aggregating a figure of 947715 tonnes. Similarly, in the year 2015-16 the figure further reduced and for the RSS Grades in rubber consumption in the country was 459570 tonnes, Solid Block Rubber 426215 tonnes, Latex Concentrates 86530 tonnes and others 22100 tonnes, by aggregating a figure of 994415 tonnes. This highlighted the fact that Natural Rubber consumption in the country is encouraging. This is explained with the help of the figure below.

Figure 2



Source: Indian Rubber Statistics, Rubber Board, Kottayam (various issues)

### 5. PRICES OF DIFFERENT GRADES OF NATURAL RUBBER IN INDIA

In this section, the prices of different grades of Natural Rubber (NR) in India are studied. An analysis of rubber price data in India assumes much relevance to the rubber industrial units. Here we are analysing the prices of different grades of Natural Rubber (NR) (RSS1, RSS2, RSS3, RSS4, RSS5, EBC2X, LATEX (60% drc), ISNR20) in India at the end of each year (Rs per 100 Kg in Kottayam Market).

**Table 3: Prices of different grades of Natural Rubber (Rs per 100 Kg in Kottayam Market)**

Mean	n	Std. Dev	
11,720.50	15	6,058.06	RSS1
11,425.20	15	5,953.77	RSS2
11,229.10	15	5,873.05	RSS3
10,951.30	15	5,743.00	RSS4
10,610.90	15	5,611.03	RSS5
10,077.50	15	5,332.81	EBC2X
12,769.30	15	6,026.90	LATEX (60% drc)
10,349.60	15	5,547.48	ISNR20
11,141.70	120	5,658.52	Total

**ANOVA table**

Source	SS	df	MS	F	p-value
Treatment	7,72,49,991.47	7	1,10,35,713.07	0.33	0.9383
Error	3,73,29,97,359.20	112	3,33,30,333.56	Result	Not Significant
Total	3,81,02,47,350.67	119			

**Correlation Matrix**

	RSS1	RSS	RSS3	RSS4	RSS5	EBC2X	LATEX (60%)	ISNR20
RSS1	1							
RSS2	0.997*	1						
RSS3	0.994*	0.999*	1					
RSS4	0.996*	1	1	1				
RSS5	0.994*	0.999*	1	1	1			
EBC2X	0.991*	0.998*	0.998*	1	0.999*	1		
LATEX (60% drc)	0.995*	0.992*	0.989*	0.99*	0.988	0.98*	1	
ISNR20	0.987*	0.996*	0.998*	1	0.998*	1	0.981*	1

critical value .05 (two-tail)- ± .514

Source: Computed from Indian Rubber Statistics, Rubber Board, Kottayam (various issues)

Prices of different categories of rubber were considered. Accordingly the average price of the rubber category LATEX (60% drc) is 12,769.30. Similarly the price of the categories of rubber namely RSS1, RSS2, RSS3 and RSS4 are Rs.11, 720.50, Rs. 11,425.20, Rs. 11,229.10 and Rs. 10,951.30 respectively. Anova test value is 0.33,  $p=0.938$  ( $p>5\%$ ), result not significant. Therefore it is possible to standardise the particular category of rubber as superior based on the price during the study period. The correlation matrix showed the fact that all cross relationship between the variables is highly positive correlated and statistically the correlation is significant.

### 6. COMPARISON OF DOMESTIC AND INTERNATIONAL PRICES OF NATURAL RUBBER

In this section, a comparison of domestic and international prices of Natural Rubber (NR) is undertaken. A comparison of domestic and international prices of Natural Rubber (NR) assumes much relevance to the rubber industrial units.

**Table 4: Comparison of domestic and international prices of natural rubber (Rs/100 Kg)**

Year	RSS 5	RSS4	RSS3	LATEX (60% drc)		ISNR20	SMR20
	DOMESTIC		INTER-NATIONAL	DOMESTIC	INTER-NATIONAL	DOMESTIC	INTER-NATIONAL
2006-07	8920	9204	9779	11190	10883	8787	9041
2007-08	8891	9085	9675	10491	10622	8817	9308
2008-09	9897	10112	10379	11604	11749	9692	9972
2009-10	11164	11498	11113	13163	11988	10786	10582
2010-11	18419	19003	19555	20500	20156	17976	17600
2011-12	20453	20805	20915	21364	21625	20130	19502
2012-13	18462	18941	17685	21135	19860	18772	15675
2013-14	16093	16602	15525	20553	16844	15643	13714
2014-15	12340	13257	11271	15744	12844	11440	9604
2015-16	10975	11306	9636	14713	11180	10042	8481
AVERAGE	<b>13561</b>	<b>13981</b>	<b>13553</b>	<b>16046</b>	<b>14775</b>	<b>13209</b>	<b>12347.9</b>

*Source: Computed from Indian Rubber Statistics, Rubber Board, Kottayam (various issues)*

The price level of the rubber both at domestic and international level was widely fluctuating during the period of study, which is very clear from the above table. The average price of the



rubber available at domestic market for the variant RSS3 and RSS4 is Rs.13561 and Rs.13981 respectively. Whereas the average price of the variant RSS3 at international market is Rs.13553. The average price of the variant LATEX (60% drc) available at both domestic market and international market is Rs. 16046 and Rs. 14775 respectively. The average price of the rubber available at domestic market for the variant ISNR20 is Rs. 13209 and the average price of the variant SMR20 at international market is Rs. 12348.

**Table 5: Price difference-Domestic Market and International Market**

DOMESTIC	INTER-NATIONAL	
16,045.70	14,775.10	mean
4,455.71	4,371.47	std. dev.
10	10	n
	0.64	t
	.5279	p-value (two-tailed)
	<b>Result</b>	<b>Not Significant</b>

*Source: Computed from Indian Rubber Statistics, Rubber Board, Kottayam (various issues)*

Price comparison was done between domestic and International market. Accordingly the average price of the rubber at domestic market is Rs.16,045.70±4,455 and that of the International market Rs.14775.10±4,371. t value is 0.64, p=0.527, (p>5%), result not significant. This highlights the fact that there is no price difference in domestic and International market for rubber.

## **7. IMPORT OF DIFFERENT FORMS OF NATURAL RUBBER TO INDIA**

In this section, import of different forms of Natural Rubber (NR) to India is studied. An analysis of rubber import data in India assumes much relevance to the rubber industrial units. Here we are analysing the import of different forms of Natural Rubber (NR) to India at the end of each year (Tonnes) from the year 2005-06 to 2015-16 using table, diagram and one factor ANOVA. These are presented below.

**Table 6: Import of Different forms of Natural Rubber (Tonnes)**

Year	Types				Total
	RSS Grades	Solid Block Rubber	Latex Concentrates(drc)	Others	
2005-06	6992	37433	783	77	45285
2006-07	33111	55075	1401	212	89799
2007-08	26349	58595	855	595	86394
2008-09	27220	49130	1412	0	77762
2009-10	73766	98574	4439	351	177130
2010-11	60722	126065	3525	380	190692
2011-12	75415	136550	1675	145	213785
2013-14	111635	242130	5965	533	360263
2014-15	122680	309615	9385	450	442130
2015-16	105210	344150	7530	1484	458374
AVERAGE	64310	145731.7	3697	422.7	214161.4

*Source: Indian Rubber Statistics, Rubber Board, Kottayam (various issues)*

The quantity of the rubber was extensively intermittent throughout the period of study, which is incredibly obvious from the above table. The average quantity of the rubber variant RSS grade is 51066. Whereas the average quantity of the variant Solid Block Rubber is 112203. The average quantity of the variant LATEX (60% drc) is 3104. The total average quantity of the rubber is 166759.

## 8. CONCLUSION

Thus to conclude it is clear that the Natural rubber (NR) production in India augmented by 24 per cent during the last fiscal year (2016-17), Production of NR increased from 563,235 tonnes in 2015-16 to 692125 tonnes in 2016-17. NR consumption during the similar period augmented from 994,550 tonnes to 1,125,320 tonnes, rising 5.1 per cent. Over the same period productivity increased from 1,450 kg per hectare to 1,570 kg per hectare. Import of NR had been mounting always from 2008-09, accomplished 460,500 tonnes in 2015-16. But in 2016-17, import of NR

turn down for the first time by 6.8 per cent to 426,500 tonnes. World production and consumption of NR in 2016, according to a report from the International Rubber Study Group (IRSG), is 12.40 mt and 12.60 mt respectively. They forecast world production and consumption of NR for 2017 at 12.93 and 12.88 mt, respectively. Thus it is clear that rubber industry in India will be prosperous in the futuristic period.

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