

SALIENT FEATURES OF RUBBER CONSUMPTION IN JAPAN

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I. AN OVERVIEW

THERE ARE three characteristic features to the development of rubber consumption in Japan since 1955:

(1) From 1955 to 1976, world rubber consumption increased 3.8 times although natural rubber use increased only 1.8 times. Japan increased its use tremendously 10 times for rubber and 3.4 times for natural rubber alone (Table I and Figure 1). This has made Japan the second largest rubber consumers in the world, after the United States. The reasons for this unexpected development are worth examining.

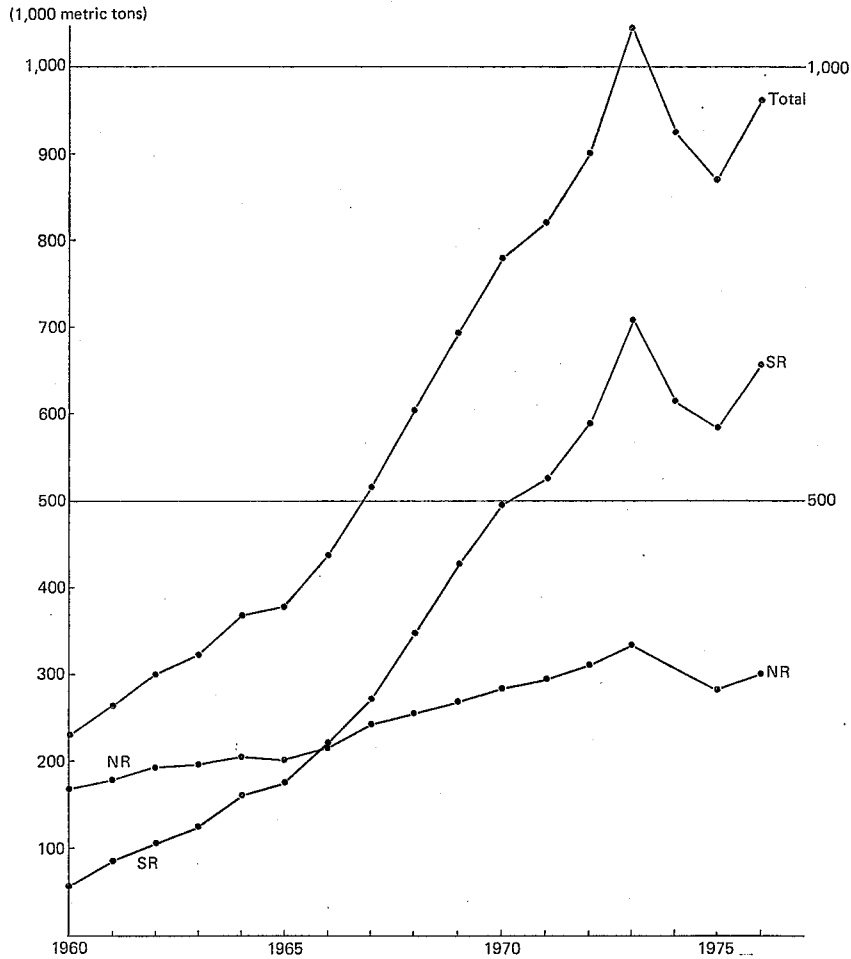
(2) A remarkable feature of the international rubber market after World War II that the growth of purchasing and production has been led by a rapidly increasing expansion in the synthetic rubber industry. Instead of natural rubber (NR), consumption of synthetic rubber (SR) has increased all over the world. This is particularly true in the major consuming countries, such as the United States, the EC, and Japan where SR consumption has been increasing at a much faster pace than NR consumption since the late fifties. In consequence, the NR

TABLE I
RUBBER CONSUMPTION IN MAJOR COUNTRIES, 1955-76
(1,000 metric tons)

		1955		1961		1967		1973		1976	
		Vol.	Index	Vol.	Index	Vol.	Index	Vol.	Index	Vol.	Index
Japan	Total	94	100	264	281	516	549	1,045	1,112	960	1,021
	NR	90	100	179	199	243	270	335	372	302	336
	NR/total (%)	95.7		67.8		47.1		32.1		31.5	
U.S.A.	Total	1,544	100	1,554	101	2,151	139	3,136	203	2,906	188
	NR	645	100	434	67	497	77	696	108	731	113
	NR/total (%)	41.8		27.9		23.1		22.2		25.2	
West Germany	Total	176	100	261	148	342	194	614	349	544	309
	NR	150	100	138	92	141	94	206	137	206	137
	NR/total (%)	85.2		53.0		41.2		33.6		37.9	
U.K.	Total	274	100	297	108	384	140	456	166	493	180
	NR	252	100	168	67	179	71	173	69	168	67
	NR/total (%)	92.1		56.6		46.6		38.0		34.1	
World	Total	3,000	100	4,112	137	6,805	227	10,743	358	11,330	378
	NR	1,920	100	2,162	113	2,535	132	3,410	178	3,543	185
	NR/total (%)	64.0		52.6		37.2		31.7		31.3	

Source: [2, June 1977, Tables 3 & 9].

Fig. 1. Natural and Synthetic Rubber Consumption in Japan, 1960-76



Sources: [2, April 1970] [2, June 1970].

proportion of all rubber consumption continued to decline greatly in these countries. In 1955, the NR share was about 40-50 per cent of all rubber consumption in the United States and Canada, more than 80 per cent in the United Kingdom and the Western European countries, and 95 per cent in Japan. The shares went down in the seventies, reaching 25 per cent for North America, 35 per cent for Britain and Europe, and 32 per cent in Japan, respectively in 1976 (Table I). During the same period, all major consuming countries except Japan had a slight increase or decrease in NR consumption in contrast to Japan's marked expansion in SR. Japan also had considerable growth in NR consumption, despite its speed in substituting SR for NR highest among the major consuming countries. This may owe partly to the unparalleled increase in all rubber use. It may have also

TABLE II
PRODUCTION OF SYNTHETIC RUBBER

	(1,000 metric tons)					
	1955	1960	1965	1970	1974	1976
Japan	—	18.3	161.3	697.5	857.9	941.3
U.S.A.	970.5	1,436.4	1,842.3	2,232.3	2,396.2	2,303.8
Canada	103.9	159.7	206.2	205.4	208.8	209.9
West Germany	10.9	79.8	164.0	301.9	371.8	380.1
U.K.	—	90.4	174.5	315.6	335.8	320.4
France	—	17.2	148.3	315.9	462.7	437.0
Netherlands	—	12.0	100.0	200.0	245.3	246.6
Italy	—	65.8	120.0	155.0	240.0	250.0
Belgium	—	—	20.0	50.0	65.0	90.0
(E.C. total)	(10.9)	(265.2)	(727.5)	(1,337.5)	(1,720.0)	(1,724.0)
Brazil	—	—	38.7	75.5	155.2	164.4
World total	1,085.3	1,880.0	3,795.0	5,892.5	7,585.0	7,960.0

Source: [2, June 1977, Table 20].

TABLE III
PRODUCTION, TRADE, AND CONSUMPTION OF SYNTHETIC RUBBER IN JAPAN
(1,000 metric tons)

	Production (A)	Export (B)	(B)/(A) (%)	Import	Consumption
1966	232.7	50.0	21.5	47.8	222.0
1968	380.7	87.1	22.9	60.7	348.0
1970	697.5	192.5	27.6	31.2	496.0
1972	819.4	263.0	32.1	24.0	588.0
1974	857.9	231.7	27.0	26.0	615.0
1976	941.3	273.6	29.1	23.6	658.0

Source: [2, June 1977, Tables 20, 21, and 22].

been effected by the changing pattern of rubber consumption based on the specific structure and changes in the structure of Japanese rubber manufacturing industries.

(3) SR substitution in Japan proceeded very rapidly after establishment of the domestic synthetic rubber industry in 1960. As demand increased, the SR industry has expanded its production capacity with large, rapid strides that would effect higher efficiency, cut costs, and improve competitive power in domestic and international markets (Table II). As a result, it has much greater capacity than is needed for the domestic market and must export this surplus. Japan is now the second largest exporter of SR in the world and has considerable influence on the international rubber supply (Table III).

In the following sections, the features and related problems of the industry will be examined in more detail, particularly on the perspectives of NR consumption in Japan.

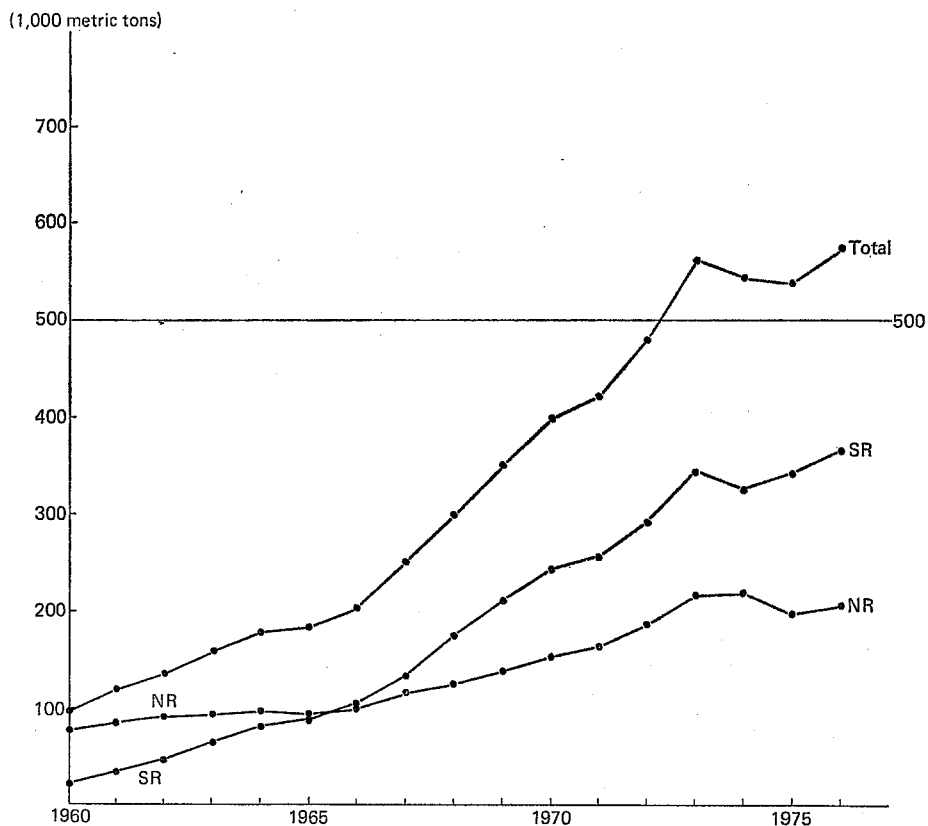
II. CONSUMPTION PATTERN AND DEVELOPMENT OF RUBBER INDUSTRY

For further investigation, it will be necessary, to place rubber consumption and the rubber manufacturing industry into categories. For this purpose, the IRSG (International Rubber Study Group) practice as shown in the *Rubber Statistical Bulletin* can be used where the rubber manufacturing industry is classified into two sectors: "tire and tire products" and "non-tire products," with the latter divided into more specific industries.

A. Changing Pattern of Consumption

In 1959, the share for the tire and tire products sector was 37 per cent of all rubber consumption in Japan, and the non-tire sector 63 per cent (Figures 2 and 3).¹ Consumption increased rapidly afterwards in both sectors, but that for tire and tire products was even faster. As a result, the share for both equalized in

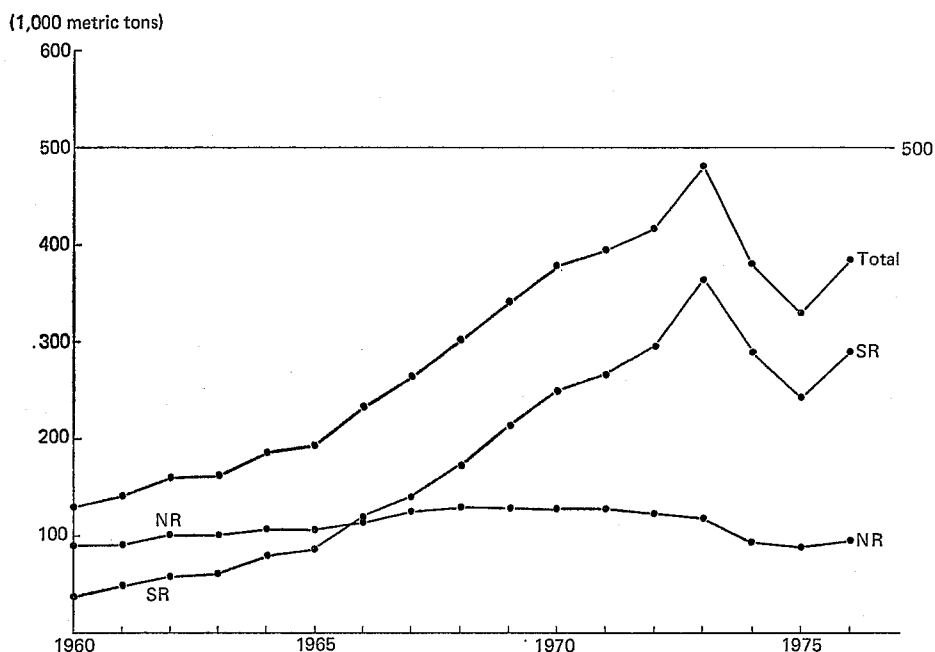
Fig. 2. Rubber Consumption by Sector-wise, 1960-76: Tire and Tire Products



Source: See Figure 1.

¹ Analysis is from 1959 only, because data for sector-wise consumption is not available.

Fig. 3. Rubber Consumption by Sector-wise, 1960-76: Non-tire Products



Source: See Figure 1.

1968, and the proportion for the tire sector increased to 60 per cent in 1974, while the non-tire sector went down to 40 per cent. This means that rubber consumption has undergone some decided changes, a change that was even more drastic for NR. Consumption for the non-tire sector rose slightly prior to 1968, but it stagnated or even declined between 1968 and 1974, while that for the tire sector steadily increased throughout the period (Figures 2 and 3).

Therefore, NR consumption in 1975 was 70 per cent for the tire sector and 30 per cent for the non-tire sector, although the proportion was 40 to 60 in 1959.

SR consumption increased rapidly throughout the period. Quite different from NR, there seems to have been no lag nor disparity in the growth rates of SR consumption in either sector (see Figures 2 and 3). The sector-wise shares of total SR consumption were also almost equal in this period.

From these points it is clear that:

- (a) Both sectors very rapidly substituted SR for NR during the period.
- (b) In the tire sector, production (use of all rubber) expanded tremendously while substitution continued, so that NR consumption in the sector was able to increase.
- (c) In the non-tire sector, substitution of SR or plastic for NR surpassed the speed of production growth, so total NR consumption of the sector would stall or decline.

TABLE IV
PATTERNS OF RUBBER CONSUMPTION, 1974

		Tire & Tire Products Sector			Non-tire Sector
		(A)	(B)	(C)	(D)
(1)	U. S. A.	63	78	35	14
	Canada	95	77	29	16
(2)	Japan	59	70	40	25
	France	65	76	40	24
(3)	West Germany	50	58	41	29
	Italy	47	58	41	26
	U. K.	49	54	42	34

Source: [2, Dec. 1975].

Note: (A) = $\frac{\text{Rubber Consumption by Tire \& Tire Products Sector}}{\text{Total Rubber Consumption}}$
 (B) = $\frac{\text{NR Consumption by Tire \& Tire Products Sector}}{\text{Total NR Consumption}}$
 (C) = $\frac{\text{NR Consumption by Tire \& Tire Products Sector}}{\text{Rubber Consumption by Tire \& Tire Products Sector}}$
 (D) = $\frac{\text{NR Consumption by Non-tire Sector}}{\text{Rubber Consumption by Non-tire Sector}}$

(d) In consequence, the tire sector has greatly increased its share of the total rubber consumption in Japan, particularly in NR.

It is useful, in this connection, to look at the situation in the rubber industry of other developed countries. Table IV summarizes their characteristic features. There are three major categories:

Group 1 (the United States and Canada): The tire sector (automobile industries) takes the greater part of total elastomer consumption as well as total NR consumption (column A has the highest percentage of the three groups). In other words, the entire elastomer market is dominated by the tire sector, while the non-tire sector is far less important as an elastomer user—especially as a customer of NR—because transfer of materials from NR to SR has been drastic (see column D).

Group 3 (West Germany, Italy, and the United Kingdom): Indicators are even in marked contrast to group 1. The tire sector is not as important in the elastomer market as is group 1, though it depends substantially on NR (see column C). The non-tire sector still has half the share of all elastomer consumption and natural rubber is a very important material for it (see column D).

Between group 3 and 1, comes group 2 (Japan and France), supposedly in an intermediate or transitional stage. This makes one believe that there is a certain sequence of development in the rubber industry—group 3 to 1 through 2.

B. Sector-wise Analysis of Rubber Consumption

What is the relation between expansion of rubber consumption and the changing structure of the rubber manufacturing industries and how do we shed light on the factors determining rubber demand. As mentioned, the rapidly growing trend

of rubber consumption in Japan from 1959 on was effected by two compounding factors: the growth rate of both sectors and the rapid substitution of SR for NR. For example, some component industries will be examined.

1. *Non-tire sector*

Significant for their use of rubber in the non-tire sector are footwear, belt, hose, and miscellaneous manufactured goods (see Table V).

TABLE V
RUBBER CONSUMPTION BY SECTOR, 1960 AND 1973
(1,000 metric tons)

Sector		1960		1973	
		Volume	Index	Volume	Index
Tire & tire products sector	All rubber consumption (A)	99.1	100	562.4	568
	NR consumption (B)	76.9	100	217.1	282
	(B)/(A) (%)		76.9		38.6
Non-tire sector	All rubber consumption (A)	130.9	100	482.6	369
	NR consumption (B)	91.5	100	117.9	129
	(B)/(A) (%)		69.9		24.4
Footwear	All rubber consumption (A)	51.4	100	50.7	99
	NR consumption (B)	35.1	100	20.2	58
	(B)/(A) (%)		68.3		39.8
Belt & hose*	All rubber consumption (A)	44.0	100	204.7	465
	NR consumption (B)	32.3	100	56.2	174
	(B)/(A) (%)		73.3		27.5

Source: [2, Dec. 1975].

* Includes other industrial-use products.

(1) Footwear industry: Development of this industry as a rubber consumer was rather slow and even declined in the late 1960s though it remained the biggest rubber consumer in the sector. Substitution of SR and other materials (plastics) for NR has moved along rather quickly (the shift in demand to plastics was particularly pronounced, because of their much easier and cheaper processing). NR ratio (NR consumption over total elastomer consumption by the industry) is still high at 40 per cent, compared with 25 per cent for the United States and 35 per cent for the United Kingdom [1, p. 30]. But it is questionable whether this will go down more or come to a standstill, because the relative price for elastomers greatly influences the choice of material. Middle- and small-scale manufacturers are the typical size in the Japanese footwear industry. They are keen on the price of rubber not only as a cost saving measure but also on capital gains through rubber market speculation. Their processing equipment and other facilities are not very modern making it difficult for them to adopt new materials or improve techniques. Therefore, the NR ratio might not be expected to decline in a short period.

(2) Belts and hoses (includes miscellaneous industrial-use products): Rubber consumption in these industries has increased about five times since 1960, but that for NR increased only by 70 per cent. This category includes so many

different kinds of industries that if further analysis were made it should be reclassified. Admissibly those industries have certainly grown or are newly created and correspond to the general economic expansion since the 1950s (the diversified development of the rubber industry). Medium- and small-scale enterprises are the main components, as is true of other industries in the sector.

2. *Tire and tire products sector*

Clearly the sweeping expansion in this sector was a major factor contributing to the growth of rubber consumption in Japan. Dividing this sector into its component industries, it can be readily seen that automobiles were the greatest contributor to growth. Table VI shows this in greater detail. Some important findings [Tables I, V, and VI] are:

TABLE VI
RUBBER CONSUMPTION BY TIRE AND TIRE PRODUCTS SECTOR, 1973
(1,000 metric tons)

		All Rubber	NR	All Rubber/NR (%)
Bicycle	Total	11.9	5.4	45.2
	Tire	7.9	4.4	55.7
	Tube	4.1	1.0	24.9
Automobile	Total	520.2	207.8	40.0
	Tire	484.5	206.1	42.5
	Tube	35.6	1.7	4.8
Automobile tires	Truck & bus	142.9	89.5	62.6
	Truck & bus, small	115.0	41.0	35.7
	Tractor, etc.	41.9	23.1	55.0
	Motorcycle	12.9	3.7	28.5
	Car	171.9	48.9	28.4

Source: *Gomu nenkan, Shōwa 50-nendo* [Japan rubber year-book, 1975] (Tokyo: Gomu-hōchi-shimbunsha, 1974).

(1) In 1973, the automobile industry took 93 per cent of all rubber consumption for the sector (96 per cent of NR) and 50 per cent of all the rubber used in Japan (62 per cent of NR). Above all, "auto-tire" manufacturing took almost all the supply. (Other industries in the sector, e.g., bicycle tire and tube and auto-tube, use a negligible portion.)

(2) The automobile industry produces various tires for truck and buses (large and small), cars, motorcycles, tractors, etc. Among those, truck, bus, and car tires influence rubber consumption most in this sector as well as in Japan as a whole. Of the total Japanese rubber use, 41 per cent goes to manufacturing truck, bus, and car tires, and 54 per cent of the NR is used for the same purpose (1973). Percentages were 52 and 62 for the United States and 40 and 44 for the EEC in 1970 [1, pp. 29, 30], which means that the situations of the three are almost similar. But quite different is the Japanese situation where rubber consumption for truck and bus tires is more than twice that for cars, while the reverse was the case in the United States and the EEC. Tires for trucks and buses need

much more NR for one unit (=higher ratio of NR to all rubber used) than car tires do. Therefore, rubber consumption in Japan, particularly of NR, is influenced much more by truck and bus tire than by car tire production, though the latter has grown continually.

(3) SR substitution since 1960 has proceeded very fast and the NR ratio declined considerably. Especially in tube manufacturing, SR (butyl) almost completely substituted for NR. In tire, however, NR is still in a strong position. Truck and bus tires have the highest NR ratio (63 per cent for large-size, 36 per cent for the small tires, and an average of 51 per cent), something which has not declined much since 1964. Car tires have the lowest NR ratio, 28 per cent, which decreased considerably from 1964 to 1967 and has not changed since. It is not clear what the cause of this is. The NR ratio for car tires in other countries, however, is much lower than that in Japan: 12.5 per cent in the United States and 22 per cent in the EEC [1, p. 30]. The reason for the difference has not been clearly explained yet.² The question of whether or not the NR ratio for car tires in Japan will approach the levels in the EEC or the United States may be important. Further inquiries are necessary to give an adequate.

III. FACTORS AFFECTING RUBBER CONSUMPTION

Rubber consumption in Japan throughout the 1960s was shared just about equally by the tire and tire products and non-tire sectors. Use continued to increase sharply thereafter in tires while the non-tire sector's growth slowed, and now, consumption by the tire sector is quite a bit larger than that of the non-tire sector. In particular, growth of NR consumption since the late 1960s was dependent mostly on the tire sector (Figures 2 and 3). Therefore, in order to closely examine future trends of rubber consumption (demand), detailed study of both sectors is necessary.

A. *Tire and Tire Products Sector*

In this sector, the predominantly great consumption (volume) for both NR and SR is for automobile tires.

In automobile tires, car tire has shown the biggest growth in rubber consumption for the past ten years and its volume of consumption was also the largest. Because of the great speed with which the shift to SR took place during this period, however, car tire demand for NR did not have any spectacular growth. In recent years, the NR ratio in car tire production has dropped to 28 per cent generally regarded as the minimum.

Car tire production will surely continue to rise from now on. In view of prospective downtrends in general economic activity and economic growth rate, the growth trend in production will probably be lower than it was in the past decade. The present NR ratio (28 per cent) will, it is believed, turn slightly upward in the future when the greater possible popularity of radial-ply tires is

² P. W. Allen gives reasons for the difference in NR ratio between the EEC and the United States, but they are not convincing [1, p. 29].

considered. (In the short run, however, the NR ratio is not likely to rise noticeably—in particular, the major manufacturers will not drastically change the NR ratio so that they can maintain constant quality.)

In terms of NR consumption, truck, bus, tractor, and industrial vehicle tires are far more important than car tires.

The NR ratio for heavy-duty tires is far higher (35–60 per cent) than for car tires, and lowering the percentage would be very difficult technically. Production increase of these tires in the past ten years was due greatly to rapid domestic economic growth and development. There is also the important fact that 30 per cent of goods produced is exported (10–14 per cent of the car tires produced are exported). One feature of Japan's tire production is that the share of truck and other heavy-duty tires in total production is much higher than in the United States or the EEC countries (65 per cent of all rubber consumption for tires, and 76 per cent of NR consumption in 1973). This will remain unchanged in the short run at least, and the car tire share will continue to increase gradually.

Growth in production of these heavy-duty tires may depend on development investment at home and on demand trends in the developing countries. (Growth rates will probably be lower than for car tires.)

Taking into consideration such factors as the slowdown in economic activity, the economy-minded consumer, better air-pollution controls, and a saturation point in motorization since the oil crisis, no one can expect a rapid uptrend similar to that after 1965. Rather, the increase will likely be 10 per cent or less per year. (The competitive power in terms of prices in the export market has been weakened since the oil crisis.)

Almost all tire production in Japan is done by six major manufacturers who have modern, large-scale plants. They procure SR raw materials directly from major domestic synthetic rubber companies and NR through major trading firms—thus, rubber does not come through the rubber exchange. Although the market price of the rubber exchange is referred to, the six tire manufacturers seem to have strong bargaining power in transactions. In procurement and utilization of rubber, a cheaper price naturally has great influence. But factors which are equally or even more important are constancy in quality, ready availability, and price stability. These are indispensable for a large-scale, modern industrial plant and the biggest reason why SR rose so rapidly as a tire material is that domestic SR production met the aforementioned conditions.

B. *Non-tire Sector*

The growth of rubber consumption in industries other than tires (and tubes) was much slower than for tires, and, as a result, its share in total rubber consumption dropped to 45 per cent (35 per cent in NR) in 1973. Rubber consumption in the future will be led by the tire sector as a matter of course, but consumption increases in other industries should not be belittled. Industries using rubber for other purposes than tires are increasing both in variety and number giving greater diversification of rubber utilization. (These industries will hereafter be called “non-tire sector”.)

Growth of rubber demand in the non-tire sector since 1960 was due to a complex set of reasons.

The footwear industry is traditionally the most important one in this sector. Rubber demand for footwears fell drastically from its 1967 peak. Main factor in this drop were that the bulk of raw materials was replaced by petrochemical products (plastics and SR)—a drop in consumer demand for rubber shoes, popularization of plastic footwears by cheaper prices and easier processing of plastics. No rise in rubber consumption can be expected in the footwear industry from here on out.

Among the industries within the sector, maintaining their traditionally important position are the belt and hose manufacturers. Their rubber use is increasing considerably, but NR consumption is not showing any visible gain. Final demand for belt and hose in the past was home use, but now there is an increased demand by large industrial uses, and as is clear from the fact that SR is more appropriate for such uses—we can expect greater growth in SR consumption.

During 1960s, both the footwear and the belt and hose industries modernized their facilities and expanded production scale. As a result, increases were made in the use of SR and plastic materials, being more superior in terms of availability, price stability, and processing efficiency.

Rubber consumption in the traditionally important area of rubberized cloth has not increased. It seems that this was due to the lack of growth in final demand at home and weak export competitive power.

These rubber industries were the mainstay of rubber consumption in the non-tire sector with increasing demand until the middle of the 1960s, but became lower afterwards (except for hose).

The considerable increase in rubber consumption for the non-tire sector beginning around 1965 was not due to consumption in traditional industries, but to newly developed technical products for industrial use, like the rubber vibration insulator, dock-fender, lining, packing, industrial rolls, and sponge. Demand for these items grew with rapid economic growth and industrial development. The variety of such rubber products are multifarious. Although consumption volume of each may be very small, put together, they account for as much as 70 per cent of the total for the non-tire sector in 1973.

Future growth of rubber consumption in the non-tire sector will depend heavily on demand for these products. Growth after 1965 was very high paralleling the tire sector. But no major growth like that of the past can be expected considering the influence of industrial investment and general economic activities.

One of the characteristics of rubber consumption in the non-tire sector is the fairly sharp downtrend in NR ratio. One reason is the switch in raw material from NR to SR in footwear and belting and hose industries. Second is the same as with industrial-use technical products, where the various SR materials are developed and used with characteristics suited to being the main material for specific products. NR is only a complementary material. Furthermore, an important government industrial policy was the drastic increase in domestic production of SR. Encouraging SR consumption and research and development for new uses was vigorously carried out.

Since the oil crisis, Japan's rubber industry was faced with rising prices for SR, and increased the use of NR to replace it. The move is gaining momentum of reconsidering of NR's characteristics instead of merely developing new products and emphasizing SR. (Same with the tire sector.) Of course, in non-tire sector industries, large quantities of SR will be used in the future when the specific features of SR meet the requirements of the product, but there will not be a total replacement of NR. There may be variations according to item, but it will be technically necessary and a common practice for NR to be a certain percentage of raw materials.

Of course, there are some cases when NR will be the main material and SR supplementary in new products.

The rubber industry in the non-tire sector underwent a fairly large-scale expansion and modernization from 1960 on, although smaller in scale than that in the tire sector. As a result, the requirements for higher quality and a stable supply of raw materials (rubber) will generally be greater. In actuality, however, this may not necessarily be so for Japan's industries.

For instance, one of the causes of the marked increase in SR used as a rubber material is the stable supply of SR. But the NR imported by Japan is mostly RSS No. 3 and lower grades even at the present state of advanced technology. It is a distinctive fact that import of crum rubber is very low. One of the reasons is that, in spite of a certain level of modernization in the industry, Japan's rubber industry in the non-tire sector is still comprised of many medium- and small-scale companies. Another reason is that they can produce the same quality products by using RSS No. 3 as with crum rubber and this helps to lower costs. In other words, it was not worth for the Japanese industry to pay the difference between "crum" or "technical" rubber and RSS No. 3.

C. *Synthetic Rubber*

As with the United States and EC countries, the rapid growth in SR consumption in Japan was made to substitute NR. SR was better in terms of ready availability and price stability and, moreover, prices were much lower than NR (in particular for general use SBR and BR). But after the oil crisis, NR became relatively cheap and still is. The biggest reason was the rise in the petroleum price which influenced SR prices. As long as the price of oil continues to rise, the SR price also has to rise, even if not proportionally. In sharp contrast, NR price once temporarily shot up after the oil crisis, but stabilized at a level slightly higher than what it was before, when it met the sluggish demand of the worldwide depression. Reflecting the situation, Japan's NR ratio of rubber consumption rose slightly in 1974. If the NR price advantage continues in the future, consumption of NR may continue to grow through substituting SR.

But, SR continues to maintain the advantage of ready availability and stable price in addition to adaptability for specific purposes. If NR consumption is to grow by being substituted for SR in the future, the price difference between the

two has to become much greater, and a more stable supply of NR will also be necessary.

The SR price in Japan climbed approximately 70 per cent since the oil crisis (as of August 1975) and seems to be still going up. In addition to a major boost in petroleum prices, general inflation, rises in the wage level, increased expenses for safety and anti-pollution measures, etc. have pushed up costs in the SR industry resulting in higher SR prices. On the other hand, the depression is causing a stagnation in SR demand (consumption), pushing the NR price down. The industry also has to take SR price levels in Europe and America into consideration so that their product will be competitive in the international market. These factors work to put on brakes on SR manufacturers' raising of prices. Therefore, Japan's SR price will eventually go up, but the margin of that increase will be held down considerably. (Japan's SR price level in late 1975 was higher than most European and American levels.)

If it is difficult for Japan's SR price to go much higher than it is at present, even for a short period of time, the price difference between SR and NR will not be too great. This means that NR consumption is unlikely to have any rapid expansion in the foreseeable future. Japan's SR production and export are not likely to expand rapidly in the near future (one or two years), and there is little possibility that SR production capacity will be expanded when prospective future demand (said to be increasing at 5 per cent per year) is taken into consideration.

IV. CONCLUSION—SOME POLICY IMPLICATIONS

Rubber consumption in Japan during 1960 and 1973 grew at unprecedentedly high rates due to rapid economic growth and motorization. Ever since the oil crisis, however, the world-wide depression and unexpected slowdown in Japan's economic growth have brought about a decline in rubber consumption. The slowdown in economic growth is not a temporary phenomenon and will continue in the economic adjustment process hereafter, so that rubber demand may be expected to grow by an annual rate of only 5–10 per cent until around 1980.

With motorization reaching saturation and the existence of air pollution problems, not too much can be expected even if the tire sector continues to play its pivotal role in rubber consumption. We may expect increased demand for industrial technical products and on the development of new industrial uses.

In future trends it is unlikely that the NR ratio will go up sharply. But, if the NR price can maintain present levels—or if the price rise remains at a minimum—growth to some extent which will substitute SR will be possible. What is important in competitive relations with SR will be stepped up measures for supply stabilization (quantity and price) of NR. Further, the importance of developing new industrial uses for NR and promotional programs related to its use should be recognized anew.

With traditional rubber products manufacturing—such as footwear, rubberized cloth, small-gauge hose, bicycle tires, etc.—consultations should be made between developed and the developing countries, to promote production and export by

the developing countries, on trade policy (for instance, reduction of duties), economic and technical cooperation, and structural adjustment in the rubber industry, with a view to formulating practical measures. This will be necessary to promote the production and export of manufactured goods by rubber-producing developing countries. Manufacturing traditional goods in Japan has recently greatly reduced competitive power in international markets because of higher wages and delayed investment for new plant and equipment (small-scale manufacturing is the rule in almost all traditional-goods-producing industries).³

³ Although, in 1965, the majority of export of rubber-manufactured goods was footwear, Japan has been a net importer of footwears since 1968 because of the decline in export and rapid increase in imports. About 30 per cent of the footwear supply comes from Korea, Taiwan, and other developing countries, and this percentage is steadily increasing in recent years.

In 1969, Japan's export of rubber-manufactured goods was mainly car tires (66 per cent of the total), and, tire and tube industries have been increasingly dependent on the foreign market (20-30 per cent of their products was exported).

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