3.3. Current Status of Natural Rubber Industry and Rubber-based Product Industry of Indonesia

(1) Natural Rubber Industry

Indonesian rubber industry enjoys two relative advantages. First, it is the second largest natural rubber producer in the world following Malaysia and second, it has the largest pool of available labor in Southeast Asia. It therefore has extremely great potential for development.

However, Indonesia's rubber industry currently remains a low processing level industry. Over 90 percent of the natural rubber is exported in the form of primary products such as crumb rubber (SIR), ribbed smoked sheet (RSS), crepe, and latex.

Exports of natural rubber totaled 1.05 million tons in 1987 and 1.08 million tons in 1988 (sheets totaled 130,000 tons, crumb rubber 940,000 and crepe 10,000 tons). On the other hand, exports of rubber-based products came to only 10,000 tons in 1987 and an estimated 30,000 tons in 1988.

Indonesia's natural rubber is produced on the three islands of Sumatra, Kalimantan, and Java. Of these, Sumatra produces the most by far. A breakdown of production in 1987 shows Sumatra accounting for 67 percent (770,000 tons), Kalimantan for 17.9 percent (200,000 tons), Java for 4.3 percent (50,000 tons), and other regions for 10.2 percent (120,000 tons).

One feature of production is that small holders account for a larger percentage of production than they do in Malaysia and Thailand. Of the area planted in 1987, small holders accounted for 83 percent (2.48 million acres), state-run plantations for 9 percent (280,000 acres), and private plantations for 8 percent (240,000 acres), with production similarly breaking down into 71 percent (800,000 tons), 17 percent (200,000 tons), and 12 percent (130,000 tons) respectively.

A look at the trends from 1981 to 1987 shows that the area planted grew by an average annual 5.8 percent in the case of state-run plantations and 3.7 percent in the case of small holders and declined by a slight 0.2 percent in the case of private plantations. Furthermore, the amount of production by small holders grew steadily by 3.8 percent, but production grew by only 0.7 percent for private plantations and 0.4 percent for state-run plantations. Therefore, the productivity per unit planted rose 0.3 percent for small holders and 2.5 percent for private plantations, but fell 2.4 percent for state-run plantations.

However, the productivity of the small holders is still low and is no more than 42 percent of that of state-run plantations and 45 percent of that of private plantations. The productivity of small holders also suffers from quality problems. Most crumb rubber processed from the raw materials produced by small holders is ranked as SIR-20, the lowest grade in terms of export standards.

Table 3-3-1: Trends in Rubber Production by Mode of Production

(Unit: 1,000tons)

	Small Holders	State-run Plantations	Private Plantations	Total
1981	642.3	193.4	127.5	963.2
82	583.6	188.6	125.0	899.2
83	673.6	200.5	132.9	1,007.0
84	704.2	207.6	120.8	1,032.6
85	719.8	211.5	123.6	1,055.0
86	763.2	200.3	149.7	1,113.1
87	801.1	197.5	133.0	1,131.7

Source: Directorate General of Plantations

Table 3-3-2: Trends in Area Planted by Mode of Production

(Unit: 1,000Acre)

	Small Holders	State-run Plantations	Private Plantations	Total
1981	1,994.2	202.3	243.6	2,440.1
82	2,035.8	205.7	242.5	2,483.9
83	2,117.9	223.6	236.5	2,578.0
84	2,190.0	247.7	212.6	2,650.0
85	2,234.5	249.4	213.8	2,697.0
86	2,332.2	266.6	223.5	2,822.3
87	2,482.1	284.1	240.5	3,006.8

Source: Directorate General of Plantations

Table 3-3-3: Productivity Per Unit Planted by Mode of Production

(Unit: kg/hectare)

	Small Holders	State-run Plantations	Private Plantations	Total
1981	503	1,239	971	904
82	430	1,217	921	859
83	506	1,248	985	897
84	505	1,335	997	1,034
85	504	1,370	997	932
86	525	1,284	1,118	950
87	514	1,221	1,127	999

Source: Directorate General of Plantations

Table 3-3-4: Trends in Rubber Production by Region

(Unit: 1,000tons)

	1981	1982	1983	1984	1985	1986	1987
Sumatra	661.4	677.6	698.5	706.0	714.0	750.1	765.5
Ache	17.2	15.5	16.2	17.7	18.5	19.3	20.0
North Sumatra	267.3	303.7	318.6	308.5	314.5	318.0	319.4
West Sumatra	21.7	25.4	28.5	33.0	31.1	36.7	39.7
Liau	106.7	101.0	71.2	78.1	81.3	83.7	87.8
Jambi	104.2	105.0	107.4	101.3	101.3	114.8	118.6
South Sumatra	144.3	127.0	156.6	167.4	167.3	177.6	180.0
Kalimantan	167.4	168.6	174.3	181.6	188.5	200.6	203.0
West Kalimantan	107.6	108.1	108.2	108.3	108.4	113.0	114.8
Central Kalimantan	34.0	33.5	38.7	42.8	46.4	51.6	56.4
South Kalimantan	25.8	27.0	27.4	30.5	33.7	36.0	31.8
West Java	44.4	41.8	48.7	46.3	47.5	48.2	48.7
Others	89.9	11.2	85.5	107.5	93.4	114.3	115.8
	1,133.2	899.1	1,007.0	1,041.3	1,043.3	1,113.1	1,133.1

Source: Directorate General of Plantations

Table 3-3-5: Exports of Natural Rubber

	1987		1988	
	Volume(KG)	Value(US$)	Volume(KG)	Value(US$)
4001-111 Latex, contain not over 0.5% amonia, cream concentrate	43,369,889	51,261,051	49,232,147	74,704,668
4001-112 Latex, contain not over 0.5% amonia, centrifuge			104,567	129,401
4001-119 Other latex, contain not over 0.5% amonia			190	209
4001-121 Latex, contain over 0.5% amonia, cream concentrate	22,409	29,449	14,400	27,360
4001-129 Other latex, contain over 0.5% amonia			90,820	98,809
4001-130 Pre-vulcanized natural rubber latex	6,000	7,200	186,230	142,046
4001-211 RSS 1	122,613,284	116,350,959	109,414,649	125,087,557
4001-212 RSS 2	5,242,113	4,869,349	5,695,183	6,592,165
RSS 3	4,116,643	3,443,496	4,300,445	4,621,4794

	1987		1988	
	Volume(KG)	Value(US$)	Volume(KG)	Value(US$)
4001-214 RSS 4	16,991,360	13,422,801	10,981,234	11,296,446
4001-219 Other RSS	305,100	237,846	27,300	48,264
4001-220 Superior processing rubber			15,200	25,080
4001-231 SIR 5L	21,002,200	21,331,419	21,953,035	27,228,701
4001-232 SIR 5	4,737,970	4,295,628	4,360,260	5,014,593
4001-233 SIR 10	76,875,860	65,304,932	60,659,150	65,269,960
4001-234 SIR 20	762,720,430	645,342,134	380,053,566	884,417,022
4001-239 Other standard Indonesian rubber	23,590,120	23,295,186	22,444,796	26,774,109
4001-241 Air dried sheet natural rubber	1,025,000	963,442	1,323,600	1,623,122
4001-251 White/pale crepe	1,894,442	1,866,256	1,817,984	2,259,063
4001-253 Thick brown crepe, remilled			219,216	206,185
4001-255 Estate brown crepe	7,570,829	5,789,289	8,589,573	7,719,233
4001-263 Rubber earth scraps			34,000	29,826
4001-271 Rubber powder	275,000	29,962	518,000	23,252
4001-291 Purified rubber (DPNR and PP crepe)			15,000	6,000
4001-292 Type rubber A and N			12,480	12,667
4001-293 Rubber any non standard grade of technically specified	25,040	21,346	70,080	64,878
4001-910 Gutta perca	3,402	119,070	3,489	108,183
4001-921 Raw Jelutong	140,000	185,510	48,200	53,725
4001-922 Jelitong pressed but not refined	1,140,300	1,044,454	931,504	732,045
4001-923 Jelutong refined	1,218,500	950,498	1,377,510	1,446,603
4001-999 Other natural gums, inedible	29,800	27,000	38,630	32,690

	1987		1988	
	Volume(KG)	Value(US$)	Volume(KG)	Value(US$)
4002-390 Other polybutadiene			27,000	54,000
4002-910 Polychoroprene(Neoprene)	2,895	10,375	31,592	71,236
4003-000 Reclaimed Rubber	94,200	24,970	74,495	41,103
4004-200 Powder obtained from waste/ scrap of hardened rubber			44,400	1,996
4006-190 Unvulcanized natural or synthetic rubber in other forms	39,170	45,327	115,320	156,041

Source: Statistics Bureau

(2) Rubber-based Product Industry

Indonesian rubber-based products include rubber gloves, foam rubber, condoms and other latex products, sports shoes, tires and tubes, hoses, V belts, conveyor belts, oil seals, and other solid rubber products.

The rubber products being exported include tires and tubes (18.420 tons), industrial hoses (413 tons), V belts (195 tons), other transmission and conveyor belts (36 tons), pipes and tubes (24 tons), yarn and cord (4 tons), flooring (5 tons), condoms (8 tons), sanitary and medical goods (52 tons), gloves (162 tons), mats and table covers (116 tons), etc. (1988).

Indonesia has a large deficit in trade in these rubber products. In 1988, exports came to US$48.73 million while imports came to US$56.52 million for a deficit of US$7.79 million.

It should be noted that recently exports of sports shoes have been increasing rapidly.

1) Position of rubber-based product industry in Indonesia's industrial sector

The weight of rubber-based products in the industrial sector is still not very large.

As of 1987, there were 168 business establishments (30 for tires and tubes, 138 for other products) accounting for 1.3 percent of the 12,778 establishments in the industrial sector as a whole. These employed 27,000 workers (13,000 and 14,000 workers, respectively), or only 1.5 percent of the total 1.788 million workers. Furthermore, the total output was 47.26 billion rupiah (31.43 billion rupiah and 15.83 billion rupiah respectively), 1.4 percent of the overall industrial output, and the gross added value was 13.61 million rupiah (8.46 billion rupiah and 5.15 billion rupiah respectively), 1.3 percent of the total. Thus in all respects the rubber-based product industry accounts for between 1.3 to 1.5 percent of Indonesian industry as a whole.

The speed of growth has been relatively regular in recent years. In the years from 1980 to 1987 the number of business establishments rose by an average annual 7.2 percent and the number of employees by 9.8 percent, somewhat higher than the 6.8 percent and 9.1

percent for industry as a whole. While the total output grew by 15.0 percent, far less than the 25.6 percent of industry as a whole, the gross added value grew by a low 9.9 percent in the tire and tube sector, but a large 42.2 percent in the other sectors, reaching 16.1 percent as a whole, well above the 13.0 percent for industry as a whole.

The number of workers per business establishment as of 1987 was 161, about 15 percent above the 140 average for industry as a whole. However, the production was 2,183 million rupiah and the gross added value 810 million rupiah, only 7.0 percent and 1.1 percent higher than industry as a whole (2,629 million rupiah and 801 million rupiah respectively). The gross added value per worker was 5.1 million rupiah, considerably lower than the 5.7 million rupiah of industry as a whole.

One structural characteristic of the rubber-based product industry is that the average size of the business establishments is relatively large, but productivity is low.

This is because while the productivity of the tire and tube sector, a modern sector, stands far above the average, that of the other sectors, which are in the initial stage of development is still low overall, even though the sectors are in the middle of rapid growth.

This shows that for Indonesia's rubber product manufacturing industry, in particular the industrial rubber-based product sector, it is becoming extremely important not only to expand in scale, but also to improve productivity. Without improving productivity, other companies cannot be expected to enter the field and the industry cannot hope to grow in size.

By way of reference, Table 3-3-10 shows a comparison of the state of operations of the rubber product industries of Indonesia and Japan as of 1987.

From this table it can be seen that the average number of workers per business establishment was 161 for Indonesia and 150 for Japan, not a very great difference. However, there was a major difference in the size of operations.

First of all, the value of production per business establishment was US$1.71 million in Indonesia and US$21.84 million in Japan, in other words, about 13 times that of Indonesia. Similarly, the gross added value was US$490,000 versus US$10.72 million, about 22 times as large. The major reasons for this were the differences in wage levels and productivity between the two countries. The per capita labor cost for Indonesia was US$934 versus US$26,472 for Japan, the latter being about 28 times as large. Further, the per capita production and gross added value were US$10,649 and US$3,067 for Indonesia and US$145,450 and US$71,434 for Japan, the latter being about 14 and 23 times as high respectively.

There was a great difference too in the share of the materials costs in the total cost of production. In Indonesia, this was 59.6 percent, while in Japan it was 43.1 percent, that is, the share was larger in Indonesia despite its being a resource producing nation. This is believed to be largely due to the differences in the composition of price costs between the two countries, i.e., the extremely high labor costs and costs of outside consignment processing in Japan compared with Indonesia, but it is also assumed that the costs of procurement of materials in the two countries is a factor. Generally speaking, in Japan, natural rubber is imported and synthetic rubber and chemical agents and sub materials are procured domestically. In Indonesia, the reverse is the case. That is, Indonesia has a higher

dependence on imports for raw materials and chemical agents and sub materials. A comparison of the import duties shows Japanese companies paying nothing for raw materials and in the range of 3.8 to 6.6 percent for chemical agents and sub materials while Indonesian companies pay as high as 15.5 percent, including the value added tax. Therefore it may be said that the costs of procuring raw materials and chemical agents and sub materials in Indonesia are not by any means lower than they are in Japan.

Table 3-3-6: Position of the Rubber-based Product Industry in the Industrial Sector (Large and Medium Size Companies) (I)

	No. of Business Establishments		No. of Employees (1,000 persons)		Labor Costs (Million Rp)	
	1980	1987	1980	1987	1980	1987
Industry Total	8,054	12,778	969	1,788	448,929	2,180,252
Rubber Industry	222	378	37	96	20,588	139,130
Rubber Materials						
Smoked Rubber	8	67	-	25	262	23,355
Crumb Rubber	76	84	17	27	8,988	35,421
Reclaimed Rubber	-	59	-	17	-	38,899
Rubber Products						
Tires & Tubes	33	30	9	13	8,473	29,518
Other Rubber Products	70	138	5	14	1,579	11,938

Table 3-3-7: Position of the Rubber Industry in the Industrial Sector (Large and Medium Size Companies) (II)

	Purchases of Fixed Capital (Million Rp)		Production Costs (Million Rp)	
	1980	1987	1980	1987
Industry Total	452.841	293.864	4,353,266	22,312,640
Rubber Industry	13,278	20,871	429,769	1,542,397
Rubber Materials				
Smoked Rubber	8	4,127	6,572	32,857
Crumb Rubber	4,165	2,177	318,043	1,034,530
Reclaimed Rubber	1,221	13,824	35,904	138,474
Rubber Products				
Tire & Tubes	6,866	319	51,907	229,715
Other Rubber Products	1,035	424	7,826	106,821

Table 3-3-8: Position of the Rubber Industry in the Industrial Sector (Large and Medium Size Companies) (III)

	Total Production (Million Rp)		Gross Added Value (Million Rp)	
	1980	1987	1980	1987
Industry Total	6,818,406	33,591,239	4,353,266	10,238,310
Rubber Industry	540,406	1,908,307	429,769	331,172
Rubber Materials				
Smoked Rubber	10,157	75,551	3,584	42,695
Crumb Rubber	367,390	1,160,236	49,347	125,706
Reclaimed Rubber	45,804	199,875	9,900	61,401
Rubber Products				
Tires & Tubes	105,050	314,322	43,627	84,607
Other Rubber Products	12,005	158,322	4,178	51,500

Table 3-3-9: Size of Business Establishments and Labor Productivity in Rubber Industry

	No. of Workers per Business Establishment		Added Value per Business Establishment (Million Rp)		Added Value per Worker (Million Rp)	
	1980	1987	1980	1987	1980	1987
Industry Total	120.3	139.9	541	801	4.5	5.7
Rubber Industry	160.7	254.0	1,936	876	11.6	3.4
Rubber Materials						
Smoked Rubber	61.9	373.1	448	637	20.5	1.7
Crumb Rubber	223.7	321.4	649	1,497	2.9	4.7
Reclaimed Rubber	na	288.1	na	1,041	na	3.6
Rubber Products						
Tires & Tubes	33	433.3	1,322	2,820	4.8	6.5
Other Rubber Products	70	101.4	60	373	0.8	3.7

Table 3-3-10: Comparison of the Rubber Product Industries of Japan and Indonesia (1987)

	No. of Business Establish-ments	No.of Employees	Labor Costs	Usage of Materials etc.	Of Which Raw Materials	Total Production	Gross Added Value
			(million Rp)				
Indonesia		(1,000 p.)					
Rubber Product Industry	168	27	41,456	336,536	281,741	472,644	136,107
Tire & Tube	30	13	29,518	229,715	191,653	314,322	84,607
Other Rubber Products	138	14	11,938	106,821	90,088	158,322	51,500
			(million Rp)				
Japan		(1,000 p.)					
Rubber Product Industry	786	118	451,814	1,269,038	1,070,725	2,482,482	1,219,207
Tire & Tubes	45	28	130,468	443,305	406,903	882,333	440,768
Footwear & Parts for same	178	19	56,653	111,136	83,301	228,836	121,493
Belts, Hoses, Industrial Products	452	61	229,183	596,840	478,318	1,165,563	568,733
Others	111	10	35,510	117,757	102,202	205,705	88,121

Note: The comparison covers Indonesian companies with 20 or more employees and Japanese companies with 30 or more employees.
Source: Indonesian figures are taken from "Statiskik Industri Besar Dan Sedang 1987" and Japanese figures from "Industrial Statistics 1987".

2) Current Status by Industry

[1] Latex Products

a) Rubber gloves

Demand for examination gloves soared due to the AIDS scare in the U.S. and as a result interest in investment in this field in Indonesia also jumped. According to the BKPM (Investment Coordinating Board), up to October 1988, approval for new investment had been granted to 85 companies. Some of these were foreign investments (PMA) from South Korea, Taiwan, and Hong Kong, but the majority were domestic investments (PMDN). However, up until now only about 20 companies have moved to construct factories. Of these, only a few have started actual operation and almost all of these are only at the test running stage. As of October 1988, the approved production capacity of companies not yet in operation reached a total of 6,388.28 million pairs.

Exports of gloves, etc., still came to only US$960,000 and 160,000 tons (1988). Seventy-six percent of exports are shipped from the Surabaya region.

b) Foam/sponge rubber

As of 1988, there were seven companies in operation which produced a total of about 2,300 tons of foam/sponge rubber a year at full production capacity. Two more companies were under construction and production was expected to increase to 3,760 tons in 1990.

The largest portion of the foam rubber produced is for the domestic market and is used for mattresses, pillows, etc.

c) Condoms

The factory of the state-run BKKBN in Bandung produces condoms under the domestic family planning program. Annual production is 10 million pieces. The company has no plans to export.

d) Rubber Thread

According to BKPM, approval had been granted for the establishment of eight companies, but most of the firms were still at the test running stage.

[2] Solid Rubber Products

a) Tires

Tires are being manufactured for trucks, sedans, and other four-wheeled vehicles and for motorcycles, bicycles, and other two-wheeled vehicles. According to APBI (Indonesian Tyre Companies Association), there are 13 registered companies, seven of which manufacture tires for four-wheeled vehicles and 13 manufacture tires for two-wheeled vehicles. The total production capacity is 7.8 million four-wheeled vehicle tires and 650,000 two-wheeled vehicle tires. Tire exports, primarily tires for trucks and sedans, have been rapidly growing since 1987. In 1988, exports rose 93 percent over the previous year to reach US$45.04 million. Imports in the same year totaled US$8.05 million and thus Indonesia enjoyed a large surplus in the tire trade.

b) Rubber/sports shoes

Investment in this sector surged starting in 1987, resulting in rapid growth. As of the beginning of 1989, 78 companies had begun operating in this field. The total production capacity has reached 70 million pairs per year. There are 22 factories under construction and once these begin operating the production capacity will rise to 126.3 million pairs. In addition, in the year up to September 1989, permits were issued for 12 new investment projects to South Korean, Taiwanese, and Hong Kong companies. Based on the data available, these are expected to increase the production capacity by at least 38.6 million pairs. Investments by the NIEs are entirely export oriented ones therefore it is expected that exports of rubber/sports shoes will continue to soar.

According to the Ministry of Industry, 45.59 million pairs of shoes were produced in 1987 and according to a survey by a private research company (CIC), 66.27 million pairs were produced in 1988.

c) Other products

Also being produced are V-belts, rubber hoses, tires and tubes, rubber mills, dock fenders, flooring, yarn and cord, and rubber parts for automobiles and electronic and electrical equipment. Almost all of the production is for domestic use. Exports are still low.

In 1988, the main exports were of industrial use hoses (US$610,000) and V-belts (US$880,000).

Table 3-3-11: Exports of Rubber-based Products

	1987		1988	
	Volume(KG)	Value(US$)	Volume(KG)	Value(US$)
4007-000 Vulcanized rubber thread & cord, textile thread covered with vulcanized rubber	240	1,460	4,040	27,170
4008-190 Rubber flooring material in other forms	78,990	62,453	5,000	6,050
4009-120 Hose for industrial use, wire braided	8,887	31,996	413,451	690,425
4009-190 Other hose for industrial use			700	2,428
4009-900 Other pipes and tubes of unhardened vulcanized rubber	23,517	82,762	24,355	103,926
4010-200 V type transmission belts or belting	72,605	311,150	195,350	875,905
4010-900 Other transmission, conveyor elevator belts of vulcanized rubber	12,415	140,913	35,950	175,564
4011-111 Tires for bicycle size 28x1.5	202,812	320,891	437,693	789,621
4011-112 Tubes for bicycle size 28x1.5	144,048	209,154	39,299	52,591
4011-121 Tires for bicycle size 28x1.625	29,960	45,860	286,197	460,195
4011-122 Tubes for bicycle size 28x1.625			5,560	9,900
4011-191 Tires for bicycle other size	2,002,445	3,600,232	2,602,102	4,811,620
4011-192 Tubes for bicycle other size	187,203	293,890	371,702	505,878
4011-211 Tires for motorcycles	588,893	829,968	1,482,023	2,441,824
4011-212 Tubes for motorcycle	157,875	236,565	253,595	290,292
4011-221 Tires for scooters	1,022,846	1,525,472	1,431,092	2,461,732
4011-222 Tubes for scooters	48,363	54,331	123,615	141,118
4011-311 Tires for passenger cars and trucks	3,394,738	6,859,899	11,392,540	15,037,761
4011-312 Tubes for passenger cars and trucks				
4011-391 Tires for other passenger cars and trucks	5,723,578	8,725,682	9,765,745	16,273,117

	1987		1988	
	Volume(KG)	Value(US$)	Volume(KG)	Value(US$)
4011-392	169,770	213,944	362,680	396,283
Tires and tubes for other road vehicles	22,955	22,375	16,406	35,235
4011-500				
Tires and tubes for airplanes			12,365	53,489
4011-900				
Tires and tubes, other	191,837	310,307	603,979	1,073,280
4012-100				
Condoms			8,362	55,860
4012-900				
Other hygienic and pharmaceutical articles of unhardened vulcanized rubber	18,592	70,533	52,172	361,235
4013-100				
Gloves, etc., from unhardened vulcanized rubber			162,144	958,911
4014-910				
Mats, table covers of unhardened vulcanized rubber			115,570	44,097
4015-200				
Scrap waste of unhardened rubber			100,000	4,484
4015-900				
Hardened rubber in the form	200,000	10,699	91,221	8,134
4016-900				
Other articles of hardened rubber	5,256	10,190	10,650	17,400

Source: Statistics Bureau

3) Summary by Region (Regional Characteristics of Manufacturers)

Region	Characteristics
Jakarta, Bogor	This region is traditional rubber producing centers and are the site of numerous manufacturers of tires, rubber products for automobiles, hoses, V belts, fenders, etc. There are also joint venture companies there. The plantations from Dutch colonial times continue to produce in the form of PTP (state run plantations). These produce mainly sheet rubber (RSS and crepe) classified by outer appearance and concentrated latex. There are also manufacturing companies which make gloves which use as a principal material concentrated latex. Research institutions there include the PPB Bogor and the PPMB.
Bandung	Bandung has numerous manufacturers of rubber products for automobile use, rubber parts and hoses for electrical use, etc. In addition, there is a condom factory of the BKKBN. The plantations from Dutch colonial times continue on in the form of PTP (state run plantations). These produce mainly sheet rubber (RSS and crepe) and concentrated latex. Research institutions include the Textile Laboratories (BBPPIT) of the Ministry of Industry and the Industrial Product Inspection Center (BBBTB).
Medan	There are both PTP and old American capital plantations. There are also companies manufacturing gloves, etc. In addition, technically specified natural rubber, the block rubber SIR is being produced for sheet rubber. In Medan, latex is refined and prevulcanized latex is produced. Research institutions include the RIEC of the Ministry of Agriculture. In regions near the Indian Ocean, there are many small holders. They face problems common to the other rubber producing countries and are receiving guidance.
Surabaya	There are few factories making industrial rubber-based products and examination gloves.

Region	Characteristics
Palembang	There are no companies producing rubber products but there are many companies producing SIR. Research institutions include the RIEC under the Ministry of Agriculture.
Pontianak	There are no companies manufacturing rubber products but there are many factories manufacturing SIR. Encouragement is being given to the manufacture of sheet angin, "unsmoked sheet rubber", by hand as a project to give guidance to small holders. Use is being made of loans from the World Bank for this project.

4) Problems Facing the Industry

[1] Insufficiency of International Competitiveness

The Indonesian rubber product manufacturing industry began as an import substitution industry. Excluding some sectors such as sports shoes and examination gloves, which have shown rapid growth in both domestic and overseas investment in the past one or two years, the industry relies on the domestic market and relies on the government to protect it.

Relying entirely on the domestic market in this way, companies still run their operations on the basis of orders received and take the attitude of "making products if there are orders" or "being able to sell anything made." Therefore, the companies have no inventory plans and none of their own brands. In some extreme cases, unauthorized use is made of famous foreign brands. In addition, almost no brochures, catalogs, or other PR materials are prepared. In particular, there is little overseas marketing and almost no organized activities. In light of this situation, there is naturally very little interest in research and development.

Due to these problems, the industry remains extremely fragile in terms of international competitiveness. Analysis of the questionnaire responses showed that only one of the 12 companies manufacturing industrial rubber-based products which responded to the questionnaire had experience with exports. Almost all of the companies had no export experience. The reasons given were the insufficiency of overseas market information (four cases), the insufficiency of production capabilities (three cases), the shortage of profit there (three cases), and the difficulty of the export procedures (one case).

In this industry, the export orientation itself is not that strong. Companies citing "expansion of exports" as a matter of interest in management accounted for only half of the responding companies (six companies). Furthermore, only four of the companies had export officers and three of these had only one or two. The companies responding to the questionnaire were all relatively large in size. If the above is true for them, then it may be assumed that the small size companies which did not respond have little or no export experience or interest in exporting. In actuality, the representative of the industrial organization recognized that the intentions of Indonesian rubber product manufactures were not as strong as Malaysian manufactures.

To help promote the industry, entry into overseas markets is indispensable. Therefore, it may be said that it is necessary to start by changing the standing and perceptions of the industry.

The situation is considerably different in the rubber glove industry which has enjoyed a rush of export-oriented investment. Some companies in this field have only just begun operations, but even so, four of the six responding companies had export officers and three already had experience with exports. Furthermore, the companies were very interested in exports, with all five of the responding companies interested in collecting overseas information and four targeting an expansion of exports.

[2] Low International Recognition

The lack of export experience, due to the insufficiency of international competitiveness, is a major stumbling block to exports. First, there is the internal industrial problem of slow accumulation of knowhow relating to overseas marketing and, second, there is the external problem of a low level of recognition in the international market. According to some of the companies which have begun overseas marketing, Indonesian products not only not well known, but they are also viewed as being inferior products. Therefore, there are many difficulties in selling products abroad when compared with Malaysia and Thailand.

Measures which can be taken for the time being would be the strengthening of price competitiveness and building up of an export record.

Strengthening of price competitiveness would probably require considerable effort. Probably none of the export companies would be able to sell in overseas markets without considerable price discounts. For example, one general rubber product manufacturer in Surabaya through that they would probably have to reduce prices 25 percent or so compared with those of Malaysian products.

Building up an export record would require long-term efforts. According to one manufacturer, they would probably have to supply an overseas buyer with products meeting its demands in quality and delivery for at least two continuous years before they could win that buyer's trust. This is an extremely important issue, not only for individual manufacturers, but also for the Indonesian rubber industry as a whole.

[3] Quality Problems with Domestically Produced Materials

(Natural Rubber)

The quality of domestic natural rubber is being improved. However, there are numerous small holders among the planters and therefore problems such as the backwardness in processing technology, inferior equipment, high impurity rates, etc., remain.

(Synthetic Rubber, Chemicals, and Sub Materials)

Synthetic rubber is not being produced domestically and thus companies rely on imports. Furthermore, the manufacture of latex products requires about 10 kinds of chemicals and sub materials while the manufacture of solid rubber products requires about

30. The domestic products of Indonesia, including those now being planned, are limited in kind and, furthermore, there are problems in quality.

There are domestic products of inorganic components, calcium carbonate, and other fillers and stearic acid available. However, good quality ones are hard to acquire. In addition, companies either do not know that there are domestic products or else suffer from the misconception that Indonesian products are poor in quality. As a result, companies which use domestic products have to reduce their sales prices. This situation in many cases has prompted the use of foreign products.

It is necessary to speed up the establishment of SII standards and to work to promote the use of domestic products through the promotion of domestic products.

[4] Problems in Gaining Customs Clearance for Imported Materials and Sub Materials

The time taken for imported raw materials and sub materials to clear customs is becoming a problem. The time taken for clearing customs has been considerably shortened compared with the past, but it is not uncommon, particularly around special occasions such as Lebaran, for the process to take about two months.

In addition, it will be necessary to shorten the time taken to draw back import duties on raw materials and sub materials used for manufacturing export products. At the present time, it takes about six months in normal cases.

[5] Slow Development of Supporting Industries

The slow development of supporting industries is proving to be a major stumbling block to all industries in Indonesia and the rubber product industry is no exception.

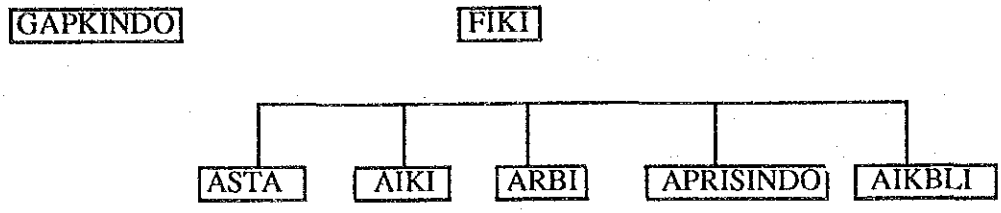
For the rubber products industry, the biggest problem is the shortage, both quantitative and qualitative, of molds and packing materials. In particular, the insufficient strength of the packing cardboard is proving to be a problem in the case of export products and there is a critical problem with deformation of the cargo during transport.

[6] Insufficient Maritime Transport Network

With the exceptions of Jakarta and Surabaya, there is the problem of an insufficient maritime transport network. For example, in the case of West Kalimantan, there are no direct passages to the U.S., the major destination for exports of natural rubber. The usual practice is to transport goods through Singapore, which is closer in distance than Jakarta. However, this invites higher transportation costs.

5) Industrial Organizations

The Indonesian rubber industry is organized under the following organizations:



GAPKINDO	:	Association of Indonesian Rubber Producers
FIKI	:	Federation of Indonesian Rubber Industries
ASTA	:	Indonesian Gloves Manufacturers Association
AIKI	:	Association of Indonesian Rubber Goods Industries
ARBI	:	Indonesian Tyre Companies Association
APRISINDO	:	Indonesian Footwear Manufacturers Association
AIKBLI	:	Association of Indonesian Foam and Latex Industries

GAPKINDO is an organization of rubber planters. It has branches in the main production areas and trade centers of Indonesia and engages in active programs such as negotiations with foreign buyers aimed at promotion of exports of SIR, RSS, and latex. Its organizational powers are reportedly strong.

FIKI is a federation of associations of rubber products. Among the associations of rubber products, APRISINDO is in the process of disappearing and AIKABLI has ceased activities due to the pullout of leading companies. Therefore, the rubber products related associations which remain active are ASTA, AIKI, and APBI.

The organizations of rubber product manufacturers have as their chief aim the exchange of information regarding management and marketing among, etc., and liaison and deliberations with related government authorities. In particular, FIKI has shown interest in the provision of information relating to technology, management and marketing in addition to coordinating with the ASEAN nations and is planning to offer seminars, etc.

Overall, however, the activities cannot be said to be sufficient. At the present time it is difficult to say that the goals have been fully achieved. Furthermore, PR activities are insufficient and even annual reports are not made.

(3) Administrative Organizations/Technical Promotion, Inspection, and Testing Organizations

The Indonesian rubber industry is under the jurisdiction of the Ministry of Agriculture, the Ministry of Industry, and the Ministry of Commerce.

The Ministry of Agriculture naturally has jurisdiction over the plantation sector and works to improve clones of primary products, provide guidance to small holders, etc.

The Ministry of Industry has jurisdiction over the rubber product industry and establishes product standards, provides guidance in technical improvements, etc.

The Ministry of Commerce has jurisdiction over the distribution of primary products and rubber products. With regard to exports, it performs export inspections on SIR and has established the Indonesia Export Training Center (IETC), preparations for the opening of which are under way.

All of these organizations have their own inspection and testing facilities.

In addition, in the area of investments, the Board of Investment (BKPM) and, in the area of export promotion, the National Agency for Export Development (NAFED), work to formulate policies or implement policies in cooperation with or under the guidance of the related government agencies.

However, there is no organization which has overall control over the rubber industry.

(4) Guidelines for the Promotion of the Rubber Industry under Repelita V

The Indonesian government has designated the rubber industry as an export industry under Repelita V and it has designated rubber products as products for export promotion. The government has accordingly established the following goals:

[1] Expansion of exports through the strengthening of competitiveness of existing export products
[2] Expansion of exports through the diversification of export products
[3] Shifting from import substitution type industry to export oriented industry through strengthening of competitiveness and improvement of efficiency
[4] Expansion of exports through promotion of export oriented foreign investment

In addition, the following targets were set from the viewpoint of development of the agricultural produce processing industries:

[1] Improvement of efficiency and productivity in the rubber material producing sector as an upstream sector
[2] Development of labor intensive industries
[3] Promotion of rubber processing industries as a downstream sector

Furthermore, the following targets were set in terms of acquiring and disseminating technology:

[1] Strengthening of research facilities, industrial development centers, etc., and improvement of capabilities of expert researchers
[2] Strengthening of research and development functions of large companies, state-run companies, etc.
[3] Provision of services in the area of technology to small and medium sized companies (education and training)
[4] Acquisition of production and processing technology and promotion of standardization and establishment of standards

[5] Improvement of efficiency in technical transfers, etc.

In accordance with the targets of non-oil/gas exports under Repelita V, exports of rubber products during the period of the Plan are expected to increase by an average of 15.7 percent annually on a value basis. Examples are shown in Table 17.

On the other hand, exports of rubber materials are expected to grow at a low level. For example, the target for exports of crumb rubber is an increase from the US$799.5 million of 1988 to US$817.76 million by the final year of the Plan, for a growth of 0.5 percent annually.

Shown here is one specific target for achieving higher added value in the rubber industry.

Table 3-3-12: Export Targets for Rubber-based Products under Repelita V

(Unit: US$ 1,000)

	1988 Figures	Repelita V 89 Target	93 Target	Target Average Annual Growth
Rubber Gloves	960	1,110	1,987	15.7%
Tires	45,000	52,065	93,298	ditto
Rubber/Sports Shoes	39,000	45,123	80,858	ditto
Condoms	55	63	111	ditto
Others (V Belts, Pipes, Rollers)	1,490	1,724	3,088	ditto

Source: Central Statistical Bureau and Ministry of Industry

3.4 Review of the Rubber-based Product Industry Development Policy

(1) Industrial Development Policy

As stated in 3.(3), Indonesia's rubber-based product industry is overseen by the Ministry of Agriculture, Ministry of Industry and Ministry of Commerce. The Ministry of Agriculture oversees plantations.

The Ministry of Industry oversees the rubber-based product industry and is responsible for preparation of product standards and guidance for technical innovation.

The Ministry of Commerce oversees distribution of primary commodities and rubber-based products. It is also engaged in export inspection for SIR. It is now preparing to establish the Indonesia Export Training Center (IETC) for the education of people involved in trade business.

The Board of Investment (BKPM) and the National Agency for Export Development (NAFED) are in charge of formulating and implementing policies in their areas in tie-up with or with the guidance of related government agencies.

Under Repelita V, the Indonesian government has set the following targets.

[1] Export expansion through the enhancement of the competitiveness of traditional export items
[2] Export expansion through diversification of export items
[3] A shift from import substitution toward export-oriented industry by enhancement of competitiveness and improvement of efficiency
[4] Export expansion through the attraction of export-oriented foreign investment

In addition, the following targets have been set from the viewpoint of developing the processing industry for agricultural products.

[1] Improvement of efficiency and productivity in the production of rubber raw materials as an upstream sector
[2] Development of labor-intensive industry
[3] Development of the rubber-processing industry as a downstream sector

The following targets have been set for the improvement and dissemination of skills.

[1] Strengthening of research facilities and industrial development centers as well as improvement of researcher abilities
[2] Strengthening of the R&D functions of large manufacturers and state-owned manufacturers
[3] Provision of service in the area of technology to small and medium-scale firms (education and training)
[4] Acquisition of manufacturing/processing technology, standardization and preparation of new standards
[5] More efficient technical transfer, etc.

Ministry of Industry estimates the production of rubber-based products which are dealt with in this report as follows:

	Production quantity at the end of Repelita IV	Projected quantity of production at the end of Repelita V	Annual growth rate
belts	770 tons	2,160 tons	22.9%
gloves	6,469 pairs	3 billion pairs	115.0%

As is clear from above estimate, a great increase in production is expected in this sector.

(2) Trade and Investment Policies

<Exports>

The promotion of exports of rubber-based products is considered to have the same goals as the promotion of exports of plastics and other chemicals in the various industrial sectors of the sectorial development program. There are no policies specific to rubber. However, the export plans under Repelita V establish a growth target for exports of rubber-based products of an average 15.7 percent annually. In particular, the government is working to increase exports of rubber tires and rubber sports shoes from the US$84 million of 1988 to US$174 million by the end of Repelita V, a more than two-fold increase.

As specific measures for promoting exports, the Industrial Product Center of the Export Promotion Agency (NAFED) will take the lead and collect and disseminate overseas information, dispatch missions overseas, receive missions from abroad, and hold seminars in Indonesia.

<Investment>

There are no restrictions on investments in the rubber-based product industry. Investment by foreign companies is possible within the framework of the current Foreign Investment Law. Foreign investment in the rubber-based product industry has increased in recent years. Investment in the sports shoes sector was particularly remarkable under Repelita IV. From 1985 to 1988 there were four investments from Japan, nine from South Korea, and three from Hong Kong (all new). Among these, 10 were in sports shoes and all had export ratios (targets) of over 65 percent.

(3) Financial System

Indonesia's financial policies are based on a firm adherence to the principle of free competition based on the market principle. That is, they are based on the belief that funds should be effectively distributed through a free market.

Therefore, the government has established systems for the preferential funding of only an extremely limited number of sectors such as food production. There are no special financial supports provided to the rubber-based product sector. (Institutional financing remains for investment funds for estates for production of rubber materials.) Therefore, while no special financial systems are available to the companies in the rubber-based

product sector, these companies are allowed to freely raise funds in accordance with their own capabilities from either the domestic or overseas markets.

In the rubber-based product sector, there were several low interest financing schemes for small-sized companies with total assets of under 600 million rupiah. However, these were abolished by the package of policies announced in January 1990. In their place, a guideline was issued stating that banks should reserve 20 percent or more of the balance of their outstanding loans for financing small companies with total assets of under 600 million rupiah. This ensured the the same amount of funds for loans to small-sized companies as in the past, but the interest rates were changed to actual market rates and applied in accordance with the credit ratings of the companies.

3.5 Current Status of Corporate Operations, Production Technology and Direction of Development in the Indonesian Rubber-based Product Industry.

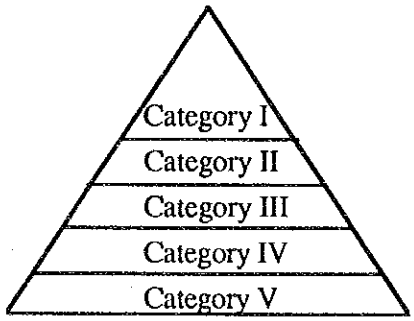
(1) Corporate Operations

1) Categorization of manufacturers

Indonesia's rubber-based product manufacturers (excluding crumb rubber, RSS and latex) are mainly small-scale manufacturers. In terms of technology level, most of them are still underdeveloped.

Target markets differ from one product to another. Many manufacturers of sports shoes, tires and examination gloves are export-oriented while most manufacturers in other sectors are dependent on the domestic market.

Rubber-based product manufacturers (excluding manufacturers of tires/tubes and sports shoes), as one of the selected industrial sub-sectors in this study, can be categorized as follows:



Thirty-eight firms (26 industrial rubber-based products firms and 12 latex product firms) were examined during the field survey portion of this study. The 38 companies included a few manufactures of tires/tubes for bicycles and rubber soles. Those manufacturers were examined merely for reference as it is considered useful to know the general level of manufacturing technology of the industrial rubber-based product sector in Indonesia.

The categorization of the manufacturers was determined through a kind of corporate diagnosis based on the surveyors' direct observations and not on indirect information such as company catalogs or brochures or simple judgements based on the company operational indices revealed in the questionnaires. (The relation between categorization of manufacturers and corporate indices will be examined and stated later on.)

The corporate diagnosis is based on field interviews with company managers, factory visits, impressions of work site conditions, control of machinery and equipment, and so on.

[1] The categorization of the 38 rubber-based product manufacturers visited during this survey is shown in Table 3-5-1 and Table 3-5-2.

Table 3-5-1: The Number of Latex Product Manufacturers by Category

Product	Category I	Category II	Category III	Category IV	Category V	Total
Condoms	1	0	0	0	0	1
Surgical Gloves	0	1	0	0	0	1
Examination Gloves	0	2(1)	8	0	0	10
Foam Rubber	0	0	0	0	1	1
Thread	0	0	0	1(1)	0	1
Total	1	3(1)	8	1(1)	1	14(2)

Note) ( ) shows the number of manufacturers producing more than two kinds of products.
The total number of latex product manufacturers visited was 12 firms.
Source: Field Survey Interviews

Table 3-5-2: The Number of Industrial Rubber-based Product Manufacturers by Category

Product	Category I	Category II	Category III	Category IV	Category V	Total
V Belts	2	0	1	0	0	3
Rubber Hoses	0	0	0	2	0	2
Rice milling rollers	0	2	2	0	0	4
Volleyballs	0	0	0	1	0	1
Thread	0	0	0	1	2	3
Rubber Bands	0	0	0	1	2	3
Dock Fenders	0	0	0	2(1)	0	2
Compounds	0	0	1(1)	1	0	2
Tires/Tubes for Bicycles	0	2(1)	1(1)	0	1(1)	4
Rubber Soles	0	0	1	0	2(2)	3
Other Industrial Rubber Products	1	2(1)	1(1)	4(2)	3	11
Total	3	6(2)	7(2)	12(3)	8(3)	36(10)

Note) ( ) shows the number of manufacturers producing more than two kinds of products. The total number of industrial rubber product manufacturers visited was 26.
Source: Field Survey Interviews

[2] The total number of manufacturers evaluated through this categorization system is shown in Table 3-5-3.

Table 3-5-3: Total Number of Manufacturers Evaluated through the Categorization System

Industrial rubber-based product manufacturers (Number of companies interviewed)		*Latex product manufacturers* (Number of companies interviewed)	Total
Category I	3(1)	1(-)	4(-)
Category II	4(1)	2(2)	6(3)
Category III	5(3)	8(5)	13(8)
Category IV	9(5)	(1)*	9(5)
Category V	5(2)	1(-)	6(2)
Total	26(12)	12(7)	38(19)

Note: ( )* indicates a manufacturer whose products are categorized as of a different type and who is not accounted for in the number of companies.visited
Source: Field Survey Interviews.

[3] Characteristics of categorized manufacturers

A general evaluation indicates that factories in Categories I, II and III can export their products.

In the case of manufacturers in Category III, however, is is necessary to improve production methods and to introduce quality control systems.

Manufacturers in Categories IV and V are far from being able to export their products at the present time. Education of management and training and instruction for engineers are required.

Characteristics of the categorized manufacturers are shown in Table 3-5-4.

Table 3-5-4: Characteristics of the Manufacturers

Category	Characteristics
Category I: Industrial rubber-based products (3 firms) Latex products (1 firm)	Manufacturers in this category produce V belts or rubber parts for automobiles and condoms. They are equipped with modern production facilities and also have testing and research facilities as well as their own training programs. They implement production schedules, process control and operation management. The working environment is very good.
Category II Industrial rubber-based products (6 firms) Latex products (3 firms)	Manufacturers in this category produce rice milling rollers or surgical/examination gloves. Production is based on orders received. Some production is done based on forecast. They implement process control and operation management. The working environment is fairly good.
Category III Industrial rubber-based products (7 firms) Latex products (8 firms)	Manufacturers in this category produce V belts, rice milling rollers, compounds, tires, tubes for bicycles, and other industrial rubber-based products. Some examination glove factories which have suspended operations are in this category. Production facilities are modern. Production is based on orders received. Process control and operation management is insufficient. The working environment is acceptable.
Category IV Industrial rubber-based products (12 firms) Latex products (1 firm)	Manufacturers in this category produce rubber hoses, basketballs, square rubber threads, rubber bands, rubber fenders and other industrial rubber-based products. Production facilities are outdated. Production is based on orders received. Process control and operation management are very bad. The working environment is not good.
Category V Industrial rubber-based products (6 firms) Latex products (1 firm)	Manufacturers in this category produce rubber bands, tires/tubes for bicycles, rubber foam, and other industrial rubber-based products. Production facilities are outdated. Production is based on orders received. Process control and operation management are not conducted. The working environment is very bad.

[4] As already stated, the categorization of manufacturers is based on the surveyors' direct observation in the field survey. Meanwhile, the main corporate indices of the manufacturers according to the survey questionnaires are shown in Table 3-5-5 and 3-5-6.

Table 3-5-5: Main Corporate Indices of the Latex Product Manufacturers According to Survey Questionnaires

Category	Company	Products	Factory Building ($1,000m^2$)	Employees (person)	Annual production Value per Man (million Rp.)	Annual Production Value (Million Rp.)	Capital (Million Rp.)	Number of Staff (person)	Annual Average Salary of Staff (1,000Rp./yr)	Education Level[more than junior high school (%)]
II	A	Thread, Examination Gloves	1.5	65	6.9	450	2,400	10	4,500	95
	B	Examination Gloves	2.9	300	2.0	611	2,500	17	3,800	95
III	C	Examination Gloves (Suspended)	1.8	-	-	-	500	4	4,063	-
	D	Examination Gloves (Suspended)	2.2	-	-	-	-	-	-	-
	E	Examination Gloves (Suspended)	-	178	-	-	3,672	20	2,400	94
	F	Examination Gloves (Suspended)	1.0	120	-	-	1,000	9	3,800	83
	G	Examination Gloves (Suspended)	1.5	72	-	-	-	10	4,200	50

Table 3-5-6: Main Corporate Indices of the Industrial Rubber-based Product Manufacturers according to Survey Questionnaires

Category	Company	Products	Factory Building ($1,000m^2$)	Employees (person)	Annual production Value per Man (million Rp.)	Annual Production Value (Million Rp.)	Capital (Million Rp.)	Number of Staff (person)	Annual Average Salary of Staff (1,000Rp./yr)	Education Level[(more than junior high school (%)]
I	H	Rubber products for auto parts	21	700	16.42	11,494	3,000	127	3,000	41
II	I	Rice milling rollers, tires/tubes for bicycles	39	1,710	13.25	22,653	2,640	44	3,545	55
III	J	Rubber soles	12	850	10.35	8,805	1,700	28	4,564	50
	K	Rice milling rollers, Rubber rollers, Other industrial rubber products	7	150	10.00	1,500	-	40	4,750	30
	L	V belts	7	131	-	-	1,961	18	2,636	39
IV	M	Rubber hoses	2	100	10.7	1,072	-	8	1,350	50
	N	Compound	4.6	65	5.0	327	331	11	1,783	25
	O	Rice milling rollers, Compound	-	200	5.6	1,125	300	17	1,783	25
	P	Thread	1.8	-	-	312	-	-	-	-
	Q	Volleyball	0.6	28	2.1	60	200	2	2,150	10
V	R	Rubber bands, Rubber soles	3	60	8.3	500	30	-	-	-
	S	Rubber bands Rubber soles	-	30	-	-	8	3	1,000	0

[5] Table 3-5-7 and Table 3-5-8 indicate the relationship between the corporate indices obtained through the questionnaires and the categorization conducted by surveyors during the field survey.

a. Latex products

Table 3-5-7: Comparison of Average Corporate Indices for Each Category of Latex Product Manufacturers According to Questionnaires

Index	Category II (average of 2 firms)	Category III (average of 5 firms)
Factory Building (m2)	2,200	1,625
Employees (people)	183	123
Annual Production Value (million Rp.)	530	-
Annual Production Value per Person (million Rp.)	2.9	-
Capital (million Rp.)	2,250	1,724
Number of Staff (people)	9	10
Average Annual Salary of Staff (1,000Rp.)	4,150	3,616
Education Level (Percentage of employees with more than junior high school education)	97	76

From the comparison in Table 3-5-7, a clear distinction between Category II and Category III in terms of factory size, employees, annual average salary for personnel and educational level of employees can be seen.

Generally speaking, Indonesian latex product manufacturers, which are mainly producers of examination gloves, can be said to be export-oriented companies and to have good potential. Including those manufacturers which have suspended operations, they can be said to have good potential in terms of managerial capability. Therefore, their development of marketing capabilities and their recovery from the adverse situation affecting the export market for examination gloves are very desired.

b.Industrial rubber-based products

Table 3-5-8: Comparison of Average Corporate Indices for Each Category of Industrial Rubber-based Product Manufacturers According to Questionnaires

Index	Category I & II (Average of 2 Firms)	Category III (Average of 3 Firms)	Category IV & V (Average of 7 Firms)
Factory Building (m2)	30,000	8,700	2,400
Employees (people)	1,200	380	80
Annual Production Value (million Rp.)	17,000	5,150	556
Annual Production Value per Person (million Rp.)	14.20	13.55	6.95
Capital (million Rp.)	2,800	1,830	174
Number of Staff (people)	86	29	8
Annual Average Salary of Staff (1,000Rp.)	5,400	4,000	2,000
Education Level (Percentage of employees with more than junior high school education)	48	40	30

From the above comparison, the average corporate indices can be seen to support the categorization based on the field observation. The manufacturers in Category IV and V can be identified by their extremely small business scale. Most of the manufacturers excluded from the survey this time may be assumed to belong to Category V. Therefore, the actual average business scale of Category IV and V might be even smaller.

A possible conclusion is that the future export oriented manufacturers to be developed would, because of their adequate business scale, be limited to those manufacturers which belong at present to Categories I, II, or III.

2) Business Administration

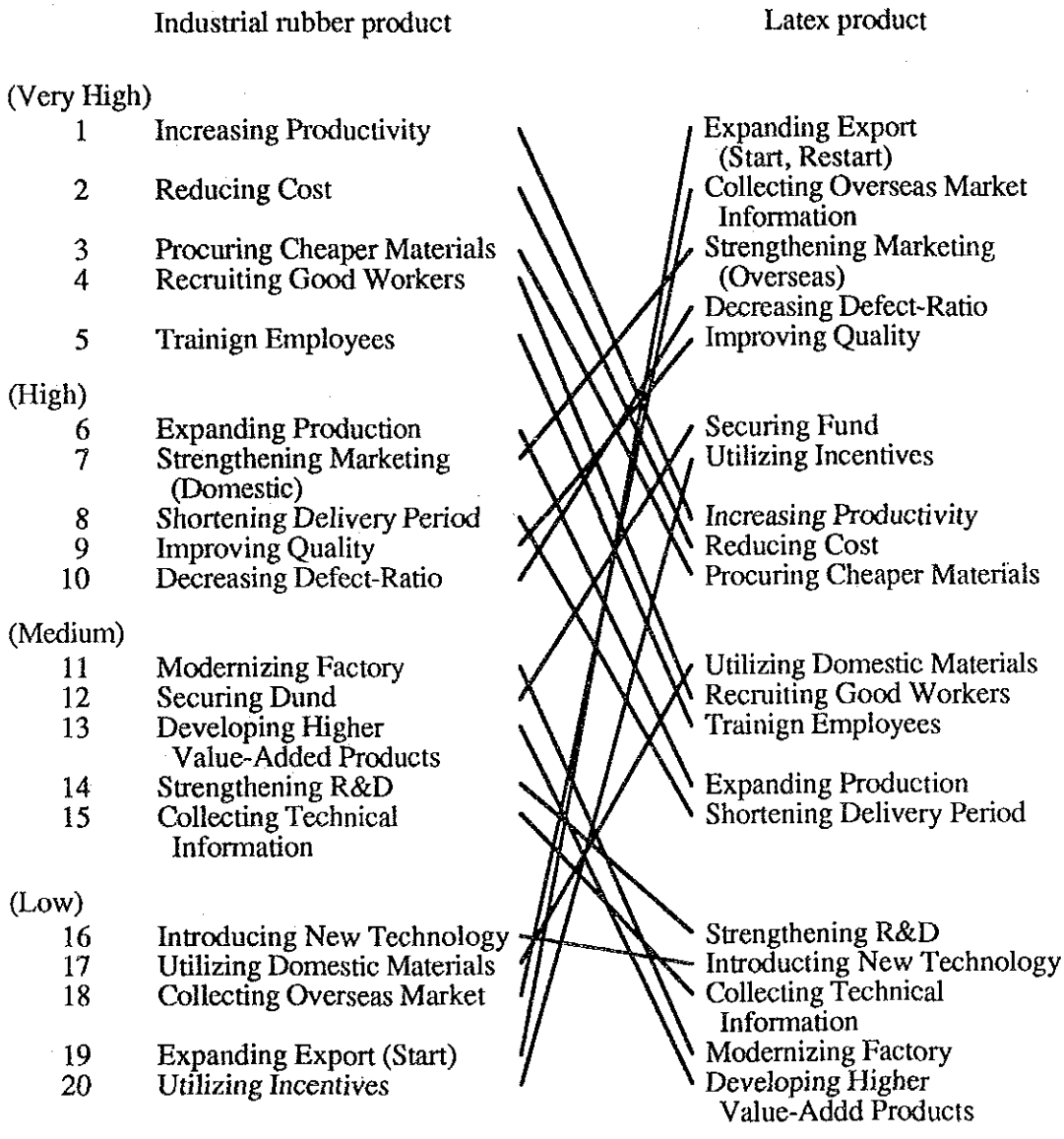
[1]Operational Stance

a Main Items of Concern to Managers

In this field survey, one of the interviews conducted was for the purpose of determining what things the managers of the 38 rubber-based product manufacturers visited are concerned about. In addition to the interview, the field survey of the factories or the questionnaire survey were also used for this purpose. At the interview stage, it was expected to be difficult to detect a common tendency in their concerns because of the variable responses which resulted due to confusion between their wishes and their needs in terms of business operation. However, as a result of the particular arrangement of the interview questions, a certain tendency was determined with regard to their concerns in terms of business operations. In the field survey, a list of 20 important items which are

considered to comprise an operational targets to be achieved in the general administration of a business were prepared. The 20 items are ordinarily considered to be equal in importance. However, the interviews were conducted taking into account the differences in the interviewees' interests relative to these 20 items. Table 3-5-9 shows the results of the survey in terms of the tendency of the concerns of the managers of rubber-based product manufacturers.

Table 3-5-9: Degree of Concern Shown by the Managers of Rubber-based Product Manufacturers



Source: Field Survey Interviews & Questionnaire Survey

(a) A conceptual scenario related to the concerns of the managers of industrial rubber-based product manufacturers

I) At the moment, the major concerns of the industrial rubber-based product manufacturers are "Increasing productivity" and "Reducing costs." To reduce costs, "Procuring Cheaper Materials" is necessary. To increase productivity, the first priority is "Recruiting Good Workers".

Among the smaller scale manufacturers with small numbers of employees, the problem of how to secure good workers becomes more important. In reality, small scale manufacturers (Categories IV and V) have recruited more workers with only elementary education levels than large scale manufacturers.

As a result, "Training Employees" becomes an inevitable and difficult problem. Except for the manufacturers in Categories I and II, most companies have not established a so-called 'OJT system'. Most of the small scale manufacturers (Categories IV or V) think they can manage to maintain their operation through small production with small sales.

II) Meanwhile, the companies belonging to Categories I, II, and III are more concerned about "Expanding Production." However, increased production requires increased customers. Therefore, they have to conduct "Strengthening Marketing" activities and cope with buyers' requirements for "Shortening Delivery Period" and ""Improving Quality" of their products. To manufacture good products speedily means to realize "Decreasing Defect Ratio".

III) However, there would be a limit to how much the defect ratio could be decreased through manual manufacturing methods. As a result, "Modernizing Factory" becomes a necessity. For that purpose, "Securing Funds" would be an important concern for the manufacturers. After the solution of the problems mentioned above, their next concerns would be "Developing Higher Value-Added Products."

The companies belonging to Categories I and II could be said to be at this stage. The manufacturers should also continue to make efforts at "Strengthening R&D" and consider the necessity of "Collecting Technical Information."

IV) Manufacturers belonging to Category I would not be satisfied with just collecting technical information. They would further try to realize "Introducing New Technology" through technical tie-ups or joint ventures. They would have concerns about "Utilizing Domestic Materials" due to doubts about their own technological capability to overcome any problems in terms of quality and the knowledge that the sales unit price could be set somewhat higher when imported materials are used.

Then they would make efforts in "Collecting Overseas Market Information" to prepare for "Expanding (Commencement of) Export". At this stage, they would naturally show interest in "Utilizing Incentives " by the government.

(b) A conceptual scenario related to the concerns of the managers of latex product (surgical/examination gloves) manufacturers.

I) The greatest point of concern right now for the manufacturers of latex product (surgical/examination gloves) manufacturers is "Expanding (Commencement of or Recommencement of) Export".

They are keenly aware of their lack of efforts in "Collecting Overseas Market Information" and "Strengthening Marketing". "Decreasing Defect-ratio" and "Improving Quality" of products are the necessary conditions for recommencement of exports, especially for the manufacturers who have lost their export market due to changes in the overseas markets and have been obliged to stop their operations or to continue operations merely for experimental purposes.

II) The market for examination gloves is said to be relatively easy to enter for anyone who is capable of "Securing Funds" for manufacturing machinery and equipment and for this one can expect the favor of import tax exemption on the basis of "Utilizing (Governmental) Incentives".

Of course, there are three managerial targets for "Increasing Productivity" "Reducing Cost" and "Procuring Cheaper Materials".

III) In order to realize the three targets they naturally show concern about "Utilizing Domestic Materials (Domestic Latex)".

Next come the concerns about "Recruiting Good Workers" and "Training Employees" through which they have to realize "Expanding Production" and "Shortening Delivery Period" with their existing machinery and equipment.

IV) In order to compensate for the limits of the efficiency of the existing machinery and equipment, "Strengthening of R & D" is necessary. In addition, "Introducing New Technology" would be highly desirable. They would conduct "Collecting Technical Information" for the preparation of "Modernizing Factory" which would be indispensable in the last stage.

After arriving at this stage, the manufacturers would be capable of "Developing Higher Value -Added Products" such as surgical gloves, condoms, etc.

b Attitudes of rubber-based product manufacturers toward exports.

(a) Industrial rubber-based product manufacturers

I) Focusing on the domestic market only.

Almost all managers of industrial rubber-based product manufacturers pay attention to the domestic market. They do not bother much with research and development and feel that their products can be sold easily.

Some of the manufacturers do not have their own brands but produce imitations of foreign brands which are popular in Indonesia. At present, almost none of the manufacturers have company brochures and they conduct overseas marketing activities by themselves on an individual basis or not at all.

II) Import substitution

The locally-produced industrial rubber-based products are in most cases sold as replacements for imported products so the manufacturers do not pay a great deal of attention to the quality of their products.

Their degree of competitiveness in the international market is poor.

III) Development of enthusiasm for overseas markets.

The desire to develop overseas markets is not very strong and even the manufacturers ranked in Categories I and II do not have a strong desire in this area.

(b) Latex product manufacturers

I) Export oriented

Out of ten examination glove factories visited, only four (4) were operating, with the other six (6) having stopped their operations due to problems in the quality of their products and the presently bad market situation.

Most of the manufacturers were established in the past 2-3 years during the investment boom in manufacturing of examination gloves destined for export to the U.S.market.

II) Lack of manufacturing technology and managerial experience

The market for examination gloves is rather easy to participate in if the investors have enough capital capacity, even if they do not have a great deal of managerial experience. Therefore, many investors took part in the market with manufacturing machinery and equipment purchased from Taiwanese makers. However, they did not receive enough guidance in manufacturing technology from the suppliers. Many of the manufacturers have been forced to halt operation due to the worsening market situation.

In addition, they had not accumulated enough manufacturing and managerial experience before the suspension of operations in order to make good products. There are some manufacturers who continue to produce the products merely for experimental purposes but the problem of product quality would remain after the recommencement of their operation even if the market situation should take a turn for the better.

III) Lack of overseas marketing

In spite of their orientation toward exports, manufacturers have entered the market without having conducted a sufficient F/S. In addition, they have not established marketing channels in the international export market. Further efforts to recommence operations with efforts at overseas marketing would be highly desired.

[2] Problems in Management Control at Factory Sites

a. State of Factory Floors

(a) Result of Field Survey at Factories

During the factory visits, the state of the rubber-based product manufacturers' production facilities was assessed based on a "factory check list." This check list included 25 items and each was evaluated and given one of three scores (excellent ...3 points, fair...2 points, bad...1 point).

A summary of the results of the survey of 32 out of 38 companies visited (the six examination glove manufacturers who have suspended operations were excluded) is given in Table 3-5-10.

While there are differences among the manufacturers, it may be said from this table that there are problems in personnel assignment and control systems in the area of

production control, in all aspects of product control, in quality control and in all aspects of labor management.

Table 3-5-10: Results of Field Survey at Factories

Evaluation Item	Check points	Total points
(Production Technology)		
Production Control		
1. Dispatched Workers	The level of automation, job range	55
2. Operation Attitude	Earnest attitude, look in their eyes, a chat during work	70
3. Working Speed	Speed of manual work, working speed	74
4. Operation Efficiency	Frequency of operation stoppage, the number of workers standing, meetings	60
5. Management Style	Posting of production tasks and achievements, posting of absence records	58
6. Operation Improvement	The amount of wastefulness, improvements in jigs and fixtures	72
Product Control		
7. Materials, Parts	Container storage method, manner or use of shelf labels	50
8. Semi-processed Products	The degree of accumulation of semi-processed products, use of stock slips	58
9. Finished Products	Types of packing, cleanness of packages	67
10. Material Handling	Notice of storage space, carrying method, Manner of placement	70
Quality Control		
11. Process Inspection	Posting of inspection standards, The level of inspection skill, boundary samples	63
12. Handling of Defects	Notice of defective units, classification of storage spaces	80
13. Inspection Equipment	Manner of maintenance, inspection mark	73
14. Management Style	Control chart, posting of the defect ratio	65
Plant Control		
15. Factory Layout	The level of assembly line use, the level of continuous operation	63
16. Maintenance of Equipment	Soil on equipment, proper pipe laying and wiring	75
17. Maintenance of Building	An uneven floor, broken windows, coloring, rain cover, leakage of roof	80
(Labor Management)		
Working Environment		
18. Proper Arrangement	Securing and indication of passages, placement of jigs and fixtures	65
19. Clothing	Uniform and regulation cap, work shoes, name card	58
20. Lighting	The level of lighting, lighting method	66
21. Ventilation	Dust, bad odors, windows, ventilating fans	70
22. Resting Room	Existence of a section for resting	80
Safety & Sanitation		
23. Safety	Posting of danger signs, use of safety equipment, poster to promote safety in work operation	60
24. Sanitation	Cleaning of buildings and passages, existence of a stand for washing hands	60
Morale		
25. Motivation	Existence of a bulletin board, existence of quality control bulletin board, posting of slogans for company-wide activities	50

Source: Field Survey Interviews

(b) Safety Measures in Factories

Factories manufacturing rubber-based products use high mechanical pressure and heat.

Using flammable organic solvents to such a large extent in a factory is very dangerous because static electricity can easily cause fire. It would be advisable to improve safety measures and issue some guidelines to workers. The Ministry of Industry and the Ministry of Manpower should consider guidelines for safety in factories.

I) Safety Concepts

It is important to train and educate workers in order to keep the working area clean and tidy.

If the three basic principles of safety - clean areas, organized areas and standards for operation - are followed, the safety levels of factories will be greatly improved.

II) Worker health

It is important to keep workers in good health in order to improve productivity and prevent disuptions. Lack of effort in this are can result in:

(1) careless mistakes which lead to disruptions on the production lines

(2) reduction of production efficiency due to a high rate of absenteeism

(3) reduced worker morale

(4) poor human relations in the factory, etc.,

Except for the factories in Category I, factories should consider these problems to be very important points to be improved.

b. State of Quality Related Work

Quality control may be said to consist of the establishment of a control system enabling quality to be stably maintained within a certain range and of the creation of control systems where countermeasures can be immediately taken when abnormalities occur in a cycle of PDCA (Plan, Do, Check, Action).

Out of the companies visited for the survey, companies ranked in Category I were performing sample inspections from the production line every day and immediately stopping the line whenever a defective product turned up. Such a system and a system for restoring the line to normal are essential for quality control.

The state of quality control and the level of quality based on the questionnaire survey of 12 industrial rubber-based product manufacturers is summarized here.

Table 3-5-11: Quality Control and Quality Level

Item \ Company	A	B	C	D	E	F	G	H	I	J	K	L
Quality Control Dept.	O	O	O	O	O	X	O	O	X	O	O	X
Number of QC Staff (people)	-	10	1	2	2	-	2	6	0	1	2	X
Quality Inspection Dept.	O	O	O	O	O	X	O	O	X	O	-	X
Preparation of Boundary Samples	O	O	O	O	O	O	O	O	O	O	-	X
Sample Inspection	O	O	O	O	O	O	O	O	O	O	-	O
Method of Final Inspection	Sampling	All	Sampling	All	All	All	All	All	Sampling	All	-	Sampling
Defect Ratio in 1988 (%)	5	-	-	-	6	30	-	2	10	-	-	
Number of Claims (Cases/'88)	-	-	-	-	-	-	-	-	-	-	-	-
Exports	no	no	no	no	no	no	no	no	no	no	no	no

Source : Survey questionnaires

Table 3-5-11 shows that the quality control systems are fairly well set up. However, from the site inspection it did not seem that the companies had adopted a system of work standards for maintaining stable quality.

In Japan's case, written work standards, written technical standards, etc., are established and kept for use so as to control such work. The manufacturing processes of industrial rubber-based products depend very often on manual labor. With manual labor it is difficult to stabilize quality in the same way as can be done with machine work. Therefore, skills training is important. At the same time, training to raise quality consciousness, knowledge of the product and knowledge about user demands is very important. However, during the field survey, there was no mention of worker training based on these goals.

In Japan's case, a supervisor explains the points to watch for in terms of quality in each manufacturing process before the start of production. Furthermore, when a need for repair or other abnormalities arise, training and activities for improvement are implemented through QC circle activities.

Table 3-5-12 shows the state of QC circle activities and the suggestion system in industrial rubber-based product manufacturers in Indonesia.

Table 3-5-12: QC Group Activities and Suggestion Systems

Company	A	B	C	D	E	F	G	H	I	J	K	L
QC Group Activities	O	O	O	O	O	-	O	X	X	X	O	X
QC Suggestion System	X	O	O	X	O	-	X	O	X	X	O	X
Number of Cases Suggested (cases/year)	-	-	-	-	-	-	-	-	-	-	-	-

Source : Survey Questionnaires

Seven companies had QC circle activities and five had suggestion systems as seen in Table 3-5-12. During the site inspection, however, it did not seem that such QC

activities were actually taking place at the manufacturers which were supposedly engaged in them, with the exception of one company (A company). For example, no displays or management charts regarding QC circles were seen and the number of suggestions for improvement was almost zero.

In light of this situation, it is difficult to say that there are any QC circle activities at Indonesian industrial rubber-based product manufacturers.

c State of Product Development

Table 3-5-13 and Table 3-5-14 show data collection with relation to product development and problem points of the same. As to the sources of information, Company A (joint venture) indicates partners in a tie-up and sales agents. However, most of the other companies indicate domestic buyers and sales agents.

Five out of 12 companies did not answer the question regarding the state of product development activities. In Japan, information is actively collected from partners in tie-ups, design magazines, domestic and international exhibitions and fairs and also auto-makers, electrical equipment makers and other different industries. The low degree of concern among the Indonesian companies regarding domestic and international exhibitions and fairs seems to be due to the fact that Indonesian industrial rubber-based product manufacturers are mostly oriented toward the domestic market.

There were many companies which complained about a lack of technology for developing high-value-added products, but some companies mentioned that they were not able to obtain the materials for high value-added products or market information on product trends.

Table 3-5-13: Sources of Product Development Information

Source \ Company	A	B	C	D	E	F	G	H	I	J	K	L
Tie-up Partners	O	-	-			-		-				
Sales Agents	O	-	-	O	-	-	O	-		O	O	
Buyers	O	-	-	O	-	-	O	-	O		O	
Design Magazines		-	-	O	-	-		-				
Trade Fairs & Exhibitions		-	-		-	-		-				
Design Contest			-		-	-		-				
Others			-		-	-		-				

Source : Survey Questionnaire

Table 3-5-14: Problems in Product Development

Problem \ Company	A	B	C	D	E	F	G	H	I	J	K	L
Lack of Technology for Producing High-Value-Added Products	O	-	-	O	O	-	O	O	-		O	O
Unavailability of Materials for Producing High-Valuc-Added Products		-	-		O	-		O	-	O		
Lack of Marketing Information on Product Trends		-	-	O		-	O	O	-		O	
Others		-	-			-						

Source : Survey Questionnaires

3) Trends in Cost Factors

[1] Manufacturing Costs

In this survey, several sets of data were obtained on the share of each element in the manufacturing costs for rubber-based products. These are shown in Table 3-5-15 and Table 3-5-16.,

Table 3-5-15: Composition of Manufacturing Costs for Industrial Rubber-based Products (%)

Cost \ Company	A	B	D	E	G	J	Average
Material							
Natural Rubber	-	22	-	6	-	15	(13)
Synthetic Rubber	-	7	-	5	-	-	(6)
Chemicals/Sub Materials	-	53	-	29	-	40	(38)
Sub-total	45	82	70	40	50	55	57
Labor	15	5	10	23	16	20	15
Sub-contract	0	0	0	0	0	0	-
Others	40	13	20	38	34	25	28
Total	100	100	100	100	100	100	100

Note: Average value shown in ( ) is arranged from the average sub-totals of materials for the six Firms
Source : Questionnaire Survey

Table 3-5-16: Composition of Manufacturing Costs for Latex Products (%)

Cost \ Company	M	N	Q	R	S	Average
Materials						
Natural Latex	-	-	-	-	62	(46)
Chemicals	-	-	-	-	9	(7)
Sub-total	43	55	48	50	71	53
Labor	14	10	6	12	6	10
Sub-contract	0	0	0	0	0	-
Others	43	35	46	38	23	37
Total	100	100	100	100	100	100

Note: Average value shown in ( ) is arranged from the average sub-totals of materials of the five firms
Source: Questionnaire Survey

a.Material Costs

According to the data, materials account for about 50 percent of the costs while labor accounts for about 10 - 15 percent of the rubber-based product manufacturers (industrial rubber-based products and latex products).

In the case of industrial rubber-based products, a breakdown of the 57 percent material costs shows natural rubber accounting for 13 percent. Meanwhile, imported materials such as synthetic rubber and other chemicals and such as sub-materials account for 44 percent.

That is, materials other than natural rubber account for an overwhelmingly large share of the material costs. The share of imported materials in the total cost of materials is about 80 percent.

Meanwhile, in the case of latex products the breakdown of the 53 percent material costs shows latex (domestic materials) accounting for an extremely high share of 46 percent and imported materials such as chemicals accounting for only 7 percent.

Generally speaking, the industrial rubber-based products in Indonesia are more affected by rising prices of imported materials compared with the latex products and they tend to be at a disadvantage in terms of price competitiveness.

To solve the problem of the high costs of imported materials, the following countermeasures should be considered.

(1) Improvement of quality and domestic supply capacity of essential chemicals and sub materials.
(2) Development of mixing technology for synthetic rubber and natural rubber.

b Labor Costs

Table 3-5-17 and Table 3-5-18 show the average wage level at the rubber-based product manufacturers in Indonesia.

Table 3-5-17: Average Wage at Industrial Rubber-based Product Manufacturers

(Unit: 1,000Rp/ycar)

Classification \ Company	A	B	C	D	E	F	G	J
Managerial Staff		6,000	14,400	6,000	2,600	3,600	5,800	2,500
Technical/Supervisory Staff	7,200	4,200	4,950	5,000	2,000	1,180	3,400	-
Clerical Staff		3,000	3,680	3,000	1,400	--	2,300	1,800
Factory Workers	1,320	2,390	-	1,200	-	-	-	630

	Average (Number of Co.)	Range Minimum ~ Maximum	Maximum/Minimum
Managerial Staff	6,013(8)	6,000 - 14,000	2.4
Technical/Supervisory Staff	3,804(8)	2,000 - 5,000	2.5
Clerical Staff	1,800(8)	1,400 - 3,680	2.6
Factory Workers	1,385(4)	630 - 2,390	3.8

Source : Questionnaire Survey

Table 3-5-18: Average Wage Level at Latex Product Manufacturers

(Unit: 1,000Rp/yr)

Classification \ Company	M	N	O	Q	R
Managerial Staff	12,000	6,000	6,500	24,000	6,000
Technical/Supervisory Staff	3,000	4,000	4,550	6,000	3,600
Clerical Staff	2,400	1,400	2,600	2,100	1,800
Factory Workers	1,560	800	-	560	1,300

	Average (Number of Co.)	Range Minimum	~	Maximum	Maximum/Minimum
Managerial Staff	10,900(5)	6,000	-	24,000	4.0
Technical/Supervisory Staff	4,230(5)	3,000	-	6,000	2.0
Clerical Staff	2,060(5)	1,400	-	2,600	1.9
Factory Workers	1,055(4)	560	-	1,560	2.8

Source: Questionnaire Survey

The average shown in Table 3-5-17 may be said to be the average wage level at the industrial rubber-based product manufacturers. There are considerable differences among individual companies with respect to this average level, as shown by the range of the table, i.e. the maximum level is 2.4 -3.8 times the minimum level.

Meanwhile, the average shown in Table 3-5-18 may be said to be the average wage level at the latex product manufacturers. There are also differences among individual companies similar to those among industrial rubber-based product

manufacturers. As shown by the range of the table, the maximum wage level is 2 - 4 times the minimum level.

Table 3-5-19 shows the average wage level of the rubber-based product manufacturers in Indonesia calculated on the basis of Table 3-5-17 and Table 3-5-18.

Table 3-5-19: Average Wage Level at the Rubber-based Product Manufacturers

(unit:1000Rp/year)

Classification	Average (Number of Co.)	Range Maximum / Minimum	Average
Managerial Staff	8,457(13)	2.4 ~ 4.0	3.2
Technical/Supervisory Staff	4,017(13)	2.0 ~ 2.5	2.3
Clerical Staff	2,500(13)	1.9 ~ 2.6	2.3
Factory Workers	1,220(8)	2.8 ~ 3.8	2.3

Source: Questionnaire Surveys

As already seen in the share of manufacturing cost elements shown in Table 3-5-15 and Table 3-5-16, average labor costs for the industrial rubber-based product manufacturers are 15 percent of the total manufacturing costs and those of latex product manufacturers are 10 percent. These levels are considered to be very favorable from a managerial point of view.

With regard to the trends in wage levels, no particular opinions about problems in rising wage levels were heard during the survey visits.

However, it should be noted that a very low level of wages leads to a low level of purchasing power.

(2) The Situation of and Problems with Production of Latex Products

Latex products are manufactured from natural latex. Rubber products for medical use, surgical gloves, examination gloves, rubber toys, foam rubber, rubber thread/cord, etc., are generally called latex products.

Latex products made using natural latex as a raw material have been selected as the target category of this survey. Specifically, examination gloves, surgical gloves, condoms, rubber thread/cord and foam rubber are focused upon.

Generally speaking, production of latex products, in comparison with the production of solid rubber products, is said to be less expensive in terms of factory construction and maintenance and relatively easier in terms of the mixing technology required and the production process. For these reasons, production of latex products can be undertaken relatively easily. However, it will be rather difficult for Indonesian latex product manufacturers to compete with their more experienced foreign counterparts because of their relative lack of technical experience and marketing capability.

1) Examination Gloves and Surgical Gloves

[1] Manufacturing Method

Most Indonesian manufacturers use automatic production machines made in Taiwan but some use machines made in the U.S.A. The same coagulant dipping method is used in Indonesia for the manufacture of both surgical gloves and examination gloves. Usually, surgical gloves must be manufactured by the straight dipping method and sterilized after the final production process is completed. However, surgical gloves manufactured in Indonesia are sterilized in the country to which they are exported. Therefore, it appears that there is not a great deal of difference between the production of examination gloves and surgical gloves in Indonesia except that the latter are made in pairs for the right and left hands.

Out of ten manufacturers visited, nine have Taiwanese-made automatic production machines and one has American-made machines.

Table 3-5-20 shows the size of the gloves produced by these production machines according to the standard sizes specified in ASTM.

Table 3-5-20: Standard Size of Examination Gloves

Designation	Size							Tolerance
	6	6 1/2	7	7 1/2	8	8 1/2	9	mm
Width by size,mm	76	83	89	95	102	103	114	±6
Width by small, medium and large size,mm				80 small 95 medium 111 large				±10
Length, mm	230 for all sizes							min
Thickness, mm Finger Palm	0.80 0.80							min min

Source: P.T. NUSA DIPA PERDANA

Fig. 3-5-1: Production Flow of Examination Gloves

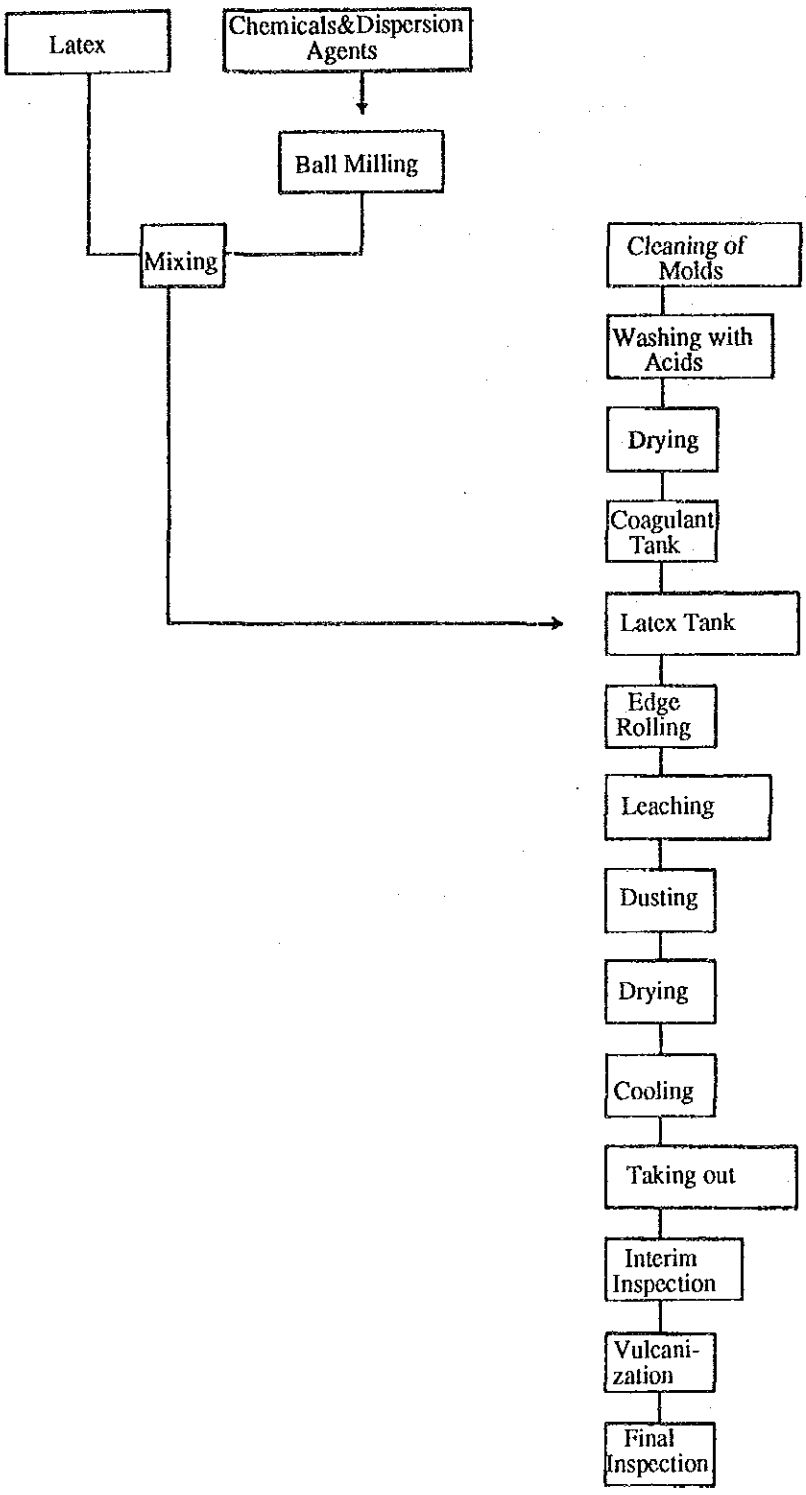


Table 3-5-21: Sterilization and Problems

Method	Problems
Sterilization by gases	Ethylene oxide gases are used. There is a problem of dermatitis caused by residue gases.
Sterilization by radiation	Cobalt 60 is used. Operation cost is high.

[2] Technical Level

It can be said that there is no way to improve production except to improve the level of manufacturing techniques through accumulated knowledge of the inherent characteristics of production machines and to secure a supply of concentrated latex of consistently good quality.

At the intermediate stage of the production process, the defect ratio at Indonesian examination glove factories appears to be 20 percent on average. The main types of defects found are pin holes, bad sleeve portions, uneven thickness at finger tips, white dots, etc. All of these defects are considered to be the result of problems with the manufacturing method.

The defect ratio could be mitigated to a certain degree if the surface film of latex were removed in the dipping tank and the speed of rotation in and removal from the dipping tank were regulated during the manufacturing process.

Table 3-5-22: Countermeasures for Defects in Examination Gloves

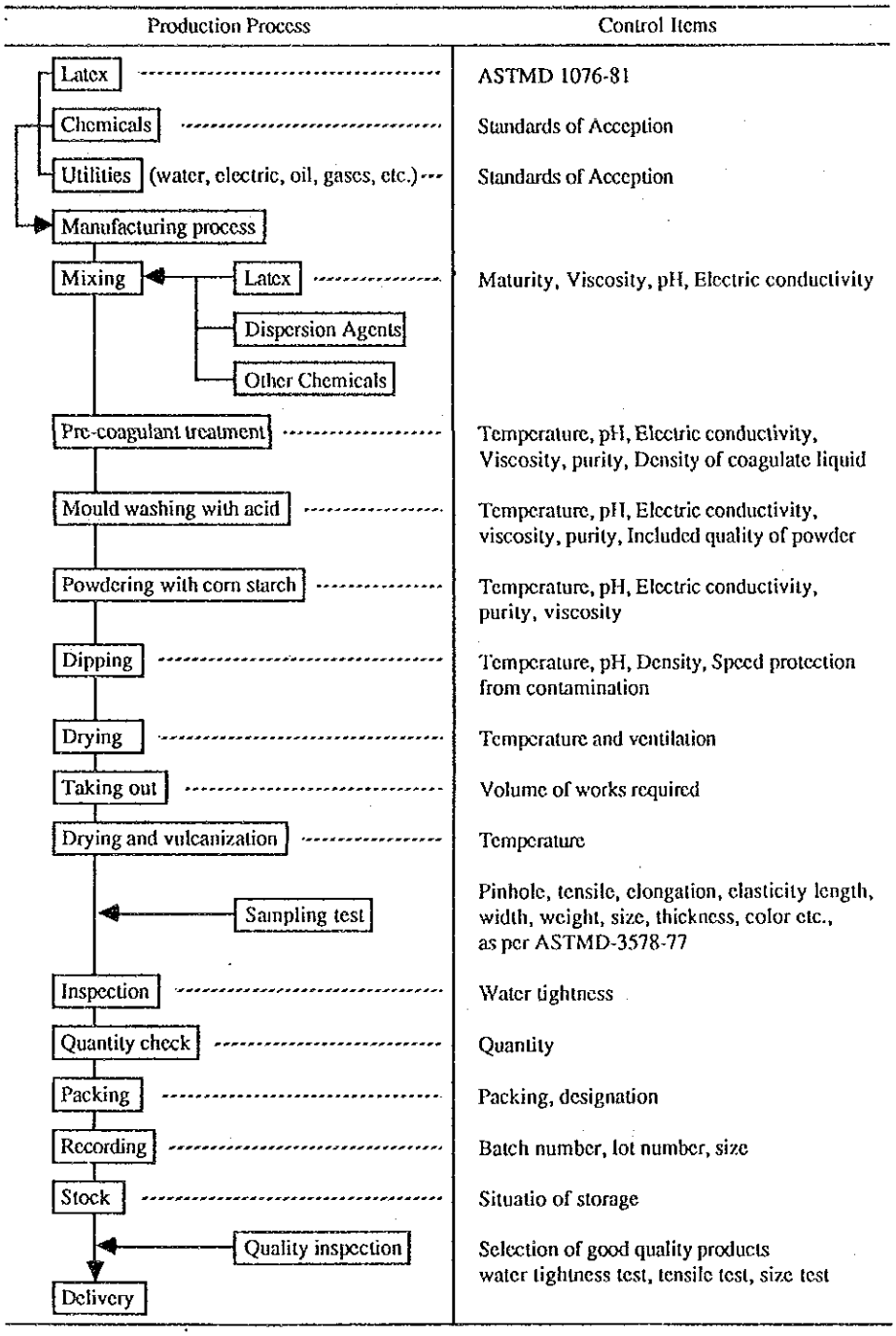
Defects	Countermeasures
Pin holes	- Improvement of material mixing and even dispersion - Improvement of factory cleaning
Bad sleeve portions	- Improvement of production machines
Uneven thickness at finger tips	- Regulation of the speed of rotation in and removal from the dipping tank
White dots	- Improvement of material mixing and even dispersion - Removal of the surface film of latex in the dipping tank
Others	- Maintaining the purity of the latex in the dipping tank by, for example, wearing caps, masks, etc.

[3] Factory Control and Quality Control

The strong smell of ammonia which is peculiar to latex product factories can be removed through use of deodorizing devices but many of the factories visited have no such devices. Moreover, many factory workers were operating without masks, caps and clean white uniforms. Efforts to rectify these oversights would be a good first step towards instilling a consciousness of quality control among workers.

Only three of the companies visited had any type of quality control program. One of them is a manufacturer of surgical gloves for export to the U.S. and another is an examination glove factory using U.S. production machines. Both of them have introduced Good Manufacturing Practices (GMP) systems as a requirement stipulated by their U.S. customers.

Fig. 3-5-2: Quality Control in the Production Process of Examination Gloves



Source: P.T. PERKASA RUBBERINDO pamphlet

[4] Corporate Management

The examination glove factories (including one surgical glove factory) visited for the field survey can be categorized into the following five types:

a) After operation on an experimental basis, production was suspended due to an unacceptably high defect ratio.
b) Operation was suspended because of the lack of a marketing channel.
c) The company was still in operation.
d) Experimental operation was continuing.
e) The factory was under construction.

A factory still operating has contracted its sister company in Singapore to perform marketing.

A factory which is continuing to operate on an experimental basis has a sales contract with American buyers which was arranged in return for its purchase of U.S.-made production machines. With the exception of these two companies, all of the companies visited during the field survey were lacking in marketing capability and had no means of accumulating knowledge about corporate management.

[5] Sales

The lack of marketing channels presents an obstacle for all of the examination glove factories in Indonesia. Excited by the boom in sales of gloves in the U.S. as a result of the spread of AIDS in the past two or three years, many companies have rushed into the business without conducting feasibility studies. It is easy to see that their hastiness in entering the market is now seriously affecting their chances of survival.

The examination glove industry should be re-established with the help of a support system centering on ASTA and similar associations. In particular, the gathering of overseas market information and the establishment of overseas marketing channels must be supported in order for success to be achieved.

2) Condoms

Currently, the only condom factory which exists in Indonesia is BKKBN located in Bandung. The factory was established with the aid of a Japanese OECF loan to supply the domestic market. It meets international standards in terms of manufacturing equipment, technology, factory control, quality control, antipollution controls, etc., and can be considered a model for all Indonesian latex product manufacturers.

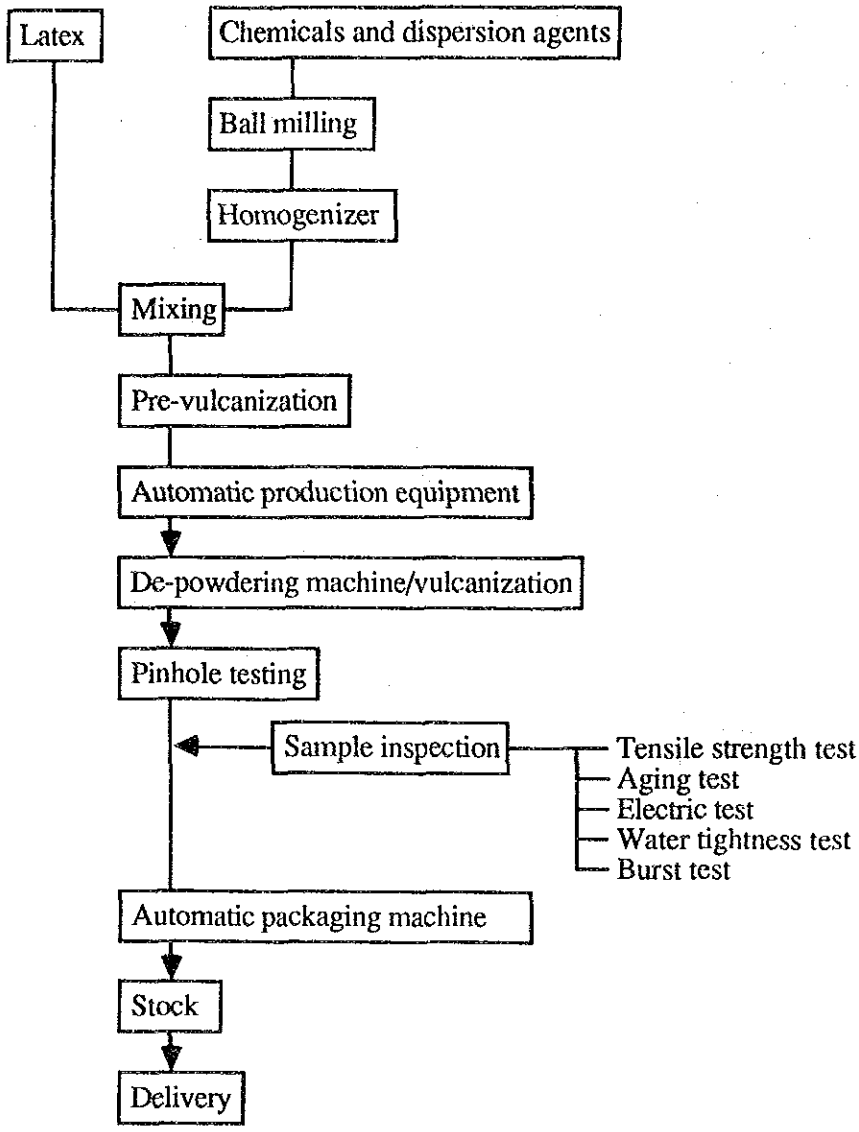
The annual production volume of the factory is said to be 10,000 thousand pieces. However, judging from the imported condoms circulated in the domestic market, complete substitution for imported condoms has yet to be achieved. The first goal of this factory should be to attain the capacity to fill the needs of the domestic market completely. Exporting should be considered a goal for the future.

Although no detailed information was obtained during the survey, it is said that five or six companies are currently preparing to begin manufacture of condoms. There are also some rumors that condoms are being exported from the Surabaya area but this could not be confirmed during the survey.

At this time, Indonesian condom manufacturing should be aimed at achieving complete import substitution and, for the time being, condom manufacturing should not be considered an export-oriented latex product industry. The world market for condoms is already dominated by large international manufacturers such as Ancel, Shmidt, Johnson, Okamoto, Fuji, Sagami, etc. Any Indonesian condom manufacturer intending

to penetrate the world export market should first invest at least 15 to 20 billion rupiah to bring production capability to the level equivalent to that of the BKKBN factory.

Fig. 3-5-3: Production Flow of Condoms



3) Rubber Thread

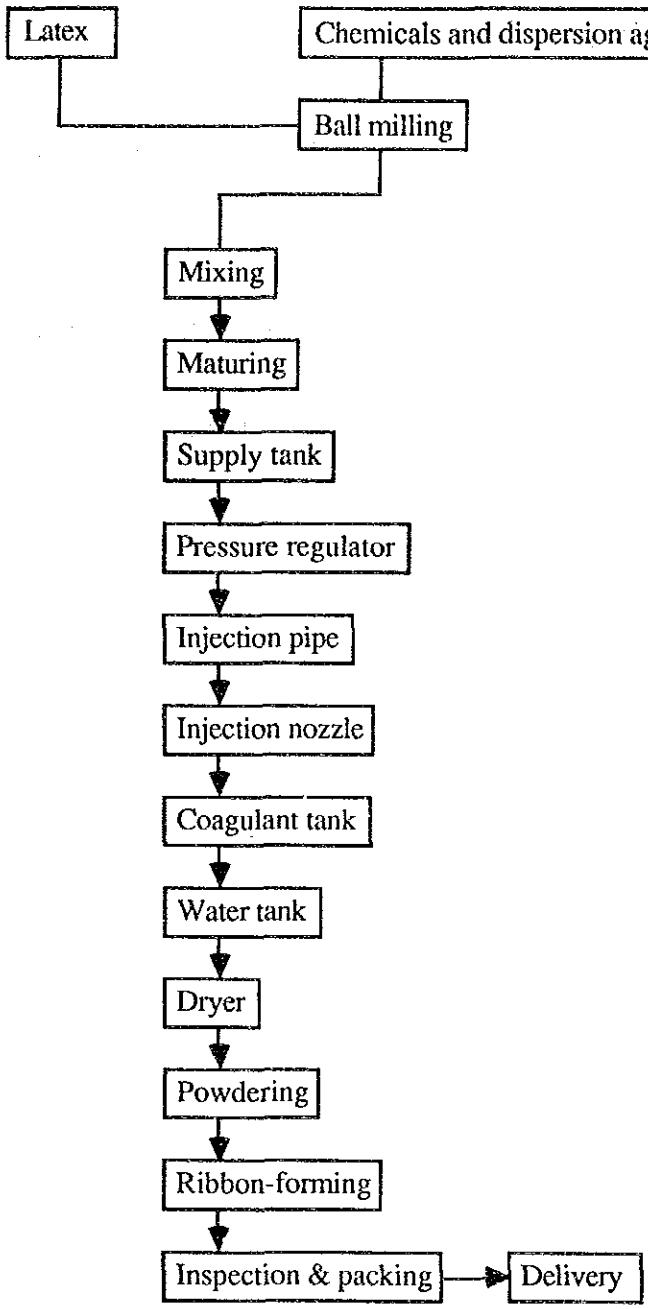
There are two ways to manufacture rubber thread - from concentrated latex or solid rubber. Among the companies visited during the field survey, only one was found to possess the production equipment required to manufacture rubber thread from concentrated latex.

Rubber thread is usually used for stockings, women's underwear, etc. The rubber threads are covered with very tiny fibers of rayon, nylon, tetron, cotton thread, etc., which are used to prevent the rubber from aging rapidly. The coating makes it possible to dye the rubber thread and to knit it. In the factory visited there were no such covering machines and the factory had just completed experimental production of rubber thread.

The manufacturing method used is the same method that is used by Japanese rubber thread manufacturers. However, an on-site inspection and testing performed by a specialist participating in the survey revealed that the rubber thread had a tendency to break under high tensile stress. The reason for this appears to be insufficient defoaming treatment during the mixing of the latex.

The factory visited falls into Category IV. Factory control and quality control are insufficient at the moment and should be improved if the manufacturer is to become export oriented. One way to achieve improvements would be to provide training for both managers and technicians.

Fig. 3-5-4: Production Flow of Rubber Thread (General case in Japanese factory)



It is difficult to assess the status of the Indonesian rubber thread manufacturing industry on the basis of only one company. However, the rubber thread industry could be considered a promising export industry if the manufacturers become determined to take full advantage of the fact that Indonesia is a latex producing country. In order to penetrate the export market, they would be required to make substantial efforts to understand market trends and consumer preferences and to deal with them effectively. They should also consider that trends in the fashion world now change very rapidly and it is difficult to catch up and keep pace. To establish export-oriented production of rubber thread, it would be necessary to improve manufacturing technology and arrange a certain scale of investment. Naturally, feasibility studies of market potential would be very important.

4) Foam Rubber/Sponge Rubber

As of 1988, seven companies were said to be producing foam rubber in Indonesia.

During the field survey, only one factory was identified as a foam rubber manufacturer and it was ranked in Category V.

Foam rubber produced in Indonesia is mostly for the domestic market and is used for such products as mattresses and pillows. In the export market at present, most products which have previously incorporated foam rubber are now using urethane foam. Therefore, the future prospects for the industry in terms of exports are not bright. However, as long as the domestic demand for foam rubber continues to increase, the industry could work toward achieving substitution for imports for urethane foam products.

Table 3-5-23: Characteristics of Latex Foam Rubber and Urethane Foam.

	Characteristics
Latex foam	Has peculiar cushiony feeling. Inferior in weather resistance and chemical resistance
Urethane foam	Varying degrees of hardness are available. Superior in heat resistance, sound absorption and ventilation

(3) The Situation of and Problems with Production of Industrial Rubber-based Products

1) V belts

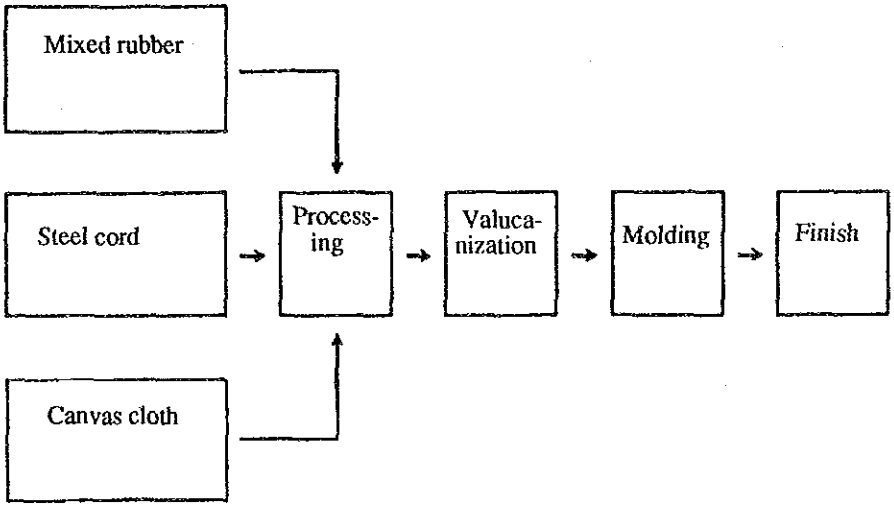
V belts are industrial rubber-based products used as auto parts, agricultural machinery parts, etc. The required improvements in the quality of this type of product have become increasingly severe in recent times. During the field survey, it was noted that V belts to be used for auto parts are manufactured by two joint venture companies. These two JV companies are Category I firms.

During the survey, it was found that only three types of V belts are produced in Indonesia.

That is: lapped belts, low-edged belts and ribbed V belts.

[1]Manufacturing Process

Fig. 3-5-5: Production Flow of V Belts



[2] Technical Level

The technical level of both joint venture companies is of the international level. They use the knowhow of their foreign counterpart companies in terms of both production equipment and manufacturing technology.

[3] Factory Control/Quality Control

The layout of the factory equipment and machinery is well managed and there are sufficient security measures at the two JV companies. Operational standards and boundary samples are prepared. Sign boards and bulletins are used for the employees' convenience in keeping informed of the operational details of the factory. Defective products are destroyed to avoid the risk that they might be shipped by mistake. Factory control and quality control in the two companies are generally at satisfactory levels.

[4] Corporate Management

To avoid the costs of the high salaries paid to foreign managerial staff and engineers, the control of management and technology are to be transferred to local personnel and engineers wherever possible.

[5] Procurement of Raw Materials

Several years ago good quality canvas cloth was difficult to obtain but the situation of procurement of raw materials has been gradually improving.

[6] Sales/Marketing

At present, the V belts are sold to domestic auto assemblers and as repair parts.

They have plans to export the V belts using the marketing channels of their JV partners in the future.

2) Rubber Rollers

Rubber rollers are used for various products ranging from the finger-tip-sized rubber rollers used in cassette recorders to the large, heavy rubber rollers which are 10 meters long and weigh 15 tons and are used for paper production. The raw rubber materials used are natural rubber and synthetic rubber, according to the required quality of the product, and the products have a wide range of degrees of hardness and colors. The rubber rollers are manufactured in Indonesia on an order-received basis.

Table 3-5-24 shows the kinds of rubber rollers produced in Indonesia.

Table 3-5-24: Rubber Rollers Produced in Indonesia

Use	Product	
Paper Industry	Back-up Roller	
	Couch Roller	
	Diamond-cut Roller	
	Felt Roller	
	Pressure Roller	
	Suction Roller	
	Vented Nippress Roller	
	Wire Drive Roller	
Plywood Industry	Anvil Cutter Roller	
	Contact Roller	
	Glue Spreader Roller	
	Sander Roller	
Textile Industry	Coating Roller	
	Dyeing Roller	
	Embossing Back-up Roller	
	Feed and Pull Roller	
	Squeeze Rollers	
	Web Spreader Roller	
Tinning, Galvanizing and and Leather Industry	Flex Roller	Pressure Roller
	Guide Roller	Squeeze Roller
	Nip Roller	Tension Roller
Asbestos, Cement Industry and Special Type	Guide Roller	
	High Temperature Resistant Roller	
	Sieve Roller	

Source: Standard Rubber Industries Pamphlet

[1] Manufacturing Method

Points regarding the manufacture of rubber rollers are
a) Winding of the rubber around the metallic axis should be improved.
b) A lengthy vulcanization process is required because of the existence of the metallic axis.

In Indonesia, mainly rubber rollers used for plywood production are manufactured.

The manufacturing method appears to be adequate.

[2] Sales

If appropriate market channels were set up, rubber rollers to be used in spinning yarn would be suitable as export-oriented products.

[3] Technical Level

Rubber rollers require a high degree of accuracy in manufacturing to meet buyers' requirements. These requirements vary depending on the type of usage and this also affects such factors as the selection of raw materials, the mixing techniques, selection conditions, etc.

Recently, demand for small rubber rollers as parts for office equipment and information-processing equipment has increased.

The present technical level of Indonesian rubber roller manufacturers has not yet reached the stage where they would be able to meet requirements in terms of high precision.

3) Rice Milling Rollers

During the field survey, it was noted that three companies are manufacturing rice milling rollers. One of them has a production system incorporating processes from the metal molds to the final products. The other two were found to have relatively inferior production line arrangements and their equipment was found to be relatively obsolete. Modernization of equipment is recommended for those factories.

4) Rubber Hoses

For the manufacture of rubber hoses, mixes of rubber and reinforcing materials such as textiles, wires, etc., are used.

Rubber hoses without a reinforcing layer are called rubber tubes.

Rubber hoses and rubber tubes are used for the transmission of liquid or compressed gases. There are large size rubber hoses over 300 mm in diameter. At present in Indonesia, suction hoses with large diameters and hoses with small diameters for oxygen and acetylene gases are manufactured.

Table 3-5-25 shows the kind of rubber hoses produced in Indonesia.

Table 3-5-25: Rubber Hoses Produced in Indonesia

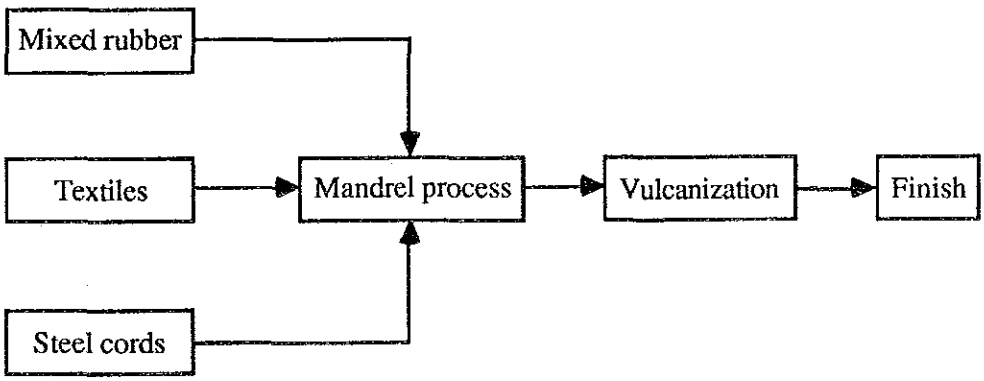
	Welding Hose
	Air Hose
	Water Delivery Hose
	Oil Suction and Discharge Hose
	Gasoline Pump Hose
	Dock Oil Hose
	Steam Hose
	Dust Collector hose
	Sand Blast Concrete Hose
	Dry Material Handling Hose
	Bulk Material Hose
	Dredging Sieve
	Fuel Oil Hose
	LPG Hose
	Acetylene Hose
	Oxygen Hose
	Twine Line Welding Hose

Source: Pamphlets of P.T.Limusnunggal Rubber & PT. Indutama Megah Indah Rubber

[1] Manufacturing Method

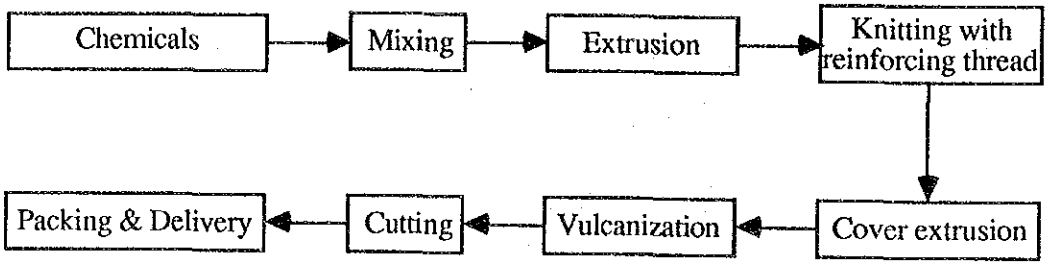
a. Manufacturing process of large-diameter rubber hoses

Fig. 3-5-6: Production Flow of Large-diameter Rubber Hoses



b. Manufacturing process of rubber hoses for oxygen and acetylene gases

Fig. 3-5-7: Manufacturing Process of Rubber Hoses for Oxygen and Acetylene gases



[2] Technical Level

The two factories visited during the field survey produce large-diameter rubber hoses and are Category IV and V companies.

The production is on an order-received basis and products are not stocked. The products are aimed at the domestic market.

Rubber hoses for oxygen and acetylene gases are produced in relatively large quantity on a stock production basis using a consecutive production machine. However, all of the products are for the domestic market only and there is no capacity for production for export.

During the site survey, the rubber used for the production of rubber hoses was found to be a mixture of natural rubber and SBR. It is recommended that the manufacturers master the technology of mixing synthetic rubber to achieve the special characteristics required in rubber hoses. It was also noted that there were no remarks such as the purpose of use, the name of the manufacturer, the manufacturing date, lot number, etc., indicated on the surface of the hoses at any of the manufacturers visited.

5) Rubber Thread

As stated previously, there are two ways of manufacturing rubber thread. One way is by use of latex, the other is by use of solid rubber.

During the field survey, only one company was found to manufacture rubber thread from solid rubber. This company is in Category IV.

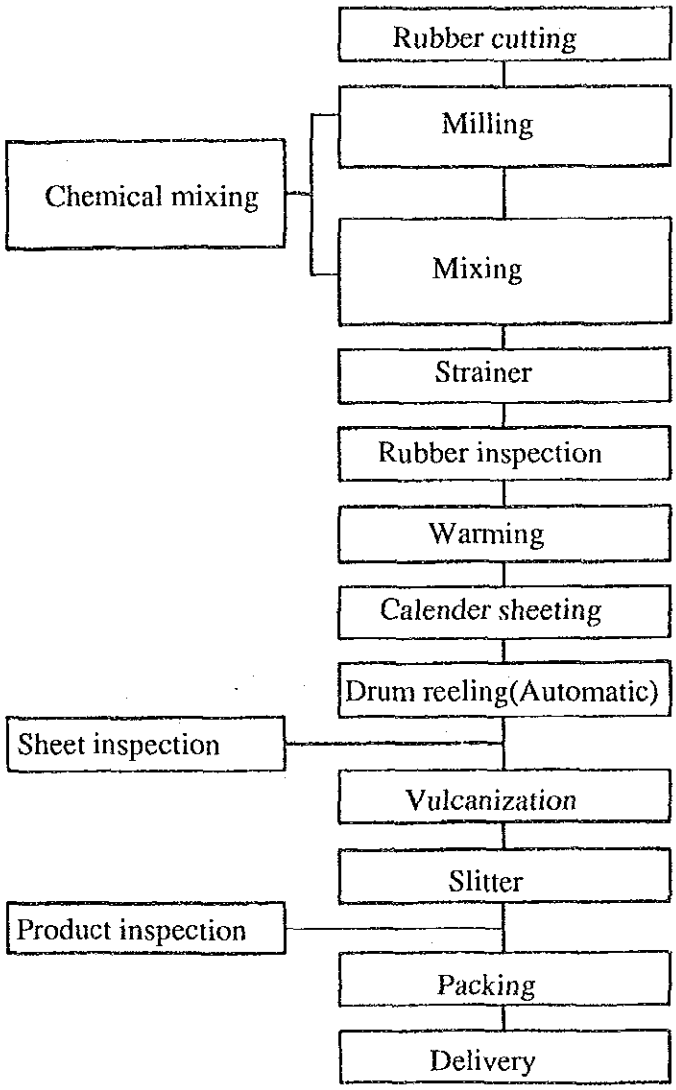
[1] Manufacturing Process

The company is manufacturing rubber thread with a diameter of 0.3mm-1mm. As a raw material, only natural rubber (SIR5) is used. (In other countries a small quantity of synthetic rubber is used with the natural rubber to allow stable vulcanization and improve the physical quality of the products.)

The product frequently breaks at a high tensile point. The reasons for the breakage are considered to be either the insufficient mixing of chemicals and sub materials or the use of unrefined sub materials containing large particles.

It appears that the company has no intentions of performing research to discover the reasons for the defect and it is not enthusiastic about promoting technological improvement.

Fig. 3-5-8: Production Flow of Rubber Thread



[2] Factory Control, Quality Control

The air in the factory was contaminated by powder from fillers because it is not well-equipped with ventilation devices such as protection hoods.

Inspection of chemicals and sub-materials at the time of reception, standardization of the mixing process of materials, testing equipment, etc., are all relatively inferior to the standard level required under the concept of factory control and quality control.

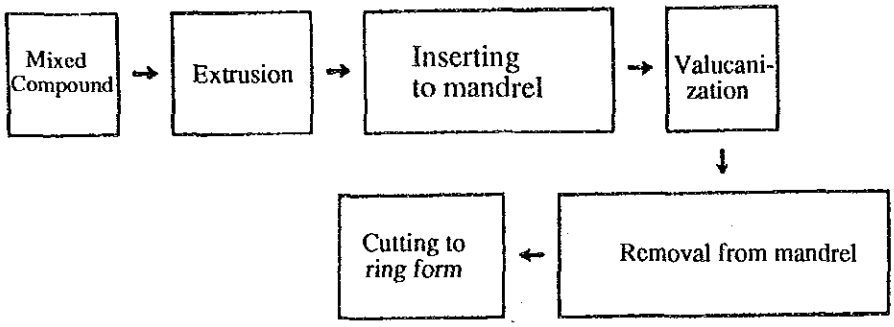
6) Rubber Bands

Rubber bands are used mainly for packaging. They are in the form of rings.

[1] Manufacturing Process

The manufacturing process for rubber bands is similar to that of bicycle tubes with similar forms of rings.

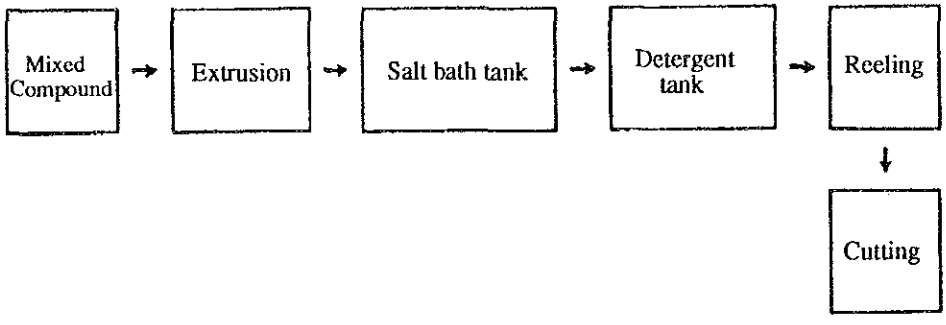
Fig. 3-5-9: Production Flow of Rubber Bands



The Indonesian method described above requires a larger number of workers because of the processes of insertion and removal from the mandrel. With this method, consecutive production cannot be expected.

In other countries, the LCM (Liquid Curing Medium) method is used to enable consecutive production.

Fig. 3-5-10: Production Flow of Rubber Bands (LCM)



[2] Technical Level

The three factories visited during the field survey were found to be unclean and in disorder.

Their final products were covered with dust, etc. All of them are in Category V and, needless to say, they have no product testing equipment. Moreover, they do not know how to utilize public research institutes for product testing.

[3] Marketing

They are all oriented toward the domestic market and have no intentions of exporting.

7) Dock Fenders

Dock fenders are used to protect ships and wharfs from damage during accidental collisions of ship hulls with quay walls at the time of mooring.

As a substitute, old used tires, hemp ropes, soft wood, etc., were once utilized. However, along with the increase in the number of larger-sized vessels used and the modernization of harbor facilities, it is increasingly required that authentic dock fenders manufactured using technical calculations and designs be used.

Dock fenders are made mainly of natural rubber and steel plates with natural rubber accounting for more than 90 percent of the materials.

During the field survey, three companies were said to be able of manufacturing V-type dock fenders, but they had no product stocks at their factories.

In Indonesia, dock fenders are manufactured mainly for domestic use as an import substitution product. To develop dock fenders which are export-oriented, very large-sized factories equipped with Banbury mixers and kneaders of large capacity or high powered boilers and large vulcanizers, etc., are required.

It is also necessary to develop international marketing capability to research the particular conditions of harbors where the dock fenders are to be installed.

In addition, in order to meet particular specifications, considerable investment in equipment such as large-sized compression testing machines would be necessary. Only one joint venture company (Category I) among the three dock fender makers is considered to have the potential to export its products. The company has the required large-sized equipment such as boilers and vulcanizers.

[1] Manufacturing Method

Manufacturing points:

(a) A thick layer of rubber is made through the process of adhesion between the metal and the rubber.

(b) A lengthy curing time is required because of the thick layer of rubber.

[2] Indonesian Industrial Standard

Table 3-5-26 shows Indonesian SII for dock fenders.

Table 3-5-26: SII for Dock Fenders (SII 2281-88)

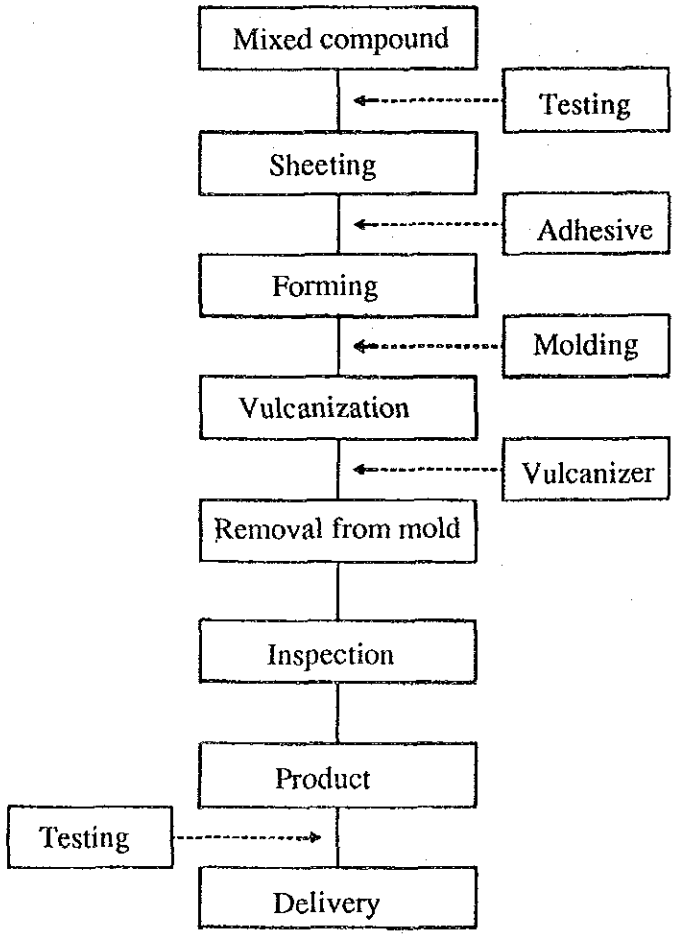
	Characteristics	Unit	Limit
1.	Tensile Strength	N / mm2	min.15
2.	Elongation	-	min.300
3.	Hardness	*Shore A	50-80
4.	Compression Set	-	min.30
5.	Tear Strength	N/mm	min.70
6.1	Decreasing rate of Tensile Strength		max.20
6.2	Decreasing Rate of Elongation	max.20	
6.3	Hardness Variation	*ShoreA	max.8

Note: *Shore A Hardness Meter
Test of energy absorption would be conducted in case of users requirement
Source: Pt. PerkebunanIII (Persero)

[3] Manufacturing process

Fig. 3-5-11 shows production flow of dock fenders.

Fig.3-5-11: Production Flow of Dock Fender



8) Other Various Industrial Rubber-based Products

These products are used for automobile parts, motorcycle parts and electrical and electronics product parts. Most rubber-based product parts are manufactured using mainly synthetic rubber and other materials such as metals and textiles. This is because of the severe quality requirements from users such as heat resistance, oil resistance, weatherproofness, etc.

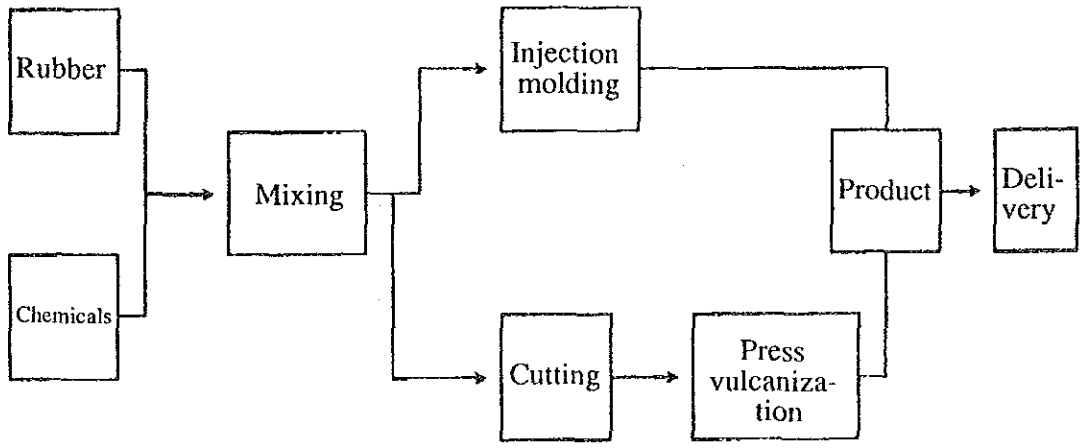
Therefore, these products are combined goods made with natural rubber, synthetic rubber, metals, textiles, etc.

The manufacturing process using a compression molding machine and an injection molding machine is similar to that for other rubber-based products. With these products, a higher level of technique and more sophisticated mechanical equipment are necessary for the required precision processing.

In addition, the extremely smooth surface of metal molds with chromium plating is required. Indonesian manufacturers currently lack knowledge of such highly technical processing. They should obtain it through technical introduction from abroad in order to develop their products into an export-oriented ones. Establishment of joint venture companies would be one way to obtain the necessary technology.

For the time being, they should try to improve their existing techniques to satisfy the requirements of domestic auto assemblers or electrical appliance makers. Through the supply of rubber-based product parts to makers of Indonesian export products such as automobiles or electric appliances, they could export indirectly. Through the efforts of the Indonesian manufacturers themselves, an accumulation of technological experience would be achieved and would enable them in the near future to directly export their own industrial rubber-based products.

Fig. 3-5-12: Production Flow of Industrial Rubber-based Products

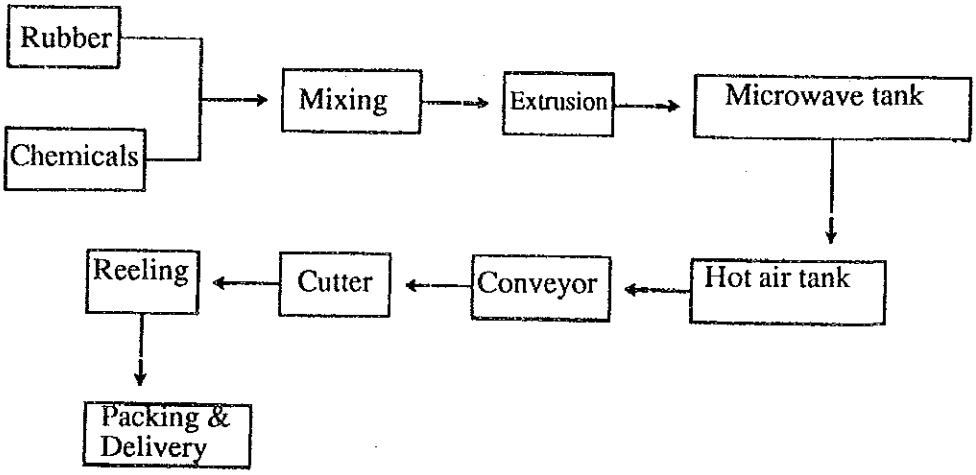


[1] Rubber-based products for automobile parts

In Indonesia, there is a demand for engine mounts, oil seals, O rings etc., for domestic automobile makers such as Astra Motors.

Of the companies visited during the field survey, only the manufacturers in Category I and several other manufacturers with technical levels similar to Category I companies were considered to be manufacturing products with continuous production machines while Category IV companies have not introduced such production machines.

Fig. 3-5-13: A Sample of Production Flow of Rubber-based Products for Automobile Parts with Continuous Production Machines in Japan



[2] Rubber-based products for motorcycles and scooter parts

In Indonesia, handle grips and packing, etc., as motorcycle and scooter parts for supply to motorcycle and scooter makers in Indonesia such as Honda, Yamaha, Suzuki and Vespa are produced. Only the rubber product makers in Categories I and II are considered to manufacture products of reliable quality.

[3] Rubber-based products for electrical appliance parts

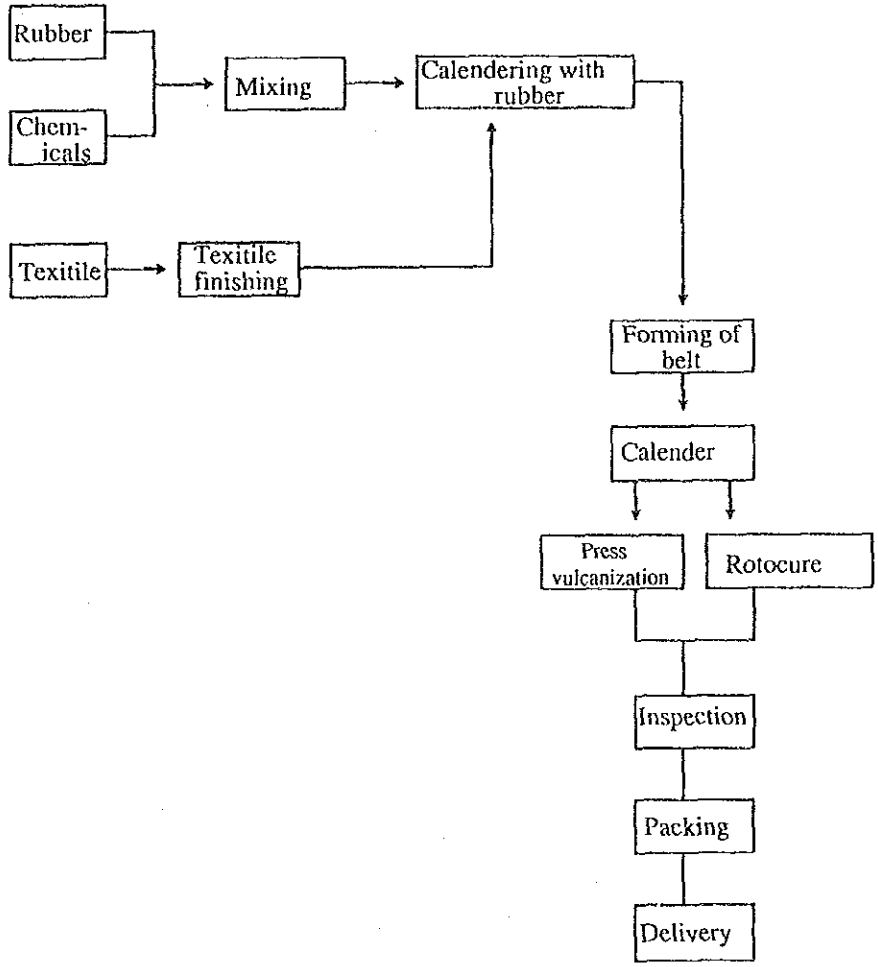
Rubber packing and rubber pads for refrigerators, etc., are produced for supply to electrical appliance makers such as National Gobel and thus are exported indirectly.

The manufacturers in Categories I and II are qualified to be designated as suppliers to the electrical appliance manufacturers.

[4] Canvas Layer Conveyor Belts and Steel Cord Conveyor Belts

It is said that conveyor belts are produced in Indonesia. However, during the survey, neither conveyor belt manufacturers nor products could be identified.

Fig. 3-5-14: Production Flow of Conveyor Belts (A Sample in Japan)



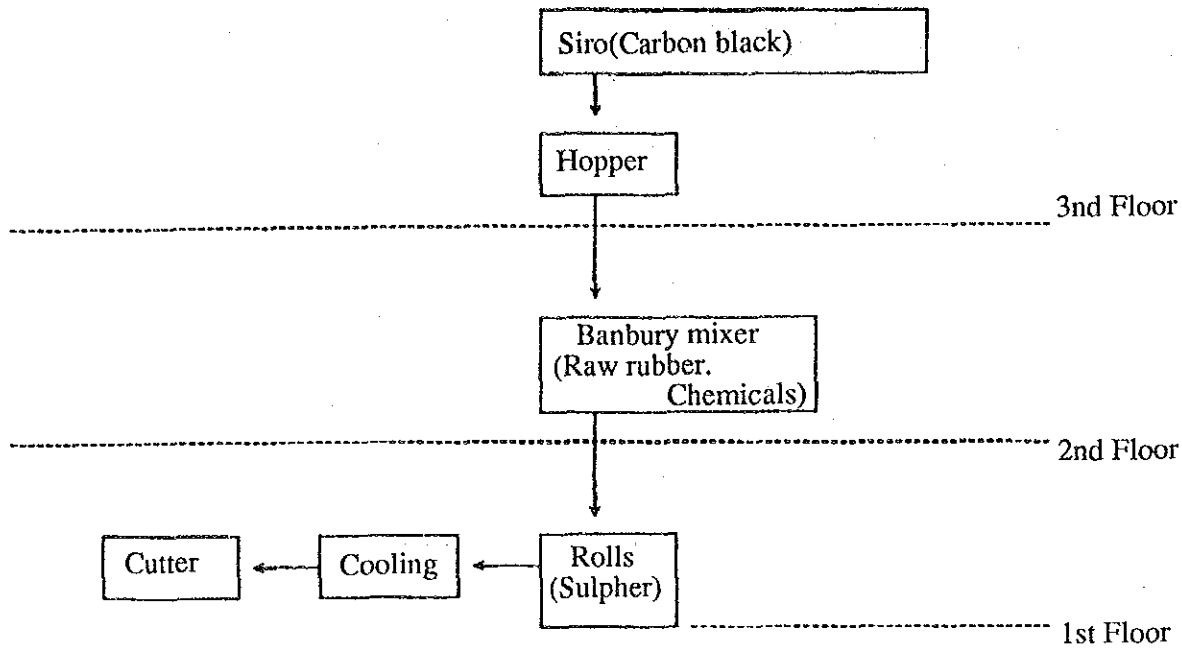
9) Compounds

During the survey, two manufacturers of Category III and IV were found to be producing compounds.

The problems for these manufacturers is the lack of mixing machines such as Banbury mixers and kneaders which are required to produce the optimum mixed materials i.e. compounds. In addition, they have no testing equipment for the finished product.

Fig.3-5-15 shows an example of plant layout at Japanese compound makers.

Fig. 3-5-15: Layout of Compound Factory (Japanese Case)



(4) Future Direction for Rubber-based Products in Indonesia.

For the future direction of the production of rubber-based products in Indonesia, it is recommended that producers specialize in the manufacturing of natural latex products and natural rubber-based products due to the advantages of local procurement of raw materials.

1) Latex Products

The volume of annual world consumption of natural latex is assumed to be about 280,000 tons. Latex products fall under five main product categories: dipped products, foam products, injected products, adhesive/bonding agents and carpet.

Table 3-5-27 shows the volume of latex consumed in the production of each latex product and includes the volume of rubber used in the latex products.

Table 3-5-27: Volume of Latex Consumed and the Volume of Rubber in Latex Products

Latex Product Type	Volume of Latex Consumed (%)	Volume of Rubber in Latex Products (%)
Dipped Products	38	85 - 98
Foam Products	21	65 - 90
Injected Products (Thread)	18	85 - 95
Adhesive/Bonding Agents	13	<50
Carpet	10	<30
	100	

Source: National Workshop on Latex Product 14-15 October 1983

Table 3-5-28 shows the latex products which are recommended for production in Indonesia.

Table 3-5-28: Latex Products Recommended for Production and Related General Remarks

Product	Remarks
Dipped products	
Surgical gloves	Only one company was found to be producing this product during the survey. It seems that the domestic demand is not yet being fully met.
Examination gloves	Many manufacturers have stopped production Establishment of marketing channels and introduction of GMP systems are urgently required.
Gloves for household use	Improved material mixing technology is required to avoid causing dermatitis. Domestic supply of sub materials such as cotton flock, etc., is desirable.
Catheters	Establishment of joint venture companies with foreign capital is required in view of technological difficulties.
Teething rings/pacifiers	Improved material mixing technology is required to avoid the problem of poisonous nitrosoamine.
Balloons	Toy balloons are not expensive but meteorological balloons have high added value. The latter requires high-technology from foreign companies.
Fingerstalls	Unit sales profit is too small.
Condoms	BKKBN's Bandung factory is producing the product. New factories require large capital investment.
Foam Products	
Rubber foam	The problem is the competition with urethane foam in overseas markets. As an import substitution product, rubber foam would be a recommended.
Injected Products	
Rubber Thread	A joint venture company should be established in view of the high level of technology required for production. Italian products are very competitive.
Adhesive/Bonding agents	
Adhesive agents	With adhesive agents for rubber footwear there would be a possibility for indirect exports if adhesive resin can be domestically supplied.
Bonding Agents	There would be the possibility of direct/indirect exports of bonding agents for rubber footwear because there is a factory where pre-vulcanized latex is produced. However, production of highly functional bonding agents for architectural use requires the introduction of foreign technology through joint ventures.

[1] Surgical Gloves

Among the manufacturers visited, only one company was found to be producing the product. It appears that domestic demand for surgical glove is still not completely satisfied. A world famous Australian maker of surgical gloves is said to have established production in Indonesia but that could not be confirmed in this survey. The required sterilization of surgical gloves is generally conducted using one of the following two

methods: (1) Sterilization with ethylene oxide gases (problem: residue gases), or (2) Sterilization with cobalt 60 radiation (problem: high cost).

In Indonesia there is a facility available for the latter method at the Atomic Research Institute in Bandung.

Introduction of a GMP system is recommended to realize the export of products in the future.

[2] Examination Gloves

Many manufacturers among those visited have suspended their operations. Introduction of a GMP system has not yet been undertaken. Taking the AIDS scare into consideration, the future prospects for exports of the product appear rather bright. The earliest possible establishment of marketing channels is desired.

[3] Gloves for Household Use

There are currently many types of gloves for household use in terms of materials such as natural latex, synthetic latex or polyethylene latex. The gloves can be divided into two types in terms of form - the supported type and the unsupported type. The latter is manufactured dipping molds into mixed latex liquid.

The supported type is manufactured by dipping the cotton gloves in the mixed latex liquid. Among the rubber gloves using natural latex, gloves for household use are most popular. Some types of gloves for household use are walled with cotton flock on the inside in order to make putting them on and taking them off easier and to make them more comfortable. Manufacturing of the product in Indonesia would be more assured if cotton flock became available domestically. Without the inside wall of cotton flock there would be a problem with dermatitis due to a certain chemical contained in the mixed latex materials. Some countermeasures should be considered in this case.

[4] Catheters

Another recommended latex product is the catheter. In Malaysia the product is manufactured on a large scale and exported to the U.S., Europe and Japan.

This latex product is recommended to Indonesian latex product manufacturers in view of the advantage of Indonesia being a latex producing country. The manufacturing method is by dipping processes requiring rather complicated production processes and strict sanitary controls. This product requires sterilization for which the utilization of the Atomic Research Institute in Bandung would be recommended. In order to export the product, it would be necessary to meet the requirements of overseas standards for medical goods. From the viewpoint of the manufacturing technology, it would be necessary to establish a joint venture with a foreign company.

[5] Teething Rings/Pacifiers

To meet the sanitary requirements for these products, the problem of poisonous nitrosoamine must be solved. The nitrosoamine is said to be one of the most carcinogenic substances. A countermeasure to the problem would be improving the mixing design of the materials and developing a special manufacturing process. In Australia, New Zealand and Europe there are movements toward the introduction of a legal regulation on the use of nitrosoamine. To examine the nitrosoamine, a very specialized and expensive measurement instrument is required and no Indonesian public institute has yet been equipped with one.

[6] Balloons

Toy balloons are rather easy to produce without high technology but the per unit profit is very low. If a good marketing channel had already been secured, this product would possibly be recommended for manufacture. Balloons for meteorological use, however, require a relatively higher level of technology which would necessitate the establishment of joint venture companies with foreign makers.

[7] Fingerstalls

The problem is that the per unit profit is very small.

[8] Condoms

At present BKKBN in Bandung is producing the product. The domestic market should be the sales target for the time being, although there is the possibility of exporting the products in the future.

New investment for a new factory would require a large amount of capital in order to compete with existing major foreign producers.

[9] Foam Rubber

In overseas markets, foam rubber has already been replaced by urethane foam. It is recommended that the product be produced in Indonesia only for the purpose of import substitution.

[10] Rubber Thread

A joint venture would be necessary to produce the product due to the high technology required in production.

[11] Adhesive Agents

Adhesive agents manufactured from latex mixed with a tackifier such as resin are used for rubber footwear.

The demand for adhesive agents made from latex would increase in line with the increase in production by rubber footwear manufacturers in Indonesia.

[12] Bonding Agents

Bonding agents manufactured from latex mixed with a vulcanizing agent are used for the manufacture of rubber footwear. The indirect export of bonding agents through the export of rubber footwear would be expected.

However, higher functional bonding agents used for architectural purposes or for plywood require high technology for production and this would necessitate joint ventures with overseas makers.

2) Industrial Rubber-based Products

The global annual consumption of new rubber on a volume basis is about 14,400 thousand tons comprising 4,800 thousand tons of natural rubber and 9,600 thousand tons of synthetic rubber. That is, the volume of synthetic rubber consumption is two times that

of natural rubber. The breakdown of global consumption of new rubber based on the three main products - tires/tubes for autos, non-tire/tube products and other industrial rubber products - is as follows:

Tires/tubes for autos	:	60%
Non-tire/tube products	:	20%
Other industrial rubber products	:	20%

The above figures are the estimated worldwide consumption of new rubber including consumption by Japan, the U.S., England, W. Germany, France, etc.

Industrial rubber-based products (excluding tires/tubes for autos) which consume relatively large amounts of natural rubber and which are recommended for manufacture in Indonesia are shown in Table 3-5-29.

Table 3-5-29: Industrial Rubber-based Products Recommended for Manufacture in Indonesia

PRODUCT	REMARKS
Dock Fenders	A large amount of investment for machinery and equipment is required. Research and study of the conditions of international harbors through close contacts with various harbor authorities overseas is necessary for marketing purposes. Among the industrial rubber-based products, dock fenders are considered to be the product consuming the most natural rubber.
Conveyor Belts	Manufacturing of this product is recommended for import substitution purposes, particularly the narrow width canvas conveyor belts used in Indonesia.
Belts for Power Transmission	Some joint venture companies are currently producing V belts in Indonesia. Including the V belts, other belts for power transmission would have potential for export in the near future.
Rubber Hoses	Large diameter rubber hoses are traditionally manufactured manually. Taking the relatively cheap labor costs in Indonesia into consideration, this product is recommended for manufacture. However, rubber hoses for use as automobile parts would be difficult to produce at present. The production of rubber hoses for auto parts would increase the use of synthetic rubber rather than natural rubber.
Other industrial rubber-based products for auto parts (O rings, packing, window seals, etc.)	As the local content regulations become more severe, there will be encouragement for the domestic production of these products. Accordingly, increasing amounts of synthetic rubber would be consumed.

[1] Dock Fenders

As an industrial rubber-based product which consumes a large volume of natural rubber, dock fenders would come first on the list of products recommended for manufacturing. The function or the types of the products to be manufactured given the current circumstances in Indonesia are already mentioned in other parts of this report.

Specifications would vary according to the characteristics of the harbors to which the dock fenders would have to be adapted. A large investment in machinery, including large sized boilers and vulcanizers, etc., and equipment to enable research and development of new types of products would also be required. Therefore, from the

technical and financial points of view, it is recommended that joint venture companies be established.

[2] Belts

There are basically two categories of belts: conveyor belts for transportation and belts for power transmission. Conveyor belts such as canvas conveyors or steel conveyors are used mainly for the transportation of iron ore, coal or cement.

This type of conveyor belt is wide, necessitating rather expensive manufacturing equipment. It is recommended that the narrow type be manufactured in Indonesia.

Belts for power transmission include V belts, flat rubber belts and timing belts, etc. V belts are used for automobiles, industrial and agricultural machines, etc. The V belt manufacturers now operating in Indonesia could also produce other types of belts for power transmission such as flat rubber belts and timing belts as exportable products. However, at present the V belt has the most potential as an export product.

[3] Rubber Hoses

Rubber hoses are used for the transmission of liquids, slurry or compressed gages and there are various kinds of rubber hoses according to the purposes or use.

Table 3-5-30 shows the kinds of rubber to be used for the various types of rubber hoses.

Table 3-5-30: Kinds of Rubber Used for Rubber Hoses

Kinds	Inner rubber	Outer rubber
Air hoses Water hoses Oxygen hoses Acetylene hoses	SBR or Natural Rubber	SBR or Natural Rubber
Air hoses for mining use	SBR or Natural Rubber	SBR or Natural Rubber
Gasoline hoses Fuel hoses	NBR	CR
Steam hoses	IIR	IIR

As seen in Table 3-5-30, SBR can be replaced by natural rubber. Meanwhile, with regard to rubber hoses for automobile parts, because of the severe quality requirements from automakers for the sake of safety (heat resistance, oil resistance and weather resistance), synthetic rubber is predominantly used in manufacturing.

In Indonesia, rubber hoses for automobile parts would be difficult to produce at the present time.

If rubber hoses for auto parts could be produced in Indonesia, it would mean increasing use of synthetic rubber.

Table 3-5-31: Kinds of Rubber Used in Rubber Hoses for Auto Parts

Product	Inner Rubber	Outer Rubber
Fuel hose	NBR	CR
Water cooling hose	SBR or EPDM	SBR or EPDM
Engine lubrication hose	NBR	CR
Power steering fluid hose	NBR	CR
Air brake hose	CR or NBR	CR
Hydraulic brake hose	SBR or Natural rubber	CR

Source: Rubber Chemistry and Technology, Vol. 49

[4] Other industrial rubber-based products for auto parts

Other industrial rubber-based products for auto parts such as O rings, packings, window seals, etc., will be increasingly produced in Indonesia in line with more severe regulations on local content. However, increased use of specific synthetic rubber would be required to cope with specific requirements in terms of functions such as heat resistance, oil resistance, weather resistance, etc.

3.6 Issues Concerning the Development of the Rubber-based Product Industry

(1) Improvement of Raw Materials

Natural rubber as a raw material for rubber products is produced from field latex obtained from rubber trees. The original rubber trees are the Hevea brasiliensis rubber which are still found in the Amazon region of South America. The quantity of field latex obtainable from trees depends on the kind of rubber tree. Rubber trees other than the original kind are called clones. In other countries which produce rubber as a raw material such as Malaysia, Thailand and Sri Lanka, improvement of the quality of the clones is considered a very important task.

1) Improvement of the Quality of Clones

In Indonesia, research and development aimed at producing good quality clones is encouraged at the various research institutes located in cities such as Sungei Putih and Palembang. The research and development is aimed at the improvement of productivity and resistance to disease, insects and strong winds. The results of the studies conducted at the research institutes are conveyed to the large national rubber plantations (PTP) in various parts of the country. Based on the advice given by the research institutes, each PTP is undertaking experimental field testing of the latex productivity of new clones.
These research institutes recommend to PTPs and small holders the following clones as shown in Table 3-6-1

Table 3-6-1: Clones Recommended by Research Institutes

	Clones
For both big plantations and small holders	AVROSS2037. BPM1. BPM24.GT-1. PR225. PR261
For big plantations	LCB1320. PR228
For small holders	PR303. PRIM600. PRIM712

Table 3-6-2 shows the new rapid growth clones in Malaysia

Table 3-6-2: New Rapid Growth Clones in Malaysia

Clone	Yield (kg./ha) 1st yr	2nd yr	3rd yr	4th yr	5th yr	Total (5 years)	Total %
GTI	700	1180	1410	1640	1570	6500	100
PRIM600	720	1210	1600	1860	2310	7700	118.5
PB280	1090	1500	1890	2180	2240	8900	136.9
PRIM900	1040	1910	2280	2220	2230	9750	150.0

Notes: For experimental purposes, GTI and PRIM600 are widely planted
Source: Rubber developments vol.37 No.3 1984

2) Plantation Management

In Indonesia, there are far more small, private plantations called small holders than there are large plantations such as the PTPs. These small holders have traditionally lagged behind the large plantations in terms of managerial capabilities and the quality of field latex.

The quality of field latex is closely related to the quality of processed rubber materials such as sheet rubber (RSS) or Standard Indonesia Rubber (SIR). Therefore, the quality of finished rubber products will depend on the quality of the field latex used.

In the statistics for production or exports of natural rubber, the production sources generally fall into two categories - large plantations such as PTPs and small plantations, the so-called small holders.

It is said that the average small holder has less than 2.5 ha. In terms of production volume, PTPs produce 1.40 tons/ha while the small holders produce 0.5 tons/ha (an example in North Sumatra).

This means that the small holders have lagged far behind the large plantations in plantation management. In addition, the small holders occupy about 80 percent of the total rubber plantation area of 3 million ha.

3) Guidance for Small Holders

At present, guidance for small holders is an important factor in improving the quality of field latex. As a result, the Ministry of Agriculture is giving attention to this matter with the aid of World Bank loans. Their efforts are gradually bearing fruit. The guidance covers methods of transplanting clones, weeding, fertilizing and tapping. The Ministry also provides financing for the purchase of sheet roller machines for sheet angins. These activities are outstanding, particularly in the Pontianak area and it is hoped that they will quickly spread to other areas of Indonesia. As a result of these activities, it is quite likely that the quality of Standard Indonesian Rubber (SIR) will improve further.

4) Quality Assurance of Sheet Rubber

RSS or crepe, the so-called sheet rubber, is produced in the relatively well-equipped factories of manufacturers such as PTPs. Sheet rubber is processed from field latex through filtering and coagulation processes. In Indonesia, sheet rubber (RSS or Crepe) has been processed using only field latex produced by big plantations such as PTPs. Therefore, it has been said that Indonesian sheet rubber is of relatively good quality compared to other processed SIR.

However, there have been problems recently with Indonesian RSS such as contamination from dust and ashes from the smoking process. These have resulted in claims from foreign buyers. It is hoped that efforts will be made in the area of quality control and that the quality of RSS can be guaranteed. If problems are to be avoided in the smoking process, the removal of dust and ashes from the surface of the sheet rubber and the installation of an inspection desk are considered necessary.

Table 3-6-3 shows the type and grade of sheet rubber stipulated in the Green Book.

Table 3-6-3: Type and Grade of Sheet Rubber (Green Book)

Item	Kind	Grade
1		RSS 1x, 1,2,3,4,5 (6)
2.	White Crepe & Pale Crepe	thin White Crepe=1x, 1(2) Thin: 1X, 1,2,3 Thick White Crepe (4) Thick White Crepe (4)
3	Estate Brown Crepe	Estate Brown Crepe 3X Thick Brown Crepe:
4	Comp Crepe	1,2,3
5	Thin Brown Crepe (v.i.w)	1,2,3,4
6	Thick Blanket Crepe (Amber)	2,3,4
7	Flat Bark Crepe	Standard & Hard
8	Smoked Blanket Crepe	No Grade

Source: Green Book 1969

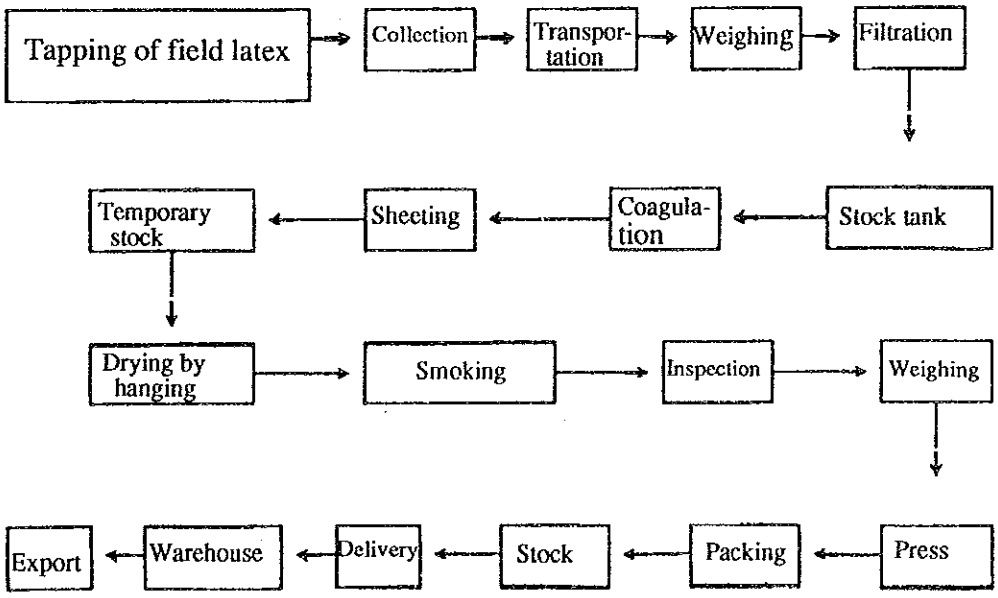
Table 3-6-4 shows the type and grade of sheet rubber produced in Indonesia.

Table 3-6-4: Type and Grade of Sheet Rubber (Indonesia)

	Kind	Grade
1	RSS	1,2,3,4
2	Pale Crepe	1,2,3
3	Brown Crepe	Blanket C, Remilled 2, Remilled 3 Brown 1x, 2x, 3x
4	Cutting	A, B
5	Air Dried Sheet	

Source: Control Bureau of Statistics of Indonesia

Fig. 3-6-1: Production Flow of RSS



5) Quality Assurance of SIR

SIR is produced from cup-lumps and sheet-angin using milling and drying processes and is generally called Technically Classified Rubber (TCR).

SIR is manufactured in fairly well-equipped crumb rubber factories such as those of PTT and other private rubber processors. But the main material for SIR, cup-lumps, comes from small holders. This is one of the reasons that Indonesian TCR, i.e., SIR,, has been considered inferior to Malaysian SMR and TTR from Thailand, particularly in terms of consistent quality. However, with the guidance being provided to small holders and the efforts being made by Indonesian crumb rubber manufacturers to improve processing, the quality level has steadily risen year by year to the point where this year it was possible to revise the quality standards and eliminate the grade SIR 50.

As an example of the improvements in the manufacturing process, some private crumb rubber factories are changing the mixing ratio of sheet-angin and cup-lumps to attain certain physical characteristics specified by buyers.

Table 3-6-5 shows new Indonesian standards of SIR as of January 1989.

Table 3-6-5: New Indonesian Standards of SIR (Jan. 1989)

Grade Item	SIR 3CV Latex	SIR 3L Latex	SIR 3WF Latex	SIR 5 Sheet	SIR 10 Field Grade	SIR 20 Field Grade	Test Method
Dirt	0.03	0.03	0.03	0.05	0.10	0.20	ISO 249
Ash	0.50	0.50	0.50	0.50	0.75	1.00	ISO 247
Volatile Matter	0.80	0.80	0.80	0.80	0.80	0.80	ISO 244
Nitrogen Content	0.60	0.60	0.60	0.60	0.60	0.60	ISO 1656
Wallace Plasticity Number		30	30	30	30	30	ISO 2007
Residue rate of Plasticity	60	75	75	70	60	50	ISO 2930
Color Limit	–	6.00	–	–	–	–	ISO 4660
Mooney Viscosity	A*	–	–	–	–	–	ISO 289
Stability of Viscosity	8	–	–	–	–	–	PRIM
Vulcanization	C*	C*	C*	–	–	–	ISO 667
Color Sign	Green	Green	Green	Green, Brown and Horizontal Bar	Brown	Red	
Color of Plastic Wrapper	Transparent	Transparent	Transparent	Transparent	Transparent	Transparent	
Color of Plastic Tape	Orange	Transparent	Milky White	Milky White	Milky White	Milky White	

Note) A* Auxiliary Code: Mooney viscosity 46-55 at CV50
Mooney viscosity 56-65 at CV60
Mooney viscosity 66-75 at CV70
B* Progress test in stock
C* As per user's request

Fig. 3-6-2: Production Flow of SIR5

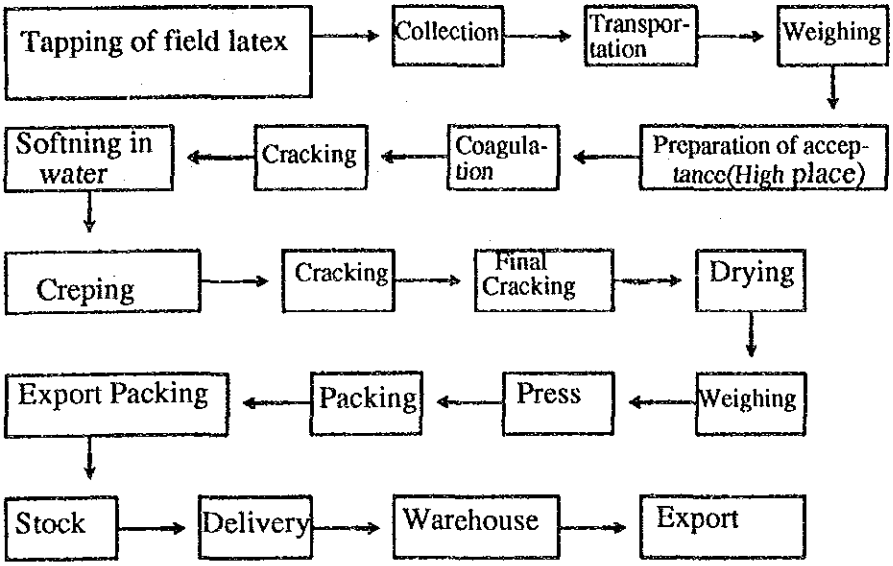
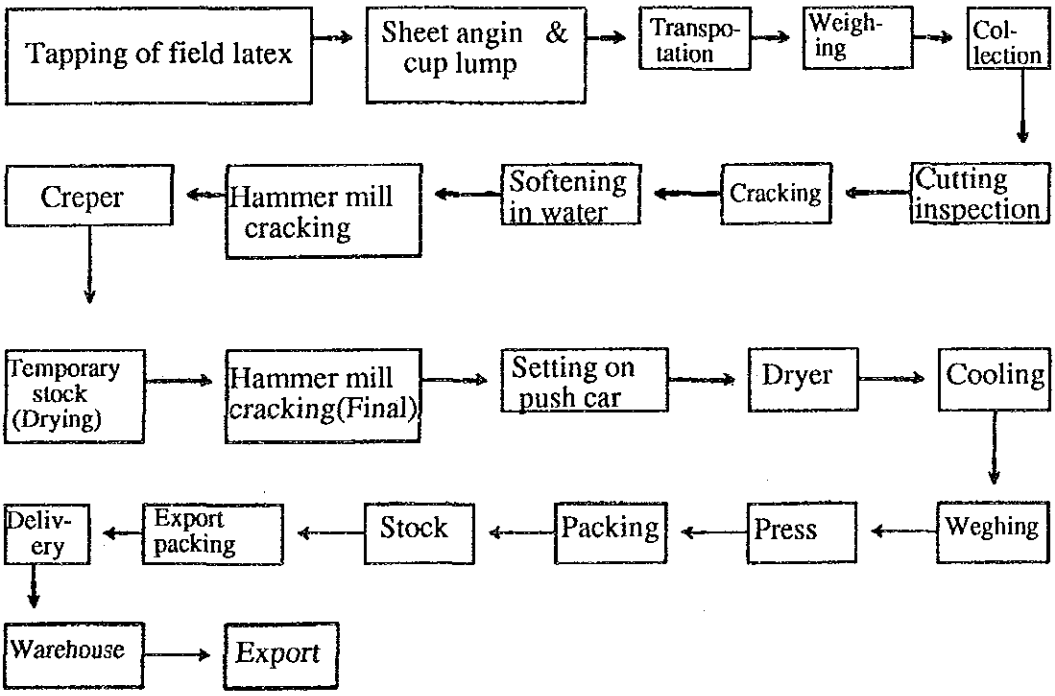


Fig. 3-6-3: Production Flow of SIR10, 20



6) Quality Assurance of Concentrated Latex

Concentrated latex is the raw material used in latex products such as condoms, gloves, balloons, mattresses, adhesives and so on. It is produced by condensing field latex which usually contains approximately 30 percent latex. There are three methods of concentrating field latex to a density of 60 percent: the centrifugal method, the evaporation method and the creaming method. The most common method is the centrifugal method which is used by approximately 90 percent of concentrated latex makers.

Indonesian concentrated latex is not well-known in the world when compared to the Malaysian product. One reason for this is a lack of public relations activities. Another is the lack of established systems to deal with the severe requirements of foreign buyers in terms of guaranteed quality, compensatory replacement, etc. Another reason could be the inconsistent quality of Indonesian concentrated latex.

To resolve the problems of consistent quality, the following measures might be considered.

1) Selection of clones related to the quality of field latex
2) Adjustment for the seasonal variations in the quality of field latex
3) Improvement of tapping methods
4) Reorganization of refineries
5) Increased attention to sanitation measures at plants
6) Optimum selection of chemical agents to be used
7) Application of anti-rust measures to tanks
8) Increased installation of centrifugal equipment

Table 3-6-6 shows the surveyor's impression during visits to Indonesian concentrated latex refineries.

Table 3-6-6: Surveyor's Impression of Refineries

	Equipment	Layout	Cleaners
A	O	•	O
B	Δ	Δ	•
C	•	•	•
D	•	•	•

O Very Good
• Good
Δ To be Improved

The newest refineries in Indonesia produce the product according to the U.S. ASTM grade. An Indonesian industrial standard (SII) for latex is also under consideration. The SII for latex should be realized as soon as possible to improve the reputation of Indonesian concentrated latex in the world market.

According to an Indonesian commercial newsletter (ICN No. 29-12th June 1989), Indonesian latex is said to be inferior in quality and higher in price compared to that of other

latex producing countries. It is reported in the Indonesian Commercial Newsletter as follows:

Country	Unit Price (US$)
Indonesian latex (PTPs ex godown)	1,200
Malaysian latex (C&F Kuala Lumpur)	1,050
Thai latex (C&F Bangkok)	950

It is desirable that the production efficiency at Indonesian refineries be improved. Table 3-6-7 shows the U.S. standard for latex (ASTM)

Table 3-6-7: The U.S. Standard ASTM for Latex

Type I Centrifuged Latex with ammonium and formaldehyde as preservatives
Type II Creamed latex with ammonium and formaldehyde as preservatives
Type III Centrifuged latex with low ammonium and other chemicals as preservatives

	Type I	Type II	Type III
Total solids	61.5	66.0	61.5
Dry rubber content (Min.)	60.0	64.0	60.0
Difference between Total solids and Dry content (Max.)	2.0	2.0	2.0
Total Alkali content	0.60min	0.55min	0.29max
Sludge content (Max.)	0.10	0.10	0.10
Coagulant content (Max.)	0.050	0.050	0.050
KOH number (Max.)	0.80	0.80	0.80
Mechanical Stability (sec. Min.)	650 sec	650 sec	650 sec
Copper content (Max. % , within Total solids)	0.0008	0.0008	0.0008
Manganese content (Max. %, within Total solids)	0.0008	0.0008	0.0008
Color	Milky White and not Blue or Gray		
Odor	After neutralized with boric acid, no putrid smell		

Table 3-6-8 shows the standards for latex required in Japan for medical use.

Table 3-6-8: Standards for Latex Required by Japanese Users

	Latex Product for Medical Use	For Condom
Total solids	61.4 - 61.93 wt%	min 61.5
Dry rubber content	60.04 - 60.20 wt%	min 59.5 wt%
Total Alkali content	0.54 - 0.75 wt%	-
pH	9.65 - 9.85	-
KOH number	0.52 - 0.80	0.8
Mechanical stability	1000 - 1500 sec	min 1800 sec
VFA number	max 0.02	max 0.02
Coagulant content	max 0.05%	-
Viscosity	100 - 130 cp	max 120 cp
Specific gravity	max 0.95	-
Color	Milk-white	Milk-white
Divergence between total solids and dry rubber contents		max 20. wt%

The mechanical stability stipulated in Table 3-6-8 is different from that of ASTM shown in Table 3-6-7. In addition, volatile fatty acid (VFA) is stipulated in Table 3-6-8 while ASTM has no stipulation for VFA.

A large VFA number indicates the propagation of bacteria at the tapping stage or at the refinery process.

It is essential to consider the requirements of Japanese users when the latex is to be exported to the Japanese market.

7) Development of New Form Rubber and New Functional Rubber

Natural rubber (RSS, crepe, SIR, etc.) is called solid rubber in block form. It is processed into mixed rubber with technical knowledge obtained through accumulated experience. The mixed rubber is transformed into the shape of the final product through a rather complicated molding process which occurs before the final vulcanization process.

During the mixing stage, a large high-powered machine such as a Banbury mixer and kneader is required. To economize in terms of the investment in equipment, manufacturers have been experimenting for many years with another method using relatively small mixing machines. To adapt to the smaller machines, powdered rubber, which can also be processed using the regular machines, was invented.

Powdered rubber has an advantage over solid rubber in that it is easy to realize automated processing. However, at the present time, powdered rubber is not widely used because of its relatively higher price in comparison with solid rubber and the disadvantages in terms of transportation costs and stocking due to the larger volume per unit weight.

In Indonesia, the Foundation for Research and Development (INIRO), BBP Bogor, is said to be interested in the pulverization of rubber. Research in the area of pulverization is recommended in light of the rising energy and labor costs forecast for the future. Powdered rubber might also be reconsidered in the near future.

It is recommended that the development of new functional rubber be adopted as another important theme in rubber raw material research in Indonesia. In Malaysia, new functional rubbers such as moplastic natural rubber and epoxide natural rubber are being developed. It is expected that through the creation of support systems as outlined in 3.6-6, Indonesian public research institutes will also be able to tackle such new challenges.

Fig.3-6-4: Production Flow of Rubber Products in General

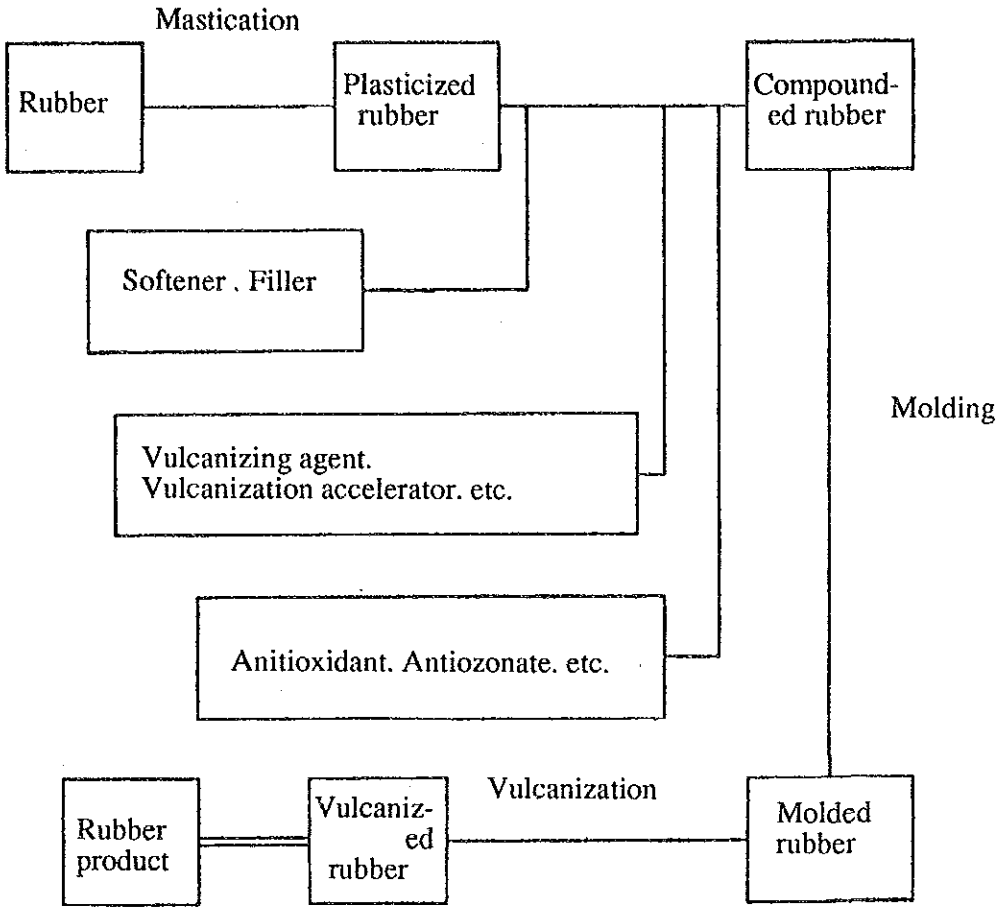
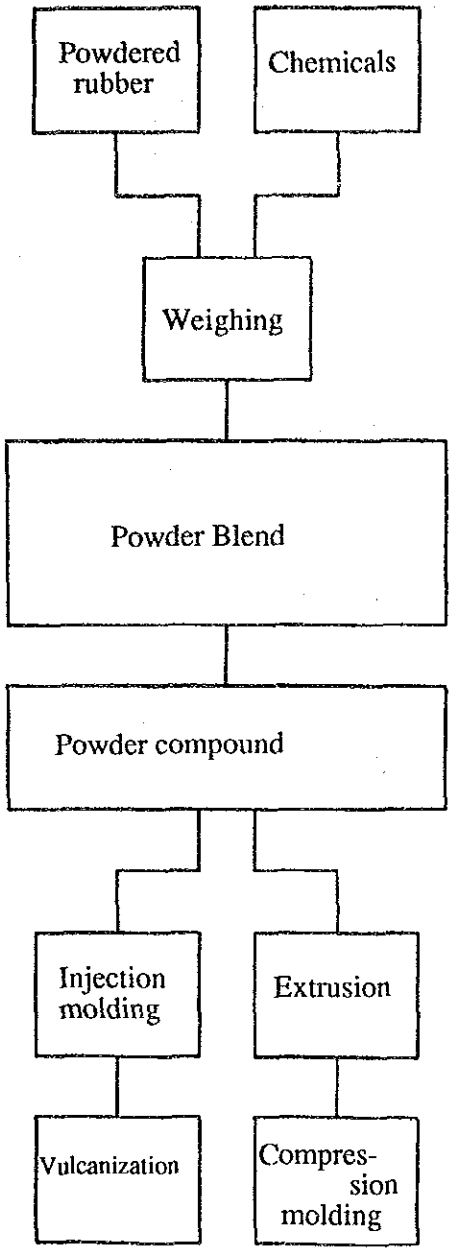


Fig.3-6-5: Production Flow of Rubber Products Using Powdered Rubber



(2) Production and Supply of Essential Chemical Agents and Sub-materials

For the production of rubber products, the selection of raw material rubber according to use and the cost of the product is the first stage. The next stage is to add the necessary chemical agents and sub materials to improve the functional quality of the product. These include vulcanization agents, anti-oxidants, reinforcing agents, filler, etc. In order to facilitate processing, accelerators, process oil, plasticizers, tackifiers, retarders and release agents, reclaimed rubber, etc., are used.

1) Improvement of Quality and Supply Capacity of Existing Sub Materials

Essential sub materials such as sulphur, stearic acid, clay, calcium carbonate and process oil are currently produced domestically, but they are said to require improvement in terms of quality. In addition, the procurement route of these materials appears to be rather complicated and not clearly defined. Therefore, most rubber product manufacturers use imported sub materials obtained through domestic importing agents.

It is possible that because of the relatively poor image of Indonesian products, producers use imported sub materials because they fear they will be forced to reduce sales prices if they use domestic sub materials. At any rate, improvement in quality and an increase in the supply capacity of domestic sub materials are essential steps to be achieved as soon as possible in the interest of improving overall quality and increasing the international competitiveness of finished rubber products. As a concrete example, government guidance states that domestic process oil should be purchased through designated sales agents of the national oil refinery Pertamina. However, most domestic process oil is said to be aromatic and to contain too much sulphur. The most appropriate process oil for use in synthetic rubber such as EPDM, which is increasingly used for rubber automobile parts, is made of paraffin and has a low sulphur content. During the field survey, some manufacturers expressed dissatisfaction with the government's guidance.

Table 3-6-9 shows the status of the supply of essential chemical agents to be used for latex products as a result of the field interview.

Table 3-6-9: The Status of the Supply of Essential Chemical Agents (Latex Products)

Item	Domestic Procurement	Imported from:
Vulcanizing agent, sulphur	Yes	W.Germany, Holland, England
Vulcanizing accelerator	No	W.Germany, Holland, England
Zinc oxide	No	Thailand
Stearic acid	No	New Zealand
Oleic acid	No	China
Causic potash	-	Italy, France, Holland
Ammonium	Yes	Taiwan
Antioxidant	No	W.Germany, U.S., Japan
Surfactant	No	Taiwan
Nitric calcium	*No*	*Taiwan Norway*

Source: Field Interview and Survey Questionnaires

Table 3-6-10 shows the status of the supply of essential chemical agents and materials to be used for industrial rubber-based products.

Table 3-6-10: The Status of the Supply of Essential Chemical Agents and Sub Materials (Industrial Rubber-based Products)

Item		Domestic Procurement	Imported from:
Vulcanizing agent	Sulphur	Yes	Malaysia, Taiwan, Korea
Vulcanization accelerator		No	W.Germany, England, U.S., Korea
Activator	Zinc Oxide	Yes	
	Transparent Zinc	No	Japan
	Titanium Dioxide	No	
	Stearic Acid	Yes	Malaysia
	Magnesium Oxide	No	Japan
Antioxidant		No	W.Germany, England, Korea, Japan
Plasticizer		Yes	Australia
Process oil	Botanic oil	Yes	Singapore, Korea, Japan, U.S.
Reinforcing agent	Carbon Black	Planning	Malaysia, Australia, Taiwan, China Japan
	White Carbon	No	Taiwan
	Calcium Carbonate	Yes	Thailand, Taiwan, Japan
	Clay	Yes	
Sponging agent		No	Korea
Coloring agent		Yes	Taiwan
Gasoline		Yes	
Textile	Canvas	Yes	
Steel		Yes	

Source: Field Survey & Survey Questionnaires

2) Amelioration of the Import Tax System

Indonesia's rubber-based product manufacturers are largely dependent on imports for procurement of essential chemical agents and sub-materials. Import costs comprise purchase price, transportation fee, insurance, import duties and other taxes and customs clearance costs, etc. There are different import tax systems depending on the country of origin of the imports.

In Indonesia, a 10 percent VAT is uniformly levied on all chemical agents and sub materials while almost all chemicals and sub materials are exempt from sales tax in Malaysia. The difference has a significant effect on the procurement costs for chemicals and sub materials in Indonesia. The amelioration of the import tax system such as reduction of customs duties or exemption from the VAT, etc., would be desirable.

3) Establishment of Domestic Plants for Chemicals and Sub Materials

Most of chemicals and sub materials used in rubber-based products are imported and West Germany, the U.K., the U.S., Japan, the Republic of Korea and Taiwan are the main sources. Imports of sub materials are expected to increase in line with the future prospects for examination glove production and the increasing number of rubber footwear manufacturing projects in Indonesia. Therefore, it is desirable that domestic production of