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Critical Issues Facing China's Rubber Industry in the Era of Market Integration: An analysis in retrospect and prospect

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Abstract

This paper discusses the emerging contradictions that may have serious implications for the sustainable growth and performance of China's rubber industry in the era of internal restructuring and global market integration. The contradictions arise from the growing mismatch between shortage of resources (natural rubber and synthetic rubber) against the ever expanding rubber industry with thin regional spread of manufacturing base. While the dynamic growth of rubber industry in the pre-reforms era was achieved under a heavy import oriented trade policy regime, the sustenance of the same is fraught with serious challenges in the emerging global context affecting the economic performance of the rubber industry. Following a comprehensive analysis of development of rubber industry in retrospect, the paper suggests some important policy options for resolving the impasse and thereby sustaining the growth dynamism of the industry in the country in the era of market integration. Invariably, sustainable growth of the rubber industry in China calls for a thorough revamping of the state policies and devising virtually non-existent institutional development strategies covering a broad spectrum of activities, viz., a) demand and supply management; b) redefining the status of natural rubber as a strategic commodity and industrial raw material; c) strengthening property rights claims of the peasantry; and d) R&D investments facilitating rubber expansion to agro-ecologically suitable areas. Given that the global market integration would continue to stimulate the growth of the domestic rubber industry, the paper highlights that the issues at the production side are to be tackled on a priority basis. However, this would need China to make a rational choice between or a combination of alternatives, viz., a) strengthening the domestic natural rubber production sector; b) continue to follow import of NR and SR; and c) massive launching of rubber investment programmes in the neighbouring regions of the Laos, Vietnam, Cambodia, Myanmar and the Philippines.

JEL Classification : **FO2, L62, L65, Q17**

Keywords : Rubber industry; Globalization; Natural rubber (NR); Synthetic rubber (SR); Tyre industry; Small and marginal farmers

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Critical Issues Facing China's Rubber Industry in the Era of Market Integration: An analysis in retrospect and prospect

P.K. Viswanathan

1. Introduction

The emergence and growth of China as an economic growth pole in the Asian region in particular since the last two decades marks a major historic event with far fetching implications on the course of future development of the global economy. In retrospect, China, which was one of the 23 original signatories to the GATT in 1947, has joined the WTO only in 2001 for reasons that are well explored. Given its gradual but seemingly systematic and comprehensive reforms with cautious open door policy over the past two decades, China has emerged as a market driven economy. In fact, China is one of the largest trading nations to be integrated into the global economic system with the crucial macro-economic indicators such as growing share in world industrial output (Appendix 1), foreign trade and global stock of FDI flows[1]. However, scholars differ as regards the sources of economic dynamism[2] of the country, which, seemingly is an offshoot of the open door policy and the subsequent restructuring and economic reforms introduced since the late 1980s.

Notwithstanding the impressive economic growth, the country's development has evinced an ostensible divergence between resource endowment of regions and geographical distribution of industrial production capacities. In retrospect, political and internal security concerns rather than economic logic of resource abundance have set the stage for industrial expansion in the provinces between 1950s to

1. The most significant feature of China's reforms and liberalisation policy has been the rapid advancement of foreign trade from US$ 20.6 billion in 1978 (start of Deng Xiaoping era) to US$ 325.1 billion in 1997, which further grew almost 3.6 times to US$ 1154.8 during 2004. China's success as an exporter is evident from the merchandise trade surplus it has registered since 1990, averaging nearly US$ 30 billion per year between 1995 and 2000. The flow of foreign direct investment has also been substantial over time, which increased almost 2 times from US$ 34.1 billion in 1990 to US$ 60.6 billion during 2004 (Yabuki, 1995; Moore, 2002; http://www.stats.gov.cn accessed on 19.04.2006).

2. There are two competing hypotheses regarding China's development model. The conventional hypothesis routed in `internal contradictions' story, which suggests that China's growth dynamism is unsustainable in view of the financial instability and inflationary consequences of over-investment and fixed exchange rates. The alternate hypothesis is labelled the `external contradictions' story as explained by the export led growth and growing US trade deficit with consequences on China's economic growth (Palley, 2006).

mid-70s leading to the dynamic growth of the eastern provinces *vis-à-vis* the interior (central and western) provinces. Invariably, the Eastern provinces were designated as the `growth pole' specialised in the production of heavy capital and technology intensive and export oriented industrial products, while the interior provinces remained almost deprived in terms of economic growth, infrastructure development including manufacturing expansion. However, the post-reforms period witnessed a policy shift towards relocation of industrial facilities from the relatively developed eastern provinces to the interior provinces based on principles of comparative resources advantage of these regions so as to achieve balanced regional growth (Oy, 1996; Susumu, 1995; Palley, 2006). Though the policy shift had significant impact, industrial growth process remain much more complex in terms of greater concentration of industries in the east coincided with thin spread of manufacturing base in rest of the regions. Evidently, industrial growth continues to be driven by export markets, mostly sustained by high levels of raw material imports even in the domestic resource based industrial segments. China, thus has become a major consumer of natural resources and primary commodities, most of which originate from other developing countries (Jilberto and Hogenboom, 2007). While such an industrial development strategy has been conducive for economic growth in the past, the sustainability of the same is rather questionable in the context of global market integration, as the industrial sub sectors remain open to global competition. This may adversely affect the sustainable growth performance of the resource based industries in the country even leading to their disintegration or natural demise in the emerging context.

Among the prominent resource based industrial segments, the case of rubber industry stands out, as the current scenario of development of rubber industry in China testifies the growth contradictions as outlined above, ie., the mismatch between rubber production sector and the dynamic growth of the rubber based industries. This paper takes up this issue for a detailed examination of the growing divergence between production of natural rubber (NR) *vis-a- vis* the spatial expansion and growth of rubber based industries in China. While doing so, the paper also dwells upon the political economy of the state policies promoting the lopsided development of rubber industry in the country. The prevailing policy environment seems to be lacking in terms of long term vision and strategies for development and strengthening of the domestic rubber sector on a sustainable basis to cater the growing domestic and global rubber industry in the era of global market integration. The issue at stake needs a thorough scrutiny in terms of the specific historic contexts and dynamics within which the agrarian

institutions as evolved in China have been antithetic to the smallholder centred rubber development in the countryside in sharp contrast to the emergence of the dynamic smallholder rubber production systems in the dominant rubber producing countries, *viz.*, Thailand, Malaysia, Indonesia and India in particular. This in turn, explains why and to what extent the Chinese rubber industry would stand to lose in the era of globalisation in terms of non-realisation of the political and economic significance of natural rubber as a strategic raw material and commodity with immense trading potential as it assumed prominence in the post war industrial world.

The paper assumes significance in view of the seemingly under explored theoretical and empirical analyses on the rubber sector in China especially in the light of the dynamism and growth potential evinced by the manufacturing segment in the post reforms era. The paper is also expected to bring forth some pertinent issues on the rubber sector in China needing further empirical analysis and policy level interventions. The paper largely depends on the secondary information and data sources pertaining to rubber production sector as well as the manufacturing sector comprising automotive and tyre industries with significant demand for rubber in the manufacturing activities. Obviously, the paper is constrained by its logical premises to dwell primarily upon the dominant natural rubber (NR) production segment in view of the socio-economic and political significance of the NR sector in creating sustainable backward and forward linkages and its trade potential in the global scenario. However, attempts are also made to bring out the interface between the natural and synthetic rubber (NR & SR) production sectors and their implications for the growth of the manufacturing sector.

The paper is organised into five sections, including introduction. Section two gives a brief of the evolutionary dynamics and characteristics of rubber production sector in China and the country's position in the global rubber industry. Section three critically examines the dynamic growth of the rubber based manufacturing sector in China along with its structural and regional dimensions especially in the context of institutional restructuring and market reforms. Section four discusses the critical issues confronting China's rubber industry in the era of global market integration. This section also unravels the apparently weaker policy and institutional responses of the country to circumvent the emerging impasse in the rubber production sector. Section five concludes the paper with reflections on the policy imperatives for institutional restructuring needed for the country to

achieve synergy between sustainable development of the rubber sector and the dynamic growth of the rubber industry.

2. China's Rubber Production Sector: Evolutionary Dynamics

Historically, rubber plantation agriculture has been evolved as an estate based production system in the tropical Asian countries during the last quarter of the nineteenth century mostly under the patronage of Western colonialism. World rubber area has grown at a trend growth rate of 1.67 per cent per annum showing almost three times increase during the last four decades from 3.88 million ha in 1961 to 10.2 million ha in 2005. Though rubber is grown in more than 20 countries now, four major countries *viz.*, Indonesia, Malaysia, Thailand and India, who were the pioneers to take up rubber cultivation on a commercial scale, continue to dominate the global rubber production sector with a relative share of 77 per cent in rubber planted area and 79 per cent of the global rubber output (Viswanathan, 2006).

In China, rubber is grown in the five provinces, *viz.*, Hainan, Yunnan, Guangdong, Fujian and Guangxi. The rubber growing areas lie in the tropics and south sub tropics between 18-24°N and 97-121°E having a monsoonal climatic pattern with a mean temperature ranging from 20°C to 25°C and an annual rainfall in the range of 1000-2500 mm (Zongdao and Yanqing, 1992). Rubber was first planted in the Hainan Island in 1906 from rubber seed brought home by an overseas Chinese from Malaya. There were only a little more than 10000 ha of rubber plantations in Hainan province in 1949, when the People's Republic of China was founded (PRC Year Book, 1997-98). The Hainan Island had been bestowed with a quasi-colonial status of being a region for production of tropical crops catering supply to the mainland provinces. Rubber was mostly produced on state rubber farms [3]. In 1950, the national government also introduced rubber in the Xishuangbanna prefecture in Yunnan province in order to ensure supply of natural rubber for national defence and industrial construction. In the 1960s and 1970s (era of Cultural Revolution), amid China's growing international isolation and tensions, rubber cultivation was accelerated into a campaign under the

3. The state farms are important producers of crops such as fruit, tea and rubber. State farms are excluded from the scope of agriculture. The state farm workers are salaried employees, drawing fixed wages comparable to other state workers, and receive many of the same benefits as urban state employees-free medical care, state-funded retirement programmes, subsidized food, and so forth. (Lardy, 1983: 100).

Yunnan Army Corps, as rubber was regarded as a strategic material to be used in national defence and in support of the war effort in Vietnam (Shapiro, 2001). An overwhelming majority of the army corps were drawn from the educated youth belonging to the Han Chinese (ethnic minority) from Hunan province, who were resettled in Xishuangbanna to establish state rubber farms (Jianchu, *et al.*, 2005).

Obviously, the state policy was to promote rubber cultivation in the border regions as a national defence strategy under the exclusive domain of state farms and cultivation of commercial crops like rubber by small farmers was restricted until the end of the collective period (1978). Promotion of cash crops and livestock products was not allowed except for areas arranged by the state plan. It was only with the introduction of household responsibility system (HRS) in 1979 that the small farmers were able to expand their production possibility frontier towards growing remunerative crops, like cotton, sugarcane, oil seeds, tea, rubber, tobacco, soybean, wheat, etc. Resultantly, there was significant rise in area under cultivation and output of natural rubber in China during the post reforms phase, with a trend growth rate of 0.45 per cent in area and 5.91 per cent in rubber output. In absolute terms, while the area under rubber increased almost 1.5 times from 0.3 million ha in 1985 to 0.45 million ha in 2004, the output of natural rubber increased more than three times from 0.19 million tonnes to 0.6 million tonnes during the above period (Table 1).

Table 1: Trends in Growth of Area and Output of Natural Rubber in China

Year	Area ('000 ha)	Output ('000 tonnes)	Share of provinces in rubber production (%)			
			Hainan	Yunnan	Guangdong	Fujian & Guangxi
1985	300	188	67.20	22.89	8.17	1.74
1990	390	264	59.32	25.48	13.57	1.63
1995	395	424	61.41	30.86	7.01	0.72
2000	421	480	58.49	35.74	5.45	0.32
2001	417	477	58.48	36.26	5.01	0.25
2002	429	527	57.46	37.70	4.61	0.23
2003	436	565	55.93	39.53	4.34	0.20
2004	445	600	54.97	40.74	4.14	0.15

Source: China Statistical Year Book; 2. Respective Provincial Statistical Year Books (relevant years).

The table reveals that the Hainan and Yunnan provinces together accounted for more than 90 per cent of rubber production in the country. Though Hainan

accounted for 90 percent of China's rubber production in 1974, by mid 1990s, Yunnan's share in output increased to 30 per cent following heavy state support and guaranteed prices. However, the other provinces, *viz.*, Guangdong, Fujian and Guangxi have been loosing their stake in rubber production as evident from the perceptible decline in rubber area over time consequent on clear felling of old plantations.

2.1. Ecology of Rubber Production

The most distinctive feature of China's rubber economy is that rubber is grown under sub-optimal environments with extreme climatic stress conditions. The rubber growing tracts experience stress situations like low temperature, typhoons, dry periods and high altitude (Huang and Yanqing, 1992; Dea *et al*., 1997; Hoa *et al*., 1998; Priyadarshan *et al*., 2005). The regions are highly vulnerable to the perils of typhoons and cold waves (Huang and Yanqing, 1979). Pronounced monsoon and dry seasons prevail form May to November and December to April, respectively. During June to October, wind velocity of over Beaufort force 10 (more than 24.5 m per second) causes havoc–branch breakage, trunk snapping and uprooting of trees. During 1949-1982, storms and typhoons lashed rubber-growing areas of China at least 55 times (Huang and Yanqing, 1992). It has also been reported that 80 per cent of the rainfall in Hainan is brought by typhoons (Jiang and Wang, 2003). The branch/ trunk snap due to typhoons while causing severe economic loss to the rubber plantations, cold waves adversely affect the growth and latex regeneration process in the existing rubber trees.

2.2. Structure and Production Conditions

Rubber plantations in China are controlled by the state farms (Lardy, 1983), despite the efforts by the state to scale up the process of rubber expansion through land titling and demarcation. The provincial statistics reveal that the proportion of state farms in rubber production appears to be as high as 70-73 per cent across the provinces even during 2004. Notably, the predominance of state farms in China is in sharp contrast to the dominant smallholder rubber systems in Thailand (90%), India and Malaysia (89% each) and Indonesia (83%) (Viswanathan, 2006). Thus, the persistence of state control on rubber production poses an important structural impediment to the rubber production system in China. This is because, the small and marginal farmers in general do not have control over output and prices which is in sharp contrast to the flexibility and

economic resilience enjoyed by the smallholders in other rubber producing countries in terms of holding the rubber in anticipation of higher output prices as well as better realisation of farm gate prices. This also points to the apparent failure of the decollectivisation process coincided with the prevalence of weaker institutional mechanisms for the enforcement of secure property rights favouring the farm households in the country even in the post reforms period.

Production conditions in the state rubber farms involve contractual arrangements between the state and the individual households (state rubber workers) who live on the state farms to manage the contracted farms. Though the farm management operations were subsidised along with price support during the collective period, the post reforms period made the farm workers highly vulnerable to increasing price risks[4] and market uncertainties, as they are forced to abide by the terms of contract of providing reasonable surplus along with rent for the land they have contracted. Thus, the opening up of the economy since the late 1980s has adversely affected the profitability of rubber production system both in the dominant state rubber farms as well as in the small scale individual rubber holdings. The income from rubber mono-cropping systems in China has been reported to be in the range of US$ 800-1000 per ha per annum (Goodman, 2004) as against US$ 1200-1400 per ha in India and Thailand (Viswanathan, 2006).

2.3. China's Status in the World Rubber Industry

2.3.1. Natural Rubber (NR)

Despite the constraints posed by sub-optimal environmental conditions as well as the bureaucratic controls along with institutional and legal impediments inhibiting the process of rubber production, the expansion in area and output of NR has been quite significant in China *vis- a- vis* other rubber producing countries. The growth dynamism has been such that the country has emerged as one of the leading producers of NR in the world stimulated by a more than proportionate growth in the rubber based manufacturing sector. On a global scale, rubber planted area has increased from 3.88 million ha in 1961 to 10.2 million ha in

4. In the late 1980s, China terminated subsidies to state rubber farmers and reduced the tariff on imported rubber (Jianchu *et al*., 2005: 411), which made way for cheaper imports of rubber into china.

2005 and the global rubber output increased from 4.25 million tonnes in 1985 to 10 million tonnes in 2005. Growth of rubber economy in China has been substantial over time, as the country has emerged as the fifth largest producer of NR in the world, with the country occupying sixth position in total rubber area (Table 2).

Table 2: Growth of the World Natural Rubber Sector and China's Share

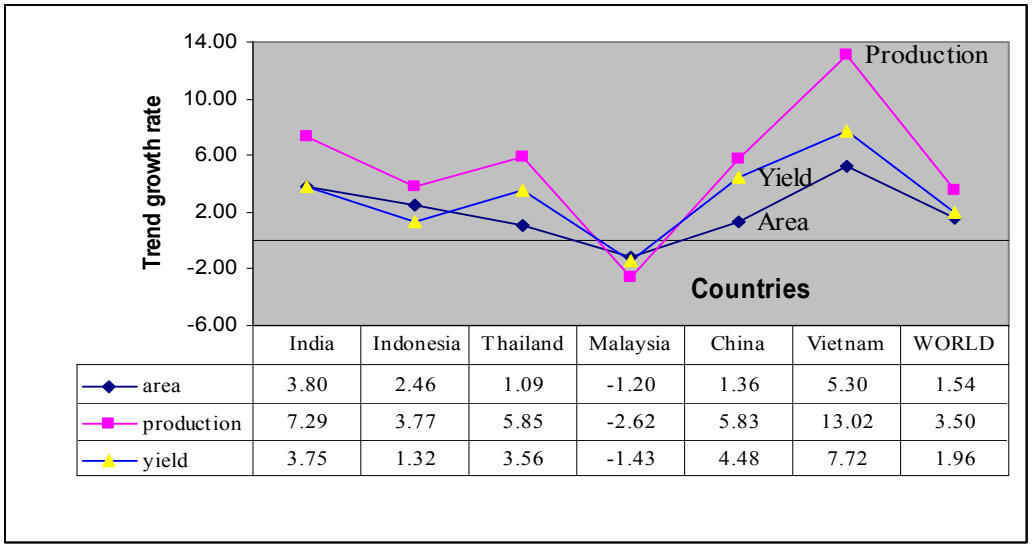
Year	China	India	Thailand	Malaysia	Indonesia	Vietnam	WORLD
1. Rubber harvested area ('000 ha)							
1985	300 (5.0)	211 (3.5)	1411 (23.3)	1535 (25.4)	1692 (28.0)	180 (3.0)	6049 (88.1)
1990	390	289	1400	1614	1866	222	6656
1995	395	346	1496	1475	2261	278	7202
2000	421	395	1563	1300	2400	412	7615
2004	445	480	1675	1400	2675	451	8299
2005	448 (5.4)	480 (5.7)	1680 (20.1)	1400 (16.7)	2675 (32.0)	510 (6.1)	8366 (86.0)
2. Rubber production ('000 MT)							
1985	188 (4.4)	187 (4.4)	773 (18.2)	1469 (34.6)	1055 (24.8)	48 (1.1)	4247 (87.6)
1990	264	297	1418	1292	1275	58	5225
1995	424	435	2061	1089	1532	125	6289
2000	482	622	2378	928	1610	291	7142
2004	600	762	3030	1190	2766	400	9693
2005	625 (6.8)	762 (8.3)	3020 (33.1)	1175 (12.9)	2128 (23.3)	450 (4.9)	9126 (89.4)
3. Productivity of rubber (Kg./ha)							
1985	626 (3)	886 (1)	548 (5)	957 (2)	624 (4)	266 (6)	702
1990	678	1028	1013	800	684	261	785
1995	1072	1257	1378	738	678	448	873
2000	1143	1575	1342	714	671	706	938
2004	1348	1705	1423	850	1034	887	1167
2005	1395 (3)	1745 (1)	1435 (2)	839 (5)	796 (6)	882 (4)	1091

Note: For Items 1 and 2, figures in parentheses denote the respective shares in the world; for item 3, the figures in parentheses indicate the respective ranking in productivity.

Source: Estimations based on FAO Statistics (http://faostat.fao.org)

Though China's share in the world rubber area has only marginally increased, share in rubber output increased from 4.4 per cent in 1985 to 6.8 per cent in 2005. There was also considerable increase in productivity of rubber as evident from a more than two times increase over the two decades from 626 Kg./ha (1985) to 1395 Kg./ha (2005). The trend growth rates in area, production and

productivity of rubber for the period 1985-2005 has shown disparate trends as evident from Figure 1.



	India	Indonesia	Thailand	Malaysia	China	Vietnam	WORLD
area	3.80	2.46	1.09	-1.20	1.36	5.30	1.54
production	7.29	3.77	5.85	-2.62	5.83	13.02	3.50
yield	3.75	1.32	3.56	-1.43	4.48	7.72	1.96

Figure 2: Growth Rates in Area, Output and Yield of Rubber: Major Countries *vs* World (1985-2005)

The trends show that the highest growth rates in productivity has been reported from Vietnam (7.72%) and China (4.48%), which could have been contributed by the increase in the share of rubber area under tapping. Higher output growth has been achieved by Vietnam (13%), India (7.3%), Thailand (5.85%) and China (5.83%) as against negative growth in Malaysia (-2.62%).

2.3.2. Synthetic Rubber (SR)

China has also emerged as the dominant producer of synthetic rubber (SR) in the world. With hardly one percent of the global share in SR output in 1975, China's share has increased on par with Japan in 2004 (Table 3). The combined share of the three countries in SR production has increased from 45 per cent in 1975 to 49 per cent in 2004, mostly accounted for by the growth in production of China. This is further evident from the results of the regression analysis (double log) examining the specific country influence on the World SR production (W_{SR}). The analysis shows that the coefficient of SR production in China (C_{SR}) had the highest influence (0.328), while SR production in USA and Japan had negative influence on the global output of SR, coefficient values being -1.426 (USA_{SR}) and -0.289 (J_{SR}) respectively.

Table 3: Trends in Global Synthetic Rubber Production and China's Share

Year	Production of Synthetic rubber ('000 tons)				Share in global output (%)			Regression results
	China	U.S.A	Japan	World	China	U.S.A	Japan	
1975	57	1990	789	6361	0.90	31.28	12.40	$W_{SR} = f(C_{SR} + U_{SR} + J_{SR})$
1980	123	2215	1094	8048	1.53	27.52	13.59	$China_{SR} = 0.328^{*}$ (2.412)
1985	171	2026	1158	8252	2.07	24.55	14.03	$USA_{SR} = -1.426^{*}$ (-1.838)
1990	316	2115	1426	9271	3.41	22.81	15.38	$Japan_{SR} = -0.289^{*}$ (-0.520)
1995	586	2530	1498	6348	9.22	39.86	23.60	R square = 0.478
2000	865	2394	1592	10108	8.56	23.68	15.75	Adj. $R^2 = 0.366$
2001	1220	2455	1466	10569	11.54	23.23	13.87	F = 4.274
2002	1362	2563	1522	10905	12.49	23.50	13.96	* (P<0.05)
2003	1348	2614	1608	11432	11.79	22.87	14.07	Observations = 29
2004	1481	2680	1616	11845	12.50	22.63	13.64	Note: (Parenthetic figures are t' ratios)

Source: 1. Indian Rubber Statistics; 2. China Statistical Year Book.

Thus the above analysis shows that China has emerged as a dominant stakeholder in rubber production in the world, occupying fifth position in NR production and third position in the production of SR. Based on the current trends in production of NR and SR, it is quite likely that China would even surpass the growth performance of India and Vietnam in the production of NR and Japan in the production of SR in the immediate future.

3. Growth of Rubber Industry in China and Regional Dimensions

Rubber industry in China brings out a sharp contradiction in terms of the sub-optimal growth of the rubber production (NR and SR) sector and the dynamic growth of the rubber based manufacturing sector. The contradiction needs further elaboration with respect to the growth and development of rubber industry in the country along with its regional dimensions. Accordingly, the following section attempts at a critical assessment of the growth, status and regional dimensions of rubber industry in the country especially since the post reforms era. For the sake of analytical brevity, the paper defines the rubber industry in China as composed of:

"the small, medium and large enterprises owned or (and) operated by the state/ private/ joint venture/ foreign companies, which use natural rubber (NR) or (and) synthetic rubber (SR) or composites of NR and SR as the major raw material or industrial sectors whose manufacturing process generates demand for products made of NR and SR or composites of both".

Based on this conceptual definition, the rubber industry is categorised into two broad sectors, *viz*., a) the tyre and non-tyre products manufacturing sectors which directly use NR, SR or their composites as the major source of raw material; and b) the automobile manufacturing sector comprising motor vehicles, trucks, cars, tractors, etc., which derive their demand (derived demand) for rubber and rubber products.

At the outset, it may be noted that as an individual industry, rubber and rubber products industry has only negligible share in the country's gross value of industrial output (GVIO) and industrial value added and the external trade (Appendix 2). Though the rubber and rubber products industry has made considerable progress over time with an increase in the GVIO from US$ 48.27 million in 1995 to US$ 158.56 million in 2003 along with rise in value added from US$ 10.36 million to US$ 44.68 million, the relative shares at the national level hovered around less than one per cent in all the three economic indicators. However, the share of value added within the rubber and rubber products industry has increased from 21 per cent (1995) to 28 per cent (2003).

Despite the insignificant share of the industry in terms of the macro economic aggregates, the specific segments like the tyre and automobile industries have achieved substantial growth over the past three decades with a dynamic presence in the global market. Hence, the analysis is mainly confined to trace the growth of the tyre and automobile manufacturing sectors with its regional dimensions and the confluence (or absence of it) between rubber production and rubber based industrialisation processes.

Logically, the development and growth of the tyre industry is driven by the growth in the automobile industry and hence there exist strict complementarity between the two sectors. Such complementarity is also contingent upon the sustainable availability of the raw material base (NR & SR) to strike a fine balance between the resource base and the resultant industrial development process. Given this, it is important to examine whether the growth of the rubber industry has been in tandem with the growth of the domestic rubber production sector. This

necessitates a closer look at the historic trends in the development and growth of the rubber production sector *vis- a-vis* the rubber industry.

Table 4 brings out the dynamics of parallel but unequal growth of the rubber production sector comprising NR and SR and the growth of the manufacturing sector comprising the segments of tyres, motor vehicles including cars and trucks and large/ medium tractors. The trend in the production of rubber shows that the production of SR has increased more than proportionate to that of NR since 1995 owing to a drastic decline in the share of NR in the total rubber output in the country.

Table 4: Trends in Growth of Rubber Production and Rubber Based Industries in China

Year	Resources production (10000 tons)		Manufacturing sector (10000 units)				
	Natural rubber (NR)	Synthetic rubber (SR)	Tyres	Motor vehicles	Cars	Trucks	Large/ medium tractors
1978	10.16	5.70	936	14.91	0.26	9.61	11.35
1980	11.30	12.30	1146	22.23	0.54	13.55	9.77
1985	18.79	17.10	1926	43.72	0.90	26.90	4.50
1990	26.42	31.60	3209	51.40	3.50	28.97	3.94
1995	42.40	58.56	8290	145.27	33.70	60.92	6.33
2000	48.02	86.52	12158	207.00	60.70	86.29	4.10
2001	47.74	121.98	13573	234.17	70.36	89.01	3.82
2002	52.74	136.21	16307	325.10	109.20	109.20	4.54
2003	56.50	134.83	19312	444.39	202.01	112.44	4.88
2004	60.00	148.05	23926	555.05	231.63	174.49	15.15
Trend growth rates							
1978-1990	1.086*	1.098**	1.139*	1.134**	1.119**	1.131*	0.927*
1991-2004	1.052**	1.125*	1.121**	1.133**	1.242*	1.091**	1.020**
1978-2004	1.069**	1.133*	1.143*	1.140*	1.298*	1.109**	1.007**

Note: Trend growth rates have been derived based on the function: $Y = \acute{\alpha}X + \beta^t$

** Denotes Significance at 0.01 level and * Denotes Significance at 0.05 level.

Source: Compiled from China Statistical Year Book.

On the other hand, the manufacturing sector comprising tyres and automobile industry, especially the car industry, has reported tremendous growth over time. In absolute terms, the production of tyres increased by almost 25 times from 9.36 million units in 1978 to 239.26 million units in 2004. Similarly, the motor vehicle industry has also made tremendous progress with production rising from 0.15

million vehicles to 5.55 million vehicles during the above period. The growth of car manufacturing industry has been more spectacular especially after 1995 with production increasing from 0.34 million (1995) to 2.32 million cars (2004).
While the production of trucks has increased by more than 18 times over time, the large and medium tractor industry has remained stagnant during most of the years except the latest year. This indirectly suggests that the growth of the rubber industry has been stimulated by the demand for tyres from the three major industrial segments, *viz*., motor vehicles, cars and trucks.

The most striking point that emerges from Table 4 is the divergence in growth between the rubber production segment and the rubber industrial sector, especially the tyre manufacturing industry. This is further evident from the trend growth rates in rubber (NR & SR) production and the output of the industrial sub sectors. For instance, NR production reported lowest levels of growth during all the three periods compared to the growth of the industrial segments, except the large and medium tractors. Whereas, the trend growth rates in the production of SR were over and above that of NR, especially during the second period at 1.125 (P<0.01) during 1991-2004. While production of NR had recorded the highest growth of 1.086 (P<0.01) during the first sub- period 1978-1990, production of SR recorded the highest growth of 1.125 during the second period. Obviously, the trend growth rates recorded by the tyre manufacturing industry have been the highest for the entire period of analysis, followed by the motor vehicles industry, mostly contributed by the growth of the car industry.

Thus the above analysis highlights the growing mismatch in growth between the resources (NR and SR) production sector and the resource dependent manufacturing sector in China especially since the post-reforms period. It also shows that the dynamic growth of the rubber industry has been mostly driven by the car and trucks industrial segments. The apparently limited growth as achieved in the rubber production sector has come from the growth in SR production rather than growth in NR production, which may be explained as an outcome of the increased substitution of NR with SR to overcome the shortage in NR supply. However, the sustainability of such a substitution process is rather questionable in view of the comparative cost disadvantage in the production of SR against NR as will be discussed later.

3.1. Regional Dimensions in Industrial Expansion

China's provinces show distinct pattern in terms of economic growth and industrial concentration as evident from the burgeoning literature (Findlay and Watson, 1996; Woo and Suming Bao, 2003; Wen, M. 2003; Yu and Wei 2003; Fanfani and Brasili 2003; Batisse and Poncet, 2004; Chen, 2005; Jilberto and Hogenboom, 2007). Much of these empirical analyses which followed the official norm of regional classification[5], come to a consensus on the specific regional pattern of industrialisation evolved in the country ever since the planning era. In the early planning years, the national development policies were guided by regional preferences with the result that the coastal provinces were been given the highest priority at the expense of the central and western provinces. Despite a reversal in the policies since the post-reforms era (Wen, M. 2003), the coastal provinces continue to be the high growth regions in terms of agricultural and industrial growth as well as FDI inflows, while the central and western provinces remain to be on low to medium growth path. For instance, the Eastern provinces consolidated their share in gross value of industrial output (GVIO) from 66 per cent in 1995 to 73.48 per cent in 2003 when both the Central and Western regions experienced a drop in their respective shares. Eastern region also dominates in the gross value of agricultural output. Sectoral composition of employment also varied across regions with Eastern provinces dominating over the other two regions with respect to employment in secondary and tertiary industries. The Eastern provinces also had the highest share of FDI inflows, ie, 86 per cent in 2003.

Given the diverging regional growth pattern in China, it is also important to examine whether the rubber industry also manifest such regional growth pattern. To accomplish this we follow the threefold official classification of the provinces. The industrial segments considered are: tyres, motor vehicles, trucks, cars, large and medium tractors and mini tractors. Though the period for which comparable provincial data available varies across the segments, the analysis tries to report

5. To capture the regional dimensions of the growth of the industry, we follow the official norm of classification of the 31 provinces into three, viz., a) Coastal/ Eastern region; b) Central region; and c) western region, mostly used by scholars. Accordingly, the Coastal region include 12 provinces such as Beijing, Tianjin, Hebei, Shandong, Fujian, Liaoning, Guangdong, Guangxi, Shanghai, Jiangsu, Zhejiang and Hainan. The Central region includes 9 provinces, viz., Shanxi, Heilongjiang, Inner Mongolia, Anhui, Henan, Hubei, Hunan, Jiangxi and Jilin. The Western region comprise of 10 provinces, viz., Sichuan, Chongqing, Guizhou, Yunnan, Tibet, Shaanxi, Gansu, Qinghai, Ningxia and Xinjiang.

the most current trend, so as to reflect upon the distinct pattern of regional concentration of specific industries. In view of the significant differences across provinces in reporting the data, the regional aggregates do not match with the national aggregates.

Table 5 provides the information on the regional spread in the location of tyre and automotive industries in China. As evident, the Eastern provinces report the highest concentration of all the industrial segments, except the trucks manufacturing industry, which is concentrated in the central region. As per the latest year (2004) for which comparable data is available, Eastern region accounts for 77 per cent in the production of automotive tyres, 81 per cent in the production of large and medium tractors, 68 per cent in the manufacturing of cars, 62 per cent (1997) in the production of mini tractors, 54 per cent in the production of motor vehicles and 33 per cent (1999) in the production of trucks.

Table 5: Regional Spread of Tyre and Automotive Industry in China

Year	Production of Tyres (10000 units)				Production of Motor Vehicles (10000 units)			
	Eastern	Central	Western	Total	Eastern	Central	Western	Total
1995	6069 (73)	1294 (16)	926 (11)	8290 (100)	78 (49)	50 (32)	29 (19)	157 (100)
2004	13123 (77)	2475 (14)	1442 (9)	17040 (100)	286 (54)	178 (34)	60 (12)	523 (100)
Annual average	8873	1764	1231	11868	126	102	35	263
Year	Large/Medium Tractors (10000 units)				Production of Trucks (10000 units) [A]			
	Eastern	Central	Western	Total	Eastern	Central	Western	Total
1995	4.42 (70)	1.88 (29)	0.03 (1)	6.33 (100)	23.19 (38)	26.51 (44)	11.22 (18)	60.92 (100)
2004	7.94 (81)	1.82 (18)	0.07 (1)	9.83 (100)	28.05 (33)	44.35 (53)	11.52 (14)	83.92 (100)
Annual average	4.68	1.58	0.09	6.35	23.29	33.52	10.85	67.658 (100)
Year	Production of Cars (10000 units)				Production of Mini Tractors (10000 units) [B]			
	Eastern	Central	Western	Total	Eastern	Central	Western	Total
2000	37.69 (62)	18.02 (29)	5.45 (9)	61.16 (100)	121.4 (59)	67.38 (33)	17.50 (8)	206.30 (100)
2004	157.18 (68)	56.81 (24)	17.64 (8)	231.63 (100)	125.1 (62)	64.03 (32)	12.54 (6)	201.65 (100)
Average	82.87	42.09	10.19	135.14	123.12	67.25	15.50	205.87

Notes: [A] = Data relates to 1995 and 1999; [B] = Data relates to 1995 and 1997.
Source: Compiled from respective provincial Statistical Year Books (relevant years)

The central provinces have the highest concentration of industrial sub sectors, such as the trucks (53%), motor vehicles (34%), mini tractors (32%), cars (24%) and large and medium tractors (18%). Though the western region has a commendable share in the production of motor vehicles (12%) and trucks (14%), there was a decline in the relative position in recent times. The western provinces also have a smaller share in the production of tyres (9%), cars (8%) and mini tractors (6%).

Given the dominance of the Eastern provinces in the tyre and automotive industrial segments (except the trucks sub-sector), it is also worth exploring whether certain of the provinces dominate in the aggregate production in each of the six industrial sub sectors. The results of the analysis are presented in Table 6.

Table 6: Share of Provinces in the Gross Production of Tyres and Automotives in China

Province	Tyres	Motor vehicle	Cars	Large/ Medium tractors	Trucks	Mini tractors	Concentration ratio
	2004	2004	2004	2004	1999	1997	(CR)#
1. Beijing	1.12	10.29 (3)	7.86 (5)	0.00	10.86 (5)	0.18	0.83
2. Tianjin	4.11	4.25	9.61 (4)	8.95 (4)	1.06	0.08	1.00
3. Hebei	0.74	2.74	0.00	16.38 (2)	0.73	8.53 (5)	0.83
4. Fujian	10.65 (2)	1.26	1.20	0.00	0.46	2.04	0.83
5. Shandong	50.83 (1)	4.01	2.17	27.67 (1)	6.04	30.58 (1)	1.00
6. Guangdong	4.12	5.29	11.51 (3)	0.00	0.75	1.08	0.83
7. Shanghai	5.44 (4)	10.69 (2)	23.74 (1)	8.85 (5)	0.02	0.00	0.83
8. Jiangsu	0.00	4.66	3.88	9.87 (3)	4.46	12.06 (3)	0.83
9. Hainan	0.00	1.28	2.31	0.00	0.00	0.00	0.33
10. Guangxi	0.00	5.44	0.48	0.00	7.54	5.35	0.67
11. Anhui	6.45 (3)	4.67	3.44	0.00	3.16	10.35 (4)	0.83
12. Jilin	1.10	12.34 (1)	14.54 (2)	0.00	18.42 (1)	1.41	0.83
13. Jiangxi	1.67	3.52	1.16	1.12	13.29 (3)	1.07	1.00
14. Henan	4.23 (5)	0.58	0.00	16.38 (2)	0.87	15.09 (2)	0.83
15. Hubei	0.26	6.42 (5)	3.80	0.81	14.43 (2)	0.58	1.00
16. Chongqing	1.89	8.30 (4)	6.79	0.71	11.42 (4)	0.02	1.00
17. Sichuan	2.01	1.20	0.00	0.00	0.05	1.89	0.67
18. Yunnan	0.00	0.98	0.07	0.00	1.07	1.66	0.67
Aggregate share	94.61	87.91	92.56	90.74	94.63	91.98	

Note: # Concentration ratio (CR) = OS/MS; OS = Obtained Score; MS = Maximum Score
Parenthetic figures are the respective rankings in the aggregate production.

Table 6 brings out that the 18 provinces together account for a significant share in the production of tyres and automotives. However, the production capacities are sparsely distributed in most cases, though certain provinces have monopoly in certain of the segments. For instance, though almost 78 per cent of the provinces produced automotive tyres, five provinces, *viz.*, Shandong, Fujian, Anhui, Shanghai and Henan accounted for almost 78 per cent of the tyre production during 2004. Similarly, though all the provinces have the manufacturing base for motor vehicles, almost half of the vehicle production comes from five provinces, *viz.*, Jilin (12.3%), Shanghai (10.7%), Beijing (10.3%), Chongqing (8.3%) and Hubei (6.4%). Car industry has its production base spread over 15 of the 18 provinces, though 67 per cent of the car production comes from five provinces, *viz.*, Shanghai (23.7%), Jilin (14.54%), Guangdong (11.5%), Tianjin (9.6%) and Beijing (7.9%). Most of the production of large and medium tractors comes from Shandong (27.7%), followed by Hebei and Henan (16.38% each), Jiangsu (9.87%), Tianjin (8.9%) and Shanghai (8.8%), despite the industry is spread over 9 of the 18 provinces. Truck industry also has a vast manufacturing base spread across all the 18 provinces, though 68 per cent of the reported production in 1999 came from three of the central provinces, *viz*., Jilin (18.4%), Hubei (14.4%), Jiangxi (13.3%), Chongqing (11.4%) and eastern province of Beijing (10.8%).

To determine the extent of industrial concentration across the provinces, we use a simple measure of concentration ratio (CR). The concentration ratio is developed based on a total score of 6 (covering the 6 rubber based industries), which implies that if a certain province has the presence of all the six industries, the province will have a ratio of 1, as the maximum score (MS) and the obtained score (OS) is 6. A ratio of 0.83 signifies the presence of 5 industries; 0.67 implies presence of 4 industries and 0.33 signifies that the province has a production base for 2 of the 6 industries, etc. Accordingly, five provinces, *viz.*, Shandong, Tianjin, Jiangxi, Hubei and Chonqing have a CR of 1, indicating the presence of all the industries in these provinces. While 9 provinces have a ratio of 0.83 with the presence of five industries, three provinces have a ratio of 0.67, indicating the presence of four industries.

The table highlights an important paradox that the three provinces, *viz.*, Hainan, Yunnan and Guangdong, which account for almost 99 per cent of the natural rubber production, lag behind in terms of growth and expansion of rubber industries, especially, tyre industry that consumes major chunk of NR production.

This appears to be an important issue which needs to be explained in the broader perspective of the political economy of preferential industrialisation policies as evolved in the country ever since 1949 and continues to persist even today. Though the present paper does not dwell upon this delicate issue, it is an important concern needing further analysis.

Thus, the above analysis validates that the comparative advantage of regions has not been a prime mover of industrial expansion in China, despite the efforts in the post-reforms phase to relocate the industries to the interior provinces. The analysis clearly brings out that the eastern provinces continue to have a definite edge over rest of the regions with respect to rubber based industries. However, the analysis also highlights a disquieting feature of the rubber based industrialisation process in the country in terms of the spatial spread of the industries with thin production capacities. Such thin spreading of the industrial base would have deleterious effects on the economic performance of the industries especially in the context of global market integration.

3.2. Rubber Industry and its Trade Pattern

In this regard, it is also important to determine the relative importance of the tyre manufacturing sector in the country's rubber based industrialisation process as the rubber products industry also includes a vast non-tyre products segment. It is estimated that there are more than 4000 manufacturing enterprises in China consuming rubber, of which, almost half (2016) are major enterprises. The estimated employment potential of the rubber industry is about one million with an asset base of 113.6 billion RMB. Broadly, the rubber industry consist of an array of products, *viz*., tyres (auto, bicycle and motorcycle tyres), rubber tubes, rubber belts, rubber shoes, rubber products, latex, reclaimed rubber, tyre retreating and relevant additives, etc (http://www.cria.org.cn). However, the tyre industry is the single largest contributor to the country's exports in rubber and rubber products as evident from Table 7.

Table 7 shows that the country's total trade in rubber and rubber products (imports and exports) has grown substantially from US$ 1241 million in 1994 to US$ 8545 million in 2004. Though in absolute terms the imports of rubber and rubber products has increased more than exports, the rate of growth in exports (1.194) has been higher than the growth in imports (1.173). However, the rubber industry has been experiencing a negative trade balance, the magnitude of which

has increased since 2000. As evident, the tyre industry accounts for the largest share in the gross volume of exports of the rubber and rubber products industry with an increase in its relative share from 48 per cent (1994) to 65 per cent (2004). There was also significant increase in the value of exports of tyres from US$ 225 million (1994) to 2487 million (2004).

Table 7: China's Trade in Rubber and Rubber Products and Trade Balance

Year	Trade in rubber & rubber products (Million US$)				Import of NR & SR (Million US$)	NR and SR (% share)	Tyre exports (Million US$)	Tyre exports (% share)
	Exports	Imports	Total	Trade balance				
1994	465	776	1241	-312	582	75.0	225.1	48.5
1995	746	985	1731	-239	751	76.2	430.5	57.7
1996	832	1432	2264	-600	1117	78.0	467.3	56.1
1997	957	1258	2215	-301	927	73.7	503.0	52.6
1998	1013	1113	2126	-100	786	70.6	575.1	56.8
1999	1177	1469	2646	-292	884	60.2	721.8	61.3
2000	1561	1906	3467	-345	1306	68.5	1003.0	64.3
2001	1624	2071	3695	-447	1386	66.9	1002.8	61.7
2002	1991	2467	4458	-476	1634	66.2	1218.4	61.2
2003	2554	3715	6269	-1161	2307	62.1	1607.6	62.9
2004	3803	4742	8545	-939	2938	62.0	2486.9	65.4
Annual average	1520	1994	3514	-474	1329	69.0	931	59.0
Growth rate	1.194*	1.173*			1.146*		1.223*	

Note: Trend growth rates have been derived based on the function: $Y = \acute{\alpha}X + \beta^t$

* Denotes Significance at 0.05 level.

Source: China Customs Statistics Year Book (relevant years).

Table 7 also brings out an important paradox with respect to the status of the rubber industry in China as a net importer of NR and SR in raw material form. Though there has been gradual decline in the share of imports of NR and SR over time, raw rubber imports still accounts for a major share in the total import bill of the rubber industry. Though there has been a decline in the combined share of the value of imports of NR and SR in raw material form from the highest reported at 78 per cent in 1996 to the lowest at 60 per cent in 1999, the combined share hovered around 62-68 per cent.

4. Critical Issues Facing China's Rubber Industry

The rubber industry in China is thus beset with an important contradiction that the dynamic growth of the industry has been achieved under an import oriented policy regime marked by higher levels of imports of NR and SR in raw materials form. While such a policy regime has been successful in enabling the country achieve the growth dynamism of the rubber industry, the sustenance of the same is fraught with serious challenges in the context of opening up of the economy and its integration with the global market. The magnitude of the crisis may assume serious proportions especially in the context of globalisation and China's entry into the WTO system. Invariably, the sustenance of the growth dynamism in the rubber industry would require the tyre/ automotive and other rubber products industries to be highly efficient and competitive in a broad spectrum of activities ranging from raw material outsourcing to devising strategies for cost reduction and achieving economies of agglomeration. As emerge from the above analysis, the rubber industry in the country faces severe constraints amidst immense growth potential along with growing gap between production and consumption of both NR and SR (Figures 2 & 3).

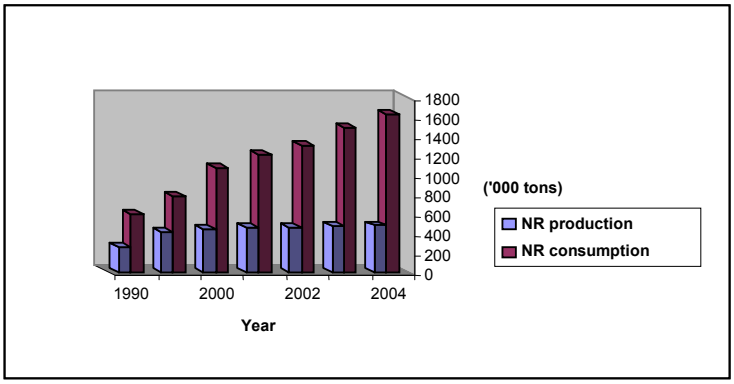


Figure 2: China's Production & Consumption of NR

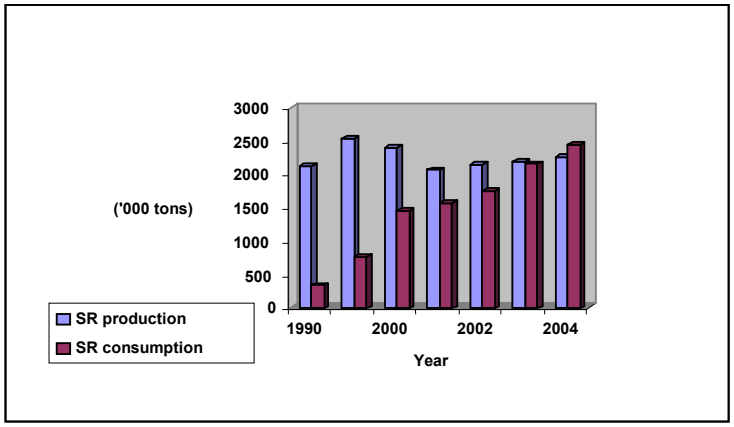


Figure 3: China's Production & Consumption of SR

The production consumption gap has been growing especially in the case of NR in view of the almost stagnant growth in production in relation to the ever growing consumption demand. Historically, efforts have been made to overcome the shortage of NR either through increased imports of NR or through increased domestic production of SR or both, with increasing financial risks in terms of growing trade deficits as discussed above. However, the increased raw material imports of NR and SR also had its spiralling effects on the unit cost of imports of both NR and SR as evident from Table 8.

Table 8: China's Imports of NR and SR and Unit Cost of Imports

Year	Imports of NR+ SR (10000 tons)	Share of NR	Total value of imports (Million USD)	Share of NR	Unit cost of imports (US$ per ton)		
					NR	SR	NR/SR
1990	38	88	352	81	840	1503	0.56
1995	63	51	751	56	1322	1057	1.25
1997	88	49	927	49	1064	1042	1.02
1998	94	46	786	41	745	914	0.82
1999	108	40	884	32	656	926	0.71
2000	156	54	1306	45	687	1017	0.68
2001	173	57	1386	43	604	1059	0.57
2002	188	51	1634	42	723	1021	0.71
2003	221	54	2307	50	962	1141	0.84
2004	238	54	2938	52	1191	1286	0.93

Source: China External Economic Statistical Year Book

Table 8 shows that NR accounts for the highest share in both the volume and value of imports of rubber and rubber products in China. The share of NR imports

in volume and value terms has been on the increase in recent years, as more and more NR is being substituted for SR in view of the higher unit cost of import of the latter. However, though unit cost of imports of NR has been lower than SR, it is likely that the trend may reverse as indicated by the convergence of ratio between unit cost of NR and SR imports in the later years, especially, 2004.

Table 8 also points to an important issue having topical relevance in the context of global market integration. Theoretically, it may be presumed that market integration enable countries to attain efficiency in resource allocation through outsourcing cheaper imports and thereby get rid of the cost-ineffective domestic production. Under the free trade policy regime, this is further facilitated through the gradual phasing out of the tariff regime and removal/ relaxation of other barriers to entry in favour of the importing country. Viewing China's rubber industry from this standpoint, one could expect that the market integration in itself would have helped the country in terms of reduction in unit cost of imports of raw materials of NR and SR. However, in reality, the above presumption stands nullified with respect to rubber industry in China, as the unit costs of import of NR and SR have been on the increase since 2001, which also coincided China's entry into the WTO system.

The empirical reality as discussed above would assume unforeseen dimensions in the era of globalisation, which necessitates China to be wary about choosing between combinations of different alternatives for sustaining the growth dynamism of the rubber industry. Invariably, this calls for a thorough revamping of the development strategies and policies in the emerging scenario. Broadly, based on an understanding of the empirical reality of the rubber production systems and rubber based industrial development processes in the major rubber producing countries such as Malaysia, Thailand and India, it may be observed that China has to evolve an institutional paradigm for sustaining the dynamism of the rubber industry in the years to come. The institutional paradigm could entail a broad spectrum of activities ranging from short-term measures for demand and supply management to long term measures, including radical reforms in the policy and institutional environments.

In this regard, it is important to have a brief discussion on the possible short-term as well as the potential long-term measures so as to resolve the crisis confronting the domestic rubber production and rubber based industrial sectors in China.

4.1. Short-term Measures

To ascertain the future prospects of China's rubber industry, it is more critical to ensure sustainable supply of rubber, especially, NR and hence, demand supply management holds the key of short term intervention strategies. Obviously, the future potential of the rubber industry appears to be bright for the country in view of the emerging growth trends of the economy. For instance, the country has been witnessing a consistent and rising GDP growth rate over 9 per cent since the past one decade along with rapid growth in annual industrial output (above 10 %) contributed by strong automobile production growth. Based on a projection of 5 per cent annual growth, China's rubber consumption is expected to grow to 5.5 million tons by 2010, an increase of above 28 per cent than the 2005 level (Jumpasut, 2005, Guohua and Haiping, 2005).

Though the industry's growth potential looks bright and the major industrial segments like the tyre and the motor vehicles industries (particularly, car industry) have been highly responsive to the dynamic growth of the economy, internal restructuring becomes an immediate short-term solution to make the rubber industry more competitive and efficient in the context of market integration. As evident from the above analysis, the industrial growth has been highly concentrated in the eastern region with the region having monopoly in the industrial output along with thin spread of manufacturing units across the provinces. An overwhelming majority of these firms are small scale operators and the production processes, including technology are seemingly duplicated with inferior products. Such firm level process and product duplication along with thin spread of industrial units across the provinces may hamper the aggregate industrial performance in the long run in the absence of policies aimed at achieving scale economies and benefits of agglomeration through internal restructuring, including disinvestment policies.

Short-term measures also necessitate China to make a rational choice between or a combination of at least three alternatives, *viz.*, a) strengthening the domestic natural rubber production sector; b) continue to follow import of NR and SR; and c) massive launching of rubber investment programmes in the neighbouring regions of the Laos, Vietnam, Cambodia, Myanmar and the Philippines.
Among the short term measures suggested, a rational policy choice would be to strengthen the domestic NR production sector for various reasons. For one, historic trends in the import of NR and SR had negative effects on the country's

balance of trade in rubber and rubber products as already discussed. Moreover, unit costs of imports of NR and SR have been on the increase since 2001. `Resorting to cheaper imports' policy is often contested as it is highly sensitive and goes well with the importing country's trade relations with the source country. In China's case, though the current NR imports are sourced mostly from Thailand (63%), Malaysia (17%), Indonesia (8%) and Vietnam (7%), continuance of the same is dubious, as these countries are underway of tremendous economic transition after recovering from the 1997 financial crisis. Moreover, of late, these countries, particularly, Thailand, Indonesia and Malaysia have also been vigorously pursuing rubber industrialisation policies by restricting exports of raw materials of NR[6] (Jilberto and Hogenboom, 2007).

Launching of rubber investment programmes in the neighbouring countries, viz., the Laos, Vietnam, Cambodia, Myanmar and the Philippines is one of the most recent policy options being tried by China. Reportedly, in Vietnam, the plantation size and output levels are on the increase facilitating border trade more economical for China rather than domestic production. There are also reports of initiatives by Chinese private firms in planting rubber in Cambodia to an extent of 63000 ha and about 30000 ha in Myanmar by 2010 (The News Today, Dhaka, April 03, 2006). Similarly, the recent trends in the development of both small and large scale rubber contracts in the Laos are the result of Chinese businesses seeking lucrative opportunities in the Laos (NAFRI, 2006). It may be that China considers Laos as a strategic, though small producer of rubber with abundant land resources, cheap labour, and a more favourable climate (Alton *et al*., 2005). However, the sustenance and worthiness of such investments is highly ambiguous in the absence of long-term feasibility studies of the investment projects at various scales of operation, involving the three countries, including China. Moreover, such investment projects are highly contentious in terms of the choice of production systems (individual smallholder versus state or private corporate contracts) and the institutional support and interventions, sourcing of R&D and strategic decision making at various levels. Apparently, China, Vietnam,

6. There is also a 'fear psychosis' taking shape among the countries in transition as they feel that China's 'peaceful rise as a super power' would sooner or later interfere with their interests and development ethos. Though the entry into the WTO allows China to benefit from the MFN status, for most of these countries, it implies more threat from cheaper Chinese products. These countries, which are also competing with China in exports manufacturing have seen trade and investment being negatively affected by China's success. In addition, it has also been reported that cheap Chinese imports into these countries have been hurting the local manufacturing companies, especially small and medium sized- that produce for the domestic market (see also Bijian, 2005).

Laos, Cambodia and Myanmar are yet to have a comprehensive R&D programme and institutional networking aimed at development of rubber plantations, which is in sharp contrast to their counterparts, *viz.*, Malaysia, India and Thailand. More importantly, there are serious apprehensions as regards the way in which the external interventions in the rubber development programmes in these countries are going to resolve the prevailing property rights regime (NAFRI, 2006).

4.2. Long Term Measures

Thus the above reasons make a strong case in favour of strengthening the domestic NR production sector, though a combination of other options may also be tried in the short run to match the growing shortage in NR supply. However, though the policy option of strengthening the domestic NR production sector is highly desirable, it calls for radical transformation in perceptions and approach towards the development of the rubber industry in China especially in the post-reform/ post-WTO context. Ironically, in China natural rubber is still being treated as a forestry product when the dominant rubber producing countries like Malaysia, Thailand and India have classified the crop as agricultural product or industrial product, following the WTO stipulations. By contrast, the crops such as cotton, sugar cane, oil seeds, tea, etc are classified as economic crops. Though the share of rubber in the total sown area of the country is the lowest at 0.3 per cent, the share is not mean compared to the relatively lower shares of other crops, viz., as cotton (3.35%), tea (0.75%) and tobacco (0.83%). More importantly, value of natural rubber output valued at US$ 78.6 million accounts for 4.53 per cent of the gross value of agricultural output (GVAO) in China based on 2003 prices. The economic significance of the crop is also to be reckoned in terms of its contribution to the gross value of industrial output (GVIO) emerging from the tyre, automotive and the non-tyre segments. Given such prominence of the crop, it is paradoxical that the national and the respective provincial governments remain lethargic towards developing the crop as a strategic raw material especially in the context of globalisation. This requires that China has to make a rational and deliberate choice in classifying NR as an agricultural crop or industrial raw material, which could benefit the country in terms of extending domestic protection and fixing up of tariff rates as per the WTO prescriptions[7].

7. Classification of rubber as agricultural product or industrial raw material is a highly contested issue in the WTO ministerial negotiations. While countries such as Malaysia and Thailand consider it as an industrial raw material, India is still to have a final stand on the status of the

As a long term measure, China has to introduce certain radical reforms to restructure the existing rubber production system, characteristically controlled by the state farms. Measures in this direction could be to strengthen the status of the individual farmers who currently work merely as 'production workers' in the contracted state farms. While it is imperative to establish new contractual arrangements such that the production workers (farmers) get adequate incentives in terms of crop share equivalents, measures should also be put in place to guarantee secure farm land contracts. In this regard, it is important to note that though the 2004 constitutional amendment guarantee individual rights on property to a period of 30 years, in effect the contracts lasts only for 15 years. Rubber being a perennial crop with an average plantation cycle of 30 years, the present contractual/ tenurial arrangements needs further amendments so as to ensure the small and marginal rubber farmers access to and control over rubber production on a sustainable basis. Along with granting of longer contractual/ tenurial security, the farmers also need to be given adequate financial and institutional support to take up rubber cultivation as in India, Malaysia and Thailand. The state farms can also be brought under the control of rubber grower cooperatives (as in India and Thailand), which would make the small rubber farmers an important stakeholder in the process of expansion of rubber cultivation.

Long term measures also necessitate China to come forward with institutional reforms and R&D interventions. Institutional reforms could mean a thorough revamping of the existing institutional framework characterised by bureaucratic control and the non-participation by the farmers (production workers) in the rubber development schemes. In this regard, China could learn from the experiences of Malaysia, India and Thailand with respect to institutional interventions and R&D programmes. Since the above countries have already built up a strong R&D and institutional framework for development of rubber, China could minimise its R&D investments to choose between planting materials and processing technologies that would be more appropriate to the agro-climatic environments that exist in the country. Though China has already made commendable progress in terms of developing cold and disease resistant clones

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crop, as the maximum permissible import tariff limit is 100 per cent in the case of agricultural products as against 40 per cent in the case of industrial products. Classifying rubber as agricultural product also renders the country to continue with the domestic support given to the farmers for cultivation of the crop.

and other silvicultural practices suitable for rubber cultivation (Priyadarshan et al., 2005), the efforts remain isolated in the absence of a strong back up from the national and the respective provincial governments. It may also be observed that China could further explore possibilities of rubber expansion (based on systematic and scientific investigations on agro-climatic suitability) to non-conventional regions and marginal areas, where rubber can be developed as an integrated farming system in an agro-forestry perspective. With the state taking the lead, the new integrated rubber production system can also be designed as a multi-stakeholder system, involving the small farmers, domestic and foreign rubber based manufacturing entrepreneurs, etc. However, this essentially requires building up a dynamic interactive space with participation from and co-ordination between the multiple stakeholders.

5. Conclusions and Policy Imperatives

The paper brings out that the development and growth of rubber industry in China is reflective of the contradictions arising from the mismatch between growing shortage of natural rubber and the dynamic growth of the industry with regional concentration in production along with spatial distribution of firms. The analysis also reiterates that rubber industry is not an exception to the broad pattern of industrial development as achieved by China in the post reforms period, which suggests that economic activism in the countryside has been driven by political and national security concerns rather than comparative resource advantage of the regions. While the growth of the rubber industry mostly driven by the tyre and automotive segments, has attained phenomenal proportions, the development of the natural rubber sector has lagged behind in view of the passive state policies and the inactivism with respect to strengthening of the domestic NR production sector. Though the dynamic growth of the rubber industry was facilitated through resorting to a heavy import oriented trade policy, the sustainability of the same is highly contested in the era of global market integration.

The paper outlines some important policy options for sustaining the growth dynamism of the rubber industry in the era of globalisation, which include a thorough revamping of state policies and evolving (virtually non-existent) institutional intervention strategies confining to a broad spectrum of short as well as long term measures. Given that the processes of opening up and market integration would continue to stimulate the growth of the rubber industry, the

paper highlights that the issues at the supply side management are to be tackled on a priority basis. However, addressing the supply side management issues would need China to make a rational choice between or a combination of at least three alternatives, *viz.*, a) strengthening the domestic natural rubber production sector; b) continue to follow import of NR and SR; and c) massive launching of rubber investment programmes in the neighbouring regions of the Laos, Vietnam, Cambodia, Myanmar and the Philippines.

Alongside, the paper also urges that China has to come forward with radical measures of institutional reforms and R&D interventions for strengthening the domestic NR production structure. In this regard, China could learn from the experiences of Malaysia, India and Thailand with respect to institutional interventions and R&D programmes. The paper also brings out a case for evolving policies and institutional mechanisms for achieving synergy between development of natural rubber sector and rubber based industrialisation processes in China. Such a synergisation process becomes essential to revamp the rubber production sector in the country to make it economically sustainable and globally competitive, taking cue from the broader development goals in the era of globalisation.

Appendix 1: China's Share in World Industrial Output and Products

Industrial output/ product	World total		China (% share)	
	1990	2002	1990	2002
1. Steel (10000 tons)	77294	79244	8.58	28.06
2. Motor vehicles (10000 vehicles)	4835	5072	1.05	8.75
3. Coal (10000 tons)	470651	428518	22.94	38.90
4. Crude Petroleum (10000 tons)	301120	348393	4.59	4.87
5. Cement (10000 tons)	114125	179720	18.38	47.97
6. Electricity (100 million kwh)	117088	166931	5.31	11.45
7. Chemical fertilizer (10000 tons)	14289	14793	13.16	25.63
8. Refrigerators (10000 units)	5245	7366	8.83	30.45
9. Television sets (10000 units)	12731	11821	21.09	34.63
10. Washing machines (10000 units)	4262	5954	15.56	26.81
11. Telephones (10000 units)	7616	20495	11.55	58.02

Source: International Statistical Year Book, PRC, National Bureau of Statistics (relevant years)

Appendix 2: Share of Rubber and Rubber Products Industry in Gross Industrial Output in China

Year	Gross Value of Industrial Output (100 million USD)			Value added (100 million USD)			Value added in rubber industry (% share)	Share of rubber industry in national trade (%)	
	National	Rubber	% share	National	Rubber	% share		Exports	Imports
1995	4384	48.27	1.10	1305	10.36	0.79	21.45	0.50	0.75
1999	8770	94.13	1.07	2601	24.44	0.94	25.97	0.60	0.89
2000	10347	98.15	0.95	3067	26.45	0.86	26.94	0.63	0.85
2001	11528	107.95	0.94	3421	29.99	0.88	27.78	0.61	0.85
2002	13379	128.57	0.96	3985	35.33	0.89	27.48	0.61	0.84
2003	17183	158.56	0.92	5072	44.68	0.88	28.18	0.58	0.90

Source: China Statistical Year Book (relevant years)

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