



Work in progress
for public discussion

WORLD BANK DISCUSSION PAPER NO. 370

WDP370
August 1997

Sri Lanka's Rubber Industry

Succeeding in the Global Market

*Rickan Ali
Yusuf A. Choudhry
Douglas W. Lister*

Recent World Bank Discussion Papers

- No. 300 *Africa Can Compete! Export Opportunities and Challenges for Garments and Home Products in the European Market.* Tyler Biggs, Margaret Miller, Caroline Otto, and Gerald Tyler
- No. 301 *Review and Outlook for the World Oil Market.* Shane S. Streifel
- No. 302 *The Broad Sector Approach to Investment Lending: Sector Investment Programs.* Peter Harrold and Associates
- No. 303 *Institutional Adjustment and Adjusting to Institutions.* Robert Klitgaard
- No. 304 *Putting Institutional Economics to Work: From Participation to Governance.* Robert Picciotto
- No. 305 *Pakistan's Public Agricultural Enterprises: Inefficiencies, Market Distortions, and Proposals for Reform.* Rashid Faruqee, Ridwan Ali, and Yusuf Choudhry
- No. 306 *Grameen Bank: Performance and Stability.* Shahidur R. Khandker, Baqui Khalily, and Zahed Khan
- No. 307 *The Uruguay Round and the Developing Economies.* Edited by Will Martin and L. Alan Winters
- No. 308 *Bank Governance Contracts: Establishing Goals and Accountability in Bank Restructuring.* Richard P. Roulier
- No. 309 *Public and Private Secondary Education in Developing Countries: A Comparative Study.* Emmanuel Jimenez and Marlaine E. Lockheed with contributions by Donald Cox, Eduardo Luna, Vicente Paqueo, M. L. de Vera, and Nongnuch Wattanawaha
- No. 310 *Practical Lessons for Africa from East Asia in Industrial and Trade Policies.* Peter Harrold, Malathi Jayawickrama, and Deepak Bhattasali
- No. 311 *The Impact of the Uruguay Round on Africa.* Peter Harrold
- No. 312 *Procurement and Disbursement Manual for Projects with Community Participation.* Gita Gopal
- No. 313 *Harnessing Information for Development: A Proposal for a World Bank Group Strategy.* Eduardo Talero and Philip Gaudette
- No. 314 *Colombia's Pension Reform: Fiscal and Macroeconomic Effects.* Klaus Schmidt-Hebbel
- No. 315 *Land Quality Indicators.* Christian Pieri, Julian Dumanski, Ann Hamblin, and Anthony Young
- No. 316 *Sustainability of a Government Targeted Credit Program: Evidence from Bangladesh.* Shahidur R. Khandker, Zahed Khan, and Baqui Khalily
- No. 317 *Selected Social Safety Net Programs in the Philippines: Targeting, Cost-Effectiveness, and Options for Reform.* Kalanidhi Subbarao, Akhter U. Ahmed, and Tesfaye Teklu
- No. 318 *Private Sector Development During Transition: The Visegrad Countries.* Michael S. Borish and Michel Noël
- No. 319 *Education Achievements and School Efficiency in Rural Bangladesh.* Shahidur R. Khandker
- No. 320 *Household and Intrahousehold Impacts of the Grameen Bank and Similar Targeted Credit Programs in Bangladesh.* Mark M. Pitt and Shahidur R. Khandker
- No. 321 *Clearance and Settlement Systems for Securities: Critical Design Choices in Emerging Market Economies.* Jeff Stehm
- No. 322 *Selecting Development Projects for the World Bank.* Jean Baneth
- No. 323 *Evaluating Public Spending: A Framework for Public Expenditure Reviews.* Sanjay Pradhan
- No. 324 *The Bangladesh Rural Advancement Committee's Credit Programs: Performance and Sustainability.* Shahidur R. Khandker and Baqui Khalily
- No. 325 *Institutional and Entrepreneurial Leadership in the Brazilian Science and Technology Sector: Setting a New Agenda.* Edited by Lauritz Holm-Nielsen, Michael Crawford, and Alcyone Saliba
- No. 326 *The East Asian Miracle and Information Technology: Strategic Management of Technological Learning.* Nagy Hanna, Sandor Boyson, and Shakuntala Gunaratne
- No. 327 *Agricultural Reform in Russia: A View from the Farm Level.* Karen Brooks, Elmira Krylatykh, Zvi Lerman, Aleksandr Petrikov, and Vasilii Uzun
- No. 328 *Insuring Sovereign Debt Against Default.* David F. Babel
- No. 329 *Managing Transboundary Stocks of Small Pelagic Fish: Problems and Options.* Max Agüero and Exequiel Gonzalez
- No. 330 *China: Issues and Options in Greenhouse Gas Emissions Control.* Edited by Todd M. Johnson, Junfeng Li, Zhongxiao Jiang, and Robert P. Taylor
- No. 331 *Case Studies in War-to-Peace Transition: The Demobilization and Reintegration of Ex-Combatants in Ethiopia, Namibia, and Uganda.* Nat J. Colletta, Markus Kostner, Ingo Wiederhofer, with the assistance of Emilio Mondo, Taimi Sitari, and Tadesse A. Woldu
- No. 333 *Participation in Practice: The Experience of the World Bank and Other Stakeholders.* Edited by Jennifer Rietbergen-McCracken
- No. 334 *Managing Price Risk in the Pakistan Wheat Market.* Rashid Faruqee and Jonathan R. Coleman
- No. 335 *Policy Options for Reform of Chinese State-Owned Enterprises.* Edited by Harry G. Broadman

(Continued on the inside back cover)

Sri Lanka's Rubber Industry

Succeeding in the Global Market

Ridwan Ali
Yusuf A. Choudhry
Douglas W. Lister

The World Bank
Washington, D.C.

Copyright © 1997
The International Bank for Reconstruction
and Development / THE WORLD BANK
1818 H Street, N.W.
Washington, D.C. 20433, U.S.A.

All rights reserved
Manufactured in the United States of America
First printing August 1997

Discussion Papers present results of country analysis or research that are circulated to encourage discussion and comment within the development community. To present these results with the least possible delay, the typescript of this paper has not been prepared in accordance with the procedures appropriate to formal printed texts, and the World Bank accepts no responsibility for errors. Some sources cited in this paper may be informal documents that are not readily available.

The findings, interpretations, and conclusions expressed in this paper are entirely those of the author(s) and should not be attributed in any manner to the World Bank, to its affiliated organizations, or to members of its Board of Executive Directors or the countries they represent. The World Bank does not guarantee the accuracy of the data included in this publication and accepts no responsibility whatsoever for any consequence of their use. The boundaries, colors, denominations, and other information shown on any map in this volume do not imply on the part of the World Bank Group any judgment on the legal status of any territory or the endorsement or acceptance of such boundaries.

The material in this publication is copyrighted. Requests for permission to reproduce portions of it should be sent to the Office of the Publisher at the address shown in the copyright notice above. The World Bank encourages dissemination of its work and will normally give permission promptly and, when the reproduction is for noncommercial purposes, without asking a fee. Permission to copy portions for classroom use is granted through the Copyright Clearance Center, Inc., Suite 910, 222 Rosewood Drive, Danvers, Massachusetts 01923, U.S.A.

ISSN: 0259-210X

Ridwan Ali is division chief of the Agriculture and Natural Resources Operations Division of the World Bank's South Asia Country Department I. Yusuf A. Choudhry is a professor at the School of Management of the University of Baltimore. Douglas W. Lister is senior agricultural economist in the Agriculture and Natural Resources Operations Division of the World Bank's South Asia Country Department I.

Library of Congress Cataloging-in-Publication Data

Ali, Ridwan.

Sri Lanka's rubber industry : succeeding in the global market /

Ridwan Ali, Yusuf A. Choudhry, Douglas W. Lister.

p. cm. — (World Bank discussion paper ; no. 370)

Includes bibliographical references.

ISBN 0-8213-4004-2

1. Rubber industry and trade—Sri Lanka. I. Choudhry, Yusuf, 1943– . II. Lister, Douglas W., 1946– . III. Title.

IV. Series: World Bank discussion papers ; 370..

HD9161.S752A37 1997

338.1'738952'095493—dc21

97-26339

CIP

Foreword

It is now widely believed that the rubber industry of Sri Lanka, after the deregulation and privatization of public estate plantations, is now in a position to reassert its position in the global market. It may take considerable efforts, however, on the part of the new companies, who have just taken over the management of the plantations, to restructure the industry so that it assumes a sustainable growth path and finds a comfortable niche for holding its position against the giant rubber producers of Asia. It is necessary for these companies to take a strategic long-term look at the market for rubber in terms of future patterns of consumption and import demands and to find their special niche. This study is a follow up to the report "Sri Lanka Tree Crops Strategy" (Agriculture Operations Division, Country Department III, South Asia Region, July 5, 1994). It identifies some of the major strengths and weaknesses of Sri Lanka's rubber with respect to other major exporters in the world and examines the strategic options for the Government of Sri Lanka and the private rubber companies. It is hoped that this study will assist policy planners to create the necessary environment for enhancing the competitiveness of the industry and the private sector to capitalize on the opportunities that are now presented to them.



Fakhruddin Ahmed
Acting Director
Country Department I
South Asia Region

Acknowledgments

The authors are indebted to the Government of Sri Lanka and the Governments of Thailand and Indonesia for making this research possible and for providing contacts with different agencies responsible for the development of rubber in these countries. They also wish to thank the management of the plantation management companies in Sri Lanka for assisting with the field surveys. The authors also acknowledge the valuable assistance provided by the Commodity Policy and Analysis Unit of the World Bank. The views and conclusions in the paper should be ascribed to the authors and not to those who provided assistance. The findings, interpretation, and conclusions are entirely those of the authors. They do not necessarily represent the views of the World Bank, its Executive Directors, or the countries they represent.

Abstract

The global rubber industry is in a growth phase where competition is intense and the market is lining up with producers who guarantee quality and consistency. The heaviest demand is coming from the vehicular tire industry. Rapid urbanization in developing countries is fueling the demand for automobiles and consequently for rubber tires. It is a critical period for the industry where fundamental changes are taking place in the way rubber is produced and marketed for competitive survival. The natural rubber industry is also competing with the synthetic rubber industry mainly on the cost factor. In the long run, it is the cost differential which will sustain one or the other since the differences in physical and technical properties are gradually being narrowed. The eventual transition to maturity should provoke firms and industries in different countries to concentrate on their core markets and defend their position vigorously. The Sri Lankan industry has to prepare for this eventuality. It has recently been taken out of state management and the private companies who now are in control should make important strategic moves to enhance its competitive ability in the global market. This may require heavy investment in modern facilities and equipment. More importantly, the industry needs to understand the future trend of consumer demand in key markets and provide the products and services desired. The industry has to move away from mass marketing strategies to more focused strategies of differentiation and positioning. Winning the game would require new thinking, new orientation and intelligent moves because the competitors are large and powerful. Sustaining competitive advantage does not only depend upon exploiting the national environment of cheap land and labor endlessly, but individual firms in the industry must draw on their own home based resources to extend and upgrade their competitive advantage continuously.

The role of the government is to develop critical resources (like manpower and capital) for high levels of productivity and to assist innovation and improvement within the industry, thereby creating an environment in which firms can upgrade their competitive advantage. A few of the essential steps that the government of Sri Lanka must take are deregulation of the labor market, removal of unnecessary controls on the industry, and developing the financial market. The government should also assist the industry with overseas promotion and collection of marketing intelligence.

While the government has the above important role in creating factors that enhance the industry's competitive advantage, individual firms in the industry have to assist the government in shaping policy and must put their support behind constructive government programs. They should stay clear of quick fixes, such as subsidies and market protection, that in the long run would undermine their competitive ability. They must also look for strategic alliances with firms in other countries to fill any resource gap that may be hindering development.

PART ONE

THE GLOBAL MARKET FOR RUBBER



CHAPTER 1

THE WORLD RUBBER ECONOMY

Rubber holds a unique position among all the agricultural crops for influencing the development of the industrial world. Its application in industries from applied materials to transportation is without parallel and in certain countries it holds the key to development. The source of rubber extends from the plantations of Southeast Asia to the factories of Europe and America. It's life cycle involves small growers and large multinationals, both playing critical roles in its production and manufacturing, before the end product arrives at the consumer's door. It's biggest use is in the manufacturing of motor vehicle tires and its finest use is in the production of surgical supplies. All of these require a sophisticated system of manufacturing and distribution through thousands of growers, buyers, distributors, dealers, and warehouses in cities and villages all over the world. The main sources of natural rubber are the developing countries of Southeast and South Asia which provide the liquid latex, both from large plantations and small farms. Natural rubber is considered superior to synthetic rubber on many attributes and is the preferred medium for making high performance automobile tires, surgical gloves and implants, contraceptives, nipples on baby bottles, etc. About 60 percent of the world rubber production is of the synthetic variety, and its production is concentrated in large European, American and Japanese, multinational companies. Synthetic rubber can be prepared to many different specifications, but most of it attempts to emulate the properties of its natural cousin. New technology developments have also brought about an integration of natural and synthetic rubber for a new breed of industrial raw materials (Tan 1991, Freedonia Group 1994). Synthetic elastomers,¹ when blended with natural rubber, produce high weathering-quality products.

PRODUCTION

Production of natural rubber is concentrated in three main countries, Thailand, Malaysia, and Indonesia, producing 31 percent, 24 percent and 19 percent of the world total, respectively.² Sri Lanka is a distant sixth, with only a 2 percent share of world rubber in 1995. Natural rubber is mainly used for producing tires, automotive parts, and a range of rubber-based producer and consumer goods. The bulk of it (65%) goes to the global tire industry and the remaining to consumer and industrial uses such as carpet

¹ *Elastomers are a type of polymers (synthetic compounds of high molecular weight), with elastic features resembling natural rubber.*

² *1995 share estimates.*

backing, shoe soles, medical insulation products, surgical gloves, automotive parts, industrial belts, and hoses. With such high concentration of use by one sector, the rubber industry is very heavily dependent upon trends in the automotive industry. Recessions and expansions in the developed countries and per capita income growth in many of the developing countries both affect the growth of rubber demand. The industry grew very slowly in the 1970s, due to numerous shocks to the world economy. It increased rapidly during the second half of the 1980s. Consumption and production were closely matched and both grew slowly from 3.8 million tons in 1975 to 4.8 million tons in 1987. There was a big upsurge of demand in 1988-1989 that created a supply shortage and prompted a sharp increase in world price for rubber. Price was stabilized to some extent by using buffer reserves under the International Natural Rubber Agreement (INRA). World rubber production grew by an average of 2 percent per annum between 1989-1995 – from 5,150 thousand tons to 5,820 tons (Table 1-1). Production slowed down in the early 1990s with rapid decline in Malaysia. Among the major producing countries, Thailand, Indonesia, India, and China increased their output substantially and in 1991 Thailand became the largest producer of natural rubber in the world ahead of Indonesia and Malaysia (Table 1-1). Philippines, Vietnam and Cambodia also did very well. Production in Sri Lanka, however, faltered between 1989-1995, and actually declined at an annual rate of 1 percent. Production growth in the corresponding period was 12 percent per annum in India, 9 percent per annum in Thailand, and 8 percent per annum in China.³ In Africa, Nigeria's production after seeing a boom in the 1980s declined steadily in the 1990s. In Latin America, Brazil's production vacillated with insignificant changes, but after showing a strong market entry in the 1980s Guatemala stagnated in the first half of the 1990s.

Table 1-1
Production of Natural Rubber, 1989-1995
('000 Tons)

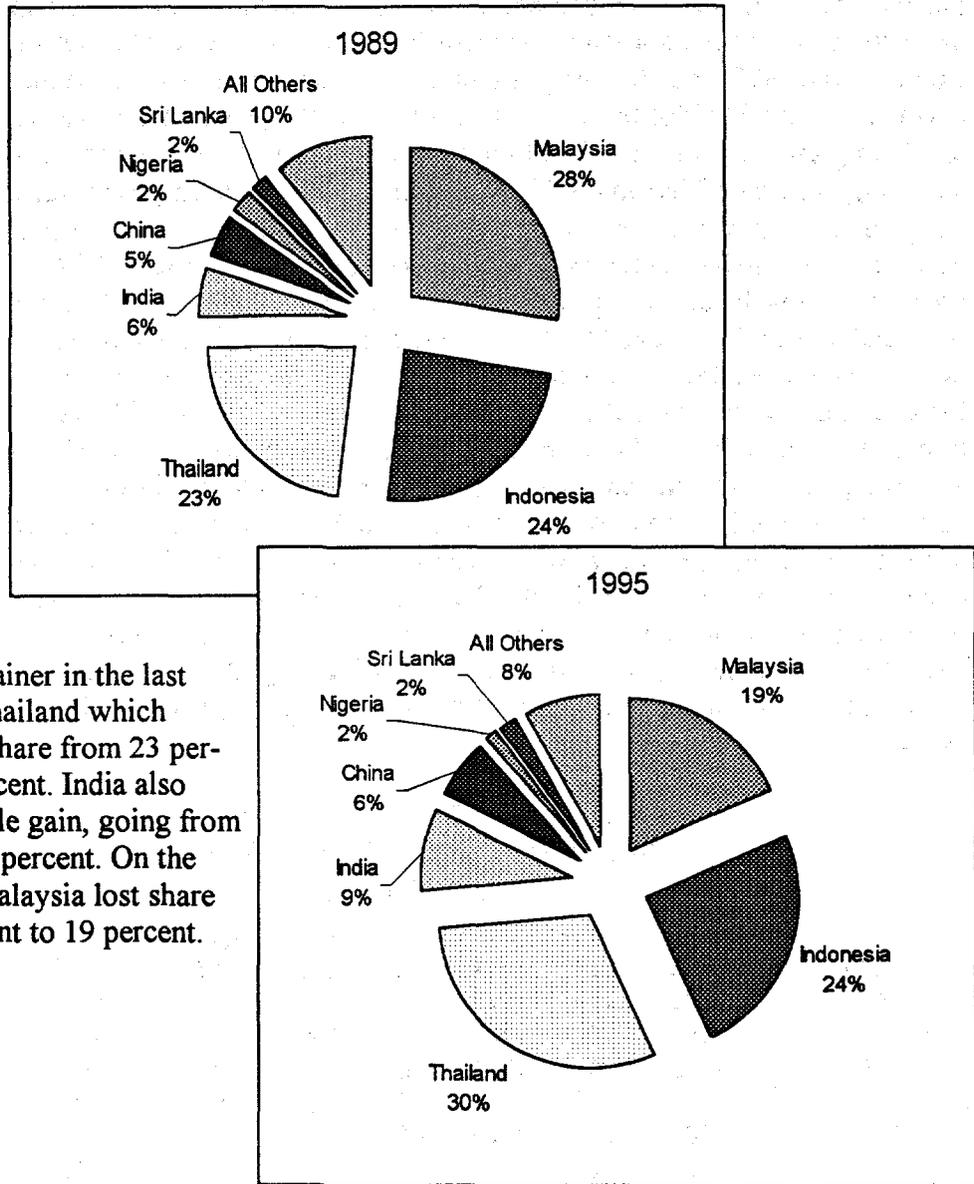
	Malaysia	Indonesia	Thailand	India	China	Nigeria	Sri Lanka	World
1989	1416	1256	1179	289	243	118	111	5,150
1990	1291	1262	1271	324	264	152	113	5,120
1991	1256	1284	1341	360	296	156	104	5,250
1992	1173	1388	1531	383	309	110	106	5,470
1993	1074	1301	1551	428	326	105	104	5,340
1994	1101	1361	1722	464	341	95	105	5,680
1995	1085	1420	1786	500	360	93	103	5,820
Gr. Rate	-4%	2%	9%	12%	8%	-7%	-1%	2%
1995 Share	19%	24%	30%	9%	6%	2%	2%	100%

Source: IRSG Rubber Statistical Bulletin, April 1996.

The change in the shares of the top six producers of rubber from 1989 to 1995 and their comparative growth rates are shown in Figures 1-1 and 1-2, respectively.

³ Growth rate estimated from the slope of the regression line through each country production series between 1989-1995.

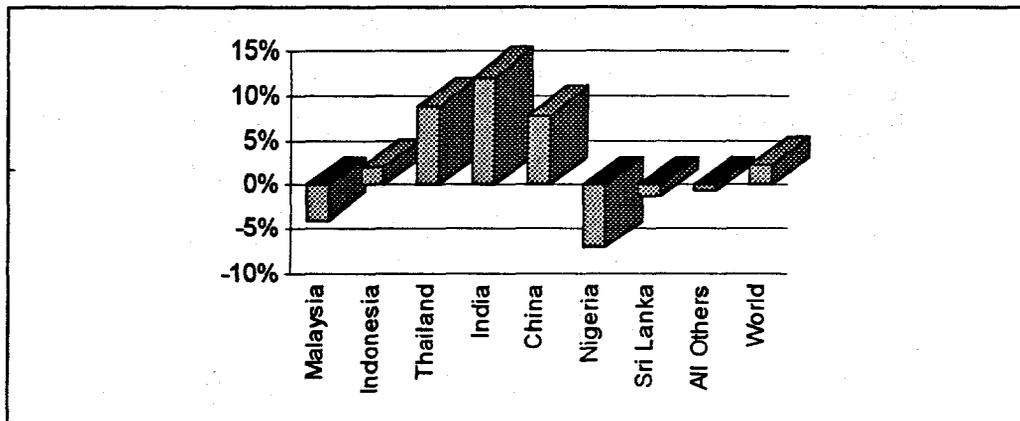
Figure 1-1
 Changing Share of Rubber Production, 1989 & 1990



The biggest gainer in the last six years is Thailand which increased its share from 23 per cent to 30 per cent. India also made a sizeable gain, going from 6 per cent to 9 per cent. On the other hand, Malaysia lost share from 28 per cent to 19 per cent.

Source: IRSG Rubber Statistical Bulletin, April 1996.

Figure 1-2
Comparative Growth Rates in Major Rubber Producing Countries, 1989-1995



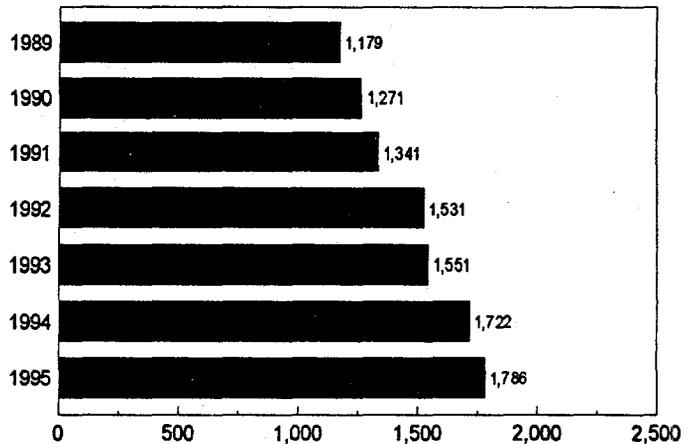
Source: IRSG Rubber Statistical Bulletin, April 1996.

The individual track record of the six top producers of 1995 is shown in Figure 1-3, covering the period 1989-1995.

Figure 1-3
Rubber Production, 1989-1995
(‘000 Tons)

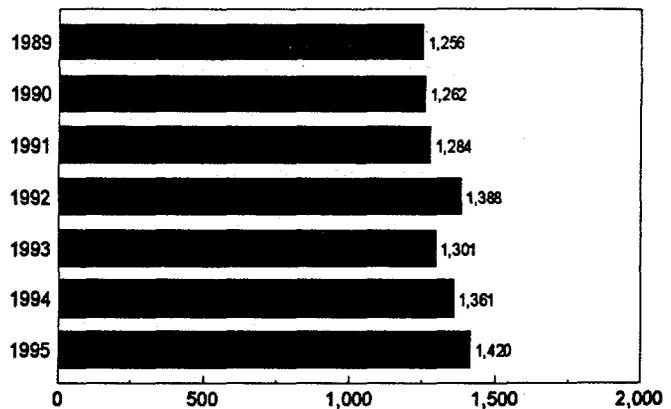
Thailand

The average yearly growth of Thailand’s rubber production between 1989-1995 was 9 percent, taking it from 1.18 million tons to 1.79 million tons in this period.



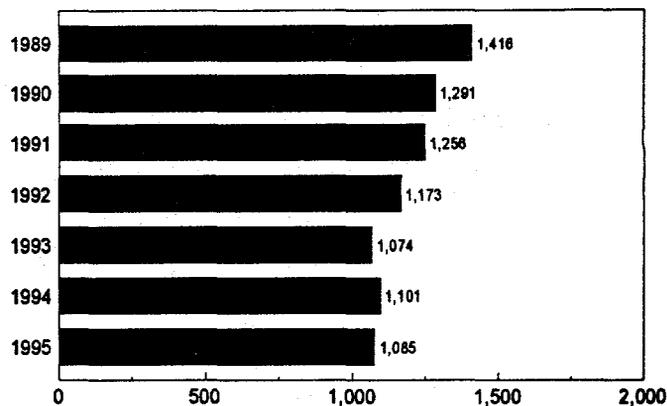
Indonesia

Indonesia’s production of natural rubber increased at about 2 percent per annum, taking it from 1.29 million tons in 1989 to 1.42 million tons in 1995. Except for 1992, the growth over these six years have been low.



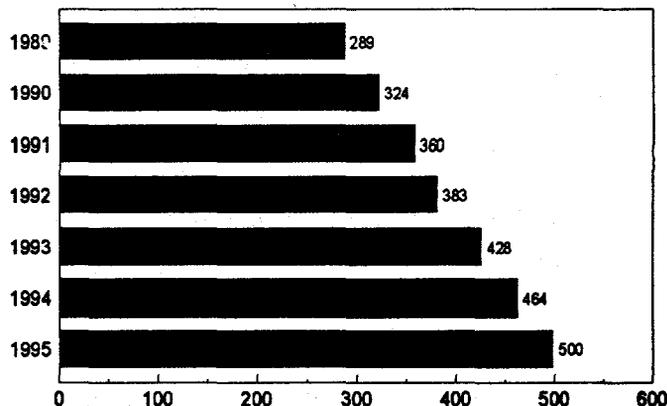
Malaysia

Of the three Asian tigers, Malaysia has had the most lack luster performance in rubber production between 1989-1995. It steadily lost share in this period going from 1.4 million tons to 1.1 million tons in these six years. The average growth rate in Malaysia was -4 percent per annum during this period.



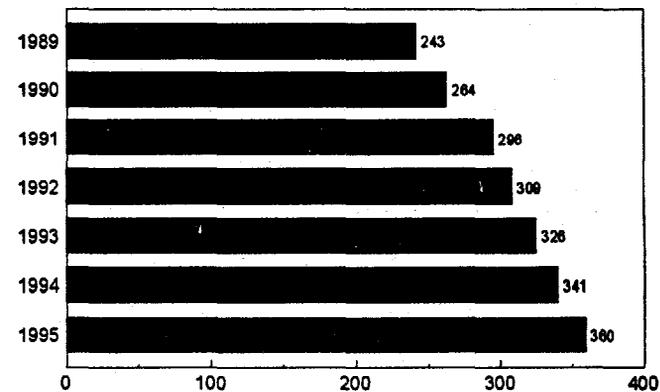
India

India's achievement in rubber production between 1989-1995 was very impressive. Production grew at the rate of 12 percent per annum to improve the base from 289,000 tons to 500,000 tons. The growth has also been fairly steady.



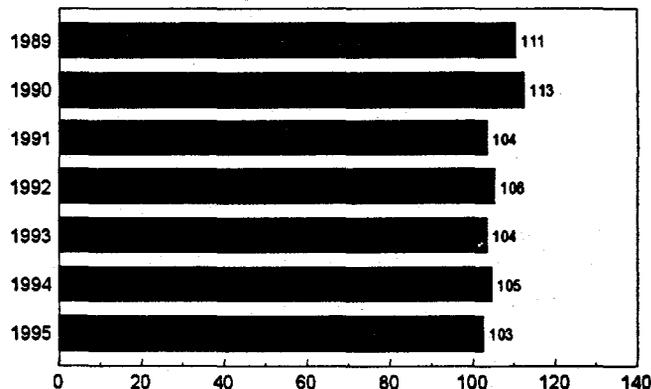
China

China's production increase between 1989-1995 was approximately 8 percent per annum which took its output of natural rubber from 243,000 tons to 360,000 tons. The growth was also fairly consistent.



Sri Lanka

On the average, Sri Lanka's rubber production declined by 1 percent per annum between 1989-1995. Its peak production in these six years was in 1990 (113,000 tons). Thereafter it declined very slowly to 103,000 tons in 1995.



Source: IRSG Rubber Statistical Bulletin, April 1996.

CONSUMPTION

World rubber consumption has increased substantially in the last three decades in spite of the prolonged recession that hit the industrial economies of the world in the 1980s. It increased from 8.8 million tons in 1960 to 12.5 million tons in 1970 and to 15.1 million tons in 1990.⁴ Between 1989-1995, world consumption of natural rubber grew at an average yearly rate of 2.3 percent (Table 1-2). Comparing this with the consumption

Table 1-2
World Natural Rubber Consumption, 1989-1995
('000 Tons)

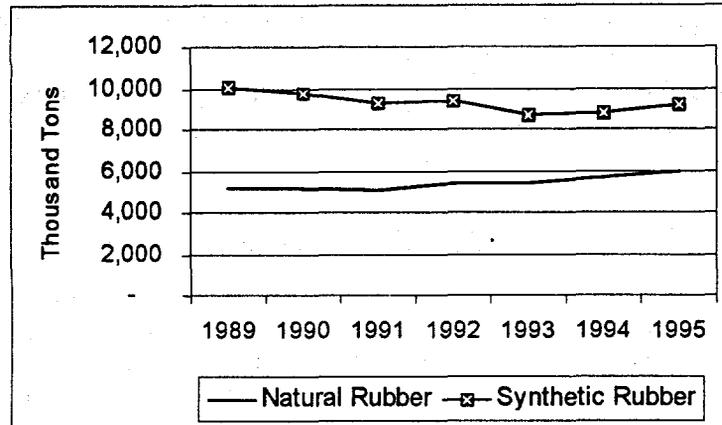
	1989	1990	1991	1992	1993	1994	1995	Growth Rate
USA	867	808	756	910	967	1,002	1,004	4.2%
Germany	221	209	211	213	175	178	208	-2.2%
France	184	179	183	179	169	180	179	-0.5%
Italy	143	130	120	115	108	100	102	-4.9%
U.K.	133	136	119	125	119	135	122	-0.9%
Russian Federation	140	150	80	28	36	20	13	-17.5%
China	650	600	610	640	650	725	732	2.9%
India	333	358	375	405	444	472	516	9.1%
Japan	657	677	690	685	631	640	692	-0.2%
Rep. Of Korea	232	255	264	275	271	290	307	4.6%
All others	1,630	1,698	1,702	1,815	1,820	1,888	2,045	3.8%
World	5,190	5,200	5,110	5,390	5,390	5,630	5,920	2.3%

Source: ISRG Rubber Statistical Bulletin, April 1996.

of synthetic rubber (SR) during the same period (1989-1995), we see that SR consumption on the whole declined at a rate of 1.8 percent per annum. After dropping from a level of 10.07 million tons in 1989 to 8.68 million tons in 1993, it started to recover in 1994 and 1995 reaching 9.17 million tons in the later year (Figure 1-4). Natural rubber (NR) consumption, however, increased at a rate of 2.3 percent per annum during 1989-1995, with positive growth in most of the years. This finding tends to dispel any notion that the synthetic rubber has taken away market share from natural rubber. The contrary may, however, be true in some countries, if not the world at large. The large scale production of synthetic rubber actually started during the Second World War because of a shortage of natural rubber. In the 1950s, 1960s and 1970s demand for rubber for making automobile tires was far in excess of supply and created opportunities for synthetic rubber take-over. By the end of the 1970s, synthetic rubber expanded its share of the rubber market to 70 percent of the total due to technological advancement in manufacturing. Natural rubber, however, continues to hold an important position in the elastomer market due to its intrinsic technical characteristics necessary for the manufacture of radial tires and certain surgical and health products like condoms that cannot be replicated by synthetic substitutes.

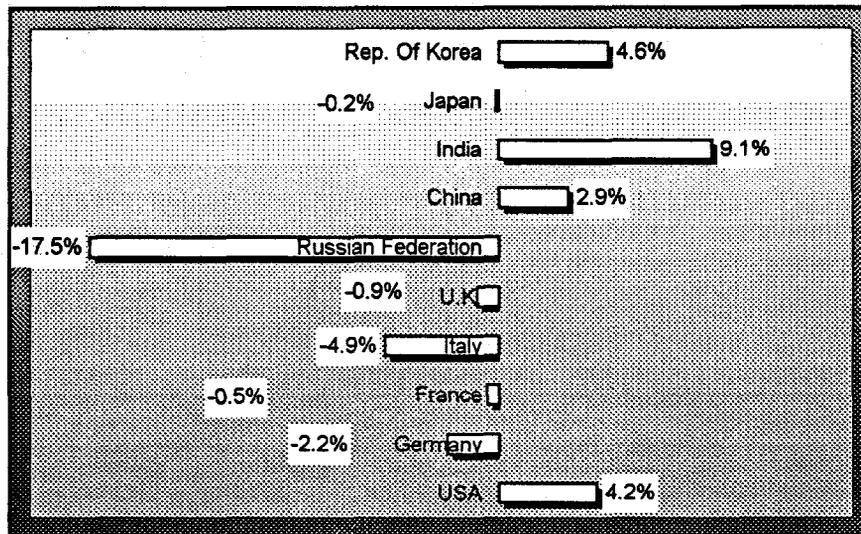
⁴ Combined consumption of natural and synthetic rubber.

Figure 1-4
World Consumption of Synthetic and Natural Rubber
1989-1995



Source: ISRG Rubber Statistical Bulletin, April 1996.

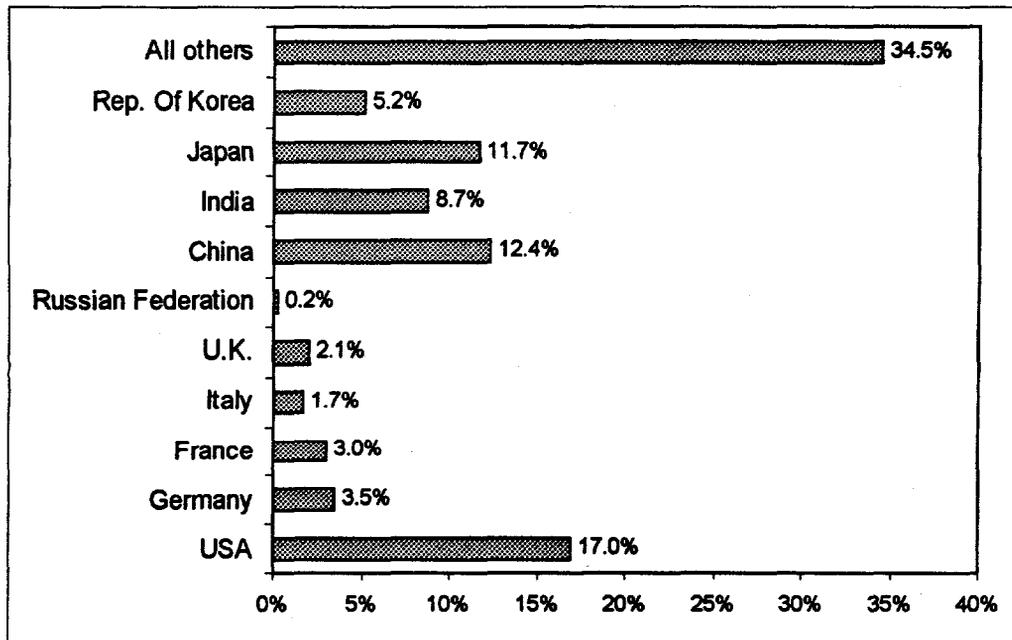
Figure 1-5
Regional Pattern of NR Consumption Growth
1989-1995



Source: ISRG Rubber Statistical Bulletin, April 1996.

The regional pattern of NR consumption (Figure 1-5) shows that the maximum growth took place in countries like India (9.1%), the Republic of Korea (4.6%), the USA (4.2%), and China (2.9%). Countries where the consumption rate declined include the Russian Federation (-17.5%), Italy (-4.9%), Germany (-2.2%), France (-0.5%), the U.K. (-0.9%) and Japan (-0.2%). The high growth thus took place mainly in North American and the Asian continents. The United States, the largest consumer of natural rubber in the world, consumed about 17 percent of total world (Figure 1-6). Other major

Figure 1-6
Country Share of Rubber Consumption, 1995



Source: IRSG Rubber Statistical Bulletin 1996.

consumers in 1995 were China (12.4%), Japan (11.7%), and India (8.7%). In Europe, Germany is the largest consumer with about 3.5 percent of the world consumption, followed by France with 3 percent and the United Kingdom with 2.1 percent. In Asia, besides Japan, China, and India, the Republic of Korea is a major consumer with a share of 5.2 percent.

THE GLOBAL ENVIRONMENT FOR RUBBER TRADE

Rubber trading has undergone significant changes since the 1970s due to technological innovation. Increased automation in tire manufacturing has placed stringent demands on quality consistency and material process ability to prevent machine down-time and material waste caused by contaminated raw rubber. Concentration of producers in the tire industry has created strategic alliances tying the majors producers of finished tires with suppliers of raw rubber in the three large producing countries. Outside the tire industry, increasing use of rubber is taking place in medical insulation products from an AIDS-induced growth in demand. Many global firms producing latex-based medical supplies have located in the major latex producing countries to minimize freight costs of latex (which has 35-40% water content) and to take advantage of low cost labor as well as generous fiscal incentives offered by some countries to attract foreign investment.

The Economic Environment

The synthetic and natural rubber industry grew very slowly in the 1970s due to numerous shocks to the world economy. It increased rapidly during the second half of the 1980s and then slowed down in the early 1990s. Consumption and production were closely matched and both grew slowly from 3.8 million tons in 1975 to 4.8 million tons in 1987. There was a big upsurge of demand in 1988-1989 that created a supply shortage of 100,000 tons and prompted a sharp increase in world price of rubber. Price was stabilized to some extent by using buffer reserves under the International Natural Rubber Agreement (INRA). Between 1990 and 1992, world elastomer (natural and synthetic rubber) consumption dropped, picking up slightly in 1992 and then dropping again in 1993. However, since 1994, there has been a recovery trend and consumption has gone up from 14.47 million tons in 1994 to 15.14 million tons in 1995 (IRSG, 1996). The growth rate of 4.6 percent in 1995 was the highest since 1984.

The Marketing and Trading Environment

The oil crises and volatility of the foreign exchange market in the seventies shifted the focus of the tire industry from synthetic to natural rubber. But higher oil prices also resulted in the downsizing of cars and less driving worldwide, which reduced the demand for tires. Increasing globalization of rubber industries changed the pattern of trade and moved it towards shorter and more direct logistic channels. Today, three or four large multinational companies dominate the world tire industry and these companies have forged direct supply links with the major rubber-producing countries who can assure them quality and consistency of supply. Concurrent changes in the technological environment have accelerated the pace of change, as new technologies requiring high grade natural rubber increased the necessity of establishing direct and continuous supply channels with selected producers. Standard grade rubber today, is bought by industries producing less sophisticated goods that can do with mixed grades of rubber accumulated from different countries.

The decline in open trading and price stabilization by INRA has reduced both spot and speculative trading in all the primary and terminal markets. The rubber traders have been the major losers in this. The thinness of the market has raised doubts about the efficacy of the price quotes from the Singapore market for RSS-grade rubber -- Sri Lanka's predominant export variety.

A significant development in 1992 took place with the establishment of a Commodity Exchange in Singapore for trading rubber futures. Interest in futures trading was sparked by the growing dissatisfaction of rubber producing countries with INRAII whose price stabilization efforts affected the producers adversely. The establishment of the Singapore exchange was followed by the International Rubber Organization's (INRO) approval for the buffer-stock managers to trade futures on this exchange. Futures market had existed prior to this, but financial market dynamics of the 1970s almost put an end to it. By the late 1980s, when openly-traded rubber reached a low of about 30% of the total rubber trade, dealers and traders raised their concerns over their diminishing trading

opportunities. This concern became more vivid with the opaqueness of the price determination mechanism that relied simply on price quotations from major suppliers.

The choice of Singapore as the location of the futures market was natural as it is proximate to 85% of world output and 55% of world consumption of rubber as more and more manufacturers make it their base for tire production. Whether this is the starting of a trend towards the merging of primary and terminal markets into a new marketing center and a move away from traditional buying from predominant supply sources is yet to be seen. But, it certainly holds healthier signs for smaller producers and rubber traders.

The Technological Environment

Seventy percent of the demand for natural rubber comes from the global tire industry whose dynamics have been shaped by fast-evolving technological changes. The introduction of radial tires in the mid-1960s shifted the demand from synthetic to natural rubber. The rate at which the diffusion of this technology took place was slow, moving from high-performance cars to regular passenger vehicles in the seventies. But it reached the commercial-vehicle segment of the developed countries in the eighties. In developing nations, radialization of automobiles is just starting in a big way and with the growing market for motor vehicles, there are great prospects for accelerating natural rubber demand.

Other technological changes that have affected demand for natural rubber are automation of the tire production process and the development of high-performance tires. Both of these have boosted demand for quality-consistent rubber. In the non-tire industries, technological innovations have produced new demand for specialty rubber such as thermoplastic elastomers, epoxidized natural rubber, and deproteinized rubber. There is also an increasing application of rubber in engineering, road surfacing, and health industries. About the only concern for the growing use of rubber comes from the disposal problem of scrap tires, which is an environmental hazard. However, more and more scrap tires are being used in fuel generation and the rate of tire degeneration is being reduced through better manufacturing technologies.

Major Exporters of Natural Rubber

The exports of natural rubber from major producing countries from 1989-1995 are shown in Table 1-3 below. The top three exporters in 1995 were Thailand, Indonesia, and Malaysia with 39 percent, 30 percent, and 19 percent of the market share, respectively. The absence of China and India from the export statistics is because these two countries consume all the rubber that they produce and have no exportable surplus.

Both Thailand and Indonesia displaced Malaysia, which had for long been the largest exporter of natural rubber in the world. In 1995, Thailand had a good 9-percent margin of rubber export share over Indonesia while the latter had a margin of 11 percent over Malaysia. The export rankings of the these three also correspond to their ranking in the production of raw rubber. There is also a trend among the major producers of raw

Table 1-3
Natural Rubber Export: 1989-1995
(‘000 metric tons)

	1989	1990	1991	1992	1993	1994	1995	Share (1995)
Malaysia	1365	1186	1041	939	770	782	789	19%
Indonesia	1152	1077	1220	1268	1214	1245	1287	30%
Thailand	1101	1151	1232	1413	1397	1605	1635	39%
Sri Lanka	86	87	76	79	70	69	68	2%
Vietnam	58	76	63	81	63	59	63	1%
Others	408	413	398	290	406	460	388	9%
Total	4170	3990	4030	4070	3920	4220	4230	100%

Source: IRSG Rubber Statistical Bulletin, June 1996

rubber to retain increasing quantities for local processing and decrease their export share. Sri Lanka is a distant fourth in rubber export with only 2 percent of the market share in 1995.

Major Importers of Natural Rubber

The United States is by far the largest importer of natural rubber in the world with almost one quarter of the world import in 1995 (Table 1-4). Among the other developed

Table 1-4
Natural Rubber Import: 1989-1995
(‘000 Metric Tons)

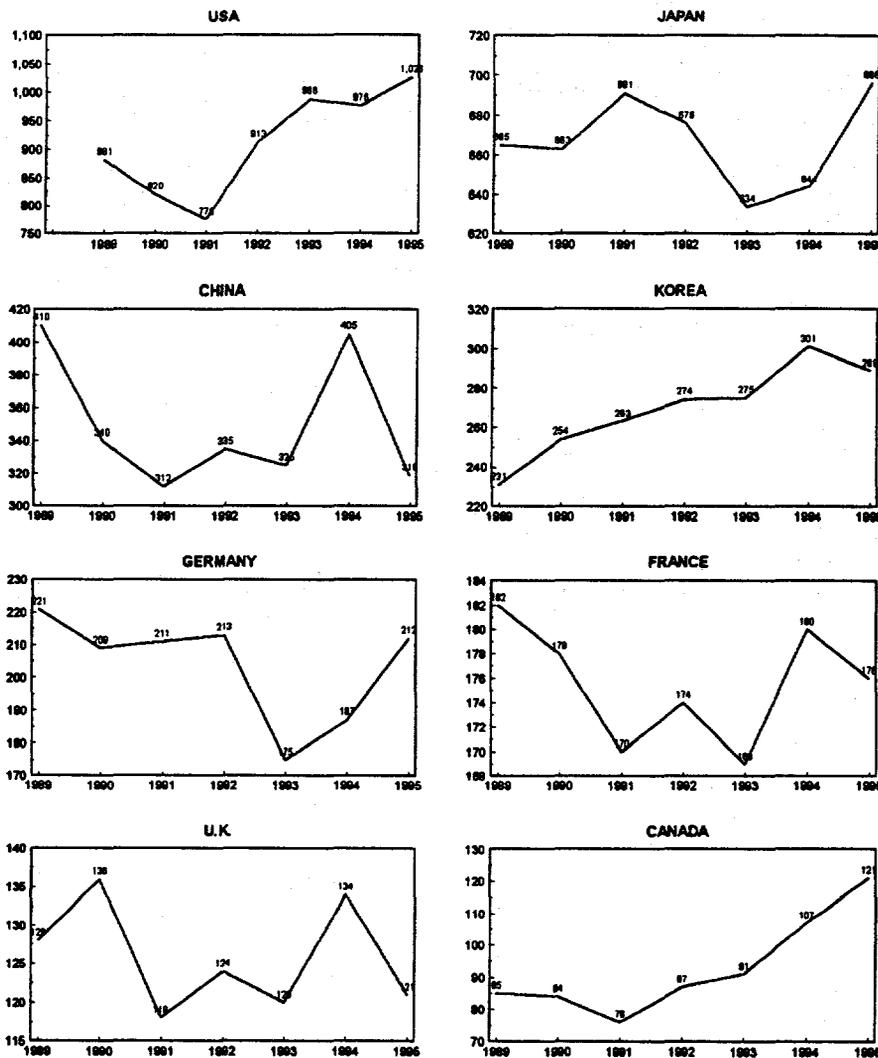
	1989	1990	1991	1992	1993	1994	1995	Share (1995)
USA	881	820	776	913	988	976	1026	24%
Japan	665	663	691	676	634	644	696	16%
China	410	340	312	335	325	405	319	8%
Rep. of Korea	231	254	263	274	275	301	289	7%
Germany	221	209	211	213	175	187	212	5%
France	182	178	170	174	169	180	176	4%
U.K.	128	136	118	124	120	134	121	3%
Canada	85	84	76	87	91	107	121	3%
All others	1388	1385	1213	1222	1181	1195	1286	30%
World	4191	4069	3830	4018	3958	4129	4246	100%

Source: IRSG Rubber Statistical Bulletin 1996.

countries, the major NR importers in 1995 were Japan (16%), Germany (5%), France (4%), U.K. (3%) and Canada (3%). In the developing world, the largest importer of raw rubber is China, with 8 percent of world import in 1995, followed closely by the Republic of Korea (7%).

The past six years import trends in major importing countries are shown in Figure 1-7. The trend has been consistently positive in the United States, the Republic of Korea, and Canada. In Japan, after a dip in 1993, the trend again became positive and is still in positive territory. In Germany, too, the trend became positive after 1993. However, the United Kingdom, France and the People's Republic of China have not shown encouraging import trends in the past six years.

Figure 1-7
Rubber Import Trend in Major Importing Countries



Source: IRSG Rubber Statistical Bulletin 1996.

THE SUPPLY-DEMAND BALANCE

Natural rubber production started to increase in early 1994, about six months after the beginning of a recovery in consumption. As a result, world NR stocks started to decline towards the end of 1994 (IRSG, *ibid.*). A boost in production following the greater demand pushed up the stocks for most of 1995. A sharp decline in rubber output in the third quarter of 1995 again caused the stock to decline towards the end of 1995. Total NR production in the first three quarters of the year rose by more than 10 percent just before adverse weather conditions brought down the output of the major three producing countries (IRSG, *ibid.*). The production, consumption, and stock position during 1990-1995 are shown in Table 1-5. The variation in the stock in these years has not been large, showing a standard deviation of 55 thousand tons and coefficient of variation of about 4 percent.

The position of individual rubber-producing countries shows that Thailand's output grew sharply by 17.4 percent in the first eight months of 1995, but fell in the remaining four months, giving a combined growth rate of 6.2 percent (IRSG, *ibid.*). Indonesian output grew in the first seven months of the year by 5.2 percent, but dropped in the remaining 5 months, taking the average growth down to 4.4 percent. The Malaysian output grew by 22.8 percent in the first four months of the year and then declined sharply, yielding an average growth rate of just 1.3 percent for 1995.

Table 1-5
The Demand and Supply of NR, 1990-1995
(000 Metric Tons)

	<u>Production</u>	<u>Consumption</u>	<u>Excess (+) or Deficit (-)</u>	<u>Stock</u>
1990	5120	5200	-80	1530
1991	5170	5100	70	1600
1992	5460	5390	70	1670
1993	5340	5380	-40	1630
1994	5670	5620	50	1680
1995	5880	5920	-40	1640

Source: IRSG Rubber Statistical Bulletin 1996.

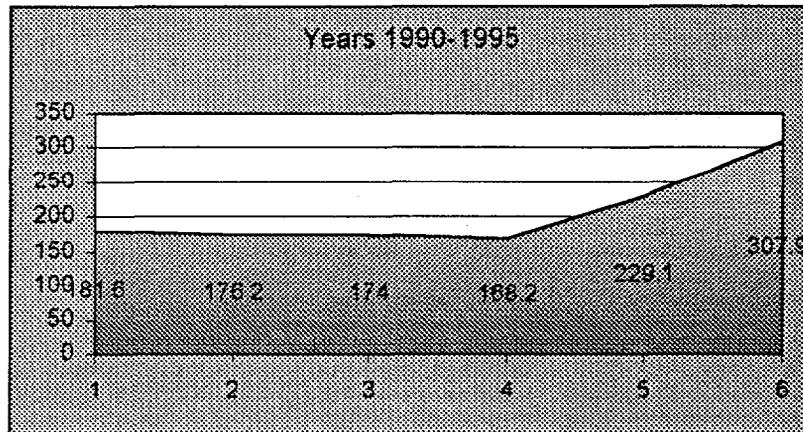
Other NR producing countries with high production growth in 1995 include Myanmar (15.6%), Bangladesh (13.6%), Ghana (12.5%), Brazil (10.7%), and Vietnam (8.0%). Mid level growth rates were achieved by India (6.3%), China (5.6%), Philippines (5.0%), Cambodia (5.2%), and Papua New Guinea (5.6%). Sri Lanka, however, had a poor showing in 1995 with only 0.7% growth (IRSG, *ibid.*).

RUBBER PRICES

The price trend of natural rubber in the past six years is shown in Figure 1-8. After a slow but gradual decline between 1990-1993, the price recovered quite nicely, reaching a level in 1995 that was 83 percent higher than the 1993 price. Even though

there was a lot of instability in monthly prices in 1995, the average RSS1 London prices this year were the highest in nominal terms this century (IRSG, *ibid.*). Price differentials between different types and grades of rubber also varied quite a bit in 1995.

Figure 1-8
NR Price Trend, 1990-1995
(Malaysian cents/kg)



*Note: Prices indicated are INRO Daily Market Indicator Price (DMIP).
Source: IRSG Rubber Statistical Bulletin, June 1996.*

A number of factors affect the price movement of natural rubber in the world market. These include the futures market activities, currency movements, government interventions in different producer countries, weather and supply factors, demand factors, and INRO's market intervention. INRA III⁵ was adopted in mid-February 1995 with an upward revision of the floor price, a shortened period of price reviews from 15 to 12 months, and a revised weighting of different rubber grade prices for fixing the DMIP. Rubber futures trading also increased in 1995 on the Tokyo Commodity Exchange (TOCOM), Kobe Rubber Exchange (KRE), and Singapore Commodity Exchange (SICOM).

FUTURE MARKET PROJECTION

The future of rubber consumption is tied to the global economy because of its intensive use in rubber tires, consumption of which is tied to the transport sector. In the next decade, rubber consumption will be in line with the world GNP growth which is expected to be around 3.5 percent to 4.0 percent per annum. The demand for rubber tire is negatively affected by such factors as longer tire life offered by newer technology, and decline of the rate of growth of motor vehicle registration in the developed countries. However, the high growth of commercial vehicles (trucks, vans, etc.) in both developed and developing countries holds promise of strong future demand particularly for natural rubber, that is used in making solid tires and radial tires. The strong demand in the United

⁵ The Third International Natural Rubber Agreement negotiated between producer and consumer countries for price stabilization through buffer stock and open market operation.

States for performance tires that have shorter lives holds additional potential for natural rubber consumption growth in the future. Non-tire rubber demand is also expected to grow strongly and will probably outpace world GNP growth. There are numerous non-tire applications for NR in many diverse sectors such as automotive (for belts, hoses, gaskets, and moldings), industrial materials (such as adhesives, padding, belting, vibration dampening, wire sheathing), consumer products (such as toys, door moldings, and construction such as roofing, sealant, and moldings).

Projected Regional Demand Pattern

According to World Bank projections⁶, world consumption of rubber is expected to grow at a rate of 2.6 percent per annum, rising from 5.2 million tons in 1991 to 7.6 million tons in 2005. The demand level for 2005 and rates of demand growth for a few selected countries are given in Table 1-6 below.

Table 1-6
Projected World Demand for NR
Year 2005 (Tons)

	Demand	Growth Rate
Japan	895,000	1.7 %
Italy	155,000	1.7 %
United States	986,000	n.a
Mexico	130,000	5.8 %
Germany	258,000	1.1 %
France	202,000	1.3 %
United Kingdom	140,000	1.0 %
South Korea	355,000	2.3 %
Thailand	200,000	3.9 %
Indonesia	195,000	3.6 %

Source: World Bank, *Commodities Market Outlook, 1992*.

Among the major tire producing countries of the OECD, the highest growth rate is expected in Japan and Italy -- around 1.7 percent per annum. However, the United States will continue to be the single largest buyer in the world with consumption of 986,000 tons by 2005. Mexico will probably see a very high growth rate because of the North American Free Trade Agreement (NAFTA) with the United States and Canada. Demand growth in Germany may remain low for a while, because of the ongoing restructuring of former East Germany, and afterwards it is projected to accelerate. In the rest of the EC, growth will be moderate.

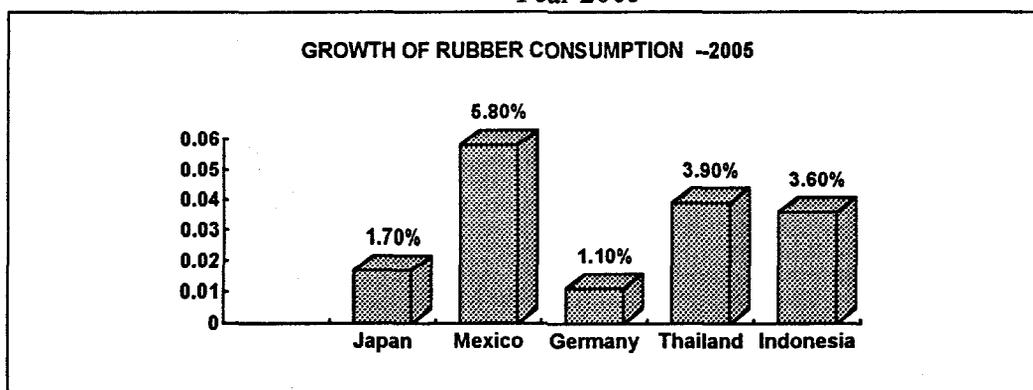
The fastest demand growth area is likely to be the LMICs⁷ of the Asia Pacific region where projected growth of 3.5 percent per annum during 1991-2005 will raise

⁶*ibid.*

⁷ *Low and Middle-Income countries.*

consumption from 1.9 million tons to 3.1 million tons. Much of this growth will come from the expanding domestic tire industry. In the three major rubber producing countries, Malaysia, Thailand, and Indonesia, demand growth is linked with the recent relocation of the global tire-making giants in these countries. Malaysia, among the three, will have the lowest growth in these years because it already had a head start in latex-based dipped-good industries from 1989-1990, and most of its demand will come from investment in tire manufacturing. Thailand, also is establishing a strong base in tire and dipped-goods manufacturing. Unlike Malaysia and Thailand, Indonesia's consumption will be of lesser quality rubber for manufacturing solid rubber for tires, shoes, and other industrial goods. Figure 1-9 shows the projected demand growth in selected OECD and LMIC countries.

Figure 1-9
Projected Demand Growth in Selected Countries
Year 2005



Source: World Bank, *Commodities Market Outlook*, 1992.

North America, Western Europe, and Japan account for most of the world rubber consumption due to their highly developed automotive and other rubber-utilizing industries. This demand, however, is susceptible to economic ills such as recession, frequent overcapacity, and intense price cutting in the industry. On the other hand, newly industrializing countries going through an economic boom, such as the Republic of Korea, China, Brazil, and Mexico, will become more and more prominent in the consumption of tires and other rubber goods in the coming years. The big question mark is on countries in Eastern Europe where there is a tremendous pent-up demand for new automobiles and commercial vehicles, partly for replacing the existing aged ones and partly for supplying new buys. These countries also have a huge demand for other western style consumer goods which require rubber in many forms such as crepe and latex.

The OECD forecasts predict a faster economic growth in the western nations in the coming years because the fundamentals are strong. The European Union also expects a revival of the European economy driven by sound fundamentals and supportive monetary and fiscal conditions. The European Bank for Reconstruction and Development predicts the period of decline to be over in Eastern Europe and strong prospects for future growth that should revitalize rubber consumption. Both World Bank and Asian Bank

forecast strong growth in the East Asian economies which should add to their current heavy demand for rubber. China is buying both NR and SR in the market because its own production of rubber is insufficient to meet its internal demand. It has entered into an agreement with Thailand to import more NR. India, is likely to continue heavy import of rubber to meet its increasing demand even though a lot of effort is being made there to expand production. Some paddy land has been shifted to rubber in Kerala, and Tripura plans to expand rubber cultivation by 10,000 hectares in the next five years (IRSG, *ibid.*). Possibilities of economic recovery in Japan are also good even though they may not parallel the growth rates of the past.

Demand projections to the year 2000 by Burger and Smit (1996), based on GDP growth, motor vehicle production and registration, production of tire and non-tire products are quite a bit more optimistic (Table 1-7).

Table 1-7
Burger and Smit's Projection of World Rubber Demand
Year 2000 ('000 tons)

	Demand 2000	Growth rate 1990-2000
USA	3455	2.80
Canada	364	3.00
Japan	1919	0.60
Germany	743	-0.60
France	561	0.60
U.K.	340	-0.50
Italy	433	-0.20
Other Western Europe	1208	0.60
Eastern Europe and CIS	1772	-3.80
Brazil	480	1.90
Other Latin America	584	2.30
China	1725	6.00
India	775	5.20
Indonesia	268	4.50
Malaysia	439	8.00
Thailand	246	5.50
All others	2194	5.40
<i>World</i>	<i>17,506</i>	<i>1.50</i>

Source: Burger and Smit, 1996.

Thus, overall the rubber consumption forecasts are good in the long term. However, SR may be a serious threat to NR producers. Thailand, the largest NR producer today is concentrating on SR production. Indonesia is also expected to follow suit. The future of Japanese demand is uncertain, because of the increasing strength of its currency and increased competition from the other Asian tigers. It has already relocated most of its production outside Japan. The same situation is faced by the major European producers of rubber goods.

Production Outlook for 2000 and Beyond

The main production of natural rubber until the turn of the century will continue to be in the three South East Asian countries – Thailand, Indonesia, and Malaysia – despite some recent growth of production in other African, Asian, and Latin American countries. Malaysia, in particular, has kept in the forefront through a number of technological developments in rubber cultivation and extraction. Using a method called young bud grafting, it has reduced the maturing time for rubber trees from seven to five years. In addition, a new extraction method called Hypodermic Latex Extraction (HLE) has been able to give a continuous dripping of latex for 40 hours with a single puncture once a week in place of the traditional two or three tapings per week. This technique has reduced the labor input in extraction and lowered the cost of production substantially. It has also reduced market instability by making short-term response to demand possible. Additionally, the gains from the higher yield of latex and commercial exploitation of rubber wood may provide an economic rationale for a potential shortening of the rubber tree's life cycle from 25-28 years to 20-22 years. Malaysia is up against many structural problems, however, for her rubber industry and is slowly converting to palm oil for its export crop of choice.

Among other rubber producing countries, Indonesia plans to double rubber plantation in South Sumatra and Kalimantan to produce 1.4 million tons a year. This country is expected to displace Thailand as the top NR producer in the world in the next few years because of its comparative advantage in land and cheap labor. Thailand is also aiming to expand production in the Northeast and has recently fortified its position with a revised Thai Specified Rubber Scheme. It is improving the quality of block rubber to increase export market share and is moving towards more value-added rubber products. Cambodia reported a large increase in NR export in 1995 and is planning to revitalize a number of the old neglected plantations and expand into new areas. The government is looking into the possibility of privatizing rubber plantations in Kampong Cham province and to release 200,000 hectares of land for coffee and rubber plantations. Vietnam currently has 250,000 hectares under rubber, and is aiming to increase it to 700,000 hectares by 2005. Other Asian countries are also gearing up to expand their rubber production.

Outlook in the African countries is also bright. West Africa is being assisted by the Common Fund for Commodities to improve the quality of production through the production of Technically Specified Rubber under a common ANRA label (IRSG 1996, op.cit.). The Liberian rubber industry is also expected to return to the market in a significant manner.

Supply Outlook

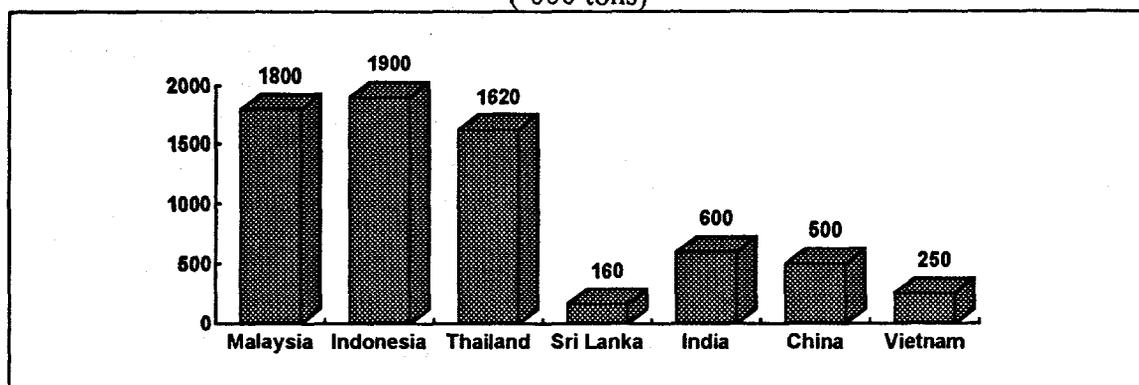
The supply projections for the year 2005 are given in Table 1-8 and Figure 1-10 below. World output of natural rubber is expected to grow at 2.7 percent per annum, from 5.20 million tons in 1992 to 7.64 million tons in 2005 (Burger and Smit 1994). Indonesia is projected to become the leading producer by 2005, overtaking Malaysia. Thailand is

Table 1-8
Natural Rubber: Production and Growth Rate
Year 2005

	Production (‘000 tons) 1992	Production (‘000 tons) 2005	Growth Rate (% p.a.) 1992-2005
Malaysia	1200	1800	2.4
Indonesia	1100	1900	3.5
Thailand	1396	1620	1.3
Sri Lanka	120	160	2.4
India	392	600	3.6
China	302	500	4.3
Vietnam	--	250	-
World	5200	7640	2.7

Source: World Bank, *Commodities Market Outlook, 1992 and Sri Lanka Strategic Issues, 1991*, Asia Country Dept.

Figure 1-10
Projected World NR Production, 2005
(‘000 tons)



Source: World Bank, *Commodities Market Outlook, 1992 and Sri Lanka Strategic Issues, 1991*, Asia Country Dept.

expected to have a slower growth because of land constraints and India is likely to achieve a higher growth rate than previous years to reach a production level of 600,000 tons per annum. Output in China is projected to grow at 4.3 percent and reach 500,000 tons by 2005. Sri Lanka, which removed export taxes, starting from end of 1992, will grow at 2.4 percent to reach 160,000 tons in the same period. The rest of the world supply will come from African countries like Cameroon, Cote d'Ivoire, and Nigeria. However, production growth is expected to be low because of political and economic instability. In Latin America, the hazards of leaf blight disease and dearth of smallholder cultivation is likely to hold back growth. Overall, the projected share of world output from the three major rubber producing countries is likely to reach 70 percent by 2005.

Burger and Smit's (1996) projection of the supply of rubber in the year 2000 shown in Table 1-9 are much more optimistic. These projections were made on the basis of predicting the total area of NR planting, percentage of uprooting and replanting, yield, quality of clones, and other exogenous factors such as weather and slaughter tapping.

Table 1-9
Burger and Smit Projection of World Rubber Supply
Year 2000 ('000 tons)

	Supply 2000	Growth Rate 1990-2000
Thailand	1926	4.50
Indonesia	1765	3.50
Malaysia	1108	-2.80
Sri Lanka	1926	4.50
India	641	6.80
Philippines	56	-1.20
Vietnam	219	16.30
China	424	4.90
Africa	314	1.10
South America	73	1.60
World	6,775	2.70

Source: Burger and Smit 1996.

Trade Outlook

Export Growth: The overall world export growth of natural rubber is projected to be 2.6 percent per annum during 1992-2005, taking the gross volume from 4.1 million tons to 6.1 million tons. However, as the three major producing countries increase their domestic consumption, their export as a share of total production is projected to decline. Table 1-10 shows the expected volume of export and export growth and the share of export in the total output of these countries.

Figure 1-11 shows the projected export growth for the major producing countries. The fastest growth track is likely to be set by Vietnam with a projected growth rate of

Table 1-10
Projected Trade Volume and Growth Rate of NR, Year 2005
('000 tons)

	Export Volume 1991	Export Volume 2005	Market Share 2005	Export Growth Rate 1991-2005	Export as a % of Production 1989	Export as a % of Production 2005
Malaysia	1170	1550	25%	1.9 %	96 %	90 %
Indonesia	1090	1890	31%	3.8 %	92 %	90 %
Thailand	1180	1490	25%	1.6 %	93 %	91 %
Vietnam	70	220		7.9%	-	-

Source: World Bank, *Commodities Market Outlook*, 1992.

7.9% per annum. African exports are expected to grow at about 1.7% per annum. As shown in Table 1-10, in spite of a slight growth in the total volume of export, the relative share of world export for all the three majors, between 1991 and 2005, will decrease by 2-6 %.

Import Growth: Import demand from the low-and-middle income countries (LMIC) should increase from 41% in 1992 to 49% in 2005. The United States will remain the single largest importer, followed by Japan. The EC import expansion will be a meager 1.1% per annum largely due to Germany's slow growth. Total German import fell from 262,000 tons in 1989 to 202,000 in 1991. By 2005 the German import recovery will only be enough to reach its 1989 level.

The Asia Pacific region will experience the highest import growth of 3.8%. The largest importers will be China and the Republic of Korea. China's import are projected to grow at 4% per annum to reach 652,000 tons by 2005 and Korean imports will rise at 2% per annum to reach 344,000 tons by 2005.

Figure 1-11
Projected Export Growth for Major Rubber Producers, 1991-2005.



Source: World Bank, *Commodities Market Outlook*, 1992

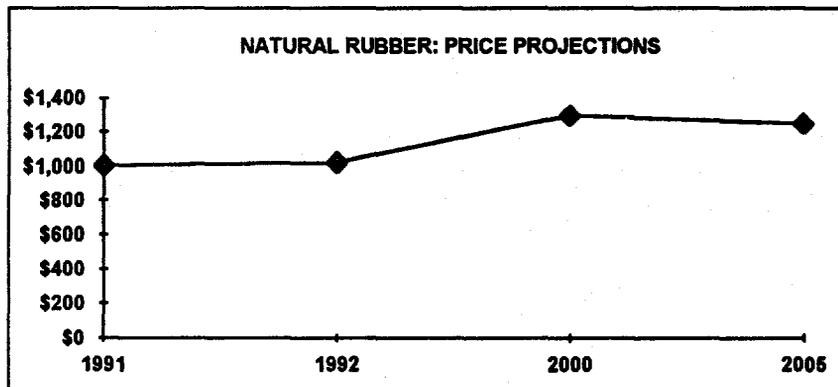
The European LMICs have rather uncertain import projections, except for Greece, Portugal and Turkey. Turkey is the highest importer in this group because of its strategic position between the two continents that makes it an ideal 'export platform' for tire manufacturers. Turkey's import is expected to grow at 4.2% per annum to reach 85,000 tons in 2005. The Eastern European countries and the former Soviet Union (FSU) have the most uncertain import outlook because of their economic problems and heavy dependency on domestically-produced synthetic rubber. However, if the economic reforms in Eastern Europe and the FSU take place earlier than anticipated, there will be additional import demands which Indonesia and Malaysia will be best able to capture because of their production potentials.

Price Outlook

1991 was the worst year in the history of the U.S. tire industry as demand cut back by original equipment manufacturer (OEM) reduced consumption by about 5 million units and caused a combined loss of \$6 billion for the three tire manufacturers, Michelin, Bridgestone, and Good Year. Turmoil in Eastern Europe also took their toll on the industry prices particularly for sheet and crumb rubber from Vietnam and latex crepe from Sri Lanka.

The prolonged recession of the 1990s kept the rubber price depressed in the early part of 1990. Projected economic recovery and growth in the second half and increased demand for rubber coming from countries like the United States, Japan, Taiwan, China, India, Korea, and Mexico, are expected to boost real price (in 1990 terms) to a peak of \$1,300 per ton towards the year 2000 (Figure 1-12). This forecast may change if the projected economic recovery in eastern Europe and FSU do not take place at the expected rate. After 2000, real prices are projected to decline to \$1,250 per ton by 2005 because of overproduction brought about by productivity increases in all the producing countries. However, if China, India, and Mexico grow at a faster rate than what has been projected, the price drop may not be that significant.

Figure 1-12
NR Price Projections to 2000



Source: World Bank, *Commodity Projections, 1992*.

Three main factors are responsible for long-term price changes of NR, demand elasticity, supply elasticity, and substitute products. Other factors that also affect the price trend are exchange rates and price index of minerals. Burger and Smit's (1996, op.cit.) price projections for the year 2000 suggest that prices are likely to be around \$2.25 per kilogram until the end of this century. Thereafter, mainly because of reduction in productive capacity, prices may go well above \$3.00 per kilogram.

THE INDUSTRY STRUCTURE

Emerging Segments

The Quality-Consistency Segment: The trend towards concentration in the global tire industry, the increasing demand for high-efficiency tires and intense global competition led by the major tire manufacturing Multinational Corporations, has led to segmentation of the natural rubber market on the basis of uniformity, consistency, quality, and predictability of supply. The high end of the demand is for uniform, quality-consistent rubber from reliable suppliers. This splits the market geographically into two parts: very large producers of natural rubber who can provide the above with ease and the rest of the world. The former segment consists of Malaysia, Indonesia, and Thailand. The latter segment has Sri Lanka, India, and the other LMICs of Asia, Africa, and Latin America. In the first segment, supply contracts, prices, and production scheduling are done through direct manufacturer- to-producer negotiations. In the second segment, prices and demand are set by open market dynamics. Because of its large size, the first segment has a significant affect on the dynamics of the second segment. As the major rubber-consuming industries in the world concentrate their buying from the first segment, the balance of the demand from the rest of the world is too low to support the small producers. The thin market for this segment naturally drives prices down and adds to the uncertainty of demand.

The High-Grade Segment: Besides the tire industry, there is a growing market for high quality rubber used in surgical, contraceptive, and clinical devices. Regulations in Germany now require motorists to carry rubber gloves so they can help accident victims without fear of contracting AIDS (Government of Sri Lanka 1991). The use of condoms and clinical rubber gloves has increased worldwide for the same reasons. The demand for high grade rubber, such as sole crepe, is on the increase and this should produce a substantially-sized segment in the near future.

Industry Standards

Demand for Quality-Consistency: The trend towards quality and consistency have generated the need for standards to be established for rubber-based industries worldwide. There may eventually be a ban on the export of low-quality rubber. Countries like Malaysia are already working to develop standards for latex concentrates to protect their own interest and to reinforce the image of their quality-consistent natural rubber. The inevitable recourse for smaller rubber producing countries is to align their production towards meeting all these new environmental requirements. Sri Lanka, which leads in the production of high grade sole crepe may develop standards around its own product for the future.

FORCES DRIVING INDUSTRY COMPETITION

The rubber industry in the 1980s was characterized by a spate of restructuring and consolidation. Apart from the drive to obtain economies of scale, there was a strong desire on the part of major tire producers to secure a firm foothold in the vast but maturing market of North America (Freedonia Group, *op.cit.*). General Tire was bought up by Continental of Germany in 1987, Bridgestone of Japan bought Firestone a year later, and Italian Pirelli acquired Armstrong Tires. In 1989, Michelin of France bought Uniroyal. Only Goodyear was successful in warding off takeovers. The world tire industry now only has nine companies with 80 percent of the world tire sale and annual revenue in excess of \$1 billion. Four of these nine firms are from Japan (Bridgestone, Sumitomo, Yokohama, and Toyo), three from Europe (Michelin, Pirelli, and Continental), and two from USA (Goodyear and Cooper). Just below them are two upstart companies from South Korea, Kumho and Hankook, both with sales in the \$800 million range. They have both started an aggressive export drive.

The concentration is much lower in the non-tire rubber industry and the top ten suppliers have 42 percent of the global market share between them. Five of these, Bridgestone, Goodyear, Continental, Sumitomo, and Yokohama, are also in the top ten for tires. Four other firms – Hutchinson, Freudenberg, Gates, and NOK hold globally-dominant positions in non-tire rubber products (Freedonia Group, *op.cit.*).

There are quite a few barriers to entry in the tire industry including high concentration, slow growth in global sales, immense capital requirements in areas including production technology and research and development. In addition, the tire companies have vertically integrated by taking ownership or control of rubber plantations in Asia and their distribution systems.

INDUSTRY PRODUCTIVITY AND PROFITABILITY

Productivity

Technological developments have advanced productivity and the yield of natural rubber many fold in countries like Malaysia. In addition to the HLE technology which improves the weekly yield of latex by over 50 percent, the development of young-bud grafting, that reduces the maturity period of a tree from seven to five years, has given the country a cost advantage of 15-20 percent. These and other improved rubber production techniques are going to give the countries which are quick to adopt them the ultimate competitive edge.

Productivity, measured by yield per hectare, is very high in Malaysia, Indonesia and Thailand in comparison to Sri Lanka, as shown in Table 1-11 below. This gives them a tremendous advantage in achieving scale efficiency and driving down the cost of production, distribution and marketing.

Table 1-11
Rubber: Cross-Country Yield Comparison

	Kilogram Per Hectare
Malaysia (state) ^a	1424
Malaysia (small holder)	1025
Indonesia ^b	1400
Thailand	1400
Sri Lanka (state) ^c	876
Sri Lanka (small holder) ^d	814

a 1992 statistics. See World Bank (1992), *Malaysia —Third Felcra Land Development Project, SAR, May.*

b 1992 statistics. See World Bank (1992), *Indonesia — Tree Crops Small Holder Development Project, SAR, March, p. 61.*

c 1991 statistics.

d 1988 statistics.

Source: Sri Lanka, Core Group Report, 1989; Plantation Sector Statistical Pocketbook, 1992.

The Cost of Production

Of the four countries, cost of production (COP) is highest in Malaysia, because of higher wage rates (Table 1-12). The Malaysian wage rate is five times more than Sri Lanka's (private sector) and about six times the wage rate in Indonesia. But even with a five-times higher wage rate, the Malaysian COP is only twice that of Sri Lanka's private sector and very near Sri Lanka's state sector COP. The Malaysians are able to hold COP down through higher inputs of technology such as the HLE technique, the young-bud grafting, and higher levels of farm efficiency. Sri Lanka's COP is the third highest in the industry, and its yield is only about 60% of both Malaysia and Indonesia. Indonesia's COP, wage rates, and yield give it the best cost advantage in the industry.

Table 1-12
Rubber: Cost of Production

Country	..Industrial Estates..		..Small Holder..		Wage Rate 1990 (\$)
	COP \$ per Mt.	COP Index	COP \$ per m.t	COP Index	
Malaysia	837	110	-	-	6.26
Indonesia	466	61	420	94	1.09
Sri Lanka	764	100	446	100	1.30
Cote d'Ivoire	920	120	550	123	2.63
Nigeria	466	61	-	-	-
Zaire	583	76	-	-	-
Thailand	-	-	720	161	3.18

Source: Allen Green, World Bank Consultant Report, May 1991; Sinchareonkul and Thainugul, 1996.

The Nature of Competition

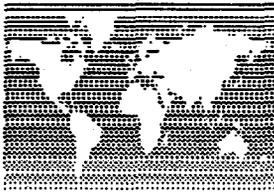
The major competitors in the world market for raw natural rubber are Malaysia, Indonesia and Thailand who held about 74 percent of the market among them in 1995. Competitive actions will center around the big three in the next decade with Thailand trying to establish a world standard for latex concentrate to secure the position of its own grade of rubber. All of the three countries will be competing aggressively with each other on quality, consistency, and price factors and will try to tie up the major buyers through long term contracts. In addition, these countries will be increasing internal consumption many fold as they establish their own integrated production and distribution system. The remaining rubber producing countries will face tough competition in their narrow low-price segment for non-standardized rubber, unless they upgrade their own production standards. With very small shares of the market, Sri Lanka, Cote d'Ivoire, Liberia, Vietnam, etc. will essentially be competing with each other for larger shares of the open-market sales. New technological developments in the plantation and extraction of rubber, however, would move some of these countries towards small niches in the high end of the market. By positioning themselves in some of these specialized niches (e.g., the segment for quality pharmaceutical rubber), they may be able to maintain their level of sales and growth in spite of future over-capacity and a bigger onslaught by the giants of the industry.

In summary, the major industry trend for the next millenium promises the following:

- **Market domination by three major producers in Southeast Asia:** Thailand, Indonesia and Malaysia will control nearly 91% of the world export of natural rubber. The composition of export in the future will be high quality, consistent-grade rubber through direct sale to manufacturers of tires and other rubber goods.
- **New production and processing technologies will drive down the cost of production:** The future trend is to make production more efficient to bring down the cost of production and improve the quality of output. Malaysia has started the revolution with intense R&D, producing new techniques like Hypodermic Latex Extraction and young bud grafting. These and other developments in the industry are going to increase yield and reduce the cost of production significantly.
- **Increasing internal demand for rubber in the big three producing nations:** A significant portion of the world tire industry will be located in Malaysia, Indonesia, and Thailand by the turn of the century which will result in a larger share of their production consumed internally and smaller share going for export. This will provide opportunities for the smaller producing nations to increase their share of the export market.

- **Rising world price for rubber expected :** Increased demand from the United States, Japan, Taiwan, China, Mexico, etc. is projected to push price upwards by the year 2000.
- **Growing demand for high-quality rubber may set industry standard:** There is a constantly growing demand for high-quality rubber for tires, and surgical, contraceptive and clinical uses. This may lead to the establishment of minimum standards for export and a ban on export of low-grade rubber.

††††††††††††††††



CHAPTER 2

MAJOR COMPETITORS IN THE GLOBAL RUBBER MARKET

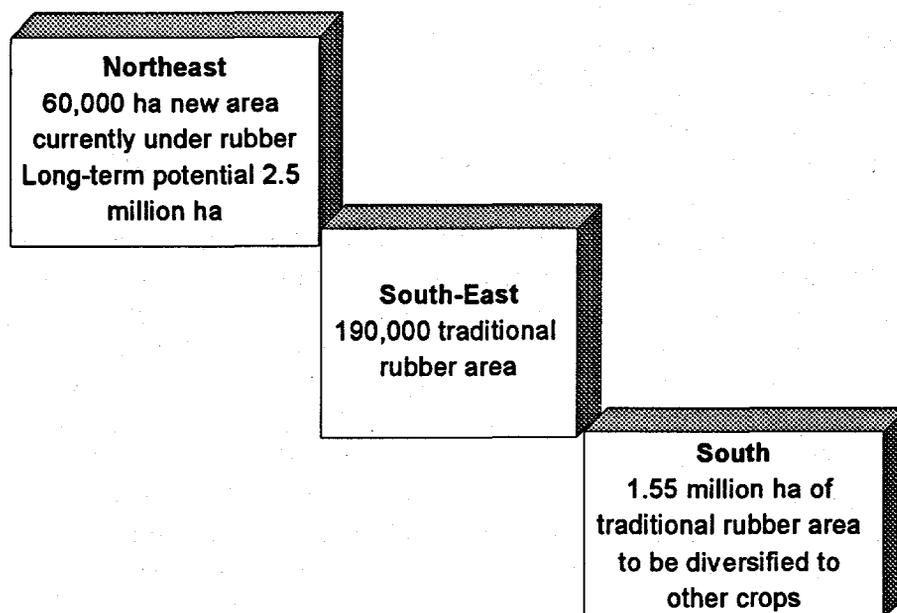
The major rubber producing countries in the world are concentrated in East and Southeast Asia. Other minor producers are located in Africa and South America. In terms of production volume, Asia produces about 5 million tons of rubber per year compared to about 280,000 tons in Africa and 62,000 tons in South America. Thailand is the largest producer in Asia with 30 percent of world production, followed by Indonesia with 24 percent and Malaysia with 19 percent (all 1995 statistics). The expected growth rate of Thailand's production between 1990-2000 is 4.5 percent per annum, compared to 3.5 percent expected growth in Indonesia and -2.8 percent in Malaysia. China and India, although big producers of natural rubber, are big consumers and are likely to keep absorbing most of their production internally.

THAILAND

Production Areas

Thailand has currently about 1.8 million hectares under rubber plantation of which 1.55 million hectares is in the southern peninsula, 0.19 million hectares in the southeast, and about 0.06 million hectares in the northeast (RRI 1996). The South has mostly replanted rubber and it is the northeast where most of the new plantations are taking place. The latter holds very high potential for future rubber development in Thailand with the potential availability of 2.5 million hectares in 18 provinces, coupled with cheap land prices and relatively cheap labor (Sinchareonkul and Thainugul 1996). In the South, the main rubber production area of Thailand, rubber has strong competition from high value crops such as fruits, palm oil, and medicinal plants, which limits its expansion in that area (Samosorn 1996). The government plans to convert 32,000 hectares of rubber plantation in the south to other crops and develop the same amount in the Northeast for rubber between 1996-2000, through generous replanting subsidies. The current and future projected status of land under rubber is shown in Figure 2-1.

Figure 2-1
Rubber Areas of Thailand



Source: Sanit Samosorn, 1996.

Projection of new planting by Burger and Smit (1994) indicate that the addition of new planting area will decrease steadily in the coming years as the government's expansion scheme in the Northeast approaches completion and the rising wage rate makes it uneconomical. By the year 2020 total area under rubber will decline from 12.3 million rai expected in 2002 to 11.1 million rai.

Production Trend

Rubber is predominantly a smallholder business in Thailand. There are only a few estates and smallholders account for over 95 percent of all planted area (Burger and Smit 1996, op. cit.). Rubber production in Thailand started as a smallholder activity. In 1960 the government, realizing that the necessary investment for developing the sector was lacking, started an ambitious program to increase the industry's output and productivity (Hobohm 1990). The rubber boom in Thailand started as a result of this. A special fund to assist rubber replanting was set up, financed primarily by a cess on rubber exports and external aid from the World Bank, UNDP, FAO, and CDC. The fund and the program are administered by the Office of the Rubber Replanting Aid Fund (ORRAF), which was set up in 1960 to aid farmers through improved plant stock, modern inputs, and cash grants. The rate of replanting has increased progressively over the years going from 7,600 ha per year in the early 1960s to 44,700 ha per year in the late 1980s. In addition to the replanting scheme, other important rubber development programs introduced by the government were the Self Help Land Settlement Scheme to resettle landless families to grow rubber on land unsuitable for other crops, a scheme for the development of large plantations under management of the Rubber Estates Organization, and various cash

incentives for the plantation of rubber. These government programs have given rubber a tremendous boost in Thailand, but there is still considerable acreage waiting for replantation and development in the non-traditional areas. The target for replantation in the period 1992-1993 was 26,600 ha and an additional 2,000 ha between 1994-1999. As a result of massive development Thailand's output of rubber has increased from a mere 170,000 tons in 1960 to 1.8 million tons in 1995 and its share of world natural rubber output has increased from 8.5 percent to 31 percent during the same period. Thailand is now the largest producer of rubber in the world, ahead of Indonesia and Malaysia and producing almost 25 percent over its closest rival, Indonesia, and 65 percent over the former world leader, Malaysia. By the year 2000, rubber output in Thailand should reach 2.3 million tons (IRSG 1996). However, Indonesia is closing the gap between itself and Thailand and is likely to takeover sometime in early 2000.

Consumption and Export Trend

Considerably small amount of rubber is consumed domestically in Thailand. In 1995, only 153,000 tons were consumed internally. However, the consumption is increasing as shown in Table 2-1. Most of the use is for making tires, although some

Table 2-1
Thailand's Rubber Consumption, 1992-1997
(Tons)

	<u>Consumption</u>	<u>Growth Rate</u>
1992	118,371	N.A.
1993	130,236	10.0%
1994	132,194	1.5%
1995	153,159	15.9%
1996*	168,520	10.0%
1997*	193,800	15.0%

*Note: * indicate projected values*
Source: The Thai Rubber Association, 1996

specialized products such as gloves, rubber bands and elastics are also manufactured with rubber. The composition of domestic rubber goods manufactured in Thailand is shown in Table 2-2. From the trend of rubber consumption for tires and tubes and the continued rise in the sales of motor vehicles in Thailand, it seems very likely that considerable internal rubber consumption will take place in the future years. Motor vehicle sales increased 17 percent between 1994 and 1995 and 14 percent between 1995-1996. Thailand also ranks second in the world for production of motorcycles which is adding a substantial demand internally for Thai rubber.

Table 2-2
Percentage of Rubber Consumption for Specific Products in Thailand

<u>Product</u>	<u>1993</u>	<u>1994</u>	<u>1995</u>
Automobile and Airplane Tires and Tubes	38.9	41.9	43.6
Motorcycle and Bicycle Tires and Tubes	7.2	7.8	7.5
Gloves	15.2	13.7	12.9
Rubber Bands	10.0	8.3	9.6
Elastic	8.0	9.1	8.0
Canvas Shoes and Foam Candle	7.2	5.1	4.8
Other Goods	13.5	14.2	13.6

Source: Sinchareonkul V. and W. Thainugul (1996).

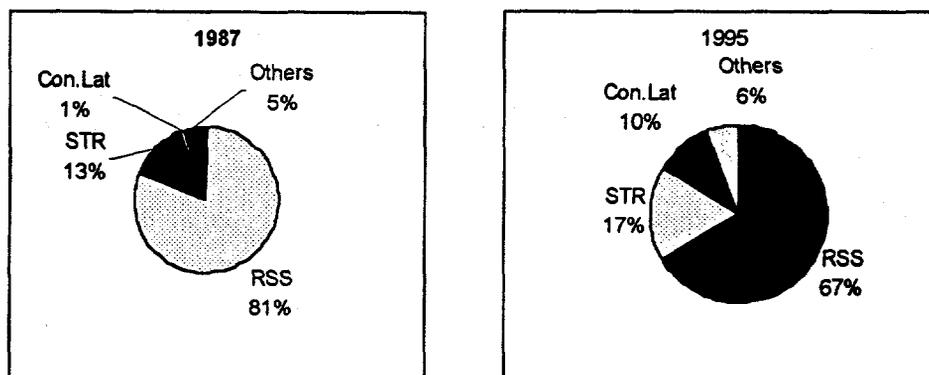
About 90 percent of the rubber produced in Thailand is exported, mostly in the form of RSS or ribbed smoked sheet rubber (67%), STR or block rubber (17%), and concentrated latex (10%). Export of crepe and skim rubber is very small (6%) in comparison (Sinchareonkul and Thainugul, *ibid.*). The proportion of STR (Standard Thai Rubber) in the overall export has gone up from 13 to 17 percent in the last eight years, but this increase is not as much as the increases realized by Indonesia and Malaysia (Table 2-3 and Figure 2-2). The major importer of Thai rubber in 1995 was Japan (34%) followed by USA (14%), the EC (13%), and China (9%). The bulk of Japanese rubber import (RSS) takes place from Thailand.

Table 2-3
Export of Specific Rubbers from Thailand, 1987-1995
 (Metric Tons)

	<u>RSS</u>	<u>STR</u>	<u>Con.Latex</u>	<u>Others</u>	<u>Total</u>
1987	706,602	113,638	10,363	42,610	873,213
1989	909,395	128,708	26,440	36,037	1,100,580
1991	977,073	158,974	61,076	34,823	1,231,946
1993	985,279	216,171	137,301	58,032	1,396,783
1995	1,086,865	279,281	169,109	100,278	1,635,533

Source: Sinchareonkul V. and W. Thainugul (1996).

Figure 2-2
Share of Specific Type of Exported Rubber, 1987-1995



Source: Sinchareonkul V. and W. Thainugul (1996).

Japan's import of Thai rubber increased from 466 thousand tons in 1989 to 562 thousand tons in 1995 but its relative share of the total Thai rubber export declined from 42 percent to 34 percent in the same period (Table 2-4). Export to China has been somewhat erratic, varying from 194 thousand tons in 1989 to 241 thousand tons in 1993, and falling to 150 thousand tons in 1995. Export to the United States, however, has risen steadily from 98 thousand tons in 1989 to 234 thousand tons in 1995. Similarly, export to the EC has also gone up steadily from 117 thousand tons in 1989 to 215 thousand tons in 1995. Other countries where Thai export has experienced a rising trend are South Korea, Malaysia, and Taiwan.

Table 2-4
Direction of Thailand's Rubber Export, 1989-1995
(Metric Tons)

Country	1989	1991	1993	1995
Japan	466,419	477,761	477,010	561,766
USA	98,398	127,022	183,653	231,859
EC	116,649	140,065	152,487	214,849
China	194,271	188,648	240,691	150,317
South Korea	34,683	51,974	78,329	93,758
Malaysia	17,771	17,357	63,008	108,404
Taiwan	22,643	39,225	42,839	10,059
USSR	6,716	5,611	19,387	8,632
Others	29,312	78,737	79,974	174,383
World	1,100,550	1,231,946	1,396,789	1,635,533

Source: *Sinchareonkul V. and W. Thainugul (1996)*.

Industry Structure

Organization: Rubber in Thailand has historically been a smallholder industry. The most recent published data show that in 1990 the extent of rubber land under small holders was 1.76 million ha (95%) and under the estates it was a mere 92 thousand ha (IRSG 1996). There are several government agencies responsible for rubber of which the notable ones are:

- *Rubber Research Institute of Thailand (RRIT)*: for research and development of new technologies and training of farmers and government workers.
- *Office of the Rubber Replanting Aid Fund (ORRAF)*: for implementing the replanting program.
- *Rubber Estate Organization*: for providing planting materials, agricultural tools, fuel, and other necessary materials required for rubber planting.
- *Department of Agricultural Extension (DOAE)*: for transferring technology to the farmers.

Productivity and Cost of Production: Rubber yield in Thailand has increased considerably over the years due to the government replanting effort, but the average yield is still below Malaysia's (Table 1-11). The country trails behind Malaysia even on labor productivity. A tapper on a Malaysian smallholding averages 1.94 tons per annum compared with 1.15 tons per annum in Thailand (Hobohm 1990, op.cit.). The low productivity, coupled with the relatively higher wage rates, offsets other advantages the county has in the cost of production (Table 1-12).

The cost of production of rubber in Thailand is high relative to its main competitors. In 1994, the COP was 17.99 Bahts per kg.⁸ This increased to 21.60 Baht per kg. in 1995 (Sinchareonkul and Thainugul, 1996, op.cit.).

Taxes and Subsidies: There is no significant tax on rubber production and export in Thailand. There is a nominal export duty and an export cess that is used to partially finance the activities of ORRAF. This cess is a form of government subsidy through which the farmers receive cash grants for meeting labor and material costs for replanting and new planting. The replanting grant is U.S \$1680 per ha over a period of seven and half years. Grants for new planting range from U.S \$615 to U.S \$640 per ha over a period of two and a half years (Hobohm, ibid.).

Marketing: There is a high degree of differentiation in the form of processed natural rubber exported from the three main rubber exporting countries. This specialization has developed a form of tie up between producers and consumers of rubber all over the world whose respective industries have adapted themselves to respond to each other's needs. In Thailand, a little over 67 percent of the rubber exported is RSS. With this high percentage of traditional sheet rubber, Thailand has aligned itself with Japan, where tire manufacturers prefer the visually graded RSS rubber to technically-specified rubber. The other important market for Thailand is the United States, with its steadily rising export. Thailand's international marketing infrastructure is well developed.⁹ The marketing information system is excellent and international distribution is easy. Important institutional arrangements for linking producers with processors and exporters with foreign buyers, such as market coordination, contract coordination, ownership integration, cooperative coordination and government coordination exist in some form or another.

Government Regulations: The government in Thailand intervenes from time to time for stabilizing rubber prices through the Rubber Estate Organization (REO). The floor price for intervention at this time is 25 Bahts per kg. for USS No.3 rubber. The government also sets minimum wages for the industry and a few provinces adjoining Burma have been allowed to import Burmese labor to meet their shortage. There is also a licensing requirement for the establishment of rubber factories. Apart from these, there is no significant government intervention in the industry.

⁸ A Baht is approximately 4 cents (US).

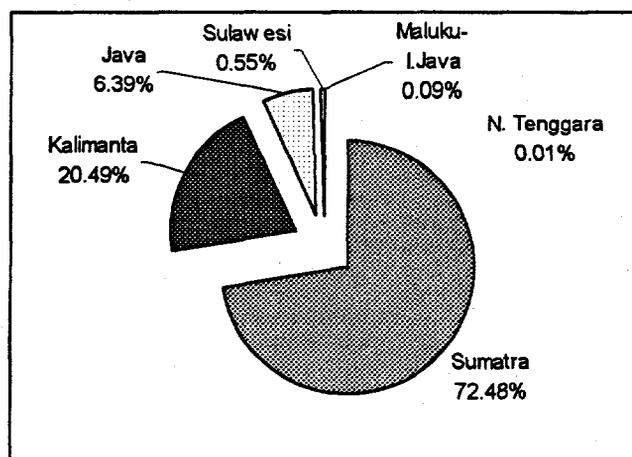
⁹ Most of the information in this section was obtained from a survey of rubber exporting firms in Thailand.

INDONESIA

Production Areas

Indonesia is the second largest producer of natural rubber in the world, after Thailand. Its production is highly centered in smallholdings, which account for 84 percent of the rubber production area, with the remaining land under government estates (8%) and private estates (8%). Total area under rubber stands at 3.58 million ha as of 1996. The two main growing areas are Sumatra with 72 percent of the rubber growing area and Kalimantan with 20 percent of the area. In Sumatra, the main regions are South Sumatra, Jambi, North Sumatra, and Riau with some small areas in Bengkulu, West Sumatra, Aceh and Lampung. Other minor areas are Java (6%), Sulawesi (0.55%), Maluku and I. Java (0.09%), and Nusa Tenggara (0.01%), as shown in Figure 2-3.

Figure 2-3
Main Rubber Growing Areas in Indonesia



Source: Statistical Estate Crops of Indonesia, Rubber- 1994-96

Area expansion under rubber from 1988-1996 has been a little over 2 percent per annum, with about the same rate of growth in both smallholder and government areas (Table 2-5). Only private estates showed a higher growth of 4 percent in this period.

Table 2-5
Area Expansion under Rubber, 1988-1996
(million hectares)

	Smallholder	Government	Private	Total
1988	2.46	0.26	0.23	2.94
1990	2.64	0.27	0.23	3.14
1992	2.75	0.27	0.27	3.29
1994	2.89	0.28	0.30	3.47
1996	2.94	0.30	0.33	3.58
Growth Rate	2%	2%	4%	2%

Source: Statistical Estate Crops of Indonesia, Rubber- 1994-96

Between 1994 and 1996 the largest expansion of rubber land took place in Java, but its holding in comparison to the total remained very small. Indonesia has substantial land for expansion of rubber in the future. Projections of future expansion by Burger and Smit (op.cit.) are shown in Table 2-6.

Table 2-6
Projected Area and Production of Rubber in Indonesia to 2000

	NES & SRDP Smallholders		Other Smallholders	
	Total Area (^{'000} ha)	Production (^{'000} tons)	Total Area (^{'000} ha)	Production (^{'000} tons)
1990	290	96	2350	793
1995	474	272	2258	793
2000	697	415	2158	797
2010	908	713	1958	799
2020	1083	795	1758	793

	Public Estates Area (^{'000} hectares)	Private Estes Area (^{'0000} hectares)	Total Production (^{'000} tons)
1990	247	235	362
1995	241	236	399
2000	233	238	420
2010	207	233	390
2020	179	235	348

Source: Burger and Smit (1994).

Production-Consumption Trend

Indonesia produces over 1.5 million tons of rubber per year, mainly in the provinces of North Sumatra, South Sumatra, Jambi, and West Kalimantan (Budiman 1996). Seventy-five percent of the production comes from the smallholder sector as shown in Table 2-7. Forecasted production increase for 2000 is 2.34 million tons and 2.70 million tons for 2010 (Utama 1996). If this projection holds true, Indonesia will overtake Thailand to become the largest rubber producer in the world by the year 2000.

Table 2-7
Rubber Production, 1988-1995
(^{'000} Metric Tons)

	1990	1991	1992	1993	1994	1995
Smallholders	913	919	1030	1102	1147	1155
Estates	362	365	368	373	357	380
TOTAL	1275	1284	1398	1475	1504	1535

Source: Statistical Estate Crops of Indonesia, Rubber- 1994-96

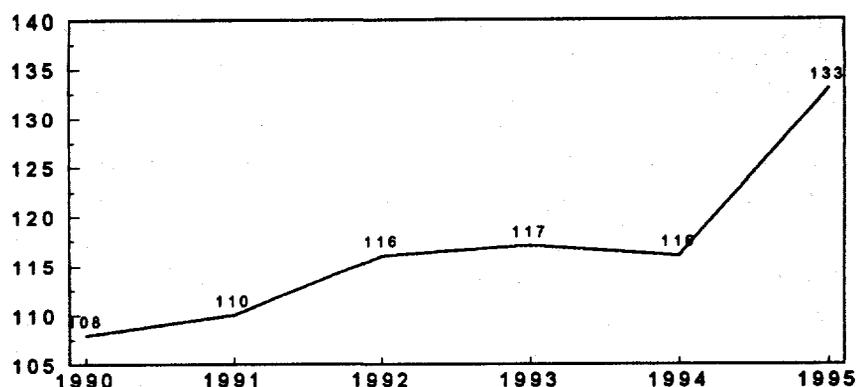
There are two categories of smallholder rubber producers in Indonesia, those organized in government development projects and independent producers. The government-managed smallholders are placed under two types of programs, the Nuclear Estate Program (NES) and the Project Management Unit Program (PMU). The NES is designed for developing new areas under rubber through the resettlement of landless farmers from overpopulated areas of Indonesia such as Java or Bali to potential rubber growing areas. A number of state owned companies (PTPs) are established as nuclear organizations to guide this resettlement. They develop the land through private companies and the smallholders are initially employed to provide the labor. When the rubber trees reach maturity, each smallholder is sold 2 hectares of the plantation on 15 years credit. Each project is equipped with a nucleus processing factory to which the smallholders must deposit the raw rubber they obtain from the tapings. The company pays them for the rubber received after deducting transport charges and the loan amortization using a pricing formula based on different grades of rubber at the FOB price level. In theory, the farmers are supposed to deliver to the factory-fresh filed latex and clean and loose cup lump. Due to lack of supervision at the tapping and primary processing stage, however, the farmers bring in mostly inferior coagula instead of fresh field latex (Budiman, op.cit.). Also, the majority of growers reluctant to pay the high administrative costs and loan repayment amounts at the time of sale sell their output to local traders as slab or cup lump at a higher price than what they would have gotten from the nucleus estate's factory (Utama, ibid.). The NES producers account for about 8 percent of all rubber producing households in Indonesia

The PMU schemes are primarily meant to assist existing rubber cultivators for replanting or new planting. Each scheme, administered by the Directorate General of Estates, sets up management units in areas of smallholder rubber growers to provide planting material, inputs, and credit to develop their holdings. The growers independently manage their holdings with some extension support from the scheme. They are also free to market their products without direction from the scheme management.

Most of the smallholder rubber growers (85%) do not belong to either the NES or the PMU schemes. They are mainly intercroppers who grow other food crops as well. Their cultivation practices for rubber are poor as a consequence of inadequate knowledge or training, making production efficiency very low. They follow a shifting cultivation cycle where a patch of forest is cleared and cultivated with rubber seedlings, generally gathered in the field, and other food crops (Utama, ibid.). After about three years when the land is depleted of essential nutrients, the annual cropping are abandoned, the growth of trees is retarded and tapping slows down. Poor tapping methods eventually exhaust the bark reserves and the area is finally abandoned. These factors provide very low efficiency of rubber production in the predominantly unassisted growers segment.

Indonesia consumes about 9 percent of its production of rubber. The consumption trend since 1990 shows a growth rate of about 3.5 percent per annum (Figure 2-4). The

Figure 2-4
Rubber Consumption in Indonesia, 1990-1995
(‘000 tons)



Source: IRSG, 1996, June

projected consumption of rubber in the year 2000, and 2020 are 117,000 tons and 271,000 tons, respectively (Burger and Smit, 1994, op.cit.).¹⁰ The projected growth rate of consumption between 2000-2020 is 4.3 percent.

Export Trend

Indonesia exports most of the rubber it produces. In 1995, it exported 1,323,800 tons of rubber -- an increase of 6.3 percent over the previous year. The past six-year trend shows that export of rubber increased at 2.9 percent per annum (Table 2-8) raising it from

Table 2-8
Rubber Export of Indonesia, 1990-1995
(‘000 tons)

	1990	1991	1992	1993	1994	1995
Latex Concentrate	31.7	59.3	39.4	40.7	35.1	25.8
Standard Indonesian Rubber	915.3	1,030.0	1,103.1	1,094.4	1,132.3	
Pale Crepe	0.4	0.3	0.5	1.0	0.7	
Brown Crepe	3.8	3.2	1.3	0.6	0.1	
Air Dried Sheets	0.9	1.4	1.4	0.7	0.7	
Skim Rubber	1.4	1.7	1.3	1.2	0.6	
TOTAL	1,077	1,220	1,268	1,214	1,245	1,324

Source: Budiman 1996 and IRSG 1996.

1.08 million tons in 1990 to 1.32 million tons in 1995. The growth has come primarily from Standard Indonesian Rubber (SIR), the export volume leader with 91 percent of the share of export. But, export of latex concentrate, the second most important grade, declined from 31,700 tons in 1990 to 25,800 tons in 1995. The United States has traditionally been the main recipient of Indonesia's direct rubber export because of the

¹⁰ The World Bank's projection for consumption by 2000 is much more conservative – 250,000 tons per year. See "Indonesia: Strategies for Sustained Development of Tree Crops", Agricultural Operation Division, Country Department V, December 7, 1989.

preference of U.S. tire manufacturers for technically-specified rubber. Export to the U.S. in 1995 was 620,700 tons or about 47 percent of Indonesia's total export. The second largest recipient was Singapore with an export of 145,100 tons. The share of all other countries, in comparison, was very small.

Industry Structure

Organization: Smallholders operating 2 ha of land or less produce over 75 percent of Indonesia's natural rubber. Government estates along with private estates, owned by Indonesian nationals or joint venture organizations and a small percentage of wholly foreign owned companies, account for the rest (EIU, 1990, op.cit.). Smallholders unassisted by any of the government schemes (NES or PMU) are the majority. They have low productivity and produce varying quality of products depending on the region. The Indonesian government undertook many different programs for raising the productivity and quality standard of rubber through provision of subsidized inputs and low cost credit. However, after 1970 this policy changed for supervised schemes where the farmers had to pay back by increasing output. The NES and the PMU schemes are examples of this strategy. The former is essentially a resettlement scheme for landless farmers in marginal areas. The problems encountered with the NES approach have been mostly structural. The beneficiaries in the scheme have generally lacked the knowledge and the motivation to make it work efficiently. The program was very costly, requiring over US\$4,500 to develop an acre. The PMU approach, on the other hand, has been more successful because it works with existing rubber growers to improve their output. Long-term loans, and good training programs have been the hallmark of this scheme; and it has worked well. The PMU approach comprises of two programs, SRDP (Smallholder Rubber Development Project and PRPTE (Undertaking for the Rehabilitation and Expansion of Export Crops). In both these projects, the farmer provides the land and the government the capital required to develop it. The cost of administering them is low for the government because the growers are already trained. Results obtained in the SRDP have been good with 68 percent of the planted area reporting satisfactory performance (Burger and Smit 1994, op.cit.).

Productivity and Cost of Production: Both the yield per ha and labor productivity in the rubber sector are low. The average yield in 1995 was 658.4 kg./ha, well below Malaysia and Thailand. There is a lot of variability in the yield between different growing regions, from 364 kg./ha to 985 kg./ha.¹¹ The average annual output per tapper is only about 160 kg. in the smallholder sub-sector, which is also well below Malaysia's 4.1 tons (EIU, op.cit.). The only reason why Indonesia has remained competitive in the world rubber market in spite of this low productivity is its low cost of production. Smallholder cost of production in the early 1990s was estimated to be \$420/ton and the estate cost of production was \$466/ton compared with \$837/ton for Malaysia and \$764/ton for Sri Lanka (Green 1991-II). The difference comes mainly from lower field costs although it is partially offset by higher transportation costs. Also, labor wages are quite low, which reduces the COP further.¹² Figures provided by the Directorate General of Estates in mid-

¹¹ Data source: *Statistical Estate Crops of Indonesia – Rubber, 1995.*

¹² The cost of unskilled labor in PTP Nusantara III in mid-1996 was US \$ 4.6 per day.

1996 however shows the cost of production to be Indonesian Rp. 2134 (US \$920) per ton in the public estates and Rp. 1956 (US \$ 850) per ton in the smallholder sector.¹³ This may indicate an erosion of the earlier cost advantage.

Labor Force: There is no shortage of labor in Indonesia's smallholder rubber sector. Wages are also quite low at about US \$4.6 for unskilled labor and US \$25 for skilled workers per diem.¹⁴ There are no mandated government labor requirements, except for the official minimum wages set for each region that has to be paid for 30 days of the month without any consideration of actual work days. This has contributed to the low labor productivity significantly.

Marketing

There are three main channels for rubber marketing in Indonesia, the semi-direct sales channel, the direct sales channel, and the indirect sales channel. Semi-direct sales take place through a producer's own sales organization in the buyer country, or through a buyer's agent in the producing country. There may be the use of at least one intermediary in the latter type of transaction. An estimate 0.1-0.2 million tons of rubber per year is traded this way. Direct sales channels link many producers directly with buyers and substantial intra-company transfers take place through the direct channel in large vertically-integrated multinationals. Direct sales are usually made by large factories that have capacities in excess of 1500 tons per month (Budiman, op.cit.). Most of the direct purchasers have an approved list of suppliers and it is difficult for smaller factories to be listed without first establishing their reputation for quality. Very often the quality requirement of the buyer exceeds the SIR specification. Also, most direct purchasers want advance commitment of specific volumes of supply, which only the larger producers can give. The price of the sale is set on the basis of two factors, a reference price and a premium or discount to be applied to the reference price. The latter is fixed at the time of the contract and the reference price floats up and down in conjunction with the market price. Indirect sales take place through a network of international dealers such as E.P. Lambert, Lewis & Peat, Cragill, and Marubeni. The principal centers for indirect trade are London, New York, Kuala Lumpur, and Singapore, which provide spot and futures trading. A number of smaller markets also exist in some European countries, like Paris and Hamburg, and in some of the major producing countries like Indonesia, Thailand and Sri Lanka. Some informal trading also takes place between the major international rubber dealers on the basis of futures contracts.

The production and marketing system are slightly different for the estates and the smallholders. In the estates, fresh field latex is centrifuged or creamed to produce latex concentrate (containing 60 percent dry crumb rubber), or processed Ribbed Smoked Sheets (RSS) or latex grade rubber (Utama, op. cit.). The cup lumps are processed to produce Technically-Specified Rubber of different grades. Smallholder rubber, on the other hand, is strained and used to produce coagulated unsmoked sheets which can be air-dried. Air-dried sheets are preferred for production of Standard Indonesian Rubber (SIR).

¹³ On the basis of data collected from a field survey as a part of this study.

¹⁴ This was the cost of labor in PTP Nusantara III, Medan, in mid-1996.

However, a lot of the smallholder rubber appears as slab rubber (40-60 percent dry) which contains impurities.

The first intermediary in the channel of distribution may be local dealers who buy the rubber from producers and sell it to larger regional dealers or processors. The rubber factories procure raw rubber through a large number of intermediaries and since many factories have surplus capacity there is usually an intense competition for the procurement of raw rubber. The final buyers, operating through a number of approved suppliers, make their purchase on the basis of their own quality standards, and prices. Direct sale of rubber also takes place through international dealers such as Cargill, E.P. Lambert, Marubeni, and C. Itoh.

In spite of the presence of both direct and indirect sales channels, the traditional rubber middlemen do not offer price and promotional incentives to producers. The prices offered to smallholders are low for all grades of rubber which reduces smallholders' motivation to go for quality output. The Indonesian Rubber Association (GAPKINDO) is trying to remedy this problem. The government is also trying to make the smallholders produce thin rubber sheets to reduce the content of water and extraneous matters.

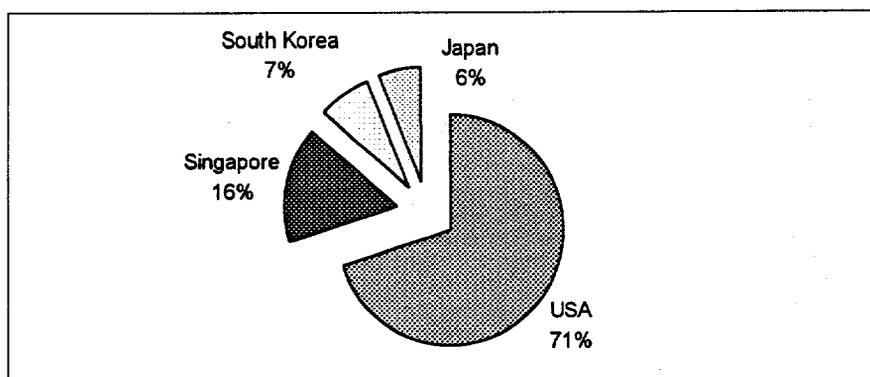
The presence of a large number of local and regional traders ensures competition in the marketing of rubber. Smallholders are generally well informed about market prices and equipped to deal with buying agents and dealers. The marketing margin for the farm-export market chain varies between 24 to 29 percent of the export value (Barichello 1995). This low level of marketing margin is an indication of the efficiency of the system. There are also sufficient processing plants to provide competition in processing. The export marketing channel is also fairly competitive. The price of rubber in the market is also freely determined and is closely related to the world price.

A few problems, however, do affect the marketing of rubber in Indonesia. The most important of these are the quality and consistency of field rubber, which eventually determines its price. The extent of cleanliness varies in time and between areas and so do the use of coagulating chemicals at the farm level (Boarichello 1995, op.cit.). This makes grading and pricing a cumbersome task for the processors. International buyers also face the same problem with Indonesian rubber. The uncertainty sometimes adds a discount on the price of Indonesian rubber in the international market.

Overall, the industry is quite competitive in Indonesia and there are no counterproductive government policies to hinder its growth.

The principal importer of Indonesian rubber is the United States followed by Singapore, South Korea and Japan. Their respective shares of the country's total export are shown in Figure 2-5.

Figure 2-5
Direction of Export of Indonesian Rubber, 1995.



Source: IRSG, Rubber Statistical Bulletin 1996.

Quality and Marketing Margins

Rubber prices are a function of quality, much of which depends upon the cleanliness of the product (i.e., absence of dirt and foreign particles), quality in terms of physical property (e.g. plasticity), and quality in terms of material consistency across different shipments of rubber to the same customer. Indonesian rubber suffers from all of these three quality defects (World Bank, 1989). Looking at the price of rubber coming from different sources in Indonesia between 1985 and 1987, one finds that the Small Holder Rubber Development Project (SRDP) has consistently outperformed others in price because it produced clean, thin, airdried sheets (Table 2-9). Farmers who produce clean farm rubber receive 71-76 percent of the export price with a resulting marketing margin of 24-29 percent (Barichello (1995). Indonesian rubber growers also receive fairly high margins in terms of wholesale prices, from 75 to 85 percent, whereas for most farm commodities in developed countries, farmers receive less than half of the wholesale price.

Table 2-9
Price of Rubber Received by Smallholders under Different Programs
(Rs/kg.)

Year	SRDP Price	PRPTE Price	Partially Assisted Price	Average Smallholder Price
1985	522	430	442	450
1986	692	659	561	576
1987	1078	893	756	577

Note: Prices are dry rubber content prices.
Source: World Bank (1989), and FAO.

The marketing system thus operates efficiently with low margins and prices move freely in the system and are closely related to world prices.

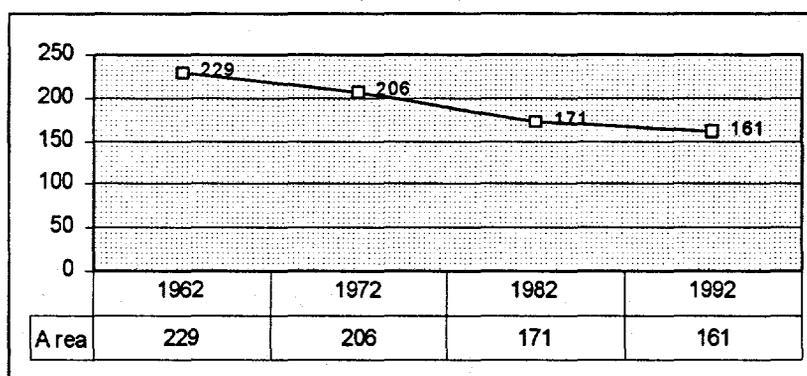
SRI LANKA

Production Areas

Rubber is grown mostly in the wet zone of the island that has two monsoons in the year. Over half the planted area is in the districts of Kalutara and Kegalle and most of the remaining areas are in Ratnapura, Colombo, Galle, Matara, Matale, Kandy, Kurunegala, and Badulla. The rubber economy of Sri Lanka has stagnated in the last 25 years and production area has declined as more and more land has been diverted to other crops (Figure 2-6).

Of the approximately 161,000 hectares of rubber in 1994, about a third is held by smallholders and the rest by estate companies. The Sri Lankan government has provided generous incentives both for developing the rubber industry since the 1980s. The Rubber Smallholder Rehabilitation Project, launched in 1981, provided finances to replant 18,000 acres of smallholder land in the Districts of Kalutara, Kegalle, and Ratnapura. The

Figure 2-6
Area under Rubber in Sri Lanka, 1962-1993
('000 ha)



Source: *Plantation Sector Statistical Pocket Book, 1995.*

Medium Term Investment Program (MTIP) was directed towards rehabilitation of the state plantations through large scale planting and replanting of 12,000 hectares. The extent of the new plantation and replanting over the period 1989-1994 is shown in table 2-10.

New plantation dropped substantially in 1992 from the previous year's level. Most of the land suitable for rubber has been exploited already and some is being diverted to other uses. The replantation rate has also dropped steadily over the years (Table 2-10) in spite of government efforts to reverse the trend. The World Bank assisted Smallholder Rubber Rehabilitation Project I (SRRP-I), which ended in 1987, was successful in achieving a replanting rate of nearly 6000 ha./year for five years. SRRP-II, that started in 1988, had by 1996 achieved 70 percent of its target of replanting 30,000 hectares and new planting of 8,750 hectares (IRSG 1996, op.cit.).

Table 2-10
Area of New Plantation and Replantation, 1989-1994
(Hectares)

Year	New Plantation	Replantation
1989	1,247	6,148
1990	1,297	5,201
1991	1,602	3,507
1992	612	2,092
1993	907	2,418
1994	671	1,624

Source: Plantation Sector Statistical Year Book, 1995, Colombo.

Production, Consumption and Export Trend

Since the 1950s, Sri Lanka has steadily lost market share to overseas competitors. Between 1952 and 1972, production increased by 1.8 percent a year (from 98,000 tons to 140,000 tons), compared to a world increase of 2.8 percent (Green 1991-I). However, between 1972 and 1990, Sri Lankan production declined by about 22 percent, due to reductions in cultivated areas, despite yield increases of 4.5 kg./ha (Green 1991-II). Output from government estates fell an average of 2.30 percent per year between 1980-1992, compared to about 1.30 percent in the private holdings (Table 2-11). Growing internal demand reduced exports by 46 percent in the period 1970-1990.

Table 2-11
Rubber Production
('000 metric tons)

	Private Sector	State Sector	Total
1980	82.70	50.50	133.20
1990	81.20	41.80	123.00
1992	69.5	36.6	106.10
Growth Rate (P.A)	-1.3 %	-2.3 %	-1.69 %
Share (1992)	65.50 %	34.50 %	100%

Source: Alan Green, 1991, Plantation Sector Statistical Pocket Book, 1993.

The production of natural rubber in Sri Lanka declined from a level of 137 thousand tons in 1985 to 105 thousand tons in 1995 – an average of 2.3 percent per year (Table 2-12). This is mainly attributed to an average annual reduction of 2.17 percent in planted area – from 206,650 hectares in 1985 to 161,400 hectares in 1995 (IRSG 1996). In 1995, production increased marginally by 0.4 percent over the previous year, which may indicate a reversal of the steady decline from 1985 to 1994.

Domestic consumption of rubber in Sri Lanka has gradually increased in the past ten years – from 11 percent of total production in 1985 to 35 percent in 1995 (Table 2-12). The increasing home demand has reduced the availability of raw rubber for export, which declined over 44 percent (from 122,400 tons in 1985 to 68,300 tons in 1995). This

was due to a concerted effort by the government and the industry to increase the value-added component of the rubber export from Sri Lanka.

Table 2-12
Production, Consumption and Export of Natural Rubber, 1985-1995
(’000 tons)

Year	Production	Consumption	Export	Consumption Growth
1985	137.5	15.1	122.4	11.0
1986	137.8	16.4	121.4	11.9
1987	121.8	19.4	102.4	15.9
1988	122.4	19.4	103.0	15.8
1989	110.7	21.0	89.7	19.0
1990	113.1	23.6	89.5	20.9
1991	103.8	26.8	77.0	25.8
1992	106.1	28.8	77.3	27.1
1993	104.2	33.4	70.8	32.1
1994	105.3	36.4	68.9	34.6
1995	105.7	37.4	68.3	35.4

Source: IRSG, Rubber Statistical Bulletin 1996.

The prevailing high rubber prices in the world market may create more incentives for production in the future. The forecast shows that production will go up to 123,000 tons and consumption to 61,500 tons (50%) by the year 2000 (Table 2-13). This would leave the country with an exportable surplus of about 61,500 tons in 2000.

Table 2-13
Production, Consumption and Export Forecast
for Rubber in Sri Lanka
(’000 Tons)

	Production	Consumption	Export
1996	110.0	44.0	66.0
1997	113.0	48.0	65.0
1998	116.0	53.5	62.5
1999	119.0	57.0	62.0
2000	123.0	61.5	61.5

Source: Burger and Smit 1996.

Beyond 2000, the production of rubber in Sri Lanka is expected to increase until about 2005, when it will probably reach a peak of 145,000 tons (Burger and Smit 1996). After that it will start declining, going down to 116,000 tons in 2010 and 82,000 tons in 2020.

The composition of rubber production in Sri Lanka has changed over the years, with a gradual shift towards latex, TSR, and sole crepe and away from sheet rubber (Table 2-14). The share of the dominant RSS grade has fallen over the years along with

the total output. There is, however, a good demand for RSS and scrap crepe from the growing domestic tire industry. Sri Lanka has about 15 percent of the world solid tire manufacturing capability, which is expected to rise with the addition of new capacity.¹⁵ The world demand for this type of tire (for fork lifts and heavy equipment) is around 10 million units annually, worth \$200 to \$300 millions.

Latex and high-grade crepe rubber are used for many products ranging from surgical gloves to hot water bottles. High growth in latex was mostly driven by domestic demand, which absorbed almost 95 percent of output in 1989. Sole crepe, which commands a premium, accounts for less than 3 percent of production.

Rubber exports of Sri Lanka declined by 45.8 percent between 1970 and 1990, because of rising domestic demand. The ratio of export to output declined from 98 percent in 1970 to 79 percent in 1990, while domestic consumption to output rose from 2 percent to 21 percent during the same period (Tan 1991). Lower grade TSR replaced much of the old RSS after 1979. The country's main export in 1994 was RSS (34 %), followed by Latex Crepe (23 %), TSR (7 %), and Sole Crepe (3%), and Latex (3%), as shown in Table 2-15. The export of latex has increased substantially since 1992, probably because of the takeover of the state plantations by private companies.

Table 2-14
Rubber: Composition of Production, 1985-1995
(%)

	RSS	Sole Crepe	Scrap Crepe	Latex Crepe	TSR	Latex & Others
1985	47.9	3.0	4.5	30.0	10.0	4.6
1986	45.3	3.2	5.4	31.6	10.3	4.2
1987	46.6	3.8	6.5	28.8	9.6	4.7
1988	51.4	2.4	4.0	27.5	11.6	3.1
1989	49.0	2.4	3.3	28.3	12.6	4.4
1990	51.9	3.3	4.4	25.8	8.7	5.9
1991	49.4	2.4	7.1	27.7	6.5	6.9
1992	42.3	3.4	4.7	23.5	14.6	11.5
1993	42.0	3.7	4.1	24.2	13.4	13.6
1994	38.8	3.8	4.2	28.6	10.9	13.7
1995	39.9	2.6	2.8	27.7	21.7	5.3

Source: IRSG 1996

Sri Lanka's share of the world rubber export in 1995 was 1.60 percent. The major international markets for Sri Lanka's rubber are Pakistan, Iran, Germany, Italy, the U.K., Poland, and Japan. Sri Lanka exports RSS, latex crepe, and sole crepe to Western and Eastern Europe. The Indian subcontinent imports primarily low-grade RSS and latex crepe. The import of Sri Lankan rubber in these and other countries is shown in Table 2-16.

¹⁵The European Rubber Journal, April 1993.

Table 2-15
Composition of Rubber Export From Sri Lanka, 1985-1994
(‘000 tons)

	RSS	Latex Crepe	TSR	Sole Crepe	Latex	Total
1985	64.5	33.9	13.9	4.4	0.6	120.4
1986	57.0	31.6	14.3	3.0	0.3	110.0
1987	54.3	32.7	12.6	3.2	0.5	106.0
1988	51.2	29.7	13.7	2.0	0.5	99.3
1989	42.6	25.4	13.7	1.9	0.3	86.0
1990	48.3	26.7	1.3	3.7	1.0	86.7
1991	38.7	25.4	3.7	1.9	0.7	76.3
1992	38.2	22.1	11.2	2.5	4.1	78.6
1993	36.1	21.8	6.7	2.6	2.1	69.6
1994	33.7	22.6	6.7	2.9	3.0	69.1

Source: Government of Sri Lanka, Plantation Statistical Pocket Book, 1995.

Table 2-16
Trend of Rubber Import from Sri Lanka
(‘000 tons)

	1992	1993	1994	1995	Growth Rate
Pakistan	9.0	9.0	10.1	8.6	-1%
Iran	1.3	3.9	6.0	7.8	23%
Germany	6.6	4.7	5.0	5.6	-3%
Italy	3.2	4.1	4.3	4.2	4%
U.K.	10.1	5.6	10.2	4.3	-13%
Poland	9.2	5.2	5.0	2.8	-19%
Japan	3.3	3.1	3.4	3.1	-1%
Spain	1.9	3.2	3.1	3.4	9%
Others	34.0	30.8	22.0	28.4	-3%
Total	78.6	69.6	69.1	68.2	-2%

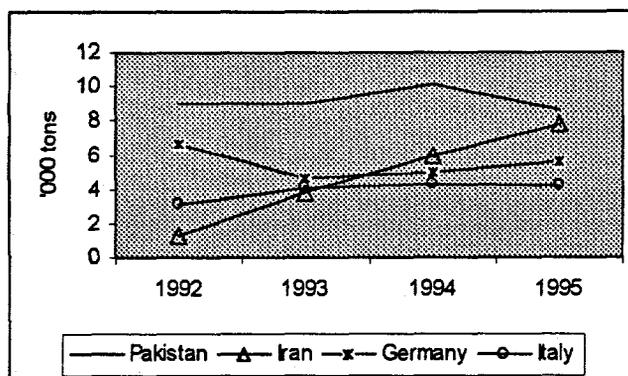
Source: IRSG Rubber Statistical Bulletin, June 1996.

The export trend in the top four markets show that Iran was ahead of all others in terms of export growth between 1992-1995, with an impressive 23 percent growth rate per annum (Figure 2-7). Spain and Italy were also good export markets with 9 percent and 4 percent annual growth, respectively. There was a decline in the export to Pakistan between 1994 and 1995, which could be a single year deviation, and Pakistan still remains the largest export market for Sri Lanka.

Countries in Eastern Europe buy mostly TSR and scrap crepe (lower grade) from Sri Lanka. These countries use RSS to complement their own synthetic rubber. Western European countries, however, use RSS in the production of specialty rubber.

Demand for rubber is influenced by the level of manufacturing technology in the importing countries. Sale of high grade and specialty rubber requires a good understanding of the market structure and needs of the buyers for rubber with specific technical properties.

Figure 2-7
Trend of Export to Major Buyers, 1992-1995



Source: IRSG Rubber Statistical Bulletin, June 1996.

Crepe rubber, a dominant export product of Sri Lanka, commands a premium price in the world market. But Sri Lanka has not done enough to develop this market. Specialty rubber has to be custom-made and mass-marketing does not work well in quality conscious markets. Since 90 percent of the specialty rubber comes from state plantations, which in the past have not gone outside the traditional broker-auction channel, the penetration of the market for quality rubber has not happened in Sri Lanka. Private companies now managing the state plantations are trying to establish direct marketing links with specialty rubber buyers overseas. The development of promotion channels for specialty rubber has also lagged in Sri Lanka. The absence of a rubber export promotion agency is noticeable.¹⁶ With the changing pattern of consumption in the 1990s and beyond, and manufacturers of finished products seeking consistency, uniformity and other high technical characteristics, the need for a body to provide advisory and marketing support services becomes important.

Industry Structure

Sri Lanka's rubber industry is dominated by private smallholders who produce two thirds of the output, the rest coming from state plantations. The output of government estates fell an average of 2.30 percent per year between 1980-1992, compared to about 1.30 percent in the private holdings (Table 2-17).

A lot of rubber processing in the smallholder sector is done through Group Processing centers (GPC), which provides some amount of quality control. The State Rubber Manufacturing Corporation (SRMC) is involved with the improvement of quality of smallholder rubber with central processing facilities. Two important institutions assisting marketing are the Commodity Purchase Department (CPD), and the All Ceylon Rubber Co-operative Societies Union (ACRCSU), who purchase the smallholders' rubber for onward sale. The CDP has a number of depots scattered over the country for purchasing rubber from small tapers. It also supplies inputs, such as chemicals needed for

¹⁶There is no equivalent to the Tea Board for rubber in Sri Lanka.

extraction, at a cost to the producers. The ACRCU directly purchases rubber from its members (Burger and Smit 1994, op.cit.).

Table 2-17
Rubber Production in Estate and Private Holdings
(’000 metric tons)

	Private Sector	State Sector	Total
1980	82.70	50.50	133.20
1990	81.20	41.80	123.00
1992	69.5	36.6	106.10
Growth Rate (P.A)	-1.3 %	-2.3 %	-1.69 %
Share (1992)	65.50 %	34.50 %	100%

Source: Alan Green, 199-II, *Plantation Sector Statistical Pocket Book, 1993.*

The estate rubber is produced in plantations managed by the recently restructured state plantation companies. Some of them have been privatized with long-term leases and the others are earmarked for privatization within a short time.

Productivity: State sector productivity, which was almost double that of the smallholder fifteen years ago, has steadily fallen while private sector productivity has risen to the point that they were almost equal in 1992 -- at about 800 kg./ha (Table 2-18 and Figure 2-8). In 1994, after the private management companies had time to improve some of the operating conditions in the plantations, the average estate yield went up to 960 kg./ha. This, however, is much lower than competing countries (such as Malaysia and Thailand) where average yields generally exceed 1400 kg./ha (Government of Sri Lanka 1989). The yield is, however, better than the average yield of 658.4 kg./ha obtained in Indonesia. In Sri Lanka, the highest yields are found on holdings of less than 0.16 ha and the lowest on holdings of 1-2 ha. Yield also increases with density of planting.

Table 2-18
Rubber Yields in Private & State Sectors
(kg/ ha)

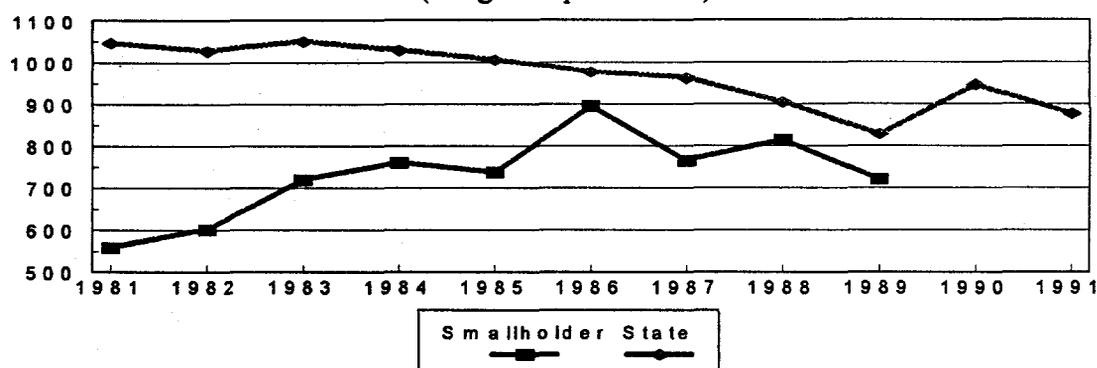
	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Small Holder	719	760	737	895	765	814	720	NA	NA	NA	NA	
State Mgmt. Cos.	-	-	-	-	-	-	-	-	-	882	880	960
Overall	818	840	818	919	824	841	766	NA	NA	NA	NA	NA

Source: *Plantation Sector Statistical Pocket Book, 1995; Suan Tan 1991.*

Some of the reasons for Sri Lanka's low yields are:¹⁷

- Rugged terrain making planting and tapping difficult.
- Sub-optimal tapping and low tapping intensity.
- Poor agronomic practices.
- High output losses in the rainy season.
- Use of stimulants during slaughter tapping.
- Low use of fertilizer.

Figure 2-8
Rubber Yields for Smallholders and Estate Sectors, 1981-1991
(kilograms per hectare)



Source: *Plantation Sector Statistical Pocket Book, 1995; Suan Tan 1991.*

Cost of Production and Profitability: The 1985-1994 cost of production and profit margins for state plantations and small holders and are given in Tables 2-19 and 2-20.

Table 2-19
COP and Profitability(Estates)
(Rs/kg)

Year	COP	% Change	Sale Price	% Change	Margin	% Change
1985	17.27	23.18	17.58	14.75	0.31	-76.1
1986	18.70	8.30	21.55	22.58	2.85	822
1987	20.10	7.48	20.20	-6.26	0.10	-96.5
1988	23.95	19.15	27.12	34.20	3.17	300
1989	28.63	19.54	25.49	-6.01	-3.14	-195
1990	28.98	1.20	25.67	0.70	-3.31	-5.4
1991	29.87	3.07	24.61	-4.13	-5.26	-58.9
1992*	32.40	8.47	35.32	4.35	2.92	280
1993*	39.88	23.0	38.75	9.71	-1.13	-100
1994*	38.19	-4.3	50.04	29.19	11.85	1400

Note: * Under private management companies

Source: *Plantation Sector Statistical Pocket Book, 1995.*

¹⁷Suan Tan, op.cit.

The state sector's profit margin has consistently been lower than that of the private sector and was negative from 1989-1991 (Table 2-19). It has turned positive since the takeover by the private management companies. Moreover, year-to-year, the margins have been unstable and a disincentive for investment.

Table 2-19
COP and Profitability(Private Sector)
(Rs/kg)

Year	COP	% Change	Sale Price	% Change	Margin	% Change
1985	10.50	9.4	14.47	16.5	3.97	40.8
1986	10.93	4.0	15.49	7.00	4.56	14.9
1987	11.23	2.7	17.82	15.0	6.59	44.5
1988	13.41	19.4	21.26	19.3	7.85	19.1
1989	15.00	11.9	19.89	-6.40	4.89	-37.1
1990	17.83	18.86	20.43	2.70	2.60	-46.6
1991	19.96	11.95	22.38	9.50	2.42	-7.3
1992	20.50	2.50	29.28	31.81	8.80	266
1993	23.00	12.19	35.66	21.78	12.66	43.86
1994	24.90	8.26	50.34	41.16	25.44	100.10

Source: ADB, *Crop Production Incentive Study, 1990; Plantation Sector Statistical Pocket Book, 1995.*

Factors Affecting Profitability

Export Marketing & Distribution: Traditional channels for marketing rubber (through middle-level dealers operating in the principal rubber-growing areas and the bi-weekly Colombo auction) may work for low-grade rubber but not for specialty rubbers. Direct marketing and development of channels to special market niches overseas should move rubber out of the commodity market and into the specialty markets which command better prices.

Sri Lanka has attempted some centralized group processing. Under this system, a group organization gathers unprocessed rubber from over 160,000 individual smallholders and determines the best processing for optimal quality output. Sri Lanka needs to develop this system further. It may also experiment with the Thai model of Group Marketing Centers, where a group of smallholders form a joint venture to weigh, grade and sell their product. This gives some economies of scale and higher bargaining power.

Labor Wages and Productivity: The same factors behind the rise in production costs of tea are responsible for rising costs in rubber also. Spiraling wages, COLA, and incentive pays accounted for more than 75 percent of cost increases for rubber in 1984 and 1988.¹⁸

¹⁸The Core Group Report, op.cit.

Other factors are the six day work week and the immobility of labor from one estate to another.

Taxes and Subsidies: The export duty on rubber was abolished in December 1992. There are no other taxes on rubber, except for five rubber export cesses (Table 2-21), the proceeds of which are mostly channeled back into replanting/new-planting by smallholders. In the absence of a functioning smallholder credit system, the export cesses serve as a "second best" financing mechanism for the relatively large expenditures associated with rubber-tree replanting/new-planting which usually occur only once in a smallholder's working life time. There is also a licensing requirement for the direct sale of rubber to overseas buyers.

Table 2-20
Rubber Cess Rates in Sri Lanka, 1995.

	Rs/Kg.
Rubber Control Cess	0.04
Rubber Replanting Cess	3.85
Rubber Research Cess	0.50
Medical Cess	0.02
Export Development Board Cess	0.50

Source: *Plantation Sector Statistical Pocket Book, 1995.*

The government supports development of smallholder rubber through two cess-funded, so called "subsidy" schemes for replanting and new planting. The Rubber Replanting Subsidy Scheme, administered by the Rubber Development Department, provides cash grants of Rs 37,050 per hectare for the replanting of old, uneconomic rubber trees (Burger and Smit 1994, op.cit.). The New Planting Subsidy Scheme, introduced in 1978, provides a subsidy of Rs. 35,815 for each hectare of new land planted with rubber.¹⁹ The "subsidies" paid out by the government between 1985-1994 are shown in Table 2-22.

Table 2-21
Cess-Funded "Subsidy" Payments to Smallholders, 1985-1994
(Million Rupees)

Year	Replanting	New Planting	Total
1985	121.1	27.9	149.0
1986	106.4	29.1	135.5
1987	94.1	32.1	126.2
1988	87.2	26.1	113.3
1989	93.9	28.7	122.6
1990	114.0	35.6	149.6
1991	106.3	35.4	141.7
1992	96.7	30.9	127.6
1993	104.7	32.6	137.3
1994	85.9	28.0	113.9

Source: *Plantation Sector Statistical Pocketbook, 1995*

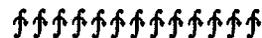
¹⁹ Source: *Plantation Sector Statistical Pocketbook, 1995.*

International Competitiveness

The DRC ratio for the smallholder rubber sector in Sri Lanka is 0.41 and for the state sector 0.69, both of which are evidence of the industry's strong comparative advantage in world markets.²⁰ However, a comparison of the cost of production of six rubber growing countries shows the relatively weak position of Sri Lanka's state sector vis-à-vis Indonesia, Thailand, Nigeria, and Zaire, but better standing against Malaysia and Cote d'Ivoire (Table 1-12). Smallholder rubber, however, is fairly competitive against all major producers, except Indonesia.

Industry Prospects

The future of the rubber industry in Sri Lanka is tied to demand growth in the Asia Pacific region and the ability of the industry to increase its productivity, lower its cost of production, and develop specialized high-grade rubber marketing. Even though it is overshadowed by the three Asian giants (Thailand, Indonesia, and Malaysia), Sri Lanka still has a great potential in high-grade rubber. Its realization, however, will require a significant restructuring of production and marketing technologies. Sri Lanka's smallholder rubber cost of production and wage rates are lower than Malaysia and Thailand, which gives it an edge over these giant competitors. It also has an entrepreneurial private sector which should do well given the right incentives.



²⁰ The DRC is the economic value (in shadow prices) of domestic resources (primary, not traded factors of production) in the production of a commodity to the domestic value added. Comparative advantage exists only if the DRC is less than 1.

PART TWO

**THE PRODUCTION AND MARKETING OF
RUBBER: STRATEGIC ISSUES**



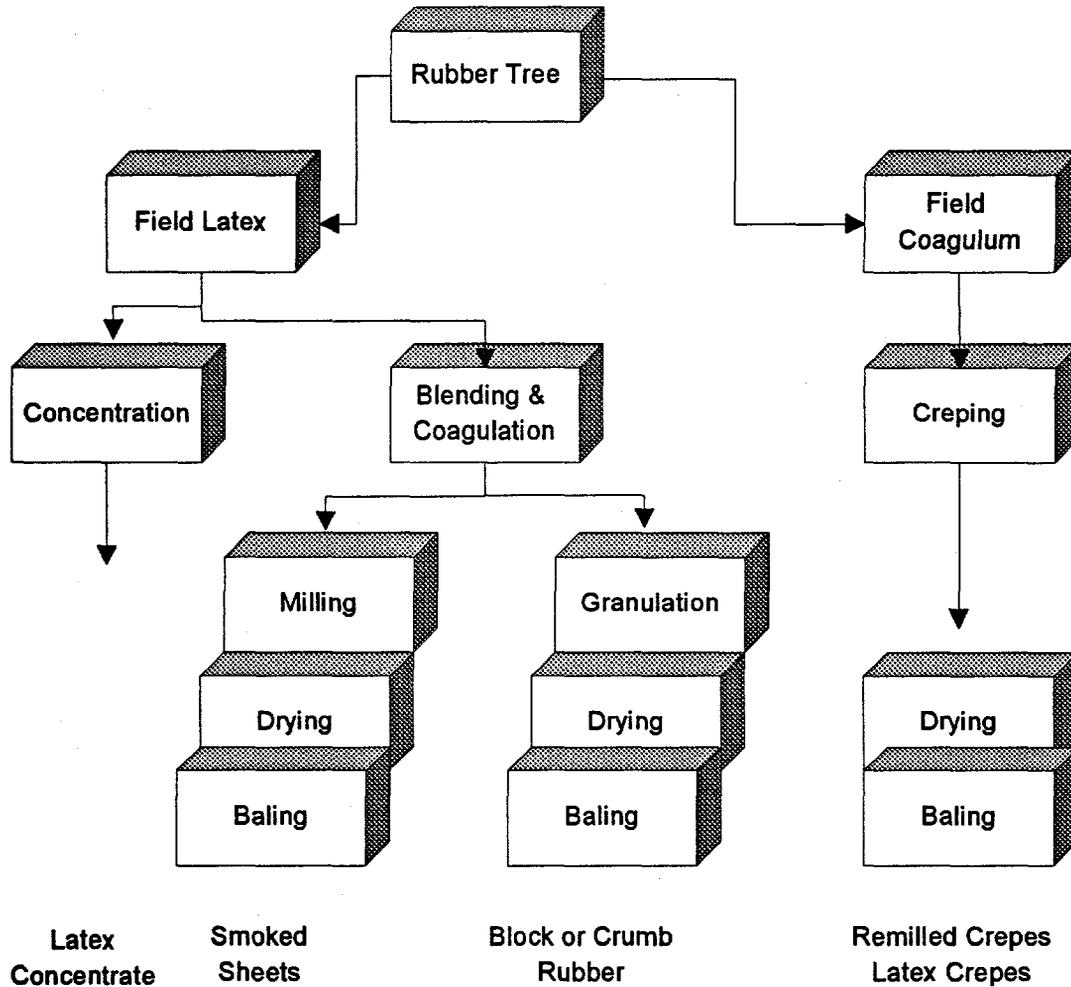
CHAPTER 3

RUBBER: PRODUCT-MARKET SYSTEM AND COMPETITIVE DYNAMICS

The worldwide marketing of rubber involves many different industries and many different processes that constitute the value chain where specific values are added at each link of the chain. The physical commodity thus flows from the basic stage (raw rubber) through the intermediate stages (smoked sheet rubber) to the final stage of end product (TSR). Each stage is associated with a particular industry. In the manufacturing, processing, and marketing of rubber, many different channel members may be involved (Figure 3-1). At the first level there is the producer, who may sell the field latex or coagulum to a rubber factory that would process the raw rubber into many different forms and then sell the semi-manufactured rubber in an auction to a buyer through brokers or agents. The buyer may then sell the rubber to a rubber goods manufacturer who, after another round of processing, may sell the final product through wholesale distributors and retailers to the end consumers. Accompanying the above physical commodity flow, there may be other flows in the production-consumption chain such as information flow, financial resources flow, and ownership rights flow.

Most commodity systems consist of a number of horizontal and vertical structural elements. The former relates to the entry and competitive system prevailing within the industry and the latter relates to the channel that moves the products through the production-processing-distribution system. Coordination of various functions is an important aspect of commodity system management, particularly when it becomes necessary to link various individual units to accomplish a common goal. For example, it is absolutely necessary to link individual rubber producers with intermediate factory processors and marketers (including brokers and exporters) to have a smoothly flowing system with optimal efficiency. In some countries the task of vertical coordination is performed by the government, as for example in the small holder rubber sector in Thailand. The form and extent of government involvement may vary across countries, from quasi-government institutions where the small rubber producers have a stake in the governance to pure governmental bodies such as the Rubber Estate Organization in Thailand, which provides planting materials, agricultural tools, fuel and other necessary materials to the growers. The Thai Central Rubber Exchange, which provides communications facilities to local auction markets, is coordinated by the government.

Figure 3-1
Natural Rubber Processing



Source: The EIU 1990.

INTRINSIC BARRIERS WITHIN A COMMODITY SYSTEM

Commodity systems in developing countries, in general, face a number of intrinsic barriers that produce many adverse effects on the flow of physical, financial, and informational resources (Jaffee, Steven, and Gordon 1992). The most important of these barriers and the way they affect the efficient production and marketing of rubber are shown in Table 3-1.

Table 3-1
Intrinsic Barriers in the Rubber Production-Marketing System

Barriers	Physical Flow	Financial Flow	Informational Flow
<u>Product Characteristics</u>			
Bulkiness Heterogeneity	High High	High	
<u>Production Support Characteristics</u>			
Geographical dispersion Unstable production Long gestation period Public goods nature of market and technical information	High High	High High High	High High High
<u>Processing and Distribution Characteristics</u>			
Public goods nature of transport and communication infrastructure	High		Medium

Source: Adapted from Jaffee, Steven and Gordon, 1992.

Although rubber is not a perishable commodity, the collection and field processing of raw rubber has to be contamination free to preserve the quality of the latex. These constraints reduce the marketing strength of the producer in addition to creating risks of product loss or decline in value during the initial processing.

Rubber is grown in many geographically-dispersed areas and by a large number of small farmers. This impairs the ability of the marketing system to move the product efficiently in the absence of good transportation infrastructure. The cost of agglomerating, sorting, grading, transporting, and distributing is also high when many producers are involved. Underdeveloped financial markets in almost all the producing countries also make it difficult for such small and dispersed enterprises to obtain business loans on reasonable terms. Problems of information deficiency and asymmetry are also accentuated in this type of market. Geographically-dispersed producers frequently face the problem of monopsonic trade with a limited number of buyers participating in the market. This is particularly true in the rubber markets of many developing countries.

Some of the infrastructure and information resources needed for effective production-marketing of rubber are available only through public investment (thus making them public goods) or through natural monopolies having large economies of scale (Jaffee and Gordon, *ibid.*). For example, new construction of roads for transporting rubber from the fields to the factories will not be undertaken by individual producers unless they have large scale operations and are reasonably assured of keeping the benefits of their investment for themselves. Otherwise, these investments have to be made by the government for the benefit of the industry and the economy as a whole. The same is true for informational flow within the system. Marketing and technical information is not likely to be shared by firms within a system because the firms are in competition with one another. Industry wide promotion is not popular because of the 'free rider' problem where some traders get the benefit without contributing to the cost.

For promoting efficient development of the rubber industry, these barriers have to be reduced or eliminated by action taken by either the government or the industry participants. The government's role is important where the particular barrier relates to creation or maintenance of public goods.

FORCES INFLUENCING COMPETITION IN THE INDUSTRY

The global market for rubber is subject to a web of underlying forces generated by its characteristic system of production, sale, value adding, and retail distribution. The industry dynamics are influenced by five major forces, illustrated in Figure 3-2 below. In general, the collective strength of these five forces indicates the intensity of competition and the profit potentials in the industry (Porter 1979, *op.cit.*).

Threat of New Entrants

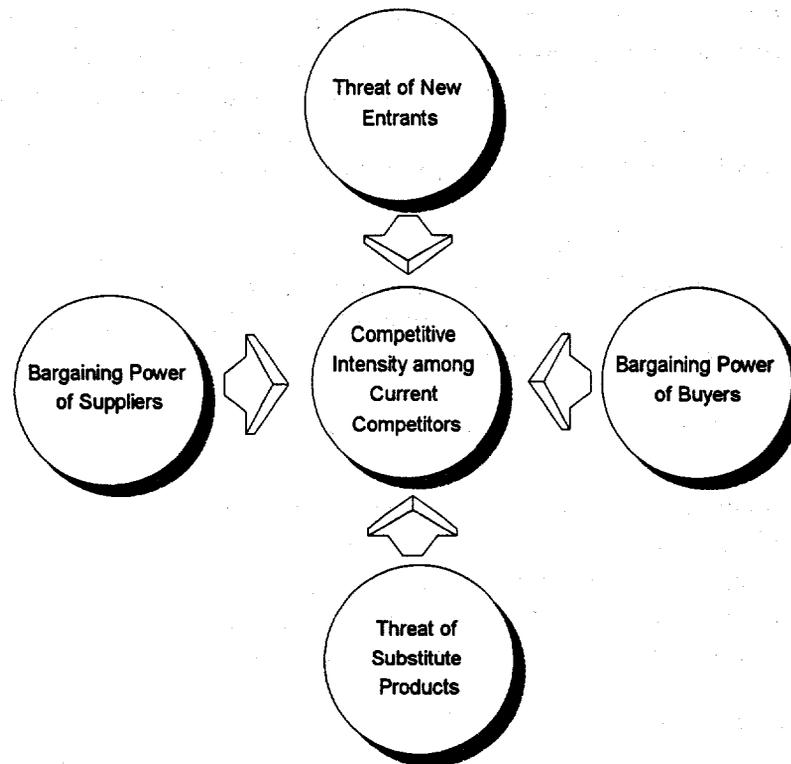
New entrants to an industry create additional capacity and come with an urge to gain market share and consumer franchise. In the process, prices are pushed down and margins reduced, resulting in reduced industry profitability in the long run. Some of the producing countries may not have the comparative advantage for producing rubber and may actually be pushing the industry towards prolonged recession. How could the traditional producers have discouraged the entry of inefficient producers? Partly by creating entry barriers.

The first entry barrier is economies of scale, through which major competitors in the industry create favorable unit cost economies for themselves not only in production but also in research and development (R&D), marketing, and general administration. There is no evidence to suggest that the traditional rubber-producing countries did any of these to deter new entrants and maintain their competitive positions in the market.

A second major entry barrier is product differentiation through which individual producers of rubber can create a perceived uniqueness for their products in the minds of the buyers. To some extent, this was done by Malaysia when it developed specific

technical standards which eventually became its hallmark and the standard for judgement of quality and consistency of rubber everywhere.

Figure 3-2
Five Forces Shaping Competition in the Global Rubber Market



Source: Authors' formulation.

Another entry barrier is created by government policies that protect the internal market through the provision of generous subsidies for domestic producers. However, the effectiveness of this barrier is reduced if the same policy is adopted in other countries as well. Also, barriers like these are economically inefficient since they insulate the industry from global competition, making it vulnerable in other fronts. In practically all countries of the world, the rubber industry has been supported by government with almost endless funds which has in effect eroded the effectiveness of this entry barrier.

The fourth barrier to entry is termed “brinkmanship,” which means major players in the market could send strong signals to a prospective entrant, through price cutting or other means, to caution it about strong retaliation. But since the price of rubber is generally determined in the auction markets by the buyers, there was very little that producers could have done in the past to implement this strategy.

Bargaining Power of Buyers

The ultimate aim of buyers in a commodity market is to lower the price as far as it will go, and to transfer profit from the producers to themselves to the maximum extent possible. In the rubber market, the bargaining power of buyers has been elevated because of the concentration of a few large buyers in an auction system where prices can easily be fixed by collusive actions. Also, the major rubber producers have developed long-term supply relationships with big multinational manufacturers of rubber goods. There is a high degree of concentration in the later stages of rubber processing and marketing and the producers have no means of breaking out of the system without an extremely heavy investment. The almost undifferentiated or standardized nature of products sold through the auction system has contributed to the bargaining power of the buyers.

Bargaining Power of Suppliers

If the suppliers of a commodity have enough leverage over the distribution system they can control prices and profitability. This usually happens when the suppliers are large, relatively few in number, or in some kind of agreement to limit supply to the market, or the products are in high demand or involve high switching costs. Crude oil was one commodity that fulfilled all of these conditions in the 1970s and hence the strong bargaining positions of their suppliers in the seventies and eighties. Rubber, on the other hand, has been at a disadvantage in all these aspects. The industry worldwide is characterized by an agglomeration of small producers. In the older producing countries, like Malaysia and Thailand, substantial investments have already been made in the sector, and significant employment is supported. It is therefore simple to understand why these countries are such easy price takers. However, natural rubber does have high switching costs in some cases and consumers cannot easily switch to alternative product such as synthetic rubber. For example, in solid-tire manufacturing, synthetic rubber cannot be substituted for natural rubber. Also, agreements between countries to stabilize rubber prices (like INRA)²¹ through the creation of stocking capacity, have worked well in the past.

Threat of Substitute Products

Producers in an industry constantly compete with firms in other industries producing substitute products. The presence of substitutes limits the potential returns by limiting prices. Substitute products can be identified by looking at the primary demand at the product-class level. For example, certain types of synthetic rubber such as styrene-butadiene, poly-butadiene, and poly-isoprene, have properties close to natural rubber and compete effectively with it in most product applications.²² Substitute products that deserve the most attention are those that are likely to improve their price performance quickly in response to market demand. The major substitute products for rubber are the

²¹ International Natural Rubber Agreement.

²² A product class is a category of products that satisfy the same needs or function.

synthetic rubber formulations mentioned above. Intra-industry rivalry between these products may be affected by the price of crude oil in the world market. With significant rise expected in crude oil prices in the coming years, the cost of synthetic rubber is likely to rise faster than the price of natural rubber (EIU 1990, op.cit.). The extent to which shifts in relative prices between NR and SR in the short run affects the demand pattern is, however, uncertain. At least one study has determined that the short-term market-share elasticity of natural rubber with respect to relative prices is very small, ranging from -0.13 in Western Europe to -0.18 in North America (Grilli, Agostini, and Wilvaars 1980). This is so because the technical adjustment cost for switching is high. The long-term elasticity, however, which takes such technical adjustments into account, is much higher, ranging from -0.25 in Japan to -0.46 in Western Europe.

Rivalry Between Competitors

This is an extremely potent force capable of affecting the industry, both positively and negatively, in a sizeable manner. On the positive side, it can provide competitive pressures to rationalize costs and bring about product and process improvements. On the negative side, it has the potential of driving down prices and hurting the entire industry. Some of the factors that create intense rivalry between competitors are industry maturity, excess capacity, high fixed costs, lack of differentiation and the absence of switching costs. The rubber industry is not far from reaching maturity, and comparatively little market expansion is taking place. The only way for competing countries to gain market share is by taking it away from others. Lack of substantive differentiation has kept the product at the level of a commodity where buyers can easily shop around for the best price. Switching costs have also been low because of its substitutability with synthetic rubber and because of the homogeneity of the product regardless of its origin.

In summary, the main reasons for the intense competition in the global rubber industries are:

- The bulk of the market is with a few large makers of automobile tires who have tied up suppliers in long-term supply relationships that are difficult to break. The three big suppliers of natural rubber in the world, Thailand, Indonesia and Malaysia, are roughly equal in size and power. Market growth has been low (around 2% per annum), and share gains at the expense of the competitors have been the only avenue for growth.
- Products are essentially undifferentiated.
- The cost of buyers switching from one supplier to another is low. Because of the dominance of the auction system, producers have not developed ways and means to tie their customers into long-term relationships.
- Producers remain in the market despite low profits because of sunk investments and the lack of other opportunities.

It is important to assess the competitive forces in the industry in terms of what is presented by the external environment and what is possible within the industry to enhance

its position. The following analysis of the rubber industry focuses on the intra-industry conditions and the specific factors that enhance a nation's ability to compete.

FACTORS THAT ENHANCE THE NATIONAL COMPETITIVE ADVANTAGE

Neoclassical trade theory explains the competence of a nation to produce a certain good in terms of its factor endowment and the opportunity cost of resources used to produce the good. David Ricardo improved upon Adam Smith's proposal for nations to compete on the basis of low cost by recognizing that market forces will allocate a nation's resources to their most productive use. Unfortunately, this theory of comparative advantage became mired in the notion that a country's existing factor endowments, like land, labor, natural resources, and capital, determined its capacity to become a low-cost producer. Forgotten, or perhaps ignored, was the fact that comparative advantage based on these four factors can be exceedingly fleeting as cost structures are constantly changing. The resource cost advantage of one country could be taken away with the use of new technology by another country (Porter 1990). In short, countries that tie their competitive ability to existing factor cost advantages with no strategy of moving beyond them will face a continual threat of being overrun by nations where technology is advancing productivity. They will also create the ability to lower the cost of production without foregoing attractive wages and returns to capital. Consequently, policies that myopically target static factor comparative advantages to attain national success in an industry will most likely fail. For instance, subsidizing an industry to lower its cost of production will have little effect where competition is based on quality, rapid product development, and productivity enhancement.

Comparative advantage has generally been measured by the Domestic Resource Cost (DRC) ratio.²³ The DRC is a *static* measure of the domestic factor costs at shadow prices involved in generating a unit value of export at international prices. It does not take into account the possibility of change that could alter the comparative advantage in the future and, therefore, does not provide any insight into the *dynamic* comparative position of a country. In the past, a few studies have tried to capture this perspective by decomposing changes in the DRC ratio over time into its components such as relative price changes, changes in factor use, and changes in total factor productivity (Nishimizu and Page 1986). This approach allows for examining the level, the change, and the sources of change in measured comparative advantage. Findings of the studies show that changes in price competitiveness and changes in total factor productivity are the major sources of change in international competitiveness. In other words, an increase in output prices relative to prices of intermediate inputs and improvement in total factor productivity reduces the DRC ratio.

The question that now arises concerns what strategies a country should adopt to create this dynamic comparative advantage that will sustain its market position in the long run. The answer is partly provided in competitive strategy literature that indicates that

²³ A DRC ratio of less than 1 indicates the presence of comparative advantage.

only by building *competitive* advantage can a nation continue to attain success in the global market (Porter 1990, D'Aveni 1994, Day 1990, Bartmess and Cernt 1993). Competitive advantage is said to exist when there is a match between the distinct competence of an organization and the factors critical for success in an industry. These factors have been presented in the form of a national "diamond," which determines a nation's competitive advantage (Porter 1990, op.cit.) as shown in Figure 3-3. They include factor conditions, demand conditions, the presence of related and supporting industries, and the firm structure, rivalry and strategy, which are reinforced by government and chance conditions. The system within which these factors operate is highly interactive and activity in any point of the diamond affects all others and vice versa.

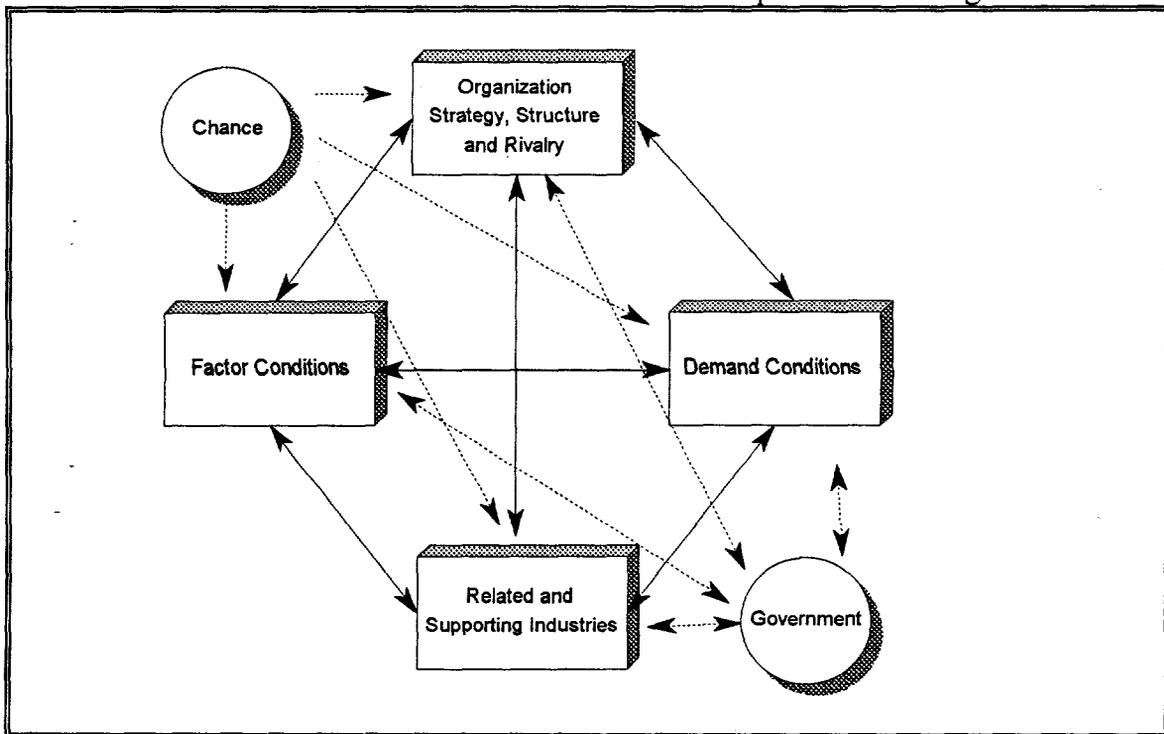
Factor Conditions

Among the factor conditions that create competitive advantage are human resources, physical resources, knowledge resources, capital resources, and infrastructure resources. The quality of workers in the industry, their skills, and the overall work ethic constitute a nation's human resource factor. For example, countries with highly-skilled plantation workers and competitive wages will have an edge over countries that do not. The availability of quality land, water, and other physical resources also provides a competitive edge to one nation over the other in the production of tree crops. For example, Indonesia's abundance of highly productive land for rubber growing coupled with natural rainfed irrigation makes it a very efficient producer of rubber. The presence of technical and managerial skills in Malaysia provides it with a competitive advantage. Its rubber industry, a significant part of which is driven by multinational firms, has gained tremendously from the superior knowledge of these organizations in production and the marketing of rubber globally. The availability of capital is another factor that gives competitive advantage to a nation because of the long-term nature of the investment.

The rubber industry in Sri Lanka was stagnant for a considerable period of time for lack of adequate investment capital. Only recently have private companies started to put serious investment in production and marketing and accelerated the growth of the industry. Infrastructure resources are also critical to tree-crop industries because of the vastness and separation of the production centers from the processing and marketing centers. For example, lack of adequate roads could mire a country's capacity to process its raw rubber efficiently.

Sometimes, a technological change can create or enhance the competitive advantage of a nation which suffers a disadvantage on some other factor. For example, the Hypodermic Latex Extraction (HLE) technology has reduced labor input and the cost of production tremendously in Malaysia, thus overcoming some of its high labor costs.

Figure 3-3
The National Diamond : Determinant of Competitive Advantage



Source: Porter (1990).

Demand Conditions

Home demand conditions are also important for an industry because they determine the rate and nature of improvement made by firms in the industry. The development of an industry for world class competition in a global market depends strongly on demand conditions at home. Three characteristics of home demand are particularly important to the creation of competitive advantage – composition, size and pattern of growth, and the means by which the home market pulls the nation's products into foreign markets (Keegan and Green 1997).

The home demand for a product can set the quality standards and give local producers a better understanding of buyers' needs ahead of their major rivals in the world market. Firms are generally more responsive to domestic consumers' needs, which can translate quickly to the foreign buyers' needs as well. Malaysia's rubber industry was innovative in producing rubber of many varieties for its own consumption, as well as for the demand from neighboring Singapore, and later finding niches for them in foreign markets. The size and pattern of home-demand growth affects the competitive ability of firms in the industry. This is because of economies of scale and the speedy ride up the learning curve which exist in a large and growing home market. The perceived risk of investment in plant and R&D is also reduced when a strong home market exists for the product. Again, Malaysia provides a good illustration of a country that has made some investment in developing better clones for rubber.

Related and Supporting Industries

Related downstream industries can provide strong support to the growth of a primary industry, by providing inputs to or by absorbing the output of the latter. The growth of automobile and motorcycle ownership in Thailand boosted that country's ability to export high performance radial tires. Efficient integration of downstream industries comes from both proximity and cultural similarity. Contacts and coordination with suppliers and strong linkages that develop within the local market are hard to crack by foreign suppliers, and thus become the sources of competitive advantage both at home and abroad.

Organization Strategy, Structure and Rivalry

Differences in management style, organizational skills, and strategic perspectives create either advantage or disadvantage for firms vis-à-vis their competitors. In plantation industries, management style is critical to success since the nature of the work force is quite different from the average industrial work force. In Sri Lanka and India, for example, generations of plantation workers have lived and worked in the rubber and rubber estates and labor management has always been a key factor behind enhancing labor productivity. The standard methods of hiring and firing also do not apply in the case of plantation workers.

The rivalry between domestic producers has a powerful influence on overall competitive advantage of firms because it keeps the industry dynamic and exerts constant pressure for innovation and renewal. In Sri Lanka, when the estate plantations were under government control, practically no innovation emerged from either the rubber production or the rubber-manufacturing industries. Since the privatization moves of the early nineties, a variety of new rubber offerings and new ways of exploiting foreign market opportunities have been surfacing.

Government

Government is not a determinant of competitive advantage but it is an important influence on its creation. The effect of government policy on trade, taxation, labor, marketing and distribution, on the development of an industry, is well known. The tree crop industry of Sri Lanka had suffered for very long through inappropriate government policies that took away its competitive advantage in the seventies and eighties (World Bank 1994). By reinforcing and supporting the factors that create competitive advantage, the government could vastly improve the competitive position of the firms and the nation as a whole in the global economy. Evidence of this is clear from the support Indonesian rubber producers receive from their government and their strong competitive position.

Chance Factors

Lastly, chance events sometimes play a role in shaping the competitive advantage of a nation. These events occur outside the control of the firm, the industry, or the government. They can create major discontinuity that can be either advantageous or disadvantageous. For example, the collapse of the former USSR and the economic chaos that ensued literally destroyed the vast market for rubber in that region.

DETERMINANTS OF NATIONAL COMPETITIVE ADVANTAGE IN RUBBER

Both international trade and competitive strategy literature recognize that comparative and competitive advantage are the products of policy, technology, human resources, infrastructure, and management factors. Furthermore, lessons of experience have shown that any commodity system²⁴ needs to be competitive on two fronts: first, it must be competitive within the country, and second, it must be competitive against similar commodity systems or industries from other countries (Alavi 1990). The system involves a series of interdependent production and marketing activities linked through a network of exchange relations and other coordinating mechanisms. There are different types of commodity systems throughout the world, each characterized by its individual structures including competitive conditions, entry barriers, contractual or ownership integration, and government influence on the system (Goldberg 1974, Morrissey 1974, Marion, et al. 1986).

In view of the four conditions presented in the Porter "diamond" discussed earlier, five essential factors related to the successful production and export of natural rubber can be proposed. These are, natural resources and human capital; macroeconomic and sector policies; physical, social, and technical infrastructure; market environment; and micro-marketing and coordination. In operational terms, these boil down to a number of specific factors that influence a commodity system's competitiveness and growth, as shown in Figure 3-4.

Natural Resources and Human Capital

Natural resources and human capital endowment are key elements in the theory of comparative advantage and are a very important basis for gauging the competitive advantage of a nation. Many of these endowments may be grown or acquired over time. For example, the management expertise needed for plantation administration could either be developed in the country through experience or brought in from other countries that have a lead in the technology. During the early days of privatization of Sri Lanka's rubber estates, many firms brought in technical advisors from other countries to help in the management process.

²⁴ A commodity system is a "small economic system . . . incorporating an interdependent array of organizations, resources, laws, and institutions involved in producing, processing, and distributing an agricultural commodity," (see Marion, et al., 1986).

Macroeconomic and Sector Policies

Fiscal and monetary policies, exchange rate policies, trade and licensing policies, price policies, and labor policies have strong influences on the incentive to invest in a sector because they affect costs and returns. Enhancement of productivity, development of markets, and the ability to meet international competition is seriously compromised by the absence of a conducive macroeconomic environment.

Infrastructure

Physical, technical, and social infrastructure provide the basic mechanism for interlinking markets with suppliers. Their inadequacy results in production inefficiency, lack of knowledge about markets, and a general failure to adapt to and service clients' needs competitively.

Market Environment

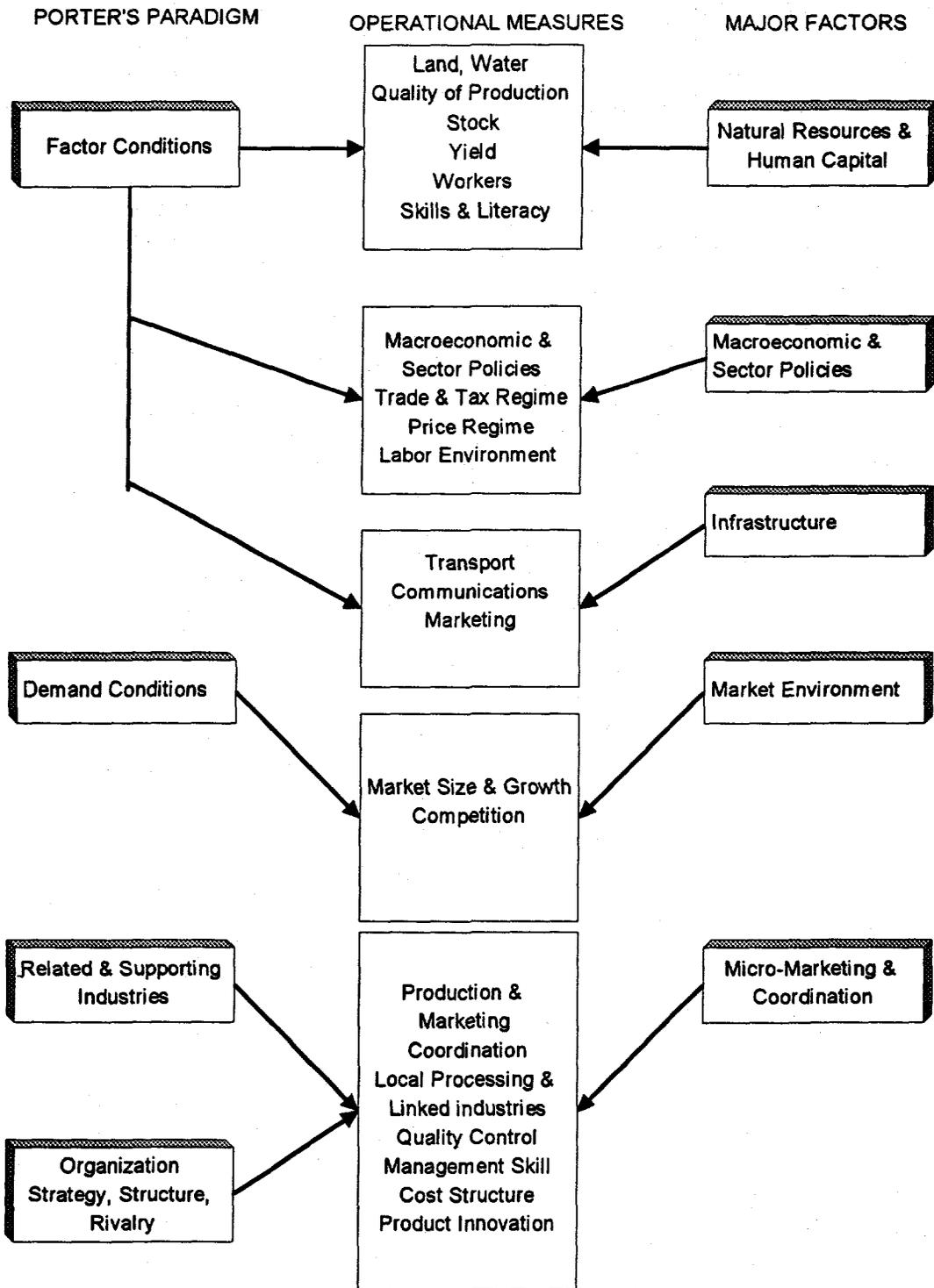
The size and pattern of demand, both within the domestic market and the international market, affect the ability of suppliers to produce and distribute efficiently. The size and growth of demand are related to income, particularly with regard to discretionary purchases. Demand for a product is also affected by changes in consumer needs, tastes, preferences, work and living patterns, and technological developments. For instance, changes in the knowledge about communicable diseases like AIDS have expanded the medical use of natural rubber substantially.

Micro-Marketing and Coordination

This involves the management of resources – physical, logistical, and human. The coordination of production and distribution, including such activities as processing, storage and transportation, product development, quality control for sales and market power, interlinking functions, risk reduction through risk sharing between partners, market research and promotion, and efficiency pricing, is important for a dynamically competitive market. These management and coordination functions establish efficient interface between markets and producers and determine the level of productivity, product quality, and transaction costs.

The rubber industry all over the world faces a number of problems limiting effective coordination of the production-marketing system. These include high production and marketing risks, inadequate or asymmetric information flow, and high transaction, logistics and marketing costs. The bulky nature of the product leads to high unit costs of moving it through the distribution channels. The quality of rubber is not easily measurable and subjective evaluation plays a key role. This limits the efficiency of grading and probably creates information asymmetries that prevent efficient information flow within the market.

Figure 3-4
Factors Determining Competitive Advantage
in the Global Rubber Industry



Source: Authors' formulation.

Certain production characteristics of rubber also limit the effective integration of the production-marketing system. One of these is the spread of production over a large geographical area creating the involvement of a large number of small producers, which makes it difficult and costly to exchange production and marketing information. The dispersion of production centers add to logistic costs and the interruption of physical flows. The small size of the producing units deter investment in storage and distribution infrastructure by the private sector. Monopsony also develops in the presence of a large number of small and geographically-dispersed producers, since not many buyers are willing to operate in this type of market. The growth of a few relatively-large processors among a large number of producers in most rubber producing countries attests to this (United Nations 1984, op.cit.). Also, the fact that rubber plants have long gestation periods ranging from six to seven years before production makes them vulnerable to a shortage of long-term financing.

Marketing and distribution support is critical for maintaining efficiency and growth of production. For the major producers of rubber, the bulk of the market is overseas and the receipt of global marketing and technical information becomes a key requirement for competitiveness. Marketing enterprises are likely to provide these services to the producers if they could appropriate the benefit of such action themselves. However, in every country that produces rubber, the primary marketing is done through auctions, where the buyers actually benefit from the gap in the producer's knowledge. Even if this were not so, in the absence of direct links between the producers and marketers, any information supplied by the latter assumes a public-good property where everybody benefits without contributing to its cost. This free-riding could also arise when individual producers acquire the information from one buyer to sell to another competing buyer. This deters private development of an information system. Distribution infrastructure likewise, such as farm to market roads and bulk-storage and transport facilities have either public goods characteristics or support the growth of natural monopolies due to the heavy investment and the economies of scale involved. Financial requirements for marketing rubber are also high because of the costs of establishing contacts, handling, transporting, storing, and inventory maintenance. Private firms in all producing countries have found it difficult to obtain both long- and short-term capital from the financial markets that are shy towards agricultural investment.

This implies that the government has very specific roles in filling the gaps or bottlenecks created by the absence or inefficiency of these flows. Public programs developed to remove externalities or instances of market failures (such as changes in trade policies affecting the sector or lack of the producer's knowledge about the activities of major buyers in the world market) should reduce the investment risks.

ANALYSIS OF NATIONAL COMPETITIVE ADVANTAGE IN RUBBER

The factors that create competitiveness in a global industry were discussed earlier. In the following section, we attempt to analyze the respective positions of two of the

major producers of rubber in the world, Thailand and Indonesia, along with Sri Lanka, on these factors. Table 3-2 provides a summary of the findings.

Natural Resources and Human Capital

Land: The abundance of land, its quality, and its cost are all important factors for the development of rubber. The largest rubber areas in the world are in Indonesia (3.58 million hectares), Malaysia (1.9 million hectares), and Thailand (1.8 million hectares). Sri Lanka has about 161,000 hectares under rubber. Indonesia has considerable land left for lateral expansion of rubber. Thailand has large areas of land suitable for rubber cultivation in the non-traditional areas, particularly in the Northeast. The potential of this region is about 2.5 million hectares in 15 provinces. In Sri Lanka, too, the total rubber acreage is declining. Most of the land suitable for rubber has already been exploited and some of it is being diverted to other use.

Quality of production stock: Considerable progress has been made in Thailand for improving the quality of rubber trees. The Office of the Rubber Replanting Aid Fund (ORRAF) has launched an accelerated program to increase the rate of replanting to over 50,000 hectares per year. Indonesia, also, is making serious efforts to revitalize its rubber-tree stock through replantation with high-yielding plants. Considerable amount of replanting and new planting in Indonesia have also given it a solid production base that is likely to sustain for many years. Sri Lanka has given rubber growers considerable incentives for replanting with newer high-yielding strains of rubber trees. A considerable amount of replacement, however, is still needed. The rate of replantation has also decreased from over 6,000 hectares in 1989 to a little over 1,624 hectares per year in 1994.

Yield: Both Thailand and Indonesia have very high rubber yields, averaging 1,400 kilograms per hectare. In comparison, Sri Lanka's yields are 876 kg./ha. in the estate sector and 814 kg./ha. in the smallholder sector.

Availability and quality of workers: Only the Northeastern region of Thailand has abundant and cheap labor for rubber cultivation, which gives the country a considerable potential for future rubber expansion. In the South, however, labor is expensive (around US \$3 per day). The plantations are losing labor to other industries with higher wages and better working conditions. If the shortage of labor in the rubber industry remains persistent, the cost of production would rise significantly in the future. Indonesian labor is abundant and cheap in most areas, averaging about US \$1.09 per day. This, in fact, is the basis for Indonesia's comparative advantage in rubber production. The cost of labor in Sri Lanka is also low – about US \$1.30 per day. The quality of labor for field work in the rubber plantations in all the three countries is average, and below Malaysia's.

Table 3-2
The Global Players in the Rubber Industry: Country Position on Competitive Factors

	<u>Thailand</u>	<u>Indonesia</u>	<u>Sri Lanka</u>
<u>Natural Resources & Human Capital</u>			
Land	Strong	Strong	Weak
Quality of production stock	Strong	Strong	Average
Yield	High	High	Low
Availability and quality of workers	Low	High	Average
Literacy rate	High	High	High
<u>Macroeconomic Environment</u>			
Macroeconomic and sector policy	Strong	Strong	Average
Exchange rate regime	Favorable	Favorable	Favorable
Trade and tax environment	Favorable	Favorable	Favorable
Pricing regime	Strong	Average	Average
Labor environment	Weak	Strong	Strong
<u>Infrastructure</u>			
Transportation and communications	Average	Average	Weak
Marketing	Good	Good	Weak
<u>Market Environment</u>			
Key market's size and growth rate	Strong	Average	Average
Competitive strength	Strong	Strong	Strong
<u>Micro-marketing and Coordination</u>			
Production/Marketing coordination	Strong	Average	Weak
Local processing and linked industries	Strong	Strong	Average
Quality control	Average	Average	Weak
Technical, financial & managerial skills	Strong	Average	Average
Cost structure	High	Low	Average
Product innovation	Average	Low	Average

Source: Authors' estimates.

Considerable changes are likely to take place in Sri Lanka's plantation work force. Literacy and education will eventually move potential workers away from the plantations to better jobs outside. Presently, however, the density of workers in the plantations (2.85 per ha.) is higher than South India (2.70 per ha.) and Kenya (2.20 per ha.). Management resources in many of the plantations under new private management are being upgraded. Changes in management style are taking place in many plantations, including such innovative measures as participative management, customer orientation, strategic focusing for global competition, and the Japanese Kaizan style of management.²⁵ Some management companies have started to upgrade workers' skills. Others have forged joint ventures with foreign partners to bring in the necessary expertise from abroad.

²⁵ "Kaizan" management emphasizes continual improvement on a self-assessment basis.

Literacy rate: The adult literacy rate in Thailand is 94 percent as compared to 84 percent in Indonesia and 90 percent in Sri Lanka (World Bank 1996). The opportunity for technological improvement and overall competitive excellence are, therefore, about the same in Sri Lanka as the other two major producers of rubber.

Macroeconomic Environment

Macroeconomic and sector policy: The Government of Thailand has undertaken a comprehensive replantation scheme for replacing the country's entire stock of rubber trees with high-yielding varieties. This is backed by improved extension services and transmission of technology for improving yields to the growers (EIU 1990, op.cit.). In addition, the Thai government has introduced several schemes for the lateral expansion of rubber area, particularly in the non-traditional areas of Northeast Thailand. There are no restrictions on the production and export of rubber from Thailand, including quota or licensing requirements. About 30 percent of the export is through direct sales to overseas buyers and approximately 60 percent of the exported rubber is sold through forward market contracts to overseas buyers. Only about 10 percent of the rubber is sold through the auctions. There is no state tax or subsidy on rubber in Thailand. Foreign exchange is transacted at the official exchange rate and there is no government-mandated price control on rubber. The labor market is free, and wages are determined by market demand and supply, without interference from the government. The government, however, has played a significant role in the research and development of rubber, the provision of extension services and market information. It has also made some contribution towards export promotion for rubber and supervising quality standards.²⁶

The Indonesian government has provided a number of direct assistance to rubber growers such as the provision of land-clearance service, high-yielding rubber stands, subsidized loans, fertilizers, and processing and marketing facilities (EIU 1990, op.cit.). There are no restrictions on the production or export of rubber from Indonesia. Over 60 percent of the export goes directly to overseas buyers and 20 percent through forward sales. Only about 3 percent of the rubber is sold through auctions in and out of the country. The percentage of direct sales has been increasing over the years. There is no quota or licensing requirement for direct sales. The foreign exchange regime is liberal and the official exchange rate prevails for all export transactions. Prices are more or less freely determined in the marketplace and there is no direct subsidy paid to the rubber producers. There is, however, a land tax (PBB) on the growing and processing of rubber, and some local taxes and value-added taxes on domestic sale. The labor market, however, is somewhat restricted as the minimum daily wage for workers is set by the government. These wages have tripled in the past four years and government policy requires payment to be made for 30 days of the month, regardless of actual workdays. The government's involvement has been moderate in research and development and extension services. It has

²⁶ Data obtained from a survey of selected Thai rubber producing and exporting companies in January 1997.

not done much towards provision of market information to the producers. Export promotion by the government also has been moderate. The government's quality control on rubber production, however, is very high.²⁷

In Sri Lanka, there are no noticeable restrictions on the production and marketing of rubber. There is a licensing requirement for direct sales to overseas buyers. There is also a notional quota on direct sales overseas, but it is a floating quota that can be raised based upon the company's requirement. About 65 percent of the rubber is sold through auctions and between 20 and 30 percent through forward contracts or direct sales. The official exchange rate applies for rubber trade and no particular foreign exchange restriction applies. There is no export tax on rubber, and the only levy is the rubber cess which is imposed in five parts mentioned before. There is no government price control on the sale of rubber domestically or overseas. The government, however, requires the rubber producers to follow the Wage Board Ordinance on labor matters. Government's involvement in research and development and extension is average. Provision of market information, however, is very low. Export promotion by the government is average. Quality control by the government is about average. There is no price control on rubber but some export cess-funded subsidy is given to small growers.

The macroeconomic environment in Sri Lanka now favors the development of rubber. The quasi-privatization of the state plantations in early 1992 boosted the sub-sector's performance. The sector has been freed from government price control and is now responsive to international market prices.

Improvements in the macroeconomic environment and sector policy reforms, starting in 1992, have turned the rubber industry around in Sri Lanka and taken it to its peak production in recent years of 105,700 tons in 1995. Much of the positive benefits have come with the removal of the export duty and ad-valorem tax, the depreciation of exchange rate, the reduction of controls on marketing, and the transfer of state-owned plantations to the private sector (partially completed by the end of 1996). However, problems still remain, such as the government's reluctance to relinquish control on labor matters. The government is slowly withdrawing from this inflexible position and the labor market is turning towards a more free system of collective bargaining. The Sri Lankan rupee was devalued by over 25 percent between 1989-1994. This exchange rate adjustment has been very beneficial for the rubber industry.

Trade and tax environment: As far back as the early 1960s, the Thai government realizing the potential of the rubber industry, introduced many ambitious programs to increase rubber output and productivity. As a result, the sector recorded quite impressive growth. There are no trade taxes on rubber except for the cess on rubber export that is used to finance replanting. In Indonesia, the rubber sector was neglected until about the early 1970s, when the oil bonanza started showing signs of ending. Since then, the government has placed a lot of emphasis on expanding the sector with liberalization and

²⁷ Data obtained from a survey of Indonesian producers of rubber in July 1996.

direct assistance to growers through the NES and PMU schemes. There are no trade taxes on rubber export and no quota or licensing requirements for direct export. There is no distortion in the foreign exchange regime either. In Sri Lanka, the decline of the rubber industry in the seventies and eighties became a serious concern of the government in the late 1980s, and it started a series of new initiatives to revitalize the sector. The Rubber Rehabilitation Project (1981), and the Medium Term Investment Program (1984) were some of the moves in this direction. Currently there are no export restrictions on rubber, except for a license requirement for rubber dealers and exporters. There is no quota or licensing requirement for direct sales overseas. In terms of local taxes, there is an acreage tax and a factory license fee for rubber growers and processors. There is also the rubber cess used to finance replanting and providing certain social benefits to smallholders.

Pricing Regime: Thailand has a rubber price stabilization scheme which prevents the slide of smallholder unsmoked sheet rubber price below 25 Baht/kg. through open market purchase and stockpiling for later release. The country also is a signatory to the International Natural Rubber Agreement 1995 (INRA III) for world wide stabilization of rubber prices. In Indonesia, there is no such price control mechanism, but the authorities use a pricing formula for determining the price for smallholder production under the NES scheme. In Sri Lanka, there is no mechanism for government control of rubber prices.

Labor environment: There is some labor shortage in Thailand, but it is not acute enough to create problems in the rubber sector. The government does not have any specific labor management rules except what is generally applicable for labor in all sectors of the economy, including minimum-wage rules. The same situation prevails in Indonesia, where the sector is tied to the official minimum wage rules of the government. In Sri Lanka, the government still sets the policy for rubber-estate workers, including hiring and firing rules, minimum work-day rules, daily wage rate, and rules for the movement of labor between plantations. These policies have been major obstacles to the growth of efficient rubber production in Sri Lanka. The government's recent thinking, however, seems to break away from many of these. It is trying to disassociate itself from intervention in wage determination and allowing collective bargaining to determine this. It has also reduced its opposition to relocation of labor across estates. The labor market may be moving towards a freer environment, but the final outcome is still uncertain.

Infrastructure

Transportation and communications: The rubber industry in Thailand suffers from a lack of feeder roads in the growing areas for transporting rubber to collection centers, factories, and port of export. The communication system, however, is well developed, and the growers and processors have access to daily market information through domestic radio and broadcasts from Singapore. Indonesia also suffers from a lack of good access roads in the remote rubber-producing areas and good shipping facilities at the ports, although the government is developing these facilities gradually. Marketing information is available quite easily through radio and television to growers and processors of rubber. Teletext (TVRI Text) and fax facilities are also available in most growing areas. In Sri

Lanka, there is a lack of an efficient rail transportation system for moving rubber from the fields to the factories. The rubber estates have inadequate and aging transport vehicles that are a major problem for rubber transportation. The communications system is not as organized as in Thailand and Indonesia. Some marketing information is available through brokers in Colombo, but the lack of good communications facilities outside Colombo is an obstacle to efficient information dissemination. Communications between manufacturers and exporters have, however, improved over the last two years due to the establishment of a satellite telecommunications system .

Marketing: The marketing infrastructure for rubber in Thailand is well developed with a central rubber market in the largest rubber-producing area of Songkhla in South Thailand. This rubber exchange has worked quite efficiently, where producers have received an average of 6 percent higher prices than other local markets (Samosorn 1996, op.cit.). Facilities at the exchange include room trading services for ribbed sheet, TSR, and latex concentrate; market and price information services, and warehousing services. Three more auction centers are planned, with on-line computer link-ups between the centers. Good marketing services and utility services (electricity, gas, and water), however, are lacking in the more remote rubber growing areas. In Indonesia, except for the remote production areas, there is no felt problem with the utilities and marketing infrastructure to serve the rubber trade. However, the system is not as developed as in Thailand. In Sri Lanka, the rubber sector suffers from unreliable electricity, telephone and water services. The marketing of rubber takes place through brokers' agents and independent buyers. The country may not be in as advantageous a position as its other two major competitors in the global marketing of rubber. A majority of the manufacturers do not have direct links with overseas buyers, relying mostly on the auction system to sell their products. Efforts are being made now to change this. A few private management companies have started to link up with buyers abroad. Some value adding is done by rubber manufacturers in Colombo.

Market Environment

Key markets' size and growth rate: Internal market demand for rubber in Thailand is expected to be very strong in the coming years, mostly as a result of an expansion of tire production for commercial vehicles. The projected growth rate of tire production in Thailand is forecasted at 8.8 percent between 1990-2000, as compared to 4.4 percent in the previous decade, taking it from 1.8 million tires in 1990 to 4.2 million tires in the year 2000 and 6.9 million tires in 2020 (Burger and Smit 1994, op.cit.). Rubber consumption will, consequently, rise from 41,000 tons in 1990 to 107,000 tons in 2000 and to 237,000 tons in the year 2020.

The principal export markets for Thai rubber in 1995 were Japan, the United States, the European Community, and China. From the rubber consumption trend until the year 2020, it appears that the highest growth during the period 2000-2020 will be in China, Germany, Canada, the CIS, and Eastern European countries (Table 3-3). Thus, demands from three of Thailand's important markets, China, Germany, and the CIS, are likely to keep its export strong in the following 20 years.

Table 3-3
World Rubber Consumption, 1990-2020
('000 tons)

Automobile Tires	1990	2000	2020	Growth Rate (% P.A)
				2000-2020
United States	1724	2158	2460	0.7
Canada	142	204	277	1.5
Jāpan	1055	1104	1252	0.6
Germany	304	394	436	0.5
France	306	352	446	1.2
United Kingdom	174	179	169	-0.3
Italy	162	157	149	-0.2
CIS and Eastern Europe	1202	1427	1850	1.3
China	522	1205	2639	4.0
India	226	350	720	3.7
Indonesia	88	117	271	4.3
Malaysia	33	73	124	2.7
Thailand	41	107	237	4.0
Rest of the World	1740	2686	4180	-
WORLD	7719	10513	15210	3.1

Other Rubber Goods	1990	2000	2020	Growth Rate (% P.A)
				2000-2020
United States	905	1331	2229	2.6
Canada	128	190	354	3.2
Japan	755	838	1413	2.7
Germany	482	539	1415	4.9
France	225	203	239	0.8
United Kingdom	185	181	199	0.5
Italy	277	336	571	2.7
CIS and Eastern Europe	1414	585	1428	4.6
China	439	514	1720	6.2
India	229	417	1103	5
Indonesia	85	145	384	5
Malaysia	170	331	436	1.4
Thailand	104	157	318	3.6
Rest of the World	1933	2316	3653	-
WORLD	7331	8083	15462	3.3

Table 3-3 (continued)

Total Rubber	1990	2000	Growth Rate (% P.A)	
			2020	2000-2020
United States	2628	3489	4689	1.5
Canada	269	394	631	2.4
Japan	1810	1941	2665	1.6
Germany	785	933	1851	3.5
France	530	555	685	1.1
United Kingdom	359	360	368	0.1
Italy	440	493	720	1.9
CIS and Eastern Europe	2616	2012	3278	2.5
China	961	1718	4359	4.8
India	455	767	1824	4.4
Indonesia	173	262	654	4.7
Malaysia	204	403	560	1.6
Thailand	144	264	555	3.8
Rest of the World	3676	4891	7614	-
WORLD	15050	18482	30453	2.5

Source: Burger and Smit 1994.

The two important markets for Indonesian rubber in 1995 were the United States and Singapore. The two markets following these were the Republic of Korea and Japan, although much smaller in size. The growth of the U.S. market for rubber during the period 2000-2020 is expected to be 1.5 percent per annum and 1.6 percent per annum in Japan. These two markets, although showing comparatively lower growth, are very large and provide substantial potential for future Indonesian export.

The three most important markets for Sri Lankan rubber in 1995 were Pakistan, Iran, and Germany. There are no statistics available for projecting the growth of the market in Pakistan and Iran, but it will probably be close to 3 percent (the same as the growth in other Asian regions). Thus, Sri Lankan rubber export growth is linked with developments in Iran and Pakistan. The robust German market growth along with its size, however, will be an assurance for Sri Lanka's future in rubber export.

Competition in key markets: The main competitor of Thailand in the United States is Indonesia, which exported 620,700 tons of rubber to the U.S. in 1995 (60.5% of U.S. import) compared to Thailand's 232,000 tons (23% of the U.S. import). The second largest competitor is Malaysia, which exported 125,000 tons (12% of the U.S. import) to the United States in 1995. In Japan, the largest market for Thai rubber, the main competitor is again Indonesia, but with considerably less market share. About 81 percent of the Japanese market is served by Thailand and only 8 percent by Indonesia. Sri Lanka's share of the Japanese market is less than 0.5 percent.

The United States is the largest market for Indonesian rubber. It is followed by Singapore, where the quantity imported is much smaller. The largest importer of Sri Lankan rubber is Pakistan which imported 8,600 tons of rubber from Sri Lanka in 1995.

This was 77 percent of Pakistan total rubber import. The next largest importer of Sri Lankan rubber in 1995 was Iran, which imported 16.3 percent of its requirement from Sri Lanka in 1995.

Micro-marketing and Coordination

Production/Marketing Coordination: Thailand has a well developed system of production and marketing coordination through group processing and marketing (by smallholders) which ensures a certain standard of quality, consistency, and pricing within the system. The central rubber market in Songkhla provides a fairly efficient link between the production centers and buyers and the planned expansion of three more auction centers, linked nationally, will make the rubber market quite efficient. Survey results show that rubber producers and exporters in Thailand are satisfied with the market coordination, cooperative or association coordination and government coordination that presently exists in the country.

Marketing coordination in the Indonesian rubber industry takes place with the help of the local collectors, who collect the rubber from the farms, and pass it on to regional traders, and from there to the processing plants, and eventually to the exporters. In the government estate sector (PTPs), the process is internally integrated and coordination is more institutionalized. The system operates quite efficiently because of the presence of a large number of traders and the efficiency of the marketing information system that keeps the producers well informed about market conditions. The high level of competition has kept the marketing margins low for rubber of comparable quality (Barichello 1995, op.cit.).

Micro-marketing and coordination of the rubber trade in Sri Lanka is less developed than in Indonesia and Thailand. Some centralized group processing has been attempted in the past with individual smallholders, but the system has not developed as yet. There is a fair degree of competition among local brokers and collection agents, but it is still an immature market. Most rubber producers feel that the system of distribution needs to be improved along with the marketing information system.²⁸ They are, however, satisfied with amount of market and contract coordination that currently exists in the industry.

Local processing and linked industries: The biggest consumption of rubber in Thailand is in the tire industry with about 39 percent of the total domestic consumption (Table 2-2). Other related and linked industries are surgical gloves, shoes, elastic, and rubber bands. There is an increasing trend for domestic consumption of rubber mainly due to a continued rise in the sale of motor vehicles, growing at a rate of approximately 14 percent per year (Samosorn 1996).

²⁸ Based on the result of a survey of rubber producers in July 1996.

Domestically consumed rubber in Indonesia goes to a number of downstream processing industries including the tire industry, shoe industry, and latex-based goods industry. The rapid growth of domestic tire production is expected to fuel the growth of domestic consumption to the end of this century and beyond (World Bank 1989).

In Sri Lanka, there is a substantial amount of local processing of rubber and inputs to local industries for either intermediate use or for producing high value added end products. Rubber products, including tires, tubes, rubber gloves, latex thread, rubber bags, foam rubber mattresses, and rain wear, are being produced in increasing quantities to feed both in-home demand and demand from the EC and the Middle East (Government of Sri Lanka 1995).

Quality control: Quality control is still a big problem in the processing and marketing of smallholder rubber in Thailand, although some improvement has been made through group processing and group marketing (Samosorn 1996, op.cit.). The STR-processing factories in the country have also switched to the ISO 9000 quality-control management system. As most of the smallholders in Thailand still produce unsmoked sheet rubber, there is an ongoing effort by the government to help improve the quality through research, group processing, and group marketing. The government is also helping the industry through training and research for producing quality end products both for domestic use and export.

In Indonesia, the existence of layers of independent dealers between the producers of rubber and the factories creates problems for maintaining the quality standards. There is, however, a pressure building through direct purchase of rubber by processors which is slowly making the dealers more quality conscious (Budiman 1996, op.cit.). Quality control at the processing side, however, is quite good.²⁹

Quality control in the Sri Lankan rubber industry has been attempted through the establishment of group processing centers and the results have been excellent (Green 1991). These, however, have not been done on a large scale. The quality of rubber from many of the state run factories have been poor, due to poor management and a general disregard for cleanliness. The private companies who have taken over the plantations recently, are making changes for better quality and consistency of rubber produced.

Technical/financial and managerial skills: Technical and management skills within the Thai rubber industry are quite strong due to the presence of strong competition and the growth of enterprising companies. Many of these companies are extremely innovative and well tuned to modern management techniques and information technology. The capital market is also very supportive of the industry, and new investments are taking place at a rapid pace.

The large rubber estates in Indonesia are technically and financially very strong, with vertical integration of production, processing, and export. The smallholder sector is

²⁹ Result of a survey of rubber producers in July 1996.

less organized and does not have the support system found in the Thai smallholder rubber sector. Smallholders within the government estates (PTP and NES) have a fair degree of technical competence although the bureaucracy may not be as efficient.

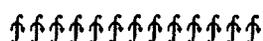
In Sri Lanka, the smallholder sector does not have very much technical and financial strength which has been a set back for the industry. In the estate sector, the new private owners-managers are bringing in new skills and knowledge which may take a while to give substantive results.

Cost structure: The average cost of production of rubber in Thailand is about US.\$720 per ton (Table 1-12). The COP for rubber in Indonesia is US.\$466 per ton in the estates and US.\$420 per ton in the smallholder sector. In Sri Lanka, the estate COP is US.\$764 per ton and smallholder COP is US.\$446 per ton. Indonesia, thus, has the lowest COP, followed by Sri Lanka, and then, Thailand.

Product innovation: One of Thailand's main strengths in the international rubber market is its ability to produce products with quality and consistency rivaling that of Malaysia. Although, the country still faces a number of problems in obtaining the quality and consistency desirable from the field, the government has provided major support for increasing the knowledge, training, and capacity of the smallholder rubber growers to improve their output and align it with the world market needs. On the production side, although it has concentrated heavily on tire production, there is considerable on-going activities on the non-tire sector to bring new products in the market place.

Very little rubber research for new product development is done in Indonesia and new innovation has been lacking in the industry.

Sri Lanka is quite advanced in the production of rubber goods and dipped-rubber goods, but there are a lot of firms in the industry where new product innovation is not pursued. As a result, the number of new products and product enhancement in the market is not very high.³⁰



³⁰ Based on a survey of rubber companies in July 1996.



CHAPTER 4

THE SRI LANKAN RUBBER INDUSTRY: STRATEGIES FOR CREATING GLOBAL COMPETITIVE ADVANTAGE

The most important concept of competitiveness at the national level is national productivity. Sustained productivity growth requires that an industry constantly upgrade itself in terms of product quality, add new desirable features, improve product technology, and boost production efficiency (Porter 1990, op.cit.). The various firms in the industry must also develop the capability to compete in more and more sophisticated markets and industry segments. Human resources freed up in the process of improving productivity can be retrained for diversion to other value-adding activities. It is important to understand that cheap labor and 'favorable' exchange rates are not the absolute definition of competitiveness (Porter, *ibid.*). Competitiveness also lies in supporting high wages and commanding premium prices in international markets, and most important of all, developing an advantage that is dynamic and evolving.

Even though companies and not nations are on the front line of international competition, the responsibility of the nation is not lessened. The environment within the home country shapes the ability of companies to innovate technology and methods that places them in the forefront of global competition. The most important sources of the national advantage need to be nurtured and advanced. Simple reliance on low wages and price control will not make a nation competitive and keep it there. Internationally successful firms constantly seek out new advantages and struggle with rivals to protect them.

Lessons of experience show that even though different organizations may use different strategies to accomplish their goals, they all tend to manifest some common underlying behavior. In general, five principles seem to explain the reason for sustained competitive advantage in globally successful firms (Porter, *ibid.*). These principles are:

- ❑ competitive advantage grows fundamentally out of improvement, innovation, and change;
- ❑ competitive advantage involves the entire value system encompassing the value chain of firms, suppliers, channels, and buyers;
- ❑ competitive advantage is sustained only through relentless improvement;
- ❑ sustaining advantage requires that its sources be continually upgraded; and
- ❑ sustaining advantage ultimately requires a global approach to strategy.

The long-term challenge for firms in Sri Lanka is to put themselves in position where they are most likely to perceive and thus best able to address the imperatives noted above. The process could be started by assessing the firms' strengths and weaknesses in the domestic and global markets, getting an early insight into the forces of the environment, understanding the needs and trends of the markets, and getting a head start for creating meaningful innovation. Some of the ways in which they could create the impetus for innovation are (Porter, *ibid.*):

- ❑ selling to the most sophisticated and demanding buyers and channels. These buyers and channels will stimulate the fastest improvement because they are knowledgeable and expect the best performance;
- ❑ seeking out buyers with the most difficult needs. These buyers will provide the challenge for upgrading performance and R&D;
- ❑ providing quality and service beyond the norms of standard products; and
- ❑ seeking out outstanding competitors as motivators.

SWOT ANALYSIS OF THE RUBBER INDUSTRY³¹

Once the forces affecting competition have been identified, the industry will be in a position to identify its strengths and weaknesses to overcome the threats and cash in on the opportunities. An understanding of the strengths, weaknesses, opportunities, and threats facing the Sri Lankan rubber industry today is the first step towards creating a long-term strategy for enhancing its position in the global market. The foregoing discussions of the production-marketing system and the relative positions of the main suppliers of rubber to the global market on major success factors, shown in Table 3-4, provide us with the following picture of the Sri Lankan industry today.

Strengths

- Sri Lanka is in a good position to become a top-notch supplier of quality rubber and rubber goods to the world. With the privatization of the state plantations, the private sector is ready to lead the way for strategic-niche marketing abroad. The manufactured rubber goods industry has won 15 percent of the world market for industrial tires, and the top plants have earned an enviable reputation for low-cost, good quality output with effective management.³²
- Sri Lanka's cost of production of rubber is lower than those of Malaysia and Thailand. The labor wage rate is also lower in Sri Lanka, which puts it in an advantageous position vis-à-vis these two major suppliers of rubber to the world market.

³¹ A SWOT, or strengths-weaknesses-opportunity-threat analysis examines the enterprise's internal strengths and weaknesses and external opportunities and threats. It is grounded in the principle that a strategy must produce a strong fit between the organization's internal capability and external environment.

³² See the European Rubber Journal, April 1993.

- The privatization of the state plantations has started the trend towards more aggressive overseas marketing, for example, the export of high-value centrifuged latex by the Kegalle Plantation.³³

Weaknesses

- Sri Lanka's cost of production and labor wage rate are higher than Indonesia's, which is a major Asian contender for global market share.
- The productivity of the rubber sector is low due to many reasons including low fertilizer use, lack of financial resources of the smallholders, low-level technology, and lack of investment.
- The productivity of the private sector (which produces 66 percent of the output) is lower than that of the state sector, due to inadequate institutional support. The average yield (both state and private) is only 60% of those of major competitors like Malaysia, Indonesia and Thailand.
- The marketing system has been passive for quite many years, particularly for high-grade rubber produced in the state plantations. There was little effort to establish direct links with specialty-rubber buyers overseas.
- Sri Lanka does not have a rubber standard like Malaysia, Thailand, and Indonesia, which makes it difficult to judge the quality and other specifications of Sri Lankan rubber.
- There is a lack of institutional support for rubber production and marketing by the large number of smallholders.
- There is a lack of an integrated strategy for development of the local rubber goods industry which could boost the export of value-added products. The three government agencies responsible for the development of the industry -- the Rubber Research Institute (RRI), the Ceylon Institute of Scientific and Industrial Research (CISIR), and the Industrial Development Board -- have little coordination among them, undermining the efforts of the private sector to advance the industry.

Opportunities

- The export market shares of major rubber producing countries are likely to go down in the future due to increasing internal demand.
- High demand growth is expected in the Asia-Pacific region in the next ten years.

³³*Sri Lanka Daily News*, December 30, 1992.

- There are significant opportunities for producing and marketing specialized rubber in the world.
- Long-term price projections are positive for natural rubber.
- There is a good potential of improving productivity and yield through necessary changes, since Sri Lanka is behind the major producing countries.
- New technology for rubber extraction and processing, which would help drive costs down, are available.
- The internal markets for the three big producers are growing fast and their export availability may go down.

Threats

- The possibility of worldwide overcapacity in the industry exists.
- Delay in the economic recovery of Eastern Europe, including the former East Germany and the FSU, may hold back the potential East European demand.
- The development of an international standard for rubber, being attempted by major buyers, may become a problem unless Sri Lanka upgrades its production quality.

An effective competitive strategy involves proactive action in order to create a defensible position against the five competitive forces shown in Figure 3-1. For the Sri Lankan rubber industry, this may involve a number of moves listed below (Porter 1980, op.cit.).

- Using the industry's strengths to position it in a way that creates the best defense against the array of competitive forces.
- Influencing the balance of forces through strategic moves to improve its operating environment.
- Anticipating likely shifts in the factors underlying the forces and responding to them before the rivals recognize them.

Positioning

The first approach for the industry is to match its strengths and weaknesses to the market and industry forces and find positions where the forces are the weakest. For example, the industry may only sell products that are not vulnerable to competition from substitutes.

Influencing the balance

The balance of competitive forces is to some extent controllable. For example, product innovation or branding could create the necessary differentiation for warding off the threat of substitute products. Capital investment in large-scale facilities or forward integration with packers and exporters would create entry barriers. Structural analysis could be used to identify the key factors and the places where strategic actions to influence the balance should be applied.

Pre-empting change

Long-range forecasts, through careful analysis of the industry-market trend, can provide projection of the changing trends that could be used in long-term planning. This is one way of staying ahead of the competition. The industry's core competency lies in its product image and the ability to serve different market segments with differentiated products. These core competencies should be constantly reassessed in the terms of future market needs and new methods should be planned to address problems before they arise.

Long-term planning for the rubber industry would involve a number of steps, starting with a clear definition of the industry's mission and objectives and ending with tactical plans.

DEFINING THE MISSION AND OBJECTIVES OF THE INDUSTRY

It is perhaps widely accepted within the rubber industry in Sri Lanka that its mission should be to produce quality-consistent rubber for maintaining profitable growth and a strong position in the global market. The four main objectives for firms in support of this mission are shown in Table 4-1.

It is important to note that there may be some built-in conflicts within these objectives and that long-range goals for profitability and increased sales may require short-run sacrifices. The process of developing an integrated strategy therefore has to be based on:

- examining the environmental threats and opportunities;
- selecting objectives that are consistent with these threats and opportunities, and with the core competencies of the industry; and
- acquiring any additional competencies required for successful implementation.

For example, even though world demand for natural rubber is growing, so is the volume of production. This requires a careful strategy of matching buyers' needs with the ability of the industry to serve the needs within its core competency. The growing markets of the Near East and Germany provide Sri Lanka with the right product-market fit because of its strength in production of high quality latex and crepe as well as low cost RSS rubber. The

strategy, therefore, has to assess future market possibilities in these countries and perhaps restructure production and capacity for the right product mix.

Table 4-1
Sri Lanka's Rubber Industry: Probable Objectives for the Millenium

PROFITABILITY
<ul style="list-style-type: none"> ▪ Net profit as a percent of sales – Set target ▪ Net profit as a percentage of total investment – Set target ▪ Net profit per share of common stock – Set target
VOLUME
<ul style="list-style-type: none"> ▪ Market share – Set target ▪ Percentage growth in sales – Set target ▪ Sales rank in the market – Set number by market segments ▪ Production capacity utilization – Set target
STABILITY
<ul style="list-style-type: none"> ▪ Variance in annual sales volume – Set target ▪ Variance in seasonal sales volume – Set target ▪ Variance in profitability – Set target
NONFINANCIAL
<ul style="list-style-type: none"> ▪ Improved image for quality and reliability – Set target ▪ Enhancement of technology for product and process innovation – Set target ▪ Improvement of manpower resources – Set target

Source: Authors' formulation.

THE RELEVANT MARKET FOR RUBBER

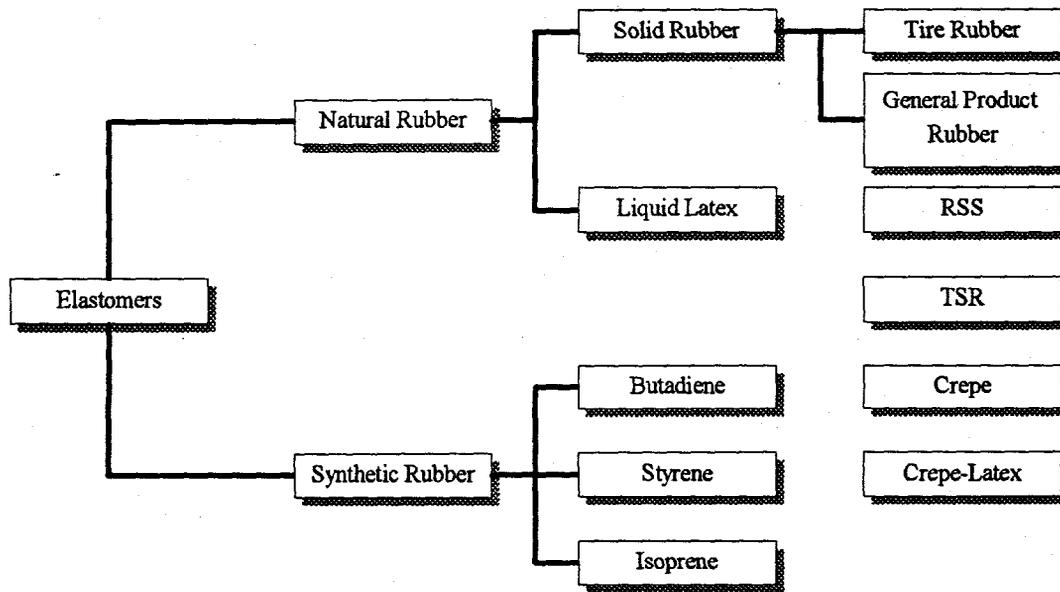
There are different product formulations within elastomers that come close to serving the same need as natural rubber. The competing alternatives could be classified at three different levels. First of all, there are competing product classes that serve the same generic need, such as plastics and elastomers. Second, there are competing product forms within a product class; for example within the elastomers are natural rubber and synthetic rubber. Thirdly, there are competing types of products within a product form such as RSS and TSR. The principal market structure for rubber is shown in Figure 4-1.³⁴

Competitive products for natural rubber are different types of synthetic rubber, such as styrene-butadiene, polybutadiene, and polyisoprene. However, the substitutability of these products tends to vary across different product uses. Different types of synthetic rubber have different physical characteristics and just a few of these can match the broad spectrum of natural rubber characteristics. Thus, synthetic rubber has specialized uses, and tends to be produced and consumed in smaller quantities for very specific types of products, as compared to natural rubber, which has a far wider range of applications.

³⁴ The market structure determines the degree of substitutability among a set of products.

Certain types of synthetic rubbers, however, come very close to their natural counterpart in most of the important characteristics, and are substitutable in many applications.

Figure 4-1
The Market Structure for Rubber



Source: Authors' formulation.

Analysis of Primary Demand for Natural Rubber

The demand for natural rubber in the world is growing at more than two percent per annum. This demand is strongly influenced by the pace of urbanization in the developing countries and the rising demand for automobile and other vehicle tires all over the world. Another strong demand for rubber in the non-tire segment of the market is coming from medical and health uses of latex products. Sizeable growth of demand has taken place in the last ten years in countries like Malaysia, Thailand, China, India, Indonesia, Canada, and the United States. Future high growth is expected in China, Indonesia, India, Thailand, and Germany (Table 3-3).

If we break the rate of consumption and the growth of consumption into three levels, high, medium, and low, and classify the main rubber-consuming countries along these dimensions, the result could be represented in the 3x3 matrix shown in Figure 4-2. The country cluster in each cell represents a particular level of future potential market for rubber. The three cells in the upper-right corner are the star cells representing the maximum future potential. In contrast, the three cells in the lower left corner represent minimum future potential. The countries in the diagonal of the matrix hold good promise for the future, but could have a reversal.

Countries falling in category 1 cells, the ones with the highest potential, are China and other developing countries in Asia like Pakistan, India, Germany, and Eastern Europe, including the CIS. Category 2 countries, are promising but require a careful approach because they are deficient either in consumption volume or consumption rate.

Figure 4-2
World Rubber Consumption: Volume vs. Growth Matrix

Low C - High G	Med C - High G	High C - High G
Indonesia 2 Thailand	Germany 1 India	China 1 Other Asia (Pakistan)
Low C - Med G	Med C - Med G	High C - Med G
Canada 3	Latin America 2	Eastern Europe & CIS 1
Low C - Low G	Med C - Low G	High C - Low G
France 3 United Kingdom Italy Brazil Malaysia Oceania	3	Japan 2 USA

Note: C = Consumption; G = Growth Rate

High consumption > 200,000 tons; Medium consumption > 100,000 tons; High growth > 3.5 % P.A;

Medium growth > 2.0 % P.A.

Source: Burger & Smit 1994.

They are Indonesia, Thailand, Japan, the United States, and the Latin American countries with the exception of Brazil. Finally, category 3 countries have the least potential and include much of Western Europe, Malaysia, Brazil and Oceania.

Analysis of the Selective Demand for Rubber

Selective demand is the demand for a specific type of rubber, such as rubber for tire manufacturing and rubber for manufacturing general products such as gloves, foam, shoes, etc. Selective demand also represents specific rubber types such as ribbed smoked sheet rubber or technically specified rubber. In analyzing selective demand, one must understand how buyers make choices from the alternative suppliers. Choice is a function of the buyer's needs and the buyer's perception of the alternatives in the context of a specific usage situation. Because needs represent internal drives and motives, which are difficult to observe and measure, one could use the concept of *benefit sought* to explain the need. The functional benefits that buyers hope to receive generally reflect these underlying needs. Frequently, *attributes* are used interchangeably with *benefits*. Attributes governing choices are not entirely related to the physical form of the product but may include broader expectations such as consistency and reliability.

Principal Market Segments for Natural Rubber

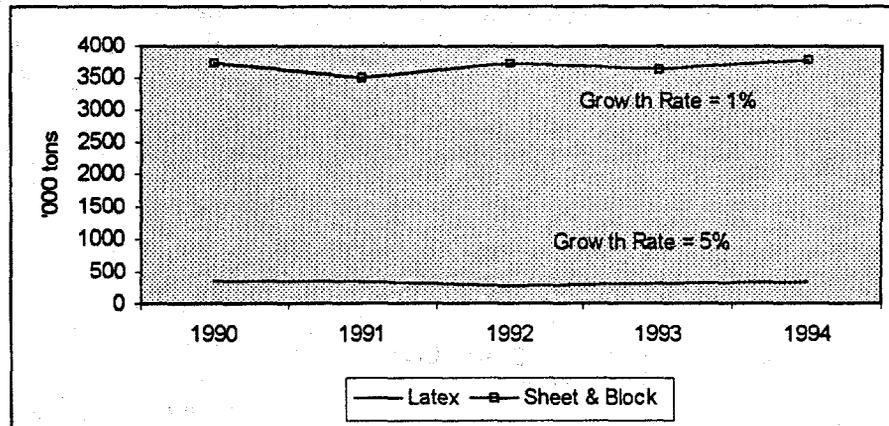
The Vehicular Tire Segment: The rubber needs for this segment could be low-cost RSS rubber for making economy tires or solid tires for heavy equipment, or high-cost TSR rubber for quality radial tires. The need varies with the economic condition of the country where it is needed. In Western Europe and North America, the demand for TSR rubber is high because of their markets for premium quality tires. In the developing countries of Asia, such as Pakistan, the demand is for the low-cost RSS rubber, because consumers in these countries are not willing to pay for the quality differentials. Japan is the only developed country in the world which still uses a lot of RSS rubber because of the structure of its tire making industry.

The projected demand for the tire segment up to the year 2020 is shown in Table 3-3. The countries with the highest expected demand growth in this segment are Indonesia, China, Thailand, and India.

The Non-Tire Segment: In the non-tire or the general rubber goods segment are all other users of rubber including health and medical users, general household users, and industrial material users. Rubber products that serve the need of this segment are latex, crepe, sole, and combinations of these. The countries with projected high demand growth for these products are China, Eastern Europe and the CIS, Germany, Japan, and Thailand (Table 3-3).

Sheet and Block-rubber Segment and the Latex Segment: The growth in the volume of sheet and block rubber import all over the world between 1990-1994 shows a much higher rate of growth for latex than all other types of rubber (Figure 4-3).

Figure 4-3
 Import Demand for Sheet & Block, and Latex Rubber
 1990-1994



Source: IRSG Rubber Statistical Bulletin 1996.

The consumption trend for latex in category 1 and category 2 countries during the period 1990-1995 (Table 4-1) shows that China holds the maximum potential for latex consumption with a growth rate of 13 percent per annum. It is followed by Latin America (9%) and India (8%).

Table 4-1
 Consumption of Latex in Potentially High Intake Countries
 1990-1995

	1990	1991	1992	1993	1994	1995	Growth Rate
China	31.0	36.0	54.0	55.0	79.0	61.0	13.04%
India	39.1	35.1	50.8	52.2	54.0	57.3	7.55%
Germany	23.0	25.7	22.1	18.1	20.1	24.5	1.26%
Russian Fed.	61.5	50.0	4.0	1.0	1.0	2.0	-37.48%
Other Asia	86.1	90.2	99.1	103.0	111.4	120.1	6.60%
USA	73.9	65.5	82.4	72.9	72.9	74.9	0.27%
Japan	15.2	14.4	13.5	12.5	12.0	10.0	-8.25%
Latin America	13.3	20.7	19.0	23.6	22.6	20.8	8.80%

Source: IRSG Rubber Statistical Bulletin 1996

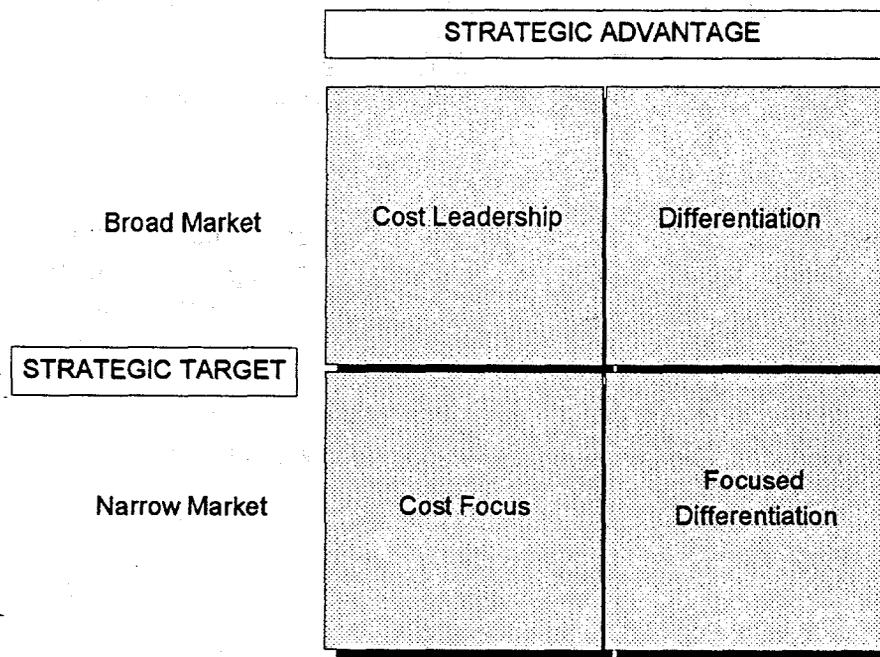
THE STRATEGIC OPTIONS FOR SRI LANKA

Creating a defensible position in the marketplace and coping successfully with the five competitive forces described earlier should define Sri Lanka's competitive strategy in the global rubber industry. A combination of three generic strategies, at the broadest level, could help it create this defensible position and outperform its competitors in the long run (Porter 1980, op.cit.).

1. Overall cost leadership.
2. Differentiation.
3. Focus.

The two main sources of competitive advantage in any industry are *low cost* and *differentiation*. A combination of these two sources of competitive advantage with the scope of the target market served (narrow or broad) yields four generic strategies, namely cost leadership, differentiation, cost focus, and focused differentiation (Figure 4-4). These strategies are internally consistent and can be used either singly or in combination.

Figure 4-4
Generic Strategies for Rubber



Source: Authors' formulation.

The industry has to decide on the *type* of competitive advantage it seeks, based on cost or differentiation, and the *market scope*, that is the size and extent of the market it seeks (Porter 1985). These decisions are helped by an analysis of the industry's competitive strength and the market opportunities offered in the long-run.

BROAD MARKET STRATEGIES

Overall Cost Leadership

This strategy is useful when an industry is able to establish itself as a low-cost producer for serving a broadly-defined market. In general, to implement this strategy the industry must construct the most efficient facilities (in terms of scale or technology),

vigorously pursue cost reductions from experience, impose tight cost and overhead control, and obtain the largest share of the market to achieve the lowest cost per unit of production. These advantages push the industry up the experience curve which then leads to more refinement of the entire process of production, delivery, service, and further lowering of cost. A low-cost position also provides defense against powerful buyers who drive down prices to the level of the next most efficient competitor. It provides substantial entry barriers and makes the industry strong enough to combat substitute products from competitive industries. A low-cost strategy, therefore, protects the industry against all five competitive forces that affect the industry (Figure 3-2). Cost leadership eventually becomes the basis of lower prices and more value offered to customers in the later, more competitive stage of the product life cycle. But it is only sustainable if sufficient barriers exist to prevent competitors from achieving the same low cost. Rapid technology development through R&D is one means of achieving this end.

Obtaining low overall costs may require a high relative market share and other conditions like higher productivity and a lower factor cost per unit of production. It may even require a wider product line to spread cost and the servicing of major customer groups to build volume. Implementing the strategy requires major investment in a state-of-the-art processing system, aggressive pricing, and start-up losses to build market share. The cost structure of Sri Lanka's rubber industry, shown in Table 1-12, does lend itself to the adoption of the cost-leadership strategy easily. This country has one of the lower costs in the global rubber industry due to low labor cost. Its productivity, however, is low (Table 1-11). The low productivity arises from a lack of investment in agricultural inputs, a lack of replacement of aging rubber-tree stock and factories, absence of proper R&D, and low worker motivation. Unless each of these problems is addressed, it may be difficult for the country to maintain an overall cost-leadership strategy. If the productivity is increased, it would give the industry a very formidable position against its higher-cost Asian rivals like Thailand and Malaysia. The only country which could be a strong competitor against Sri Lanka as a cost leader is Indonesia. There may, however, be market niches where Sri Lankan producers would be able to realize both cost advantages and superior product offering relative to Indonesia.

Differentiation

The second generic strategy is to differentiate the industry offerings and create a line of products that are perceived industry-wide as unique products. The strategy could be extremely powerful in coping with the five environmental forces in a different way than the cost leadership strategy. It provides insulation against competitive rivalry because of customers' brand loyalty and resulting lower sensitivity to price (Porter 1980, op.cit.). It automatically generates entry barriers because competitors have to overcome the uniqueness of the product to gain consumer preference. Differentiation yields higher margins with which the industry can deal with suppliers' power. Buyers' power is also diminished by an absence of substitute products to satisfy consumers' desire. The threat of substitute products is diminished as a natural sequel to differentiation unmatched by rivals in the industry.

To build differentiation, the industry in Sri Lanka has to match its natural advantages and strengths to the characteristics of the market that allows differentiation. The challenge could be met in many different ways: through technology that would create the desired product, quality, brand image, and features that consumers crave, and develop a marketing network. Sri Lanka is strong in the production of sole crepe and latex rubber which is a strength in markets of Asia, the United States, and Germany. The image of Sri Lanka's rubber is good in these countries. With well planned efforts to enhance this image, through forceful and creative marketing, the country could do very well in the high-grade/high-quality rubber segment.

NARROW MARKET STRATEGIES

Cost Focus and Focused Differentiation

A narrow focus strategy, which targets a narrowly defined market, has the ability to create more customer value from a better understanding of customers' needs and wants. The entire focus strategy is built to serve a particular target very well and has a distinct advantage if the competitors are working in much broader markets. Benefits of both differentiation and lower cost are possible with this strategy since concentrating on providing products to serve a particular segment's needs is a form of differentiation and it is possible to achieve lower cost with specialization. It must be noted, though, that the low cost is not from the perspective of the whole market but within the narrow market target. The focus strategy imposes a limit on the overall market share achievable because it involves a tradeoff between profitability and sales volume.

A narrow focus strategy can be combined with either a cost-leadership or a differentiation strategy. The first results in a *cost-focus* strategy where the industry pursues a narrow target market with a low-cost strategy, offering the market lower prices than the competition. The second yields a *focused-differentiation* strategy that offers a narrow market the perception of product uniqueness at a premium price. As indicated above, cost leadership is a sustainable source of competitive advantage only if there are enough barriers to prevent competitors from achieving the same low costs. Sustained differentiation depends on continued perceived value and the absence of imitation by competitors (Porter 1980, op.cit.). Several factors determine whether focus can be sustained as a source of competitive advantage. First, a cost focus is sustainable if the competitors are defining their target markets more broadly. Second, a differentiation focus is sustainable only if competitors cannot define the market even more narrowly. Third, focus can be sustained only if competitors cannot overcome barriers that prevent imitation of the focus strategy and if consumers in the target segment do not change over to other segments that the focuser does not serve.

The global rubber market holds numerous opportunities for Sri Lanka to follow both cost focus and focused differentiation strategies. The main action necessary is to select the right target markets and to concentrate on them. Earlier we analyzed the principal market segments for both standard rubber and latex. There are many ways in

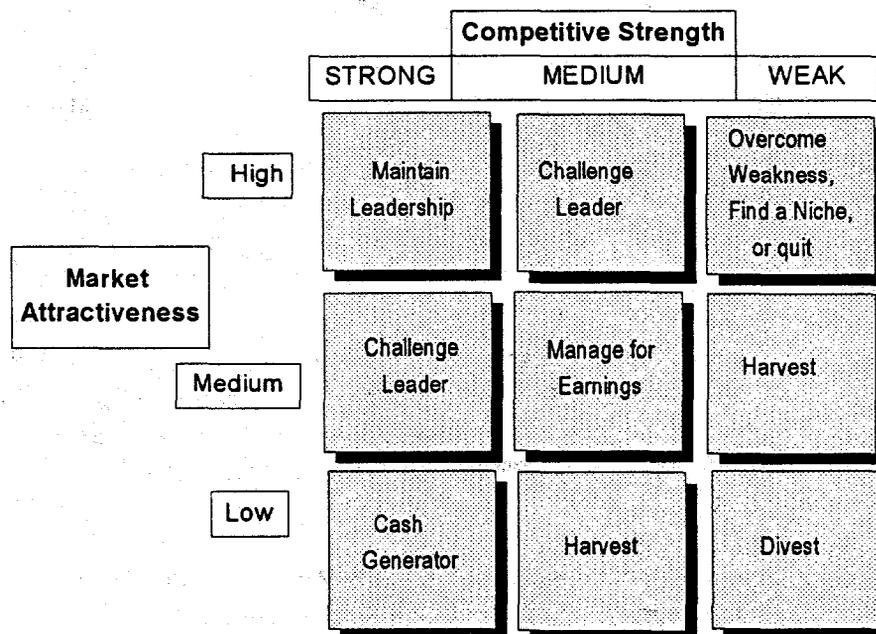
which these segments could be further refined. For example, secondary segments could be defined in terms of consumers' needs and desires, usage rate, values and lifestyles, etc. Many sophisticated marketing tools and techniques (such as conjoint analysis) are available for formation and profiling of segments based on these factors. However, detailed consumer research data are necessary to do this scientifically.

Sri Lanka is not exploiting its comparative advantage in the production of high grade crepe rubber that would give it a price advantage over the existing RSS export. The traditional channel of marketing rubber through middle-level dealers needs to be replaced by direct marketing and developing customized channels for special market niches overseas.

THE STRATEGIC OPTIONS

Considering all the possible generic strategies discussed above, which set of strategies should the rubber industry in Sri Lanka adopt? This decision depends upon the

Figure 4-5
The Directional Policy Matrix



Source: Authors' formulation.

nature of the specific market served by the industry. The directional policy matrix shown in Figure 4-5 provides guidelines for implementing strategies in different markets. This matrix relates the competitive position of the industry with the market's attractiveness.

Multiple factor indices may be used to quantitatively define both dimensions of this matrix as shown in Table 4-2.

Table 4-2
Evaluating Competitive Strength and Market Attractiveness
for Sri Lanka's Rubber in Four Major Countries

	Iran	Pakistan	China	USA
COMPETITIVE STRENGTH DIMENSIONS				
1. Market share	High	High	Low	Low
2. Management skills	Medium	Medium	Medium	Medium
3. Modern and efficient facilities required	Medium	Medium	Medium	Medium
4. Innovation technology	High	High	Medium	Low
5. Product image	High	High	Medium	Medium
6. Cost advantage	High	High	High	Low
7. Quality of distribution	Medium	Medium	Low	Low
<i>Overall Competitive Strength</i>	<i>High</i>	<i>High</i>	<i>Medium</i>	<i>Low</i>
MARKET ATTRACTIVENESS DIMENSIONS				
1. Global industry sales-growth rate in the market	High	Low	High	Low
2. Attractiveness of market size	Low	Low	High	High
3. Projected market growth rate	High	Low	High	Medium
4. Consumer loyalty	High	High	Low	Medium
5. Lack of government-created barriers	Medium	Low	High	Low
6. Overall potential for profit	High	Medium	Medium	High
<i>Overall Market Attractiveness</i>	<i>High</i>	<i>Medium</i>	<i>Medium</i>	<i>High</i>

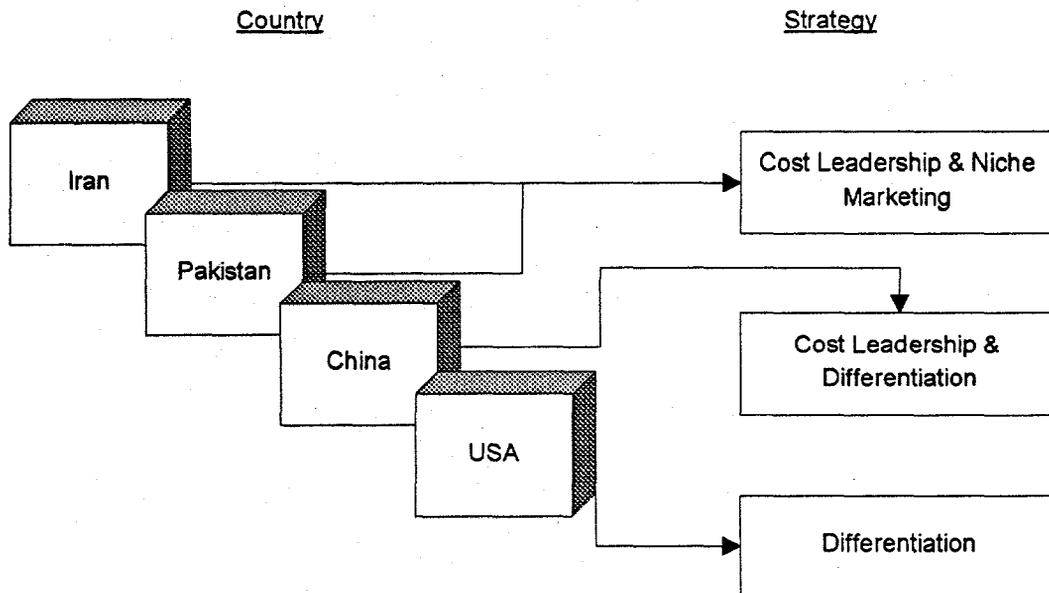
Source: Authors' estimates.

From an assessment of the overall strength of Sri Lanka's rubber industry and the attractiveness of the potential markets of Iran, Pakistan, China, and the USA (Table 4-2), the use of three basic strategies shown in Figure 4-6 could be suggested. But additionally, each market needs to be targeted with one or more of the three generic competitive strategies, i.e., cost leadership, differentiation, and focus.

The Iranian market is extremely attractive for Sri Lanka and given the rubber industry's high strength in that market, the best strategy to follow would be:

- use the low-cost strategy to develop strong brand loyalty and long-term franchise; and
- segment the market and identify niches for cost focus and focused differentiation.

Figure 4-6
Basic Strategies in Key Markets



Source: Authors' formulation.

The overall attractiveness of Pakistan's market is medium for Sri Lanka but its competitive position there is high. Also, it is a market mainly for low-price RSS rubber. The strategies best suited for this market are therefore:

- use the low cost production advantage to keep out competitors; and
- use product and service differentiation for particular segments of the market.

The Chinese market holds medium attraction for Sri Lanka and its competitive position there is also medium. However, China is a giant consumer of rubber and its demand for latex is rising fast. The best strategy for Sri Lanka is therefore to:

- use its cost leadership position to penetrate the market and develop brand loyalty; and
- differentiate its specialized rubber in this market to carve a niche which would be difficult for competitors to penetrate.

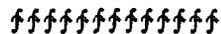
The U.S. market is another highly attractive market for Sri Lanka. Presently, its competitive strength is low in this market because it lacks the capability of producing a standardized, consistent, high quality, and diversified line of rubber for the market, and its marketing strength is low. The recommended strategies for this market would therefore be:

- address some of the critical weaknesses that prevent a major entry into this market. Form joint ventures both for getting the right marketing channels into the market and for establishing a niche, which could forestall competition; and
- segment the market for specialized rubber and rubber products and develop a well-differentiated product line to fill the niche for high quality product offerings where competition is weak or non-existent at this time.

SUSTAINING COMPETITIVE ADVANTAGE VIA STRATEGIC INTENT

The three generic strategies presented in this chapter are alternative, viable means of addressing competitive forces in the rubber industry worldwide. Firms or industries that fail to develop their strategy in at least one of these three directions are likely to lose out to competition. These organizations will lack market share, investment returns, the resolve to become efficient low-cost producers, and effective marketing skills that provide well-differentiated products with value in the eye of their customers. These organizations are almost guaranteed low profitability, either losing the high-volume customers who demand low prices or giving up profits to grab business from low-cost competitors. They also lose high-margin businesses – the cream – to firms who have focused efficiently on high-margin target markets with highly-differentiated products.

Sustaining competitive advantage is yet another dimension of the competitive game that the Sri Lankan rubber industry must understand well if it expects to be strong in the future. Competitiveness is a function of the pace at which an organization implants new advantages deep within itself. Thus, there has to be a *strategic intent*, growing out of ambition and an obsession for winning. Few competitive advantages are long lasting and keeping scores of old advantages is not the same as building new advantages (Hamel and Prahalad 1989). Success lies in creating tomorrow's competitive advantage faster than the competitors can mimic what one has today. For Sri Lankan rubber producers and exporters, the effort should be to build a wide portfolio of advantages by stacking layers of advantage on top of one another. For example, one layer of advantage could be through diversification into high-value forms of rubber. Then a second layer of quality and reliability could be added by building plants large enough to serve world markets. The third layer could be built with efficient marketing channels and brand names to gain recognition. Yet another layer could be added by building a global brand franchise – or a global customer base. This process of building layers demonstrates how the organization could move along the value chain to keep strengthening its competitive advantage.



References

- Alavi, H. (1990), *International Competitiveness: Determinants and Indicators*, World Bank Industry Development Division Paper No. 29.
- Barichello, Richard R. (1995), *A Survey of Distribution and Marketing Issues in Indonesian Agriculture*, Mimeo, June.
- Bartmess, Andrew, and Keith Cernt (1993), "Building Competitive Advantage through a Global Network of Capabilities," *California Management Review*, No. 2, Winter, pp. 78-103.
- Budiman, AFS. (1996), *The Future Development of Rubber Production and Marketing in Indonesia*, paper presented at the International Rubber Marketing Conference, Phuket, Thailand, April 11-13.
- Burger, Kees and Hidde P. Smit (1994), *The Natural Rubber Market – Review, Analysis, Policies and Outlook*, Economic and Social Institute, Free University, Amsterdam.
- _____, (1996), *World Demand and Supply of Natural Rubber to the Year 2000*, Economic and Social Institute, Free University, Amsterdam; paper presented at the International Rubber Marketing Conference, Phuket, Thailand, April.
- D' Aveni, Richard (1994), *Hypercompetition: Managing the Dynamics of Strategic Maneuvering*, New York, Free Press.
- Day, George S. (1990), *Market Driven Strategy: Processing for Creating Value*, New York, Free Press.
- The Feedonia Group (1994), *World Rubber and Tire*, Monograph, Cleveland.
- Goldberg, R. (1974), *Agribusiness Management for Developing Countries - Latin America*, Cambridge, Mass.: Ballinger Publishing Company.
- Government of Indonesia, Direktorat Jenderal Perkebunan (1995), *Statistical Estate Crops of Indonesia- Rubber, 1994-1996*.
- Government of Sri Lanka (1989), *The Core Group Report*.
- _____, (1991), *Sri Lanka: Task Force Report*, Colombo.
- _____, (1992), *Plantation Sector Statistical Pocketbook*.
- _____, (1995), *Plantation Sector Statistical Pocketbook..*

- _____, (1995), *Central Bank of Sri Lanka Annual Report*.
- Green, Alan (1991-a), *Technology & Market Development in Tree Crops*, SA1AG Division, World Bank, Washington D.C.
- _____, (1991-b), *Rubber Production and Processing of Sri Lanka*, SA1AG Division, World Bank, Washington D.C. April 25.
- Grilli, Enzo R., Barbara Bennett Agostini, and Maria J't Hooft-Wilvaars (1980), *The World Rubber Economy – Structure, Changes and Prospects*, The World Bank Staff Occasional Papers, Number Thirty, The Johns Hopkins University Press, Baltimore.
- Hamel, Gary, and C.K. Prahalad (1989), "Strategic Intent," *Harvard Business Review*, 67, No. 3 (May-June), pp. 63-76.
- Hobohm, Sarwar (1990), *Natural Rubber: Prospects for the 1990s*, The Economist Intelligence Unit, London.
- International Rubber Study Group (1996-a), *IRSG Rubber Statistical Bulletin*, April.
- _____, (1996-b), *Outlook for Elastomers – 1996-97*, London.
- Jaffee, Steven and Peter Gordon (1992), *Exporting High-Value Food Commodities: Success Stories from Developing Countries*, World Bank Discussion Paper, No.198, Washington D.C.
- Keegan, Warren J. and Mark C. Green (1997), *Principles of Global Marketing*, New Jersey, Prentice Hall.
- Marion, B. and the NC117 Committee (1986), *The Organization and Performance of the U.S. Food System*, Lexington, Mass.: D.C. Heath and Company.
- Morrisey, J. (1974), *Agricultural Modernization Through production Contracting: The Role of the Fruit and Vegetable Processors in Mexico and Central America*, New York, Praeger.
- Nishimizu, Mieko and John M. Page Jr. (1986), "Productivity Change and Dynamic Comparative Advantage," *The Review of Economics and Statistics*, May.
- Porter, Michael E. (1979), "How Competitive Forces Shape Strategy," *Harvard Business Review*, March-April, pp.137-145.
- _____, (1980), *Competitive Strategy: Techniques for Analyzing Industries and Competitors*, The Free Press, New York.

- _____, (1985), *Creating and Sustaining Superior Performance*, The Free Press, New York.
- _____, (1990), *The Competitive Advantage of Nations*, The Free Press, New York.
- Rubber Research Institute of Thailand (1996), *Thailand Rubber Statistics*.
- Samosorn, Sanit (1996-a), *The Future Role of Thailand in the Elastomer Industry*, Paper presented at the 37th IRSG Assembly, Phuket, Thailand, April.
- _____, (1996-b), *The Future of Thailand in Diversified Production Trend*, Paper presented at the Asia International Rubber Conference, Bangkok, December 2-3.
- Sinchareonkul V. and W. Thainugul (1996), *The Development and Status of the Thai Rubber Industry*, The Thai Rubber Association, Bangkok.
- Tan, C. Suan (1991), *Prospects for Natural Rubber Industry in Sri Lanka*, World Bank, SA3AG Division, June.
- World Bank (1989), *Indonesia: Strategies for Sustained Development of Tree Crops*, Vol.1, June, Agriculture Operations Division, Country Department V, Washington D.C.
- _____, (1991), *Sri Lanka Strategic Issues*, Asia Country Department I
- _____, (1992-a), *Commodities Market Outlook*, Washington D.C.
- _____, (1992-b), *Indonesia – Tree Crops Small Holder Development Project*, Agriculture Operations Division, Country Department V, Asia Regional Office.
- _____, (1992-c), *Malaysia – Third Felcra Land Development Project*, SAR, May, p.42.
- _____, (1994), *Sri Lanka Tree Crops Strategy*, Agriculture Operations Division, Country Department III, South Asia Region, Washington D.C. July 5.
- _____, (1996), *World Development Report*, Washington D.C.
- Utama, P.T., Indeco Duta and Winrock International Institute for Agricultural Development (1996), *Study on Monitoring the Impact of Policy Changes and Investments in the Tree Crops Sector – Indonesia*, February.

Distributors of World Bank Publications

Prices and credit terms vary from country to country. Consult your local distributor before placing an order.

ARGENTINA

Oficina del Libro Internacional
Av. Cordoba 1877
1120 Buenos Aires
Tel: (54 1) 815-8354
Fax: (54 1) 815-8156

AUSTRALIA, FIJI, PAPUA NEW GUINEA, SOLOMON ISLANDS, VANUATU, AND WESTERN SAMOA

D.A. Information Services
648 Whitehorse Road
Mitcham 3132
Victoria
Tel: (61) 3 9210 7777
Fax: (61) 3 9210 7788
E-mail: service@dadirect.com.au
URL: <http://www.dadirect.com.au>

AUSTRIA

Gerold and Co.
Weinburggasse 26
A-1011 Wien
Tel: (43 1) 512-47-31-0
Fax: (43 1) 512-47-31-29
URL: <http://www.gerold.co.at/online>

BANGLADESH

Micro Industries Development Assistance Society (MIDAS)
House 5, Road 16
Dhanmondi IV Area
Dhaka 1209
Tel: (880 2) 326427
Fax: (880 2) 811188

BELGIUM

Jean De Lanroy
Av. du Roi 202
1060 Brussels
Tel: (32 2) 538-5169
Fax: (32 2) 538-0841

BRAZIL

Publicações Técnicas Internacionais Ltda.
Rua Peixoto Gomide, 209
01409 Sao Paulo, SP
Tel: (55 11) 259-6644
Fax: (55 11) 259-6990
E-mail: postmaster@pti.uol.br
URL: <http://www.uol.br>

CANADA

Renouf Publishing Co. Ltd.
5369 Canotek Road
Ottawa, Ontario K1J 9J3
Tel: (613) 745-2665
Fax: (613) 745-7660
E-mail: order_dept@renoufbooks.com
URL: <http://www.renoufbooks.com>

CHINA

China Financial & Economic Publishing House
8, Da Fo Si Dong Jie
Beijing
Tel: (86 10) 6333-8257
Fax: (86 10) 6401-7365

COLOMBIA

Infoenlace Ltda.
Carrera 6 No. 51-21
Apartado Aereo 34270
Santafé de Bogotá, D.C.
Tel: (57 1) 285-2788
Fax: (57 1) 285-2798

COTE D'IVOIRE

Center d'Édition et de Diffusion Africaines (CEDA)
04 B.P. 541
Abidjan 04
Tel: (225) 24 6510; 24 6511
Fax: (225) 25 0567

CYPRUS

Center for Applied Research
Cyprus College
6, Diogenes Street, Engomi
P.O. Box 2006
Nicosia
Tel: (357 2) 44-1730
Fax: (357 2) 46-2051

CZECH REPUBLIC

National Information Center
prodejna, Konviktska 5
CS - 113 57 Prague 1
Tel: (42 2) 2422-9433
Fax: (42 2) 2422-1484
URL: <http://www.nis.cz/>

DENMARK

Samfundslitteratur
Rosenoerms Allé 11
DK-1970 Frederiksberg C
Tel: (45 31) 351942
Fax: (45 31) 357822

ECUADOR

Libri Mundi
Libreria Internacional
P.O. Box 17-01-3029
Juan Leon Mera 851
Quito
Tel: (593 2) 521-606; (593 2) 544-185
Fax: (593 2) 504-209
E-mail: librimundi@librimundi.com.ec
E-mail: librimundi@librimundi.com.ec

EGYPT, ARAB REPUBLIC OF

Al Ahram Distribution Agency
Al Galaa Street
Cairo
Tel: (20 2) 578-6083
Fax: (20 2) 578-6833

The Middle East Observer

41, Sherif Street
Cairo
Tel: (20 2) 393-9732
Fax: (20 2) 393-9732

FINLAND

Akateeminen Kirjakauppa
P.O. Box 128
FIN-00101 Helsinki
Tel: (358 0) 121 4418
Fax: (358 0) 121-4435
E-mail: akatilaus@stockmann.fi
URL: <http://www.akateeminen.com/>

FRANCE

World Bank Publications
66, avenue d'Iéna
75116 Paris
Tel: (33 1) 40-69-30-56/57
Fax: (33 1) 40-69-30-68

GERMANY

UNO-Verlag
Poppelsdorfer Allee 55
53115 Bonn
Tel: (49 228) 212940
Fax: (49 228) 217492

GREECE

Papasotiriou S.A.
35, Stourama Str.
106 82 Athens
Tel: (30 1) 364-1826
Fax: (30 1) 364-8254

HAITI

Culture Diffusion
5, Rue Capois
C.P. 257
Port-au-Prince
Tel: (509 1) 3 9260

HONG KONG, MACAO

Asia 2000 Ltd.
Sales & Circulation Department
Seabird House, unit 1101-02
22-28 Wyndham Street, Central
Hong Kong
Tel: (852) 2530-1409
Fax: (852) 2526-1107
E-mail: sales@asia2000.com.hk
URL: <http://www.asia2000.com.hk>

HUNGARY

Euro Info Service
Margitszegi Europa Haz
H-1138 Budapest
Tel: (36 1) 111 6061
Tel: (36 1) 302 5035
E-mail: euroinfo@mail.mtav.hu

INDIA

Allied Publishers Ltd.
1/1 Mount Road
Madras - 600 002
Tel: (91 44) 852-3938
Fax: (91 44) 852-0649

INDONESIA

Pt. Indira Limited
Jalan Borobudur 20
P.O. Box 181
Jakarta 10320
Tel: (62 21) 390-4290
Fax: (62 21) 421-4289

IRAN

Ketab Sara Co. Publishers
Khaled Eslamboli Ave., 6th Street
Kushesh Dalafrooz No. 8
P.O. Box 15745-733
Tehran
Tel: (98 21) 8717819; 8716104
Fax: (98 21) 8712479
E-mail: ketab-sara@neda.net.ir

Kowkab Publishers

P.O. Box 19575-511
Tehran
Tel: (98 21) 258-3723
Fax: (98 21) 258-3723

IRELAND

Government Supplies Agency
Oifig an tSoláthair
4-5 Harcourt Road
Dublin 2
Tel: (353 1) 661-3111
Fax: (353 1) 475-2670

ISRAEL

Yozmot Literature Ltd.
P.O. Box 56055
3 Yohanan Hasandiar Street
Tel Aviv 61660
Tel: (972 3) 5285-397
Fax: (972 3) 5285-397

R.O.Y. International

P.O. Box 13056
Tel Aviv 61130
Tel: (972 3) 5461423
Fax: (972 3) 5461442
E-mail: royil@netvision.net.il

Palestinian Authority/Middle East

Index Information Services
P.O.B. 19502 Jerusalem
Tel: (972 2) 6271219
Fax: (972 2) 6271634

ITALY

Licosa Commissionaria Sansoni SPA
Via Duca Di Calabria, 1/1
Casella Postale 552
50125 Firenze
Tel: (55) 645-415
Fax: (55) 641-257
E-mail: licosa@fbcc.it
URL: <http://www.fbcc.it/licosa>

JAMAICA

Ian Randle Publishers Ltd.
206 Old Hope Road, Kingston 6
Tel: 809-927-2085
Tel: 809-977-0243
E-mail: irpl@colis.com

JAPAN

Eastmen Book Service
3-13 Honggo 3-chome, Bunkyo-ku
Tokyo 113
Tel: (81 3) 3818-0861
Fax: (81 3) 3818-0864
E-mail: orders@svt-eps.co.jp
URL: <http://www.bekkoame.or.jp/~svt-eps>

KENYA

Africa Book Service (E.A.) Ltd.
Quran House, Mfangano Street
P.O. Box 45245
Nairobi
Tel: (254 2) 223 641
Fax: (254 2) 330 272

KOREA, REPUBLIC OF

Daeyon Trading Co. Ltd.
P.O. Box 34, Yoida, 706 Seoun Bldg
44-6 Yoido-Dong, Yeongchengpo-Ku
Seoul
Tel: (82 2) 785-1631/4
Fax: (82 2) 784-0315

MALAYSIA

University of Malaya Cooperative Bookshop, Limited
P.O. Box 1127
Jalan Pantai Baru
59700 Kuala Lumpur
Tel: (60 3) 756-5000
Fax: (60 3) 755-4424

MEXICO

INFOTEC
Av. San Fernando No. 37
Col. Toriello Guerra
14060 Mexico, D.F.
Tel: (52 5) 624-2800
Fax: (52 5) 624-2822
E-mail: infotec@rtn.net.mx
URL: <http://rtn.net.mx>

NEPAL

Everest Media International Services (P) Ltd.
GPO Box 5443
Kathmandu
Tel: (977 1) 472 152
Fax: (977 1) 224 431

NETHERLANDS

De Lindboom/In/Oor-Publikaties
P.O. Box 202, 7480 AE Haaksbergen
Tel: (31 53) 574-0004
Fax: (31 53) 572-9296
E-mail: lindeboo@worldonline.nl
URL: <http://www.worldonline.nl/~lindeboo>

NEW ZEALAND

EBSCO NZ Ltd.
Private Mail Bag 99914
New Market
Auckland
Tel: (64 9) 524-8119
Fax: (64 9) 524-8067

NIGERIA

University Press Limited
Three Crowns Building Jericho
Private Mail Bag 5095
Ibadan
Tel: (234 22) 41-1356
Fax: (234 22) 41-2056

NORWAY

NIC Info A/S
Book Department, Postboks 6512 Etterstad
N-0606 Oslo
Tel: (47 22) 97-4500
Fax: (47 22) 97-4545

PAKISTAN

Mirza Book Agency
65, Shahrah-e-Quaid-e-Azam
Lahore 54000
Tel: (92 42) 735 3601
Fax: (92 42) 576 3714

Oxford University Press

5 Bangalore Town
Sharae Faisal
PO Box 13033
Karachi-75350
Tel: (92 21) 446307
Fax: (92 21) 4547640
E-mail: oup@oup.khi.orum.com.pk

Pak Book Corporation

Aziz Chambers 21, Queen's Road
Lahore
Tel: (92 42) 636 3222; 636 0885
Fax: (92 42) 636 2328
E-mail: pbc@brain.net.pk

PERU

Editorial Desarrollo SA
Apartado 3824, Lima 1
Tel: (51 14) 285380
Fax: (51 14) 286628

PHILIPPINES

International Booksource Center Inc.
1127-A Antipolo St, Barangay, Venezuela
Makati City
Tel: (63 2) 896 6501; 6505; 6507
Fax: (63 2) 896 1741

POLAND

International Publishing Service
Ul. Piekna 31/37
00-677 Warszawa
Tel: (48 2) 628-6089
Fax: (48 2) 621-7255
E-mail: books%ips@ikp.atm.com.pl
URL: <http://www.ipsoc.waw.pl/ips/export/>

PORTUGAL

Livraria Portugal
Apartado 2681, Rua Do Carmo 70-74
1200 Lisbon
Tel: (1) 347-4982
Fax: (1) 347-0264

ROMANIA

Compani De Librarii Bucuresti S.A.
Str. Lipsicani no. 26, sector 3
Bucharest
Tel: (40 1) 613 9645
Fax: (40 1) 312 4000

RUSSIAN FEDERATION

Isdatefstvo <Ves Mir>
9a, Lotpachniy Pereulok
Moscow 101831
Tel: (7 095) 917 87 49
Fax: (7 095) 917 92 59

SINGAPORE, TAIWAN, MYANMAR, BRUNEI

Asahgate Publishing Asia Pacific Pte. Ltd.
41 Kallang Pudding Road #04-03
Golden Wheel Building
Singapore 349316
Tel: (65) 741-5168
Fax: (65) 742-9356
E-mail: asahgate@asianconnect.com

SLOVENIA

Gospodarski Vestnik Publishing Group
Dunajska cesta 5
1000 Ljubljana
Tel: (386 61) 133 83 47; 132 12 30
Fax: (386 61) 133 80 30
E-mail: repansekj@gvestnik.si

SOUTH AFRICA, BOTSWANA

International Subscription Service
P.O. Box 41095
Craighall
Johannesburg 2024
Tel: (27 11) 880-1448
Fax: (27 11) 880-6248
E-mail: iss@is.co.za

SPAIN

Mundi-Prensa Libros, S.A.
Castello 37
28001 Madrid
Tel: (34 1) 431-3399
Fax: (34 1) 575-3998
E-mail: libreria@mundiprensa.es
URL: <http://www.mundiprensa.es/>

Mundi-Prensa Barcelona

Consell de Cent, 391
08009 Barcelona
Tel: (34 3) 488-3492
Fax: (34 3) 487-7659
E-mail: barcelona@mundiprensa.es

SRI LANKA, THE MALDIVES

Lake House Bookshop
100, Sir Chittampalam Gardiner Mawatha
Colombo 2
Tel: (94 1) 32105
Fax: (94 1) 432104
E-mail: LHL@sri.lanka.net

SWEDEN

Wennergren-Williams AB
P.O. Box 1305
S-171 25 Solna
Tel: (46 8) 705-97-50
Fax: (46 8) 27-00-71
E-mail: mail@wwi.se

SWITZERLAND

Librairie Payot Service Institutionnel
Côtes-de-Montbenon 30
1002 Lausanne
Tel: (41 21) 341-3229
Fax: (41 21) 341-3235

ADECO Van Diemen Editions Techniques

Ch. de Lacuzé 41
CH1807 Blonay
Tel: (41 21) 943 2673
Fax: (41 21) 943 3605

TANZANIA

Oxford University Press
Maktaba Street, PO Box 5299
Dar es Salaam
Tel: (255 51) 29209
Fax: (255 51) 46822

THAILAND

Central Books Distribution
306 Sitom Road
Bangkok 10500
Tel: (66 2) 235-5400
Fax: (66 2) 237-8321

TRINIDAD & TOBAGO, AND THE CARIBBEAN

Systematics Studies Unit
9 Watts Street
Curepe
Trinidad, West Indies
Tel: (809) 662-5654
Fax: (809) 662-5654
E-mail: tobe@trinidad.net

UGANDA

Gustro Ltd.
PO Box 9997, Madhvani Building
Plot 16/4 Jinja Rd.
Kampala
Tel: (256 41) 254 763
Fax: (256 41) 251 468

UNITED KINGDOM

Microinfo Ltd.
P.O. Box 3, Alton, Hampshire GU34 2PG
England
Tel: (44 1420) 86848
Fax: (44 1420) 89889
E-mail: wbank@ukmifn.demon.co.uk
URL: <http://www.microinfo.co.uk>

VENEZUELA

Tecni-Ciencia Libros, S.A.
Centro Cuidad Comercial Tamanco
Nivel C2, Caracas
Tel: (58 2) 959 5547; 5035; 0016
Fax: (58 2) 959 5636

ZAMBIA

University Bookshop, University of Zambia
Great East Road Campus
P.O. Box 32379
Lusaka
Tel: (260 1) 252 576
Fax: (260 1) 253 952

ZIMBABWE

Longman Zimbabwe (Pvt.) Ltd.
Tourle Road, Ardennie
PO. Box ST125
Southerton
Harare
Tel: (263 4) 6216617
Fax: (263 4) 621670

Recent World Bank Discussion Papers (*continued*)

- No. 336 *Targeted Credit Programs and Rural Poverty in Bangladesh*. Shahidur Khandker and Osman H. Chowdhury
- No. 337 *The Role of Family Planning and Targeted Credit Programs in Demographic Change in Bangladesh*. Shahidur R. Khandker and M. Abdul Latif
- No. 338 *Cost Sharing in the Social Sectors of Sub-Saharan Africa: Impact on the Poor*. Arvil Van Adams and Teresa Hartnett
- No. 339 *Public and Private Roles in Health: Theory and Financing Patterns*. Philip Musgrove
- No. 340 *Developing the Nonfarm Sector in Bangladesh: Lessons from Other Asian Countries*. Shahid Yusuf and Praveen Kumar
- No. 341 *Beyond Privatization: The Second Wave of Telecommunications Reforms in Mexico*. Björn Wellenius and Gregory Staple
- No. 342 *Economic Integration and Trade Liberalization in Southern Africa: Is There a Role for South Africa?* Merle Holden
- No. 343 *Financing Private Infrastructure in Developing Countries*. David Ferreira and Karman Khatami
- No. 344 *Transport and the Village: Findings from African Village-Level Travel and Transport Surveys and Related Studies*. Ian Barwell
- No. 345 *On the Road to EU Accession: Financial Sector Development in Central Europe*. Michael S. Borish, Wei Ding, and Michel Noël
- No. 346 *Structural Aspects of Manufacturing in Sub-Saharan Africa: Findings from a Seven Country Enterprise Survey*. Tyler Biggs and Pradeep Srivastava
- No. 347 *Health Reform in Africa: Lessons from Sierra Leone*. Bruce Siegel, David Peters, and Sheku Kamara
- No. 348 *Did External Barriers Cause the Marginalization of Sub-Saharan Africa in World Trade?* Azita Amjadi Ulrich Reincke, and Alexander J. Yeats
- No. 349 *Surveillance of Agricultural Price and Trade Policy in Latin America during Major Policy Reforms*. Alberto Valdés
- No. 350 *Who Benefits from Public Education Spending in Malawi: Results from the Recent Education Reform*. Florencia Castro-Leal
- No. 351 *From Universal Food Subsidies to a Self-Targeted Program: A Case Study in Tunisian Reform*. Laura Tuck and Kathy Lindert
- No. 352 *China's Urban Transport Development Strategy: Proceedings of a Symposium in Beijing, November 8-10, 1995*. Edited by Stephen Stares and Liu Zhi
- No. 353 *Telecommunications Policies for Sub-Saharan Africa*. Mohammad A. Mustafa, Bruce Laidlaw, and Mark Brand
- No. 354 *Saving across the World: Puzzles and Policies*. Klaus Schmidt-Hebbel and Luis Servén
- No. 355 *Agriculture and German Reunification*. Ulrich E. Koester and Karen M. Brooks
- No. 356 *Evaluating Health Projects: Lessons from the Literature*. Susan Stout, Alison Evans, Janet Nassim, and Laura Raney, with substantial contributions from Rudolpho Bulatao, Varun Gauri, and Timothy Johnston
- No. 357 *Innovations and Risk Taking: The Engine of Reform in Local Government in Latin America and the Caribbean*. Tim Campbell
- No. 358 *China's Non-Bank Financial Institutions: Trust and Investment Companies*. Anjali Kumar, Nicholas Lardy, William Albrecht, Terry Chuppe, Susan Selwyn, Paula Perttunen, and Tao Zhang
- No. 359 *The Demand for Oil Products in Developing Countries*. Dermot Gately and Shane S. Streifel
- No. 360 *Preventing Banking Sector Distress and Crises in Latin America: Proceedings of a Conference held in Washington, D.C., April 15-16, 1996*. Edited by Suman K. Bery and Valeriano F. Garcia
- No. 361 *China: Power Sector Regulation in a Socialist Market Economy*. Edited by Shao Shiwei, Lu Zhengyong, Norreddine Berrah, Bernard Tenenbaum, and Zhao Jianping
- No. 362 *The Regulation of Non-Bank Financial Institutions: The United States, the European Union, and Other Countries*. Edited by Anjali Kumar with contributions by Terry Chuppe and Paula Perttunen
- No. 363 *Fostering Sustainable Development: The Sector Investment Program*. Nwanze Okidegbe
- No. 364 *Intensified Systems of Farming in the Tropics and Subtropics*. J.A. Nicholas Wallis
- No. 365 *Innovations in Health Care Financing: Proceedings of a World Bank Conference, March 10-11, 1997*. Edited by George J. Schieber
- No. 366 *Poverty Reduction and Human Development in the Caribbean: A Cross-Country Study*. Judy L. Baker
- No. 367 *Easing Barriers to Movement of Plant Varieties for Agricultural Development*. Edited by David Gisselquist and Jitendra Srivastava
- No. 368 *Sri Lanka's Tea Industry: Succeeding in the Global Market*. Ridwan Ali, Yusuf A. Choudhry, and Douglas W. Lister



THE WORLD BANK

1818 H Street, N.W.
Washington, D.C. 20433 USA

Telephone: 202-477-1234

Faxsimile: 202-477-6391

Telex: MCI 64145 WORLDBANK
MCI 248423 WORLDBANK

Cable Address: INTBANKRAD
WASHINGTONDC

World Wide Web: <http://www.worldbank.org>

E-mail: books@worldbank.org



ISBN 0-8213-4004-2