Korea and Brazil: A Partnership for the New Millennium

October 2000

Edited by
Won-Ho Kim

Korea-Brazil 21st Century Commission
Korea Institute for International Economic Policy
A government funded economic research center founded in 1990, the Korea Institute for International Economic Policy is the world's leading institute on the international economy and its relationship with Korea. KIEP advises the government on all major international economic policy issues, as well as serving as the warehouse of information regarding Korean government policy. Further, KIEP carries out research for foreign institutes and governments on all areas of the Korean and international economy.

Making this possible is the most highly knowledgeable economic research staff in Korea. Now numbering over 101, our staff includes 35 research fellows with Ph.D.s in economics from international graduate programs, supported by over 50 researchers. Our staff’s efforts are augmented by KIEP’s Korea Economic Institute of America (KEI) in Washington, D.C. and the KIEP Beijing office, which provide KIEP with crucial and timely information on the local economies. KIEP has been designated by the government as the Northeast Asia Research and Information Center, the National APEC Study Center and the secretariat for the Korea National Committee for the Pacific Economic Cooperation Council (KOPEC). KIEP also maintains a deep pool of prominent local and international economists and business people who are called on to assist KIEP in meeting the individual demands of our clients.

KIEP continually strives to increase its coverage and grasp of world economic events. Allowing for this expansion has been greater cooperative efforts with leading research centers from around the world. In addition to many ongoing joint projects, KIEP is also aiming to be a part of a much expanded and closer network of Asia’s and the world’s research institutes. Considering the rapidly changing economic landscape of Asia that is leading to a further integration of the world’s economies, we are confident KIEP’s win-win proposal of greater cooperation and sharing of resources and facilities will increasingly become standard practice in the field of economic research.

Kyung Tae Lee, President

KOREA INSTITUTE FOR INTERNATIONAL ECONOMIC POLICY
300-4 Yarmgok-Dong, Seocho-Gu, Seoul 137-747, Korea
Tel: 02)3480-1045 / FAX: 02)3480-1144,1199
URL: http://www.kiep.go.kr

Price USD 12
FOREWORD

Brazil, the fifth largest nation in the world, and possessing a population of 160 million, is the world's eighth largest economic power and leader of the South American market. During the Cold War, both Brazil and South Korea maintained very cooperative relations in political terms, however, their economic relations were quite limited. Brazil's import-substitution industrialization strategy, from the 1960s through 1980s, and the prevalence of macroeconomic instability there, in the late 1980s, led to protectionist trade measures that hindered both countries' attempts at further developing their economic relations. In the 1990s, however, the reformist governments in Brazil and its neighbors chose to focus on open-regionalism strategies, and established the Southern Common Market (MERCOSUR). While taking advantage of the economies of scale resulting from this regional integration, Brazil has continuously promoted market-oriented economic reforms. As the leader of MERCOSUR, Brazil has forged free trade accords with Chile and Bolivia, as well as with other major South American economies. All this has helped Brazil to emerge as a dynamic force in the world economy. Although Brazil recently suffered from a financial crisis resulting from an overwhelming accumulation of foreign debt and the confidence-loss effect caused by the Asian financial crisis, its economic dynamism was strong enough to allow Brazil a rapid recovery. The annual inflow of more than $20 billion in foreign direct investment firmly indicates that the economic growth of the country has not lost any momentum.

In the spirit of continued cooperation, the Korea-Brazil 21st Century Commission, created as a result of President Kim Yong Sam's visit to Brazil in 1996, during its first four meetings and parallel academic conferences, held alternately in Korea and Brazil, decided on a number of fields to be jointly developed by both countries. Notable progress has resulted from the Commission's coordination of the exchange of intellectuals and experts from a vast array of fields of mutual interest. The proposed science, technology and industrial cooperation fund, visa exemption accord, and summit meeting are already in sight.

This book is a compilation of numerous papers and presentations submitted by Korean and Brazilian scholars, and discussed by the Korea-Brazil 21st Century Commission members. Several new articles have been added, and others have been re-edited and updated since their initial presentation. We would like to give our special thanks to the esteemed members and coordinators of the Korea-Brazil
21st Century Commission for their insightful, wise and expert contributions, through all stages of this project, and to all those who put a great deal of effort into this book. It is my sincere hope that this publication provides both useful information and ideas that will assist in the building of further mutually cooperative and rewarding relations between Korea and Brazil, while also serving as a valuable academic resource.

October 2000
Seoul, Korea

Soonhooon Bae
Chairman
Korea-Brazil 21st Century Commission

Kyung Tae Lee
President
KIEP
Contents

FOREWORD ....................................................................................................................... 3

I. Korea and Brazil: Development and Challenges ......................................................... 9

1. The Management of Science and Technology in Industrial Development:
   Lessons from the Korean Experience ................................................................. 11
   \textit{Linsu Kim}
   Professor, Korea University

2. Korean Economic Growth and Current Crisis ...................................................... 33
   \textit{Woo Tack Kim}
   Professor, Hallym University

3. Brazil’s Current Economic Situation and Major Issues ........................................... 51
   \textit{Alkimar R. Moura}
   Professor, Getúlio Vargas Foundation (FGV)

4. The Brazilian Economy: From Hyper-Inflation to Stabilization ............................. 60
   \textit{Claudio Monteiro Considera}
   Researcher Director of the Institute of Applied Economics Research (IPEA)

II. Korea-Brazil Economic Relations at the Turn of the Century .................................. 93

5. Korea-Brazil Trade and Investment Relations: Boom, Crisis, and Future
   Prospects .................................................................................................................. 95
   \textit{Won-Ho Kim}
   Director for the Americas, Korea Institute for International Economic Policy
   (KIEP)

6. The Brazilian Economy, MERCOSUR, and Cooperation between Brazil
   and Korea .................................................................................................................. 110
   \textit{Luiz Felipe de Seixas Corrêa}
Secretary-General of External Relations of Brazil

7. Brazil-Korea Cooperation: Perspectives and Questions .......................... 117
   Mauro M. Durante
   President of the Executive Board of the Brazilian Service for Support to Micro
   and Small Companies (SEBRAE)

8. Korea’s Financial Crisis and Financial Cooperation between Korea and
   Brazil ........................................................................................................ 130
   Jae-Yoon Kim
   Former Member of the Monetary Board of the Bank of Korea

9. SMEs in Mercosur and Korea: Searching for New Sources of Economic
   Development ............................................................................................ 143
   Gilmar Masiero
   Professor, the State University of Maringa

10. Economic Cooperation between Asia and Mercosur: Searching for
    Economic Cooperation Directions between Korea and Mercosur ...... 173
    Ki-Su Kwon
    Country Specialist, Korea Institute for International Economic Policy (KIEP)

III. Korea-Brazil Science and Technology Cooperation in the New Millennium

11. Korea-Brazil Science & Technology Cooperation: Trends and Issues ... 193
    Sung Chul Chung
    Director, Center for International Science and Technology
    Cooperation (CISTC/STEPIC)

12. Science and Technology in Brazil: Possibilities of Cooperation with Korea
    ............................................................................................................... 205
    Eduardo M. Kriger
    Chairman, Brazilian Academy of Science

13. Biotechnology in Korea and Prospects for Cooperation with Brazil ... 211
    Young Hoon Park
    Director, Bioprocess Technology Research Division, Korea Research Institute of
14. Biotechnology in Brazil and Korea: Possibilities for Cooperation ...... 224
   Antonio Paes de Carvalho
   Professor, Institute of Biophysics Carlos Chagas Filho, Federal University of Rio de Janeiro

15. The Korean Initiatives Towards the Information Society:
   Opportunities for Cooperation with Brazil. ............................. 238
   Carlos J. P. Lucena and Mario D. Ripper
   Professor, Department of Computer Science at Catholic University of Rio de Janeiro and Consultant, Fang & Ripper

APPENDICES .................................................................................................................. 253

A. The Final Report of the Korea-Brazil 21st-Century Commission ........... 255

B. The Minute of the First Meeting of the Korea-Brazil 21st-Century Commission
   ................................................................................................................................. 261

C. The Minute of the Second Meeting of the Korea-Brazil 21st-Century
   Commission ................................................................................................................. 269

D. The Minute of the Third Meeting of the Korea-Brazil 21st-Century
   Commission ................................................................................................................. 278

E. The Minute of the Fourth Meeting of the Korea-Brazil 21st-Century
   Commission ................................................................................................................. 289
Korea and Brazil: Development and Challenges
The Management of Science and Technology in Industrial Development: Lessons from the Korean Experience

Linsu Kim
Professor of Management College of Business Administration
Korea University

1. Introduction

Industrial development is a process of acquiring technological capabilities and translating them into product and process innovations in the course of continuous technological change. In advanced countries, learning by research by corporations, universities, and government research institutes (GRIs) plays a dominant role in expanding the technological frontier. In developing countries, by contrast, learning by doing and imitative reverse-engineering by corporations, with limited assistance from universities and GRIs, is a dominant pattern of accumulating technological capabilities. A few newly industrializing economies (NIEs) have made the rapid transition from learning by doing to learning by research. Korea must be counted as one of them.

Indeed, Korea has transformed itself from a subsistent agrarian economy into a newly industrialized one in the space of the past three decades. Beginning in 1962, the Korean economy grew at an average annual growth rate of almost 8 percent. Although Korea faces a serious financial crisis in recent years due to the mismanagement of macro economy and the financial sector, unlike other Asian economies facing a similar crisis, it has a relatively strong industrial base. It is reflected in the evolution of its export structure. In the mid-1960s, Korea began exporting textiles, apparels, toys, wigs, plywood, and other labor-intensive mature products. Ten years later, ships, steel, consumer electronics, and construction services from Korea challenged established suppliers from the industrially advanced countries. By the mid-1980s, computers, semiconductor memory chips, video cassette recorders, electronic switching systems, automobiles, industrial plants
and other technology- and knowledge-intensive products were added to the list of Korea's major export items. In the mid-1990s, Korea is working on the next generation products such as multi-media electronics, high density television, personal communication systems and a new type of nuclear breeder. Such phenomenal growth and structural change in exports may be attributed to many social, economic, and technological factors, but most important of all may be technological learning (Kim 1997a).

This paper addresses the question: How has Korea managed science and technology in the process of its industrialization? Alternatively, how have Korean firms upgraded their technological capabilities over time? Have universities and government research institutes (hereinafter R&D community) been effective in helping the industry? If not, why not? How does its role evolve over time as industrialization progresses? These questions address vital issues facing many developing countries today, as well as industries in advanced countries which are seeking to upgrade their technological capabilities.

This paper first presents a three-stage model of technology development as an analytical framework, which is then used to examine the dynamic pattern of R&D activity in a newly industrializing country, namely Korea. Such a model places as much emphasis on the role of universities and GRIIs as on the research role of private firms in the process of industrial development. Finally it discusses lessons of the Korean experience for other developing countries.

2. An Analytical Framework

This framework analyzes and integrates two technological trajectories: one in advanced countries and the other in developing countries. Technological trajectory refers to the evolutionary direction of technological advances that are observable across industries and sectors.

Technological trajectory in advanced countries. Utterback postulates that industries and firms in advanced countries develop along a technology trajectory made up of three stages—fluid, transition, and specific (Utterback 1994). Firms in a new technology will exhibit a fluid pattern of innovation. The rate of radical (rather than incremental) product innovation is high. The new product technology is often crude, expensive, and unreliable, but it fills a function in a way that satisfies some market niche. Product changes are frequent as are changes in the market, so the production system remains fluid and the organization needs a flexible structure to respond quickly and effectively to changes in market and technology (Abernathy and Utterback 1978; Utterback, 1994).
As market needs become better understood and alternative product technologies converge or drop out, a transition begins toward a dominant product design and mass production methods, adding competition in price as well as product performance. Cost competition leads to radical change in processes, driving costs rapidly down. Production capability and scale assume greater importance to reap scale economies.

As the industry and its market mature and price competition grows more intense, the production process becomes more automated, integrated, system-like, specific, and rigid to turn out a highly standardized product. The focus of innovation shifts to incremental process improvements, seeking greater efficiency. When the industry reaches this stage, firms are less likely to undertake R&D aimed at radical innovations, becoming increasingly vulnerable in their competitive position. Industry dynamism may become regenerated through invasions by radical innovations introduced by new entrants (Anderson and Tushman 1990; Cooper and Schendel, 1976; Utterback and Kim, 1985). Often these are innovations generated elsewhere that migrate into the industry. Some industries, however, are quite successful in extending the life of their products in this specific state with a series of incremental innovations to add new values (Baba 1985). It is at the later stage of this state that industries are typically relocated to developing countries where production costs are lower. The upper part of Figure 1 depicts the above model. This technology trajectory model may change significantly with a shift in the techno-economic paradigm (Freeman and Perez 1988). The Utterback however, model is still useful in analyzing technology policy and strategy in developing countries.

Technological trajectory in developing countries. On the basis of research in several different industries in Korea, the author developed a three stage model—acquisition, assimilation, and improvement—to extend Utterback (Kim 1980). During the early stage of their industrialization, developing countries acquire mature (specific state) foreign technologies from industrially advanced countries. Lacking local capability to establish production operations, local entrepreneurs develop production processes through the acquisition of "packaged" foreign technology which includes assembly processes, product specifications, production knowhow, technical personnel and components and parts. Production at this stage is merely an assembly operation of foreign inputs to produce fairly standard, undifferentiated products. For this purpose, only engineering (E) efforts are required.

Once the implementation task is accomplished, production and product design technologies are quickly diffused within the country. Increased competition from
new entrants spurs indigenous technical efforts in the assimilation of foreign technologies in order to produce differentiated products. Technical emphasis is placed on engineering and limited development (D&E) rather than research (R).

The relatively successful assimilation of general production technology and increased emphasis upon export promotion, together with the increased capability of local scientific and engineering personnel, lead to the gradual improvement of mature technology. Imported technologies are applied to different product lines through local efforts in research, development and engineering (R,D & E).

Integration of the two trajectories. Linking the technology trajectories of Utterback (1994) and Kim (1980), Jinjoo Lee and his associates (1988) postulate that the three-stage technology trajectory in developing countries takes place not only in mature technology in the Specific stage but also in growing and emerging technologies in the Transition and Fluid stages. As shown in Figure 1, firms in developing countries, which have successfully acquired, assimilated and sometimes improved mature foreign technologies, may aim to repeat the process with higher-level technologies in the Transition stage in advanced countries. Many industries in the first tier catching-up countries (e.g., Taiwan and Korea) have arrived at this stage. If successful, they may eventually accumulate indigenous technological capability to generate emerging technologies in the Fluid stage and challenge firms in the advanced countries. When a substantial number of industries reach this stage, the country may be considered a member of the advanced countries. In other words, developing countries reverse the direction of technology trajectory in advanced countries.

Using the analytical framework, this paper examines the evolving role of R&D in corporations, universities, and GRIs and their interactions, within each of the three stages in transition from the duplicative imitation stage, to the creative imitation stage, and to the innovation stage in Korea. It then discusses the implications of the Korean experience for other developing countries.

3. Duplicative Imitation Stage

In the early years of industrialization, firms in developing countries import or imitate mature technologies, whose products and markets have already been well tested in the advanced countries (Pack and Westphal 1986). Technology tends to be readily available in machine-embodied form (Kim and Kim 1985). Large firms acquire production technologies mainly through turnkey plants or foreign license. Given the scale of large investment required, large local firms at this early stage are highly motivated to look to experienced foreign firms to ensure swift
construction and smooth start-up. In contrast, small firms took an imitative approach, reverse-engineering foreign products and evolving organically over a long period time. Both large and small firms deployed deliberate and aggressive strategies to assimilate foreign technologies (Kim and Lee 1987). Thus, R&D in the sense of generating new knowledge, was not needed; only limited engineering development (ED) was necessary. Such imitative reverse engineering was possible only because Korea had a good stock of well-trained human resources. Some developing countries attained rapid growth in elementary education. But what was unique in Korea was the well-balanced expansion in all levels of education early enough to support its economic development. In the 1960s, using data from the late 1950s for 73 developing countries, Harbison and Myers (1964) found three nations Korea, Taiwan, and Yugoslavia with levels of educational achievements far above what would be expected, given their levels of economic development. Two of these are the countries that made phenomenal industrial development in

〈Table 1〉 Research and Development Investment in Korea, 1965-1995

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>R&amp;D expenditures</td>
<td>2.1</td>
<td>10.5</td>
<td>42.7</td>
<td>282.5</td>
<td>1,237.1</td>
<td>3,349.9</td>
<td>9,440.6</td>
</tr>
<tr>
<td>Universities</td>
<td></td>
<td>0.4</td>
<td>2.2</td>
<td>25.9</td>
<td>118.8</td>
<td>244.3</td>
<td>770.9</td>
</tr>
<tr>
<td>GRIs</td>
<td></td>
<td>8.9</td>
<td>28.1</td>
<td>104.5</td>
<td>367.2</td>
<td>731.0</td>
<td>1,766.7</td>
</tr>
<tr>
<td>Private sector</td>
<td>0.2</td>
<td>1.3</td>
<td>12.3</td>
<td>81.4</td>
<td>751.0</td>
<td>2,374.5</td>
<td>6,903.0</td>
</tr>
<tr>
<td>R&amp;D/GNP</td>
<td>0.26</td>
<td>0.38</td>
<td>0.42</td>
<td>0.77</td>
<td>1.58</td>
<td>1.95</td>
<td>2.69</td>
</tr>
<tr>
<td>Number of researchers (total)\textsuperscript{1)}</td>
<td>2,135</td>
<td>5,628</td>
<td>10,275</td>
<td>18,434</td>
<td>41,473</td>
<td>70,503</td>
<td>128,315</td>
</tr>
<tr>
<td>Universities</td>
<td></td>
<td>352</td>
<td>2,011</td>
<td>4,534</td>
<td>8,695</td>
<td>14,935</td>
<td>21,332</td>
</tr>
<tr>
<td>GRIs</td>
<td>1,671</td>
<td>2,458</td>
<td>3,086</td>
<td>4,598</td>
<td>7,542</td>
<td>10,434</td>
<td>15,007</td>
</tr>
<tr>
<td>Private sector</td>
<td>112</td>
<td>1,159</td>
<td>2,655</td>
<td>5,141</td>
<td>18,996</td>
<td>38,737</td>
<td>68,625</td>
</tr>
<tr>
<td>R&amp;D exp/researcher (w.1,000)</td>
<td>967</td>
<td>1,874</td>
<td>4,152</td>
<td>15,325</td>
<td>27,853</td>
<td>47,514</td>
<td>73,574</td>
</tr>
<tr>
<td>Researcher/10,000 population</td>
<td>0.7</td>
<td>1.7</td>
<td>2.9</td>
<td>4.8</td>
<td>10.1</td>
<td>16.4</td>
<td>28.6</td>
</tr>
<tr>
<td>Number of corporate R&amp;D centers</td>
<td>0</td>
<td>1\textsuperscript{2)}</td>
<td>12</td>
<td>54</td>
<td>183</td>
<td>966</td>
<td>2,270</td>
</tr>
</tbody>
</table>

Note: 1) The figures do not include research assistants, technicians, and other supporting personnel.

2) For 1971.

Source: Ministry of Science and Technology, Korea.
the subsequent years.

During this period, universities played little role in helping industry in Korea. They remained primarily as undergraduate teaching-oriented institutions, undertaking little research. As shown in Table 1, university R&D expenditure was a mere 400 million (US$1.3 million) in 1970, accounting for only 3.5 percent of the nation's total R&D expenditures. This was insignificant compared with the proportion of the nation's researchers who were affiliated with universities in the same year (over 35 percent).

In the absence of research in universities, the government took the initiative in establishing a GRI the Korea Institute of Science and Technology (KIST) by recruiting overseas-trained Korean scientists and engineers. As shown in Table 2, GRIs accounted for 83.9 percent of the nation's total R&D expenditures and 43.7 percent of the nation's pool of researchers in 1970, reflecting their dominant role in R&D activities in Korea. This figure also shows that the number of researchers at KIST and small GRIs exceeded that of universities through 1970.

GRIs, however, faced numerous obstacles in the 1970s. For example, they suffered from poor linkages with industry. Most Korean scientists and engineers recruited by KIST came from either academic institutions or R&D organizations that undertook advanced research. There was no demand from industries for the kind of service that KIST could offer. Expertise was particularly lacking in manufacturing know-how and the development of prototypes, which were in great demand in the early years. Furthermore, KIST could not compete against foreign firms in supplying detailed blueprints and other manufacturing know-how, as well as being unable to assist industries in solving teething problems in the crucial initial stages of production.

This does not necessarily mean that KIST did not produce any significant outcomes. In fact, researchers at KIST developed several meaningful results. Skeptical about its engineering and production capability, the private sector, however, was reluctant to commercialize these results. The private sector preferred turnkey transplants or technology licensing from experienced foreign firms to technology transfer from the inexperienced local GRIs such as KIST. (Large projects such as fertilizer, chemical, and cement plants relied completely on turnkey basis, while consumer electronics resorted to foreign licensing.)

After several failed attempts to transfer the research results to the private sector, KIST founded the Korea Technology Advancement Corporation (K-TAC), a for-profit venture, to commercialize them. K-TAC, in turn, established several production subsidiaries and served as a holding company to finance and supervise them. Products commercialized successfully through this mechanism include
Vitavax (a raw material for an insecticide), HOP (an intermediate material for an insecticide), and metallic powder (KIST 1994).

Despite its problems, KIST made important contributions to industrial development in Korea. One of the most important roles played by KIST at this stage was in helping industries strengthen their bargaining power in acquiring foreign technology. In an attempt to develop an effective linkage between KIST and the private sector, the government coerced large firms to undertake joint research with KIST. Such joint research provided opportunities for some firms to acquire sufficient prior knowledge about technology to be imported. This enabled them to identify prospective technology suppliers and to enhance their bargaining power in negotiating technology transfer arrangements. Once imported, such joint research provided a platform on which the firms could assimilate and adapt technology rapidly. In other words, during the early years of industrialization the private firms entered joint research programs not so much to obtain significant research outcomes as to gain initial knowledge about technology which they were interested in acquiring.

For example, when black and white TV sets reached a rapidly declining stage in the export market, the color TV set became the next target product for Korean firms to sustain ever increasing exports. No foreign color TV producer was willing to license technology to Korean producers and help them invade the U.S. market again, as they did with black and white TV sets. Three major TV set producers therefore jointly entered a research contract with KIST in order to gain sufficient knowledge and experience in color TV technology. Experience gained from black and white receivers and learning from the joint research made it possible for local firms to strengthen their bargaining power and brought the royalty rate significantly down in licensing core patents held by RCA in 1974, enabling them to enter color TV set production and build up exports. In his study of Latin American countries, Utterback (1975) also concludes that the major role of public R&D centers in developing countries is to facilitate and lubricate foreign technology transfer by assisting in the private sectors acquisition of foreign technology, formally or informally.

KIST also played a significant role in transferring technology to industry through reverse-engineering of foreign technology an activity which was beyond the capacity of Korean industry at the time. A case in point involves polyester film production for use in cassette tapes. When a Japanese company rejected Korean requests for technology transfer, for fear of losing its market in Korea, a Korean chemical firm in collaboration with KIST successfully undertook a reverse engineering task to invent around the production technology. At that time, Korea
recognized process patents but not product patents. KIST had no sooner invented around the technology when the Japanese company offered a technology transfer arrangement, which the Korean government rejected in order to protect the Korea-developed technology. Korea now is the world's major supplier for audio and video cassette tapes (Kim 1991).

Another important economic effect of local technology development by GRIs was a drastic cut in the prices of imported technologies and materials. For example, no sooner had KIST successfully developed Betamethasone in 1979 than its import price was halved, from 30,000 won per kg to 15,000 won. When the GRI developed Rifamycine in 1982, again its import price dropped by more than half, from 1 million won per kg to 0.45 million won (KIST 1994).

The most important but unintended role the GRIs played during the early years of industrialization in Korea was the production of experienced researchers. When the private sector was reluctant to invest in R&D, the GRIs generated a large number of experienced researchers, who later spun-off to new GRIs and emerging corporate R&D centers in the 1980s. For example, over 2,800 experienced researchers left KIST to pursue careers elsewhere: 420 to private R&D centers, 784

**Table 2** The Evolution of R&D Activities in Korea

<table>
<thead>
<tr>
<th></th>
<th>Duplicative Imitation Stage</th>
<th>Creative Imitation Stage</th>
<th>Innovation Stage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Business R&amp;D</strong></td>
<td>- Little R&amp;D investment</td>
<td>- Formative stage</td>
<td>- Dominant role in the nation's R&amp;D</td>
</tr>
<tr>
<td></td>
<td>- Imitative Reverse-</td>
<td>- Advanced reverse-</td>
<td>- Globalization of R&amp;D</td>
</tr>
<tr>
<td></td>
<td>engineering</td>
<td>engineering</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Limited engineering(E)</td>
<td>- Development and</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>engineering (D&amp;E)</td>
<td></td>
</tr>
<tr>
<td><strong>University R&amp;D</strong></td>
<td>- Minimal role</td>
<td>- Formative stage</td>
<td>- Basic research</td>
</tr>
<tr>
<td></td>
<td>- Undergraduate</td>
<td>- Informal links with</td>
<td></td>
</tr>
<tr>
<td></td>
<td>teaching-oriented</td>
<td>industry</td>
<td></td>
</tr>
<tr>
<td><strong>Government</strong></td>
<td>Strengthening industry's</td>
<td>Expansion of GRI</td>
<td>Leading role in national</td>
</tr>
<tr>
<td><strong>Research</strong></td>
<td>bargaining power in</td>
<td>network</td>
<td></td>
</tr>
<tr>
<td><strong>Institute R&amp;D</strong></td>
<td>technology transfer</td>
<td>Incubating experienced</td>
<td>R&amp;D projects</td>
</tr>
<tr>
<td></td>
<td>Training experienced</td>
<td>researchers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>researchers</td>
<td>Leading role in national</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reverse-engineering of</td>
<td>R&amp;D projects</td>
<td></td>
</tr>
<tr>
<td></td>
<td>advanced technologies</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Leading role in the</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>nation's R&amp;D</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

784
to universities, 1,594 to newly established GRIs (KIST 1994).

Table 2 summarizes the characteristics of the duplicative imitation stage in terms of the role of major R&D actors in Korea. It also provides a preview of the characteristics in the subsequent stages.

4. Creative Imitation Stage

As the industrialization process unfolds and firms master manufacturing competencies in standardized, low-cost products, they seek to upgrade their capabilities and the value-added of their production in the face of increasing wages and emerging competitive threats from the second-tier developing countries. While their own R&D activities play a central role in achieving such upgrading, the R&D community (eg, GRIs and universities) also plays a supplementary role for rapid technological upgrading. We shall see how in the case of Korea industry intensified its in-house R&D and the R&D community came to play a role rather different from that of the early stage in Korea.

The government at this time launched various programs to induce the private sector to set up formal R&D laboratories. These include tax incentives and preferential financing for setting up new laboratories and exemption from military service obligation for key R&D personnel. Spurred by these programs and in response to increasing market competition, the number of corporate R&D laboratories increased from only one in 1970 to 966 by 1990, reflecting the seriousness with which Korean firms were pursuing more technology-intensive development. The newly established corporate R&D centers were able to draw on the existing GRIs for most of their experienced researchers, as well as on Korean graduates working abroad.

Consequently, this period saw significant structural change in R&D investment. The government took initiatives in Korea's R&D efforts in the early stage when the private sector had neither the capability nor market incentives to undertake such activities. But as industrialization progressed and Korea lost its comparative advantage in labor-intensive industries, the private sector rapidly took the leading role in local R&D in order to sustain its international competitiveness. For instance, the average annual growth rate of the nation's R&D investment as a proportion GDP over the decade of the 1980s (1981-1991) was the highest in the world, at 24.2 percent compared to 22.3 percent in Singapore, 15.8 percent in Taiwan, 11.4 percent in Spain, and 7.4 percent in Japan. The average annual growth rate of business R&D per GDP was also the highest in Korea (31.6 percent) compared to 23.8 percent in Singapore, 16.5 percent in Taiwan, 14.0 percent in Spain, and
8.8 percent in Japan (DIST 1994). Consequently, the share of the private sector in the nations total R&D expenditure rose from a mere 3 percent in 1970 to 75 percent by 1985. This was a dramatic transition by any standard.

Other important indicators of Korea’s rapid growth in industrial R&D were patent registrations in Korea and abroad. Domestic patent growth rate has significantly increased from a mere 48 percent in 14 years (1965-1978) to almost triple in the next 11 years (1979-1989), reflecting the increasing importance of intellectual property rights in the face of fading reverse engineering.

Several cases demonstrate the substantial in-house R&D in Korean firms. For example, when Japanese and U.S. producers were reluctant to transfer their patented technologies related to videocassette recorders and microwave ovens, Korean firms reinvented them by intensifying in-house R&D, giving them stronger bargaining power in licensing technology from the patent holders. In this case, foreign licensing cleared a path to the export market rather than to technology. Magaziner and Patinkin (1989) recount how Samsung developed the microwave oven and became one of the worlds leading producers.

While companies themselves started to pick up more of the R&D burden in the 1970s and 1980s, the government also took steps to ensure that there was a sound technological capability in both universities and GRIIs. Frustrated in its efforts to reform the undergraduate teaching-oriented universities under the jurisdiction of the Ministry of Education (MOE), the Korean government conceived a dual system, with the Ministry of Science and Technology (MOST) also being permitted to found a research-oriented institution specializing in science and technology. This was accomplished with the establishment of the Korea Advanced Institute of Science and Technology (KAIST) in 1975; this institution subsequently played a pivotal role in generating a large number of high caliber scientists and engineers.

Another important effort to upgrade the R&D capability of universities throughout the country began in the late 1970s and 1980s. The government established the Korea Scientific and Engineering Foundation under MOST in 1977. In a complementary move, the government also established the Korea Research Foundation under MOE in 1981. These foundations funded basic research in universities. The government also enacted the Basic Research Promotion Law in 1989, explicitly targeting basic research as one of the nations top technological priorities. As a result, as shown in Table 3, the size of industry-supported university research increased from \1.0 billion (US$2.1 million) in 1975 to nearly \169.2 billion (US$240 million) in 1990, reflecting the hugely increased interest of industry in tapping sophisticated capabilities available in universities. The
proportion of industry-funded university research also increased from 50 percent in 1975 to nearly 70 percent in 1990. Nevertheless, except for a few universities, university R&D remained rudimentary compared with the increasingly sophisticated needs of industry.

<table>
<thead>
<tr>
<th>Table 3</th>
<th>Sources of Fund for University and GRI Research</th>
</tr>
</thead>
<tbody>
<tr>
<td>For Universities</td>
<td></td>
</tr>
<tr>
<td>(a) Government</td>
<td>0.9</td>
</tr>
<tr>
<td>(b) Industry</td>
<td>1.0</td>
</tr>
<tr>
<td>(c) Others</td>
<td>0.1</td>
</tr>
<tr>
<td>(d) Total</td>
<td>2.0</td>
</tr>
<tr>
<td>(b)/(d)</td>
<td>50.0</td>
</tr>
<tr>
<td>For GRIs</td>
<td></td>
</tr>
<tr>
<td>(e) Government</td>
<td>37.9</td>
</tr>
<tr>
<td>(f) Industry</td>
<td>5.6</td>
</tr>
<tr>
<td>(g) Others</td>
<td>0.2</td>
</tr>
<tr>
<td>(h) Total</td>
<td>43.7</td>
</tr>
<tr>
<td>(f)/(h)</td>
<td>12.8</td>
</tr>
<tr>
<td>(a)/(e)</td>
<td>2.4</td>
</tr>
<tr>
<td>(b)/(f)</td>
<td>17.9</td>
</tr>
<tr>
<td>(d)/(h)</td>
<td>4.6</td>
</tr>
</tbody>
</table>

Note: Errors in total are due to round-up.
Source: Korea Industrial Technology Association, Major Indicators of Industrial Technology, Seoul: KITA, various years.

In addition to the formal university-industry relations, there existed informal knowledge transfer mechanisms such as private consulting by university professors. These moonlighting arrangements, which were quite extensive, were flexible and cost effective in helping firms to strengthen their technological capabilities. Private firms could identify university faculty members whose expertise was specifically relevant to their technological tasks and recruit them on a short term basis. This form of collaboration may be symptomatic of Korea's position as a catching-up country, where technological tasks are not yet at the frontier (Kim 1993).

Another important feature of university-industry relations was the emergence of technology-based venture firms, as in advanced countries (Brett, Gibson, and Smilor 1991; Roberts 1991; Jones-Evans and Kirby 1995). KAIST and several leading universities have served as incubating institutions for such venture firms. One example is Medison, one of many technology-based small firms spun off from
KAIST, and now one of the most successful new venture firms in Korea. The founder, who had a PhD in electronics engineering, and his four cofounders were graduate students in a laboratory that undertook research at KAIST on ultrasonic scanner technology. Medison is now one of the most dynamic ultrasonic scanner producers in the world, accounting for 25 percent of the global market in portable models. The firm has expanded its production and marketing activities worldwide and diversified into related businesses such as bioenergy medical equipment and medical information systems (Kim 1997a).

In parallel with the aforementioned investment to modernize university R&D activities, the government established several specialized GRLs, focusing on such sectors as chemicals, machinery, electronics, ocean science, standardization, nuclear energy, biotechnology, system engineering, aerospace, to serve the growing needs of the private sector. GRLs have continued to play an important role in strengthening the bargaining power of local enterprises in acquiring increasingly sophisticated foreign technologies. Although Korean firms have acquired successively more sophisticated capabilities, substituting their own domestic technologies for foreign technologies, they have had to rely continuously on imports for new technologies in almost all industries. For instance, when Corning Glass refused to transfer optical fiber production technology to Korea in 1977, two large copper cable producers in Korea entered a joint R&D project with the relevant GRI. After 7 years of R&D, the locally developed optical cable was tested successfully on a 35-km route in 1983. Although this local effort eventually grounded to a halt due mainly to slow progress in R&D, it nonetheless helped local firms gain bargaining power in acquiring foreign technology on favorable terms. Four firms entered licensing agreements with multinational enterprises in 1984 (Kim 1993).

In addition, the government introduced two major national R&D projects: the Industrial Generic Technology Development Project (IGTDP) and the National R&D Project (NRP). The IGTDP has concentrated mainly on solving current problems in existing technology areas with high economic externalities (ie spillover effects). The Ministry of Trade, Industry, and Energy (MOTIE) undertakes a survey each year to identify urgent R&D projects in industrial firms and offers financial supports to GRLs and university laboratories to undertake the projects jointly with private firms. Most of them are related to import-substitution of Japanese components in the electronics and machinery industries. In a 1989 survey, for instance, 174 technologies were identified, 146 of which were designated as projects to be funded. For IGTDPs, the government earmarked US$17.2 million (¥11.5 billion) in 1989.

In contrast, NRP projects focus primarily on future problems in new (to Korea)
technology areas with a high risk of failure or with high economic externalities, thus warranting public support. MOST identified several target areas, such as localization of machinery parts and components, new materials development, semiconductor design, super-mini computer development, energy conservation technology, localization of nuclear energy fuel, new chemical development, biotechnology development, and basic research in universities. The governments total investment in NRPs increased significantly from US$17.7 million (\$13.3 billion) in 1982 to $123.5 million (\$98.8 billion) in 1993.

5. Innovation Stage

In the period when technological upgrading to knowledge-intensive industries is proceeding in earnest, the relations between the different institutions of R&D activity change once again, under the impress of an internal dynamic of technological learning in the country concerned, and the external pressures of more and more intense competition at these technologically advanced levels. While the role of universities is enhanced, much of the product-oriented R&D is now accomplished in rapidly expanding R&D laboratories of private firms. This phase is now clearly established in the case of Korea.

In the wake of growing importance of innovation capability in sustaining Koreas international competitiveness in recent years, the private sector drastically stepped up its R&D efforts, from W.2.37 trillion ($3.36 billion) in 1990 to W.6.90 trillion ($8.95 billion) in 1995, maintaining its proportion to the nations total R&D at 81 percent during the same period (see Table 2). This is one of the highest among both advanced and newly industrialized countries. This is significantly higher than the levels of 50.5 percent in the United States, 52.1 percent in Taiwan, 54.4 percent in Singapore, 21.7 percent in Greece, 40.3 percent in China and 77.4 percent in Japan. The Table also shows that the number of corporate R&D centers increased from 966 in 1990 to 2,270 in 1995, reflecting the seriousness attached to R&D by private firms in recent years.

Three examples show how Korea has now drawn abreast of the world technology frontier in certain sectors. In semiconductors, Samsung developed the 256 Mega dynamic random access memory (DRAM) chip ahead of Japan (Kim 1997b). Korean firms are neck-and-neck with Japanese firms in developing flat panel display technologies. Although a core patent was licensed from the U.S., Korea is one of the first countries that commercialized code division multiple access (CDMA) mobile telephone technology. It is private sector R&D that underpins these and similar achievements.
In this process, Korean firms have boosted their own capabilities through recruitment of highly trained Korean-American scientists and engineers. The U.S. is populated with thousands of top-notch scientists and engineers who are Korean-Americans. Leading chaebols have lured away some of the best. Many of them left Korea more than a decade ago, earned PhDs in Americas best universities, and rose through the ranks of such leading U.S. concerns as IBM, Fairchild, Intel, and National Semiconductor. The well-financed Korean chaebols gave them challenging jobs and attractive compensation packages with considerable independence. Government statistics show that the number of scientists and engineers recruited by corporate R&D centers from abroad was 427 in 1992 alone. Some came back for short-term assignments, indicating that many Korean scientists and engineers abroad maintain close technical ties with Korean firms.

In addition to intensified in-house R&D, Korean firms began globalizing their R&D activities. LG Electronics, for instance, has developed a network of R&D laboratories in several locations, including Tokyo, Sunnyvale in California, Chicago, Germany, and Ireland. These outposts monitor technological change at the frontier, seek opportunities to develop strategic alliances with local firms, and develop the state-of-the-art products through advanced R&D. The LG Technology operation in Sunnyvale, for instance, plays a pivotal role in designing the latest personal computers, display terminals, and high resolution monitors, while the LG North American Laboratory in Chicago concentrates on HDTV, digital VCR, and telecommunication equipment. Samsung, Daewoo, and Hyundai Electronics have developed equally extensive R&D outposts. Samsung has R&D outposts in San Jose, Maryland, Boston, Tokyo, Osaka, Sendai in Japan, London, Frankfurt, and Moscow. Daewoo has two in France, one in the U.K., and one in Russia. Hyundai has outposts in San Jose, Frankfurt, Singapore, and Taipei.

Korean firms are also globalizing R&D through mergers and acquisitions. Hyundai, for example, has been the most aggressive at acquiring equity stakes in foreign firms as a way to gain access to cutting edge technologies. For instance, Hyundai acquired full ownership of Axil Computer in Santa Clara, California for computer development; it acquired significant stakes in Laserbyte Corp. in Sunnyvale, California to gain access to magneto optical disk drive technology, in Metaflow in La Jolla, California to develop SPARC compatible microprocessors, in Image Quest in San Jose, California to develop flat panel displays, and in Maxtor in San Jose, California to develop hard disk drives (Kim 1997a).

University research has also expanded significantly. Table 2 shows that R&D expenditure by universities almost tripled in five years from \244.3 billion (US$345.5 million) in 1990 to \770.0 billion (US$999.5 million) in 1995. The number of
university researchers also more than doubled from 21,332 to 44,683 during the same period. In addition, emulating the U.S. experience, the government introduced in 1989 a scheme to establish Science Research Centers (SRCs) and Engineering Research Centers (ERCs) in the nation's leading universities. The number of SRCs and ERCs increased from 13 in 1990 to 35 in 1995. These centers receive research grants from the government for nine years.

The knowledge-intensive stage also saw the resurgence of strong university-industry linkages. Table 3 shows, for instance, that the total amount of university research support by industry increased significantly in four years from \169.2 billion (US$239.3 million) in 1990 to \437.9 billion (US$567.9 million) in 1994. The number of joint research undertaken by SRCs and ERCs with industry also increased from 24 cases involving 34 firms in 1990 to 415 cases involving 338 firms in 1994 (KITA 1995), indicating a drastic increase in the scale and intensity of university-industry relations. In addition, several leading universities (i.e., Seoul National, Yonsei, and Korea) have developed science parks on the campus. Several chaebols firms are in the process of establishing joint-research laboratories in these universities.

In the government programs, GRIs continue to serve as the backbone of advanced R&D in Korea. This is well reflected in the fact that over 80 percent of national R&D investment goes to GRIs. Some of the GRIs have developed significant research results (such as 4M DRAM memory chips, electronics switching system, CDMA mobile telephone system) which were subsequently passed across to the private sector. Nevertheless, in the face of the rapid expansion of private R&D activities and increasing intensity of university R&D, reform of GRIs to redefine their roles has been discussed for sometime. Organizational inertia and the labor union of GRI members have made it difficult to implement these reforms.

In addition to the two national R&D programs mentioned above, the government introduced in 1992 the Highly Advanced National R&D (HAN) Project, also known as the G-7 Project, which is aimed at lifting Korea's technological capability to the level of G-7 countries by the year 2020. These three major national R&D projects (there are also three others) are designed to encourage GRIs to enter into consortia with the private sector. Universities also have access to these projects.

HAN, the most ambitious government program, has two parts: product technology development projects and fundamental technology development projects. The former includes new drugs and chemicals, broadband integrated services digital network (B-ISDN), next generation vehicle technology, and high definition television (HDTV). The latter projects cover such activities as ultra-large scale integrated circuits, advanced manufacturing systems, new materials for
information, electronics, and energy industries, environmental technology, new functional biomaterials, alternative energy technology, and next generation nuclear reactors. Altogether, a total of US$5.7 billion will be invested jointly by the government, universities, and industries, about half of which will come from the private sector.

The sum of $1.3 billion has already been invested during the first three years, involving over 13,000 researchers and resulting in 2,542 patent applications and almost two thousand academic articles. Notable outcomes include quinolon-based antibiotics, liver disease treatment medication, and HDTV. The 256-Mega DRAM chip development was also one of the target technologies designated by the HAN, but private producers had already built enough technological capability to develop the chip on their own.

The most recent program introduced by the government to enhance Korea's basic capability is the Creative Research Initiative Program, introduced in 1997. This program, albeit small in terms of investment size in the initial year, is designed to identify two dozen or so promising young scientists and engineers and provide them with sufficient research grants for nine years, subject to two interim reviews, to undertake concentrated advanced research so as to make breakthroughs in frontier technologies. Researchers from both universities and GRIs have shown enthusiastic responses.

Thus, the role of the R&D community has become increasingly important in the most recent phase of industrialization, as Korea entered relatively more technology-intensive industries. Universities play more important roles not only as a major source of well-trained scientists and engineers, but also as a major source of advanced research breakthroughs in frontier technologies. They also incubate technical entrepreneurs, who, with appropriate encouragement, spin off technology-based small ventures. While GRIs may have to undergo a drastic reform in the years to come, they are expected to play an increasingly important role in the area of public technologies such as nuclear energy, environment, health care, and marine science. They are also expected to provide effective technical services to small- and medium-sized enterprises (SMEs). In short, in the presence of demand from the private sector, the supply side of technological capability from the R&D community becomes effective, provided that the R&D community keeps reforming its role in providing effective services to the private sector with expertise, agility and flexibility.
6. Concluding Remarks

Korea has, indeed, been transformed from a subsistent agrarian economy into a newly industrializing one during the past three decades. Such phenomenal industrial development stemmed largely from the rapid acquisition of technological capability in the process from imitative learning by doing to innovative learning by research in the course of continuous market and technological change. The evolution of roles and dynamic interactions among the private sector, universities, and GRIs have made major contributions to the Korean industrialization. Such transformation offers many lessons for other developing countries, which are eager to see if Korean experience could be emulated in their countries. Seven such lessons are worth identifying.

First, Korean experience indicates that the first and most important implication for public policy is expanded investment in education even before launching an industrialization program. Compared with other developing countries that attained an equally rapid growth in elementary education, what was unique in Korea was the well-balanced expansion in all levels of education early enough to support its economic development. If anything, Korea went too far in this direction: the expansion of education exceeded the pace of economic development and created a short-term unemployment problem in Korea; the number of graduates in most fields exceeded demand. Consequently, unemployment among the educated was regarded as a serious social problem in the 1960s. But the formation of educated human resources laid an important foundation not only for the subsequent imitative reverse-engineering in the initial stage and advanced reserve-engineering in the intermediate stage, but also for rapid assimilation of imported foreign technologies.

Second, the most fundamental way to strengthen indigenous technological capability is to make definitive commitments to expanding tertiary educational programs and raising their quality. Building a significant number of first-rate educational institutions requires enormous financial and intellectual investment and requires a decade or more. This is one of the several major mistakes made by Korea. Korea expanded its tertiary educational program but failed to invest sufficiently to upgrade its quality. The Korean government belatedly recognized the mistake and has attempted to introduce a major reform in recent years, but it will take a decade or so before its effects can be seen.

In parallel with the expansion of tertiary educational programs, developing countries need to introduce research funding programs to strengthen basic research capability. Policymakers in developing countries often overlook the importance of
basic research, which in their case is not designed to create new technologies to challenge advanced countries, but rather to provide a window of opportunity for them to catch-up with advanced countries. Baumol, Blackman, and Wolff (1991) also conclude that the quantity and quality of education in an economy is one of the major influences determining whether the economy is catching-up rapidly to narrow the gap with advanced countries. Developing countries achieved parity with advanced countries in terms of the percentage of children attending primary school. The provision of secondary and higher education explains differences in national wealth. Governments in developing countries should assume full responsibility for taking necessary measures to provide quality secondary and tertiary education to their populace.

Third, it is important to adopt a liberal policy with respect to the phenomenon of brain drain in developing countries. It makes sense to allow science and engineering graduates to migrate to advanced countries. Otherwise, many of them will not find suitable jobs and continue to advance their technical competence at home in the early stage of industrialization. Brain drain was also a serious problem for Korea through the 1960s. As of 1967, 96.7 percent of Korean scientists and 87.7 percent of Korean engineers educated abroad remained there, mainly in the U.S., compared with the corresponding world comparisons of 35 and 30.2 percent for all countries (Hentges 1975). They, however, became important sources of an overseas technical network and a high calibre manpower pool for Korea's subsequent development. These high-ranking scientists and engineers enabled Korea to grow as a contender in cutting-edge technologies in the knowledge-intensive stage.

For this purpose, governments in developing countries need to introduce, at the appropriate stage, a program to reverse brain drain to attract scientists and engineers residing abroad to return home. The Korean government launched an ambitious program to repatriate overseas Korean scientists and engineers living abroad in the 1960s and 1970s. Such a program also set a model for the private sector, which assertively recruited high-caliber scientists and engineers in the 1980s and 1990s. Taiwan also implemented a similar program to lure home overseas Chinese scientists and engineers.

Fourth, although S&T is not important for developing countries to acquire and assimilate mature foreign technologies in the initial stage of industrialization, it is imperative to invest in developing S&T infrastructure such as GRIIs in the early stage. The Korean experience shows that it takes a decade or longer to develop an effective S&T infrastructure. In the early stage of industrialization, S&T infrastructure, particularly GRIIs, suffer from poor linkages with industries.
The most important role of S&T infrastructure in the early stage, albeit unintended, was to generate experienced researchers, when the private sector faltered in R&D investment. Then when large firms began establishing corporate R&D centers to respond to market competition, these experienced researchers within the S&T infrastructure could be recruited and played a pivotal role in these private R&D centers.

Fifth, one of the most significant transformations in the Korean experience is the private sectors drastic shift from a minimal role in the nations R&D in the initial stage to its dominant role in the knowledge-intensive stage. An implicit point is that such a transformation was possible primarily in response to intensifying competition in the market. Korean experience shows that the most effective source of competition is export policy. That is, it is imperative for developing countries to adopt export promotion policy if they want to expedite industrialization. This policy creates business opportunities and concurrently imposes crises for firms to undergo a life or death struggle in the competitive international market. The Korean experience shows that to survive in the crises, Korean firms had to accelerate learning by importing and rapidly assimilating production technology from abroad.

Consequently, firms in export-oriented industries were forced to learn more rapidly and grew faster than firms in import-substituting industries. Likewise, countries with export-oriented industrialization (EOI) grew faster than those with import-substituting industrialization (ISI). For instance, the average annual economic growth rate for EOI countries was 9.5 and 7.7 percent, respectively, for 1963-1973 and 1973-1985 periods, as compared to 4.1 and 2.5 percent for ISI countries. The real per capita income growth rate was 6.9 and 5.9 percent for the same periods for the former as compared to 1.6 and -0.1 for the latter, as the latter group had a higher population growth rate. It can be argued that this was the principal reason why the EOI-oriented NICs in East Asia grew faster than their ISI-oriented counterparts in Latin America.

Sixth, it is also important for governments in developing countries to offer various incentive programs for the private sector to undertake R&D activities. These programs may include tax concessions, preferential financing, and the exemption of military service obligation for key R&D personnel. The first two enable firms to reduce the cost of setting-up R&D laboratories and undertaking R&D activities, while the last one helps firms to recruit high caliber young technical people who can commit to the R&D function.

Finally under the World Trade Organization (WTO) regime, it is not easy to regulate the flow of foreign technology or investment. Nevertheless, it is important
for developing countries to recognize that in the early stage of industrialization, foreign licensing (FL) and foreign direct investment (FDI) are not so important for acquiring foreign technologies. The really significant means for technology acquisition is the procurement of turnkey plants (in the case of continuous process industries such as chemicals) and capital goods such as plant and equipment. The Korean experience was that FDI and foreign licensing was restricted in the early years, while technology transfer through other means such as capital goods imports was promoted in the early years. Such a policy, designed to maintain Korea’s management independence from foreign multinationals, was effective in forcing Korean firms to take initiatives and give a central role to learning (ie, acquiring, assimilating, and improving imported technologies) rather than relying entirely on foreign sources. Well-trained, hard working Koreans were motivated to maximize technological learning from readily available foreign goods and were equipped with sufficient knowledge to reverse-engineer them successfully.

In conclusion, despite evident differences in specific sociocultural, economic, and technological conditions in developing countries, there appear to be many lessons to learn from Korea, which has undergone a rapid transition from imitative learning by doing to innovative learning by research in R&D. The lessons involve learning from Korea’s successes, while not repeating Korea’s mistakes.
References


KITA. various years. Major Indicators of Industrial Technology. Seoul: Korea Industrial Technology Association.


Korean Economic Growth and Current Crisis

Woo Tack Kim
Professor, Hallym University

1. Determinants of Long-Run Growth: Lessons of Economics

What does the economic theory teach about economic growth? The economic performance of East Asian countries during the last thirty years was so exceptional that it has raised many questions. On the other hand, new economic theories developed during the last ten years have provided the ground for alternative interpretation of the fact and have encouraged debates on many fronts. As new theories have claimed empirical researches for supporting evidence, large numbers of studies have loomed up. Among them the most comprehensive studies are Barro (1996), Hall and Jones (1996), Rodrik (1997), and Sachs (1997).

These studies reported empirical findings that strongly support the general notion of neoclassical convergence. And they confirmed that the followings are factors affect most the long-run growth. Other things being equal, initial conditions — GDP per capita and schooling — matter. Demographic variables such as life expectancy, dependency ratio, population growth rate affect the saving and investment in education, in turn, growth rate. Openness, government saving, and institutional quality are proved crucial. In addition to these variables, factors such as inflation, terms of trade, physical geography, also affect the long-run growth.

A part of them is given exogenously by nature, by history or by international environment. The rests are variables that government policies can change as long as they have will, even though not easy. Some can be changed only in the long run.

2. The Korean Miracle was real

The success story of the Korean economy during the last 30 years is well known and we are not going to repeat the whole story. Indeed, the economic transformation of Korea has been one of the most remarkable accomplishments in history. Incomes per capita that was under US$ 100 in the 1960s have reached
ten thousand dollars mark in 1996\(^1\), making it the worlds 11th largest economy. These increases in GDP are reflected in substantial improvements in the standard of living, including extended longevity, better health and education and dramatic reductions in poverty.\(^2\) Absolute poverty was eliminated almost completely.

How could the Koreans accomplish all these? As mentioned above, high saving, low taxes and government spending, strong commitment to education and openness to trade are all vital to growth. These are exactly what Koreans have been doing. Furthermore, relatively open economies ensured that labors and capital were allocated more in response to price signals in spite of the bureaucrats interventions.

3. Korean Economy Performance in the 1990s

Until mid 1997, the Korean economy was praised as the model of economic development. Both press and academia rushed to draw the lessons from its experience. Even the interventionist industrial policy was applauded.\(^3\) Few exceptions are Krugman(1994)\(^4\) and Easterly et al. (1993).\(^5\) Here is why. Data will tell you.

\(^1\) It is a more than ten-fold increase in just over three decades, in real terms.


\(^4\) He argued that the rapid expansion was unsustainable all along because it has been based on expansion of inputs and not on gains in efficiency. Thus once the sources of inputs expansion are exhausted and capital piles up towards rich country levels, diminishing returns will set in and growth will slow sharply.(Krugman, Paul, "The Myth of Asia’s Miracle." *Foreign Affairs*, November/December 1994, 62-78)

\(^5\) Shocks, especially those to terms of trade, rather than country characteristics such as education levels or political stability play a large role in explaining variance in growth. It means economic growth depends more on good luck than on good policy.( Easterly, W., M. Kremer, L. Pritchett and L. Summers, "Good Policy or Good Luck? Country Growth Performance and Temporary Shocks." *NBER Working Paper* No.4474. Cambridge, Mass.: NBER, 1993.)

---

**Table 1** Economic Growth Rate (in %)

<table>
<thead>
<tr>
<th>Year</th>
<th>1970-79</th>
<th>1980-89</th>
<th>1990-97</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970-96</td>
<td>8.4</td>
<td>7.95</td>
<td>7.45</td>
</tr>
</tbody>
</table>

Source: The Bank of Korea(BOK); Ministry of Finance and Economy.
4. Signs of Trouble

Did the economy manifest any symptoms before the crisis? The slowdown of growth and the increasing current account deficits were the first signs. The slowdown began in the fourth quarter of 1995 but the current account deficit jumped early in the first quarter. The trouble started with downturns in the semiconductor, metals and petrochemical sectors. The depreciation of Yen which made Korean products expensive compared with Japans aggravated the downturn. In 1997, debt burdened chaebols began to fail and eight of the largest thirty chaebols have gone bankrupt even before the exchange crisis. In early 1997, heated discussions around these signs of trouble arose. The issue was whether cyclical factors or structural factors caused the problems.

5. Causes of Slowdown

5-1. Cyclical Factors

There was plenty of reasons that made the Korean government officials and businessmen to believe the deterioration of current account and the slowdown of economic activities since 1995 were caused mainly by cyclical factors. The Asian Miracle: Is it over?6) First, demand from rich countries was weak as the rate of growth in industrial production slowed in 1995. Second, the depreciation of yen against dollar to which Korean Won is linked, eroded Korean exporters competitiveness against Japanese producers. Third, the slump in the world semiconductor market hits Korea especially hard. Memory chip prices fell by more than 80% in 1996 and electronics account for a big chunk of its exports.

Furthermore, the fact that imports fell as sharply as exports supports the argument of cyclical origin of export slowdown rather than an underlying loss of competitiveness. Koreas export growth rate slowed from 30% in 1995 to 4% in 1996, but its import growth also slowed, from 32% to 11%.

Above all, signs of recovery were visible and two most troubled indicators began to show improvement in 1997. The growth rate increased to 6.4% in the second quarter from 5.5% of the first quarter. The current account deficit was heading lower and by mid-1997 was already back to 2.5% of GDP from 4.9% in 1996.

---

5-2. Structural

Even if the main causes of the recent slowdown were cyclical, that slowdown has still exposed several structural problems which need to be tackled to sustain rapid growth. The Korean economy was squeezed between the challenge from countries with cheaper labor, such as China, Thailand, Malaysia, and better technology and greater economies of scale of the US, Japan and so on. Dealing with this double squeeze was a major challenge.

The problem was in far worse shape than the macroeconomic data had suggested. Korean economy is too heavily concentrated on a few industries, such as electronics and petrochemicals. The export dependent demand structure makes the economy acutely sensitive to external shocks.

However, the discussion of structural problem narrowed to the decreasing price competitiveness of Korean product in export markets, in turn, to high cost of production. The major culprit was labeled as four high or high cost come low efficiency by Korean media. Four high referred to high wages, high interest rates, high land price and high distribution costs.

Korean firms are suffering because they no longer enjoy cheap, hard-working labor. Factories are heavily overmanned. According to recent Volvo’s assessment, the productivity of Samsung Heavy Industry’s worker is only 30% of their Swedish counterpart.\(^7\) Infrastructure bottlenecks are widespread because transport and power systems have failed to keep pace with industrial expansion. Furthermore, there are causes of chaebols own made. They are indebted too heavily. Their average debt-to-equity ratio is about 400%, more than three times the average for large American firms. Simply servicing debt has become their heavy burden.

<table>
<thead>
<tr>
<th>Table 2</th>
<th>Labor Cost and Interest Rate of Major Asian Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Korea</td>
</tr>
<tr>
<td>labor cost in manufacturing ($/hour, 1995)</td>
<td>17.40</td>
</tr>
<tr>
<td>interest rate(short-term, April 1997)</td>
<td>13.30</td>
</tr>
</tbody>
</table>

It is noteworthy that the discussion of structural problem gyrated around production costs and did not go beyond. The problems much talked now such

\(^7\) Chosun-Ilbo, April 22, 1998.
as financial sector weakness, chaebol structure and governance, government regulations failed call due attention until the financial crisis occur and foreigners raise questions, even though these were well-known policy agenda since Rohs administration.

6. Why did the Koreans fail to prevent the Crisis?

Why did the Koreans fail to adopt preventive measures after the South East Asian crises? Last October, when the speculative attack to Brazilian currency began, following Hong Kong, the Brazilian authorities reacted swiftly raising interest rates and announcing the fiscal package and succeeded to defend its economy from exchange crisis. On the other hand, Koreans wasted six months since the Thai crisis until November when they asked the IMF for bail-out. In the meantime, domestic press warned repeatedly the government because Korean financial companies already had trouble to borrow money in international financial markets. Their creditworthiness was questioned and the spread on interest paid was continuously increasing. One bureaucrat of the Ministry of Finance and Economy confessed in a hearing that the authorities failed to act when the first signs of trouble emerged because they were complacent after so many years of high growth. Furthermore, neither bureaucrats nor politicians in charge of economic policy making understood how a financial crisis occurs. Ignorance and complacency made the policy makers to sit idle until foreign reserves and the economy’s credibility exhaust.

Politically, the exchange crisis could not be more untimely. It was the last year of a presidential term and coincided with election campaign. Vote counting prevailed over the fate of the economy. Bureaucrats were at their most cautious. Deep down, they hoped that the banks could struggle few more months until February, when a new president takes office.

7. Explanation of Crisis in Vogue

The factors traditionally causing exchange crisis such as fiscal deficit, public debt, high inflation are out of question. The private debt was the source of trouble and the root of these debts has to be explained. Then appeared one explanation which emphasizes crony Asian capitalism\(^8\) as the cause of crisis. American triumphalists and some academics, such as Paul Krugman, advocate this line of

arguments. Now it has become a quasi common sense. The argument goes as follows. The Asian countries caught in crisis have three characteristics in common. First one is high growth; second is a boom-bust cycle in asset prices preceding the currency crisis. The other is reckless lending on overly risky investments by banks and finance companies. Continued high growth bred excessive optimism. Optimism combined with policies such as insufficient financial regulation and implicit government guarantee of banking system, was sufficient in creating incentives that led to reckless external finance and domestic lending. Too much lending and too much investment mean excessive demand for assets. The result is rising price of assets in limited supply. A bubble is formed. Once made a bubble, only remaining question is when it bursts.

During the whole period of rapid growth Korean banks were served as tools of state industrial policy. The governments control of credit allocation worked well enough at first, when the economy was relatively simple and the way to increase production was to invest heavily and copy rich countries technology. But the state-guided banks habit of lending on the basis of political consideration rather than proper risk-assessment has created the expectation among banks and firms that the government will bail them out if need be. Consequently firms borrowed and invested too much while banks lent recklessly. In the 90s, with abundant liquidity in international financial markets, Korean banks and chaebol could borrow freely abroad. The low cost of capital was invitation to debt financed investment and the high debt-equity ratio became trademark of chaebols financial structure.

Though the model is illuminating in some sense, it does not apply well to Korean case. First of all, there was nothing like a bubble-bust during the last few years. There was a real estate price deflation as far back as 1993, but that was not serious enough be called a bubble-bust. The prices of major assets, real estate and stock, in mid-1997 were comparable to those of the end of 1980s. Those were about 30% lower than the historical peak prices. In short, the prices were within the normal range of ups and downs. It seems that the sequence of a bubble-bust and exchange crisis is reversed in Korea. The asset price deflation experiencing now is a result of exchange crisis, not the cause.

8. Confidence Crisis

In August 1997, IMF revised up their forecast of Korean economy's growth rate from 5.6% to 6.5%. And, as late as October, its annual consultative mission gave Korea a clean bill of health based on strong economic fundamentals. After
all, the Korean economy was performing well and the bubble explanation of crisis is not convincing. The structural arguments given above are not applicable, either, because it is valid only to gradual slowdown of the economy in the long-run, not to a sudden halt as happened in Korea.

Korea got in trouble because firms and financial institutions had incurred short-term external debts that far exceed its foreign exchange reserves. Though these short-term debts played key role in Korean exchange crisis, the debt structure alone, without market psychology, does not explain what had happened. The Korean short-term debt to foreign reserve ratio exceeded three as early as 1996 and remained stable until October 1997. The short-term debts did not scare the foreign lenders in 1996. They got nervous and ran only after the South-East Asian crisis. It was a contagion. A herd behavior prevailed. Since Koreans total foreign debt was only about 30 percent of GDP (among the lowest of all developing nations), this was clearly a case of temporary liquidity crunch rather than fundamental insolvency.9)

It is important to note that the distinction between a liquidity crunch and a solvency crisis has significance only before the crisis. Once the crisis occurs this distinction disappears rapidly. Because the crisis can destroy the real economy. A liquidity crunch makes firms to fail and the production capacity of an economy to decrease. That's what is happening now in Korea. This means that the preventive measures before crisis could be different in two cases, but the prescription for solution after crisis could hardly be different.

9. Questions

The crisis is still ongoing and we do not as yet fully understand. Many experts have already given their versions of explanation. These have led to the following questions. I have tried to express my reflection on the issues. However, my intentions were to raise issues for discussion.

Q 1: Is the fundamental of Korean economy still sound?

As we have already observed the strength and weaknesses of the Korean economy, the answer to this question is yes from the macroeconomic view point, but no in the micro level. Yes, simply because the fundamentals that made Korea a wonder case of the world economy have not disappeared. Human capitals do not evaporate overnight. Economy as a whole save 35% of what it produces. Low

proportion of public sector in economy, openness to trade, stable prices, sound government finance, all macro indicators are sound.

Then what is wrong in micro level? Bad habits in some areas: the government meddling in the economy; the Japanese style management which value stability on employment but no concern with the return on assets; corporate structure based on cross-shareholding and cross loan guarantee; labor market rigidity; bad debts in financial sector, etc. Above mentioned high factor cost are resolved since prices change easily, especially in crisis situation.

Q 2: Was the IMF prescription a cure?

The conventional explanations of exchange crisis do not fit Korean case where macroeconomic policies have been sound and especially the exchange rate was not too out of parity. It was not suffering from financial laxity of excess demand either. But the IMF prescribed its all-purpose recipe, a combination of tight fiscal policy and tight monetary policy targeted to curb inflation. Maybe its why the first bail-out plan of IMF has failed to restore stability in Korea. The government with small budget deficits should not have to make them smaller.

The IMF thoughts that high interest rates were inevitable to restore market confidence. Although high interest rates demand high cost, as they hurt highly indebted Korean firms, the IMF required to accept this cost until the foreign exchange market is durably stabilized. Actually more than ten thousands firms went bankrupt since last December, not enduring the burden of high interest rates. In retrospect, however, it may be wrong to say that interest rates should not be that high. We do not know how much Won would depreciate and add to the burden of companies foreign currency debt keeping interest rates low.

In an economy confronted with increasing unemployment, the IMF imposed tight fiscal policy became easy target of critics. However, thinking of the need to create large current account surplus, the fiscal prudence is not on the wrong track.

The major economic reforms—financial sector restructuring, labor market reform, corporate governance and restructuring—demanded by the IMF, are not new plan. All these issues have been very familiar, some since Rohs administration, because they have been occupying pages of policy agenda in the 90s. Though those reforms are what they were planing to do by their own and are good for their economy, it is legitimate to ask, as Prof. Martin Feldstein of Harvard and many others did, whether the IMF bail-out conditionality could extend that far.

Q 3: How quickly should emerging economies open their capital markets?

Since financial markets can work less than perfectly, setting the financial sector
free may involve high risks. Many observers are suspicious about the relationship between the joining the OECD and the financial crises in Mexico and Korea. Because they were pushed to open up their capital markets when they sought to join the rich countries club. In some sense, these economies crises were accidents occurred during the process of capital market opening. The governments failed to adopt due regulation and banking supervision mechanism. They neglected checking excessive short-term borrowing that was used to finance long-term projects.

Therefore, some control on free capital movement such as Tobin tax which makes short term speculation more costly, may be useful. Premature opening of a country’s banking market to foreigners could cause excessive competition, and instability could follow. Recently this kind of argument has gained greater support among economists and the Chilean experience of short-term capital control is getting their attention. However, we can not ignore the benefit a free flow of capital brings. So core questions remain to be answered are regarding the extent of capital control and the velocity of capital market liberalization.

**Q 4: How to deal with Moral Hazard?**

Asia’s recent troubles have made clear the dangers of making macroeconomic mistakes, and maintaining fragile banking systems in a world of volatile capital movements. There is the question of moral hazard. Knowing that help is available might induce governments to continue reckless policies and, even more dangerously, encourage the financial markets to continue reckless lending.

But a basic dilemma remains: how to help a country in financial trouble and keep a crisis in one country from spreading to others without handing out cash to hedge funds.

**Q 5: Is the Asian crisis a test of institutions?**

In a free market system, countries sometimes experience financial and banking crises, associated with currency crises. Britain, Italy and Latin American countries in the 1980s, and most recently in several Scandinavian countries and Mexico have experienced exchange crisis. None of them have crony Asian capitalism. The fact that these countries, except Latin American countries, had highly transparent economic system and advanced institutional frameworks demonstrates that

---

10) the Asian crisis is a test of institutions. . . . . . Their present difficulties are bred by failure of their institutions to deal with the risks involved in sudden increases in the scale of financial transactions. (Norman Gall, *Money, Greed, Technology.* Paper presented at the international conference on BRAZIL AND THE ASIAN CRISIS. Fernand Braudel Institute of World Economics, Sao Paulo, April 1998/p.4.
transparency is not sufficient for robust financial system.\textsuperscript{11)} Therefore, the explanation of the current Korean situation wholly based on institutional or cultural deficiency would not be upheld.

However, I admit that the institutional interpretation contains a grain of truth. Although the direct cause which trigged the panic was the liquidity crunch, Korean economy had built-in obsolescence which made the panic mechanism function. The root of whole problem was the interventionist government. Alan Greenspan, U.S. Federal Reserve chairman, summarized as the crises have their roots in the endeavor of some East Asian countries to open up their economies to world competition, while still mandating a significant proportion of their output through government directives.\textsuperscript{12)} Interpreting this way, the Asian crises are a modest replay of 1989 with the dismantling in many Asian countries of the model of so-called mercantilist capitalism, which involved a good deal of state intervention.\textsuperscript{13)}

It was a test of institution and the crisis has shown that men couldn't find alternative to market yet. However, it is a test of institution not only of the countries involved in crisis but also of international financial system. Because the current crisis is closely related to one fundamental weakness of the current international financial system that it is not able to deal effectively with the herd behavior in the market.\textsuperscript{14)}

10. Future Prospect

The earlier history might be instructive. The Korean economy has survived woes worse than current one not long ago. Korean saw its GDP fall by almost 4% in 1980. Between 1965 and 1985 Korean economy suffered chronic, large current account deficits. The deficits exceeded 10% of its GDP in some years. At the time future looked grim, but eventually bounced back.

Six months has passed since the submission for IMF bail-out, data indicate that economic situation is stabilizing and is going back to normal. Two indicators, unemployment rate and capacity utilization, are not in their usual levels yet. It

is because their pre-crisis levels were, in fact, unusual.

Korea's future will not be a replay of its past. The economic landscape of Korea is about to be transformed once again. Economic reform and globalization will dictate the destiny of its economy. If the Korean government explore wisely the financial crisis as the perfect chance for speeding up reform, the crisis will turn out to be a blessing in disguise. In 5 years time, the Korean should recover the pre-crisis level of purchasing power.

(Table 3) Real GDP Growth Rate Forecast

<table>
<thead>
<tr>
<th></th>
<th>BOK</th>
<th>KDI</th>
<th>MFE</th>
<th>IMF</th>
<th>OECD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998</td>
<td>-1.5</td>
<td>-0.9</td>
<td>-0.2</td>
<td>-0.8</td>
<td>-0.7</td>
</tr>
<tr>
<td>1999</td>
<td>2.1</td>
<td>2.8</td>
<td>2.5</td>
<td>4.1</td>
<td>3.5</td>
</tr>
</tbody>
</table>

(Table 4) Economic Targets (May 1998)

<table>
<thead>
<tr>
<th></th>
<th>1998</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
</tr>
</thead>
<tbody>
<tr>
<td>growth rate (%)</td>
<td>-1.0</td>
<td>2.5</td>
<td>5.4</td>
<td>5.5</td>
<td>5.7</td>
</tr>
<tr>
<td>inflation (CPI, %)</td>
<td>9.2</td>
<td>5.4</td>
<td>4.7</td>
<td>4.1</td>
<td>3.8</td>
</tr>
<tr>
<td>foreign reserves (US$ billion)</td>
<td>41</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>current account (US$ billion)</td>
<td>21.0</td>
<td>17.6</td>
<td>11.0</td>
<td>9.0</td>
<td>7.0</td>
</tr>
<tr>
<td>unemployment(%)</td>
<td>6.0</td>
<td>5.8</td>
<td>4.4</td>
<td>3.9</td>
<td>3.6</td>
</tr>
<tr>
<td>fiscal deficit(%)</td>
<td>1.75</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Source: The Bank of Korea(BOK); Ministry of Finance and Economy.

This optimistic picture of Korea's future is not guaranteed. Korea's enormous potential could yet be squandered. Economic recovery will not come automatically. Determined governments, good policy choice, and a strong capacity for implementation will all be needed, as will a conducive international trading and investment environment.

As Korean economy matures its growth rate will, naturally, tend to slow. But Korea's opportunity for catch-up remains immense. The amount of capital per worker is considerably lower than in rich industrial economies. The average Korean works with only two-fifths the amount of capital available to his American
counterpart. Even in education there's much room to improve. In 1994, the average workers had received only nine years of education in Korea, while workers in most industrial countries get at least 10 years, often much more. Its economy needs to be opened up to more competition, the power of the overweening and indebted chaebol (conglomerates) must be reduced, and labor and capital market rigidities should be relaxed.

11. Conclusion

The rapid expansion of the East Asian tigers has provoked fear in the West and pride back home. Now the sentiment is in reverse. The Asian crises are provoking fear in the East and pride among American triumphalists. As Harold James observes, hubris and despair chase each other in quick succession.

The crisis can be overcome only if all interest groups involved are convinced that they need to compromise and to accept the long delayed reform. In general, deeper the crisis, easier will be the formation of this conviction. In this way, a misfortune turns into a blessing as an old Korean saying.

An important lesson of our recent experiences is that it is policies and institutions that make the big difference. If Korea want to replay its past success, it must nurture linkages with the global economy and it must prepare its governments for a new role. Korean government will be increasingly faced with the challenge of reforming itself, and of redefining the boundaries of its responsibilities. Korean government should become less concerned with appropriating and directly allocating resources. It should instead focus on distilling a shared vision about future economic direction.

### Table 5: Trade (customs clearance) and Current Account Balances

<table>
<thead>
<tr>
<th></th>
<th>Export</th>
<th>Import</th>
<th>Trade Balance</th>
<th>Current Account</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997 4th Q</td>
<td>36,726</td>
<td>34,517</td>
<td>2,209</td>
<td>3,270</td>
</tr>
<tr>
<td>1997 year</td>
<td>136,164</td>
<td>144,616</td>
<td>-8,452</td>
<td>-8,900</td>
</tr>
<tr>
<td></td>
<td>5.0</td>
<td>-3.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1998 1st Q</td>
<td>32,321</td>
<td>23,918</td>
<td>8,403</td>
<td>10,690</td>
</tr>
<tr>
<td></td>
<td>8.7</td>
<td>-35.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>April</td>
<td>12,189</td>
<td>8,257</td>
<td>3,932</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7.0</td>
<td>-35.5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: The Bank of Korea (BOK); Ministry of Finance and Economy.

### Table 6: External Debt, Reserves, Inflation etc.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>December</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>External Debt</td>
<td>157.5</td>
<td>161.8</td>
<td>154.4</td>
</tr>
<tr>
<td>Short-term Debt</td>
<td>(US$ billion, %)</td>
<td>100.0</td>
<td>88.9</td>
</tr>
<tr>
<td>Total Foreign Reserves</td>
<td>33.24</td>
<td>24.4</td>
<td>20.41</td>
</tr>
<tr>
<td>Usable (US$ billion)</td>
<td>29.42</td>
<td>7.26</td>
<td>8.87</td>
</tr>
<tr>
<td>Consumer Prices, % (last 12 months)</td>
<td>0.4</td>
<td>0.1</td>
<td>2.5</td>
</tr>
<tr>
<td>Interest Rates</td>
<td>4.9</td>
<td>4.3</td>
<td>6.6</td>
</tr>
<tr>
<td>Corporate bond</td>
<td>-</td>
<td>-</td>
<td>29.0</td>
</tr>
<tr>
<td>Call rate</td>
<td>-</td>
<td>-</td>
<td>30.1</td>
</tr>
<tr>
<td>Default Rates on Promissory Notes, %</td>
<td>0.46</td>
<td>0.78</td>
<td>0.58</td>
</tr>
<tr>
<td>Unemployment, %</td>
<td>2.26</td>
<td>2.64</td>
<td>3.08</td>
</tr>
<tr>
<td>Capacity Utilization in Manufacturing</td>
<td>100</td>
<td>98.1</td>
<td>94.9</td>
</tr>
<tr>
<td>Foreign Investment</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Portfolio</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>FDI (US$ billion)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Source: The Bank of Korea (BOK); Ministry of Finance and Economy.
<Graph 1> Real GDP Growth Rate

<Graph 2> Investment Growth Rate
Graph 3: Investment Ratio

Graph 4: Fiscal Balance
(Graph 5) Current Account

(Graph 6) Exchange Rates
Graph 7: Trade Balance

Graph 8: Trade Growth Rates

- Export Growth Rate
- Import Growth Rate
Graph 9: Inflation and Interest Rates

[Graph showing inflation and interest rates over time with CPI and interest rate represented by different markers.]
Brazil's Current Economic Situation and Major Issues

Alkimar R. Moura
Professor of Economics at the Fundação Getúlio Vargas

1. Introduction

The purpose of these notes is to present a very brief summary of the current Brazilian economic situation, with emphasis on its short and medium term macroeconomics policy objectives and results. This is treated in the first part of the paper. In the second part it will deal with the prospects and challenges facing the national economy, as it tries to consolidate its stabilization program and at the same time to promote economic growth and a more equal pattern of distribution of income and wealth among the Brazilian population.

2. Present Situation:

2.1. Policy Objectives:

In the 1990s but especially after the 1994 stabilization program (Real Plan), Brazil has been engaged in a process trying to attain internal and external equilibrium and structural reforms, in order to reach both macroeconomic stability and conditions for sustained long-term growth and improvement in the social conditions.

Internal and external equilibrium means in the context of these notes the achievement of a low and declining inflation rate, with both fiscal and external balances. Structural reforms, on the other hand, are designed to foster competition particularly in the industrial sector, to reform the public sector, with reduction of the governments share in the economy and direction of its activities mainly to the provision of public goods, and finally to increase the domestic savings rate.

Of all the countries in the world, Brazil has probably had the longest inflationary experience ever, since the late 1950s until the mid 1990s. In the second
part of the 1980s and in the early 1990s there were numerous and failed attempts at controlling inflation. The Real Plan, in June 1994, was the only stabilization program which was successful in curbing the rate of inflation, by a combination of a certain degree of fiscal restraint (but not much), elimination of indexation, (by introducing a temporary unit of account applied to wages and contracts), currency reform, (with the replacement of the old currency for the Real), restrictive monetary policy (by increasing both the basic interest rate and the reserve requirements on the banking system), all this combined with appreciation of the domestic currency in relation to the US dollar in the first months of the program. However, in March 1995, as part of the reaction against the impact of Mexican crisis on the Brazilian economy, there was a 5% nominal devaluation of the real and the introduction of a foreign exchange regime characterized by a sliding band.

Having attained a dramatic fall in the inflation rate, the question that Brazil faces from now on is how to maintain internal and external equilibrium, so as to resume economic growth with price stability. The recent emergence of a large trade deficit coupled with a gradual worsening of the fiscal imbalance is probably an unintended consequence of the type of stabilization program put into effect in Brazil in 1994. Other Latin American countries faced similar problems as well. It seems paradoxical that price stability could have contributed to the deterioration of the fiscal accounts, as it seems to have happened in Brazil in the post Real period.

One channel for this to happen was through increases in the financial component of the public expenditures, due to the high domestic interest rate policy, which raised the cost of servicing the internal federal debt. In the Brazilian case, the burden of the higher real interest rate explains 22.4% of the 6.11% increase in the operational deficit as a proportion of GDP, between December 1994 and December 1995. In Mexico, as indicated by Ros (Ros 1997), the same policy led to a reduction in the governments operational surplus between 1988 and 1990. A second mechanism has to do with the maintenance of the real value of budgetary expense, when stability prevails. In fact, during periods of high and rising inflation rate, governments at all levels could reduce public expenditures in real terms by simply delaying the cash disbursements associated with some types of budgetary expenses. This is a type of fiscal repression to reduce planned budgetary expenditures, as mentioned by Bacha(Bacha 1994). Most tax revenues, on the other hand, were indexed to inflation. Therefore, during periods of high inflation, there were short-term gains to government by delaying cash disbursements, gains which do not materialize in a stable environment. The third and probably the most important factor accounting for the fiscal unbalance refers to the wage policy in
the public sector. In fact, the government granted a wage hike in the first months after the Real Plan due to the need to equalize pay increases in different branches of the federal government. Furthermore, in January 1995 there occurred the last nominal wage increase associated with the maintenance of indexation clauses in the public sector. With low inflation, most of these nominal salary gains became permanent real wage increases, thus leading to both growing public deficits and higher levels of domestic absorption.

High public deficits imply by definition negative public savings and thus lower total savings (if the private savings increases do not offset the decline in public savings). Given the level of total investment, the fall in national savings requires an absorption of foreign savings to finance the required investment rate. This equalization mechanism works through higher domestic real interest rate, which helps to finance the budgetary deficit. In the Brazilian case, inflows of foreign finance led also to a real exchange rate appreciation as in other economies which have experienced similar private capital movements, as documented by Calvo, Leiderman, and Reinhart. (Calvo, Leiderman, and Reinhart 1993). Such currency appreciation together with trade liberalization measures and domestic private expenditure growth, which was a by-product of the stabilization process itself, caused a gradual deterioration in the trade deficit and in the current account. Therefore, the attainment of price stability in Brazil was accompanied by the emergence of the twin deficits in the fiscal and in the external accounts. The resolution of these imbalances depends not only on the correct management of conventional macroeconomic polices but also on structural reforms which can remove rigidities in the public sector expenditures, thus allowing for the possibility of higher domestic saving rate. The degree of rigidity in the federal governments expenditures, as measured by the share of nondiscretionary expenditures (that is, payments of wages and salaries, pensions, social security benefits, transfers to States and municipalities and other tied expenses) in the total public expenditures has increased a great deal in the last years. On a cash basis and as a proportion of GDP, they have been raised from 9.8% in 1988 to 15.1% in 1995. For details, see Giambiagi (1997).

2.2. Policy Results:

The following tables display the main economic indicators of the most recent period. Briefly, they show that the enormous fall in the inflation rate (Table 1) was associated with the continuing recovery of economic activity (Tables 2 and 3). The expected 4% annual GDP growth for 1997 means the fifth consecutive year
with increases in per capita income, which is a non-trivial achievement, given the poor growth record for the Brazilian economy in the 1980s. The next two tables (4 and 5) indicate the persistence of a sizable albeit decreasing public deficit and the emergence of a large trade deficit from 1995 on.

(Table 1) Monthly Inflation Rates (general price index)

<table>
<thead>
<tr>
<th>Years</th>
<th>March</th>
<th>June</th>
<th>September</th>
<th>December</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994</td>
<td>44.8</td>
<td>46.6</td>
<td>1.6</td>
<td>0.6</td>
</tr>
<tr>
<td>1995</td>
<td>1.8</td>
<td>2.6</td>
<td>(1.0)</td>
<td>0.2</td>
</tr>
<tr>
<td>1996</td>
<td>0.2</td>
<td>1.2</td>
<td>0.1</td>
<td>0.9</td>
</tr>
<tr>
<td>1997</td>
<td>1.1</td>
<td>0.7</td>
<td>0.6</td>
<td>-</td>
</tr>
</tbody>
</table>

Source: Fundação Getulio Vargas.

(Table 2) GDP Growth Rate (in %)

<table>
<thead>
<tr>
<th>Years</th>
<th>Total</th>
<th>Per Capita</th>
<th>Years</th>
<th>Total</th>
<th>Per Capita</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>(4.3)</td>
<td>(5.9)</td>
<td>1994</td>
<td>6.0</td>
<td>4.5</td>
</tr>
<tr>
<td>1991</td>
<td>0.3</td>
<td>(1.3)</td>
<td>1995</td>
<td>4.3</td>
<td>2.9</td>
</tr>
<tr>
<td>1992</td>
<td>(0.8)</td>
<td>(2.3)</td>
<td>1996</td>
<td>3.0</td>
<td>1.6</td>
</tr>
<tr>
<td>1993</td>
<td>4.2</td>
<td>2.7</td>
<td>1997(1)</td>
<td>4.0</td>
<td>2.6</td>
</tr>
</tbody>
</table>

Note: 1) forecast.  
Source: IBGE.

(Table 3) GDP Growth by Sector (in %)

<table>
<thead>
<tr>
<th>Years</th>
<th>Agriculture</th>
<th>Industry</th>
<th>Services</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>3.1</td>
<td>2.5</td>
<td>3.4</td>
<td>3.0</td>
</tr>
<tr>
<td>1997(1)</td>
<td>5.8</td>
<td>7.3</td>
<td>3.1</td>
<td>5.1</td>
</tr>
<tr>
<td>1997(2)</td>
<td>5.1</td>
<td>4.3</td>
<td>2.8</td>
<td>4.0</td>
</tr>
</tbody>
</table>

Notes: 1) second quarter. 2) forecast.  
Source: IBGE.
### Table 4: Fiscal Balance

<table>
<thead>
<tr>
<th>Years</th>
<th>Nominal</th>
<th>Operational</th>
<th>Primary</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993</td>
<td>58.1</td>
<td>(0.2)</td>
<td>(2.6)</td>
</tr>
<tr>
<td>1994</td>
<td>43.7</td>
<td>(1.3)</td>
<td>(5.1)</td>
</tr>
<tr>
<td>1995</td>
<td>7.0</td>
<td>4.8</td>
<td>(0.3)</td>
</tr>
<tr>
<td>1996</td>
<td>6.1</td>
<td>3.8</td>
<td>0.1</td>
</tr>
<tr>
<td>1997&lt;sup&gt;1)&lt;/sup&gt;</td>
<td>4.9</td>
<td>3.1</td>
<td>(0.6)</td>
</tr>
</tbody>
</table>

Notes: 1) June. Positive number: deficit, negative number: surplus.
Source: Banco Central.

### Table 5: External Accounts

<table>
<thead>
<tr>
<th>Years</th>
<th>Trade Balance</th>
<th>Current Account</th>
<th>Reserves</th>
<th>Exchange Rate&lt;sup&gt;1)&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>US$</td>
<td>% GDP</td>
<td>US$</td>
<td>% GDP</td>
</tr>
<tr>
<td>1993</td>
<td>13.2</td>
<td>3.1</td>
<td>(0.6)</td>
<td>(0.14)</td>
</tr>
<tr>
<td>1994</td>
<td>10.4</td>
<td>1.9</td>
<td>(1.7)</td>
<td>(0.31)</td>
</tr>
<tr>
<td>1995</td>
<td>(3.4)</td>
<td>(0.4)</td>
<td>(17.9)</td>
<td>(2.48)</td>
</tr>
<tr>
<td>1996</td>
<td>(5.5)</td>
<td>(0.7)</td>
<td>(24.3)</td>
<td>(3.25)</td>
</tr>
<tr>
<td>1997</td>
<td>(9.9)&lt;sup&gt;2)&lt;/sup&gt;</td>
<td>-</td>
<td>(15.6)&lt;sup&gt;3)&lt;/sup&gt;</td>
<td>(4.0)</td>
</tr>
<tr>
<td>1997&lt;sup&gt;4)&lt;/sup&gt;</td>
<td>(10.0)</td>
<td>-</td>
<td>(34.1)</td>
<td>(4.4)</td>
</tr>
</tbody>
</table>

Notes: 1) end of period; 2) July (12 months); 3) July; 4) estimate.
Source: Banco Central do Brasil.

### 3. Structural Reforms

Under this label, the three following aspects of structural reforms are being considered:

a) Trade liberalization;
b) Privatization of state-owned companies;
c) Financial sector reform;

a) Trade liberalization: there occurred a substantial increase in the external trade volume which reached almost 80% between 1992 and 1996: from US$ 56.3 to US$ 101.0 billions. Yet, the Brazilian economy remains relatively
closed in terms of trade volume in relation to GDP: in July 1997, the trade flows/GDP ratio reached 14.4%, a figure similar to the 14.6% ratio observed in 1987. Compare for instance, that figure to the 57% ratio for Korea in 1995 and one can conclude how external trade growth is lagging in Brazil. More importantly, however, was the continuation of a trend towards trade liberalization centered on the elimination of non-tariff import restrictions, abolishment of import programs and reduction in tariffs, thus decreasing the level of protection to domestic producers. In fact, there was a substantial decline in import tariffs from 1990 onwards as can be seen in Table 6. According to Moreira and Correa (Moreira and Correa 1997), the average rate of tariff reduction in the last 6 years of the Brazilian trade liberalization program (from 1990 to 1995) was 3.05%, in comparison to a rate of 1.7% for Korea, during similar periods in the Korean experience of trade opening during the 1980s.

\textbf{(Table 6) Nominal Import Tariff Rates (Median)}

<table>
<thead>
<tr>
<th>Years</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>July 1988</td>
<td>40.2</td>
</tr>
<tr>
<td>Sept. 1990</td>
<td>32.6</td>
</tr>
<tr>
<td>Feb. 1991</td>
<td>20.8</td>
</tr>
<tr>
<td>Oct. 1992</td>
<td>14.4</td>
</tr>
<tr>
<td>Dec. 1995</td>
<td>12.8</td>
</tr>
</tbody>
</table>

b) Privatization of state-owned companies: both the Federal and state governments are implementing a massive program of privatization of companies in various sectors: steel, mining, telecommunications, electricity generation and distribution, water and sanitation, gas distribution. There is also a program for transfer to the private sector of concessions of public services: highway, ports, container terminals. The privatization program could yield up to US$17 billions in 1997 in revenues to the public sector.

c) Financial sector reform: the Brazilian financial and banking system is undergoing a deep process of restructuring as a result of both the stabilization program and the controlled opening of the financial sector to foreign investment. The main components of this process are: privatization of federal and state banks (2 relatively large state banks have already been privatized and one federal bank is to be auctioned soon); penetration of
foreign banks into the retail domestic banking market, (the third largest private bank was sold to a foreign bank, following an intervention by the Monetary Authorities); consolidation, either voluntary or involuntary of the financial sector with reduction in the number of banks,(since the introduction of the stabilization program, the Central Bank has intervened in 96 financial institutions). Also, there occurred adjustments in the financial sector, as a result of voluntary decisions made by private agents leading to a reduction in the number of financial intermediaries (incorporation, mergers and acquisitions, associations). Last, but not least, the strengthening of the banking supervisory apparatus is being implemented by the Central Bank.

4. Prospects for the Brazilian Economy

It is clear that the main short and medium-term problem facing the Brazilian economy is the joint fiscal and external imbalance. These were the outcomes of a policy mix centered on a combination of a restrictive monetary, a somewhat loose fiscal posture and an exchange rate mechanism conducive to domestic currency appreciation.

As far as the external sector disequilibrium is concerned, it is worth noting that the real is being devalued at a nominal rate of about 0.6% per month, equivalent to 7.5% per year. Domestic inflation, as measured by consumer price indexes is running at rates between 4 and 5% yearly. However, in June 1997, on an effective real exchange rate basis, the domestic currency was still appreciated in relation to its value in June 1994. On the other hand, direct investment flows plus equity investments provide most of the current account financing (in 1996, these investment inflows accounted for almost 64% of the current account imbalance). Programs for export promotion are also being implemented.

In terms of public finances, it is expected that the privatization process will continue and may generate something between 2% and 3% of GDP of revenue to the public sector. Administrative and social security reforms, which are being discussed by the Brazilian Congress will hopefully provide the conditions for sustainable long-term equilibrium in the public finances, at the federal, state and municipal levels.

The short and medium term scenario for the Brazilian economy, given the current mix of economic policies and before the recent instabilities in the international financial and foreign exchange markets, implied a GDP real growth rate of 3 to 4%,a declining inflation rate and minor improvements in the joint
external-fiscal imbalances. However, such policy configuration is unable to avoid the worsening of the twin deficits or yet to provide a cushion against turbulence in the international financial markets, as shown by the impacts of the late turmoil in world markets on the national economy, when the Central Bank is said to have lost between US$ 8 and 10 billions in foreign reserves, trying to defend the exchange rate parity. The policy-makers’ reactions were based on sharp increase in domestic interest rate, on a reduction of government expenditures and on an effort towards getting congressional approval for tax increase. It is too early to tell whether such policy responses have decreased or not the vulnerability of the Brazilian economy to external shocks. One probable outcome is the decline in the growth rate of GDP for the coming year. In the long run, conditions for higher growth for output and employment with price stability will depend on the political will to implement much needed structural reforms to restore financial equilibrium to the public sector. Recent gyrations in the international financial markets have affected both Korea and Brazil in various degrees and for different reasons. Apparently, this turmoil in world finance seems to be mostly related to pull or country-specific factors, than to global, or push factors, using a terminology from the recent literature on the determinants of capital flows to developing countries, (See, for instances, Taylor and Sarno 1997). If this is true, it only confirms the need for a firm commitment to an agenda for reform and growth, for both Korea and Brazil.
References


Ros, J. 1997. Inflação e estabilização da economia mexicana, in O plano Real e outras experiências internacionais de estabilização do Brasil: IPEA/CEPAL.

The Brazilian Economy: 
From Hyper-Inflation to Stabilization\(^1\)

**Claudio Monteiro Considera**

Researcher Director of the Institute of Applied Economics Research (IPEA)

1. Introduction

Brazilian experience along the 80's and the beginning of the 90's has been characterized by a general tendency to stagnation associated to the persistence of deep macroeconomic disequilibrium - in particular, by high and increasing inflation. Notwithstanding the localized spells of growth, usually related expectation involving the future behavior of inflation, between 1980 and 1992 the economy has grown at an average of only 1.25% p.a., in this manner forcing the per capita income to drop to 7.6% during the period. Thus, along those years, a considerable deterioration of the living conditions of a significant share of the population has been verified, with regards to perspectives of overcoming the structural problems related to misery and social inequality.

More than simply reflecting the external disequilibrium (deriving from the crisis related the external debt) and the internal one (associated to the persisting public deficits and the continuation of extremely high inflationary levels), this period is characterized, in fact, by the exhaustion of the post war development strategy. This has been based in the substitution of imports and in storming state intervention in productive activities-which have oriented the Brazilian industrialization process since the beginning of the 50's. The failure of the several attempts to stabilize the economy along 80's can therefore be attributed, to a large extent, to the lack of acknowledgment of the need to promote structural changes that would lead to a new pattern of development. This new pattern should be less

---

dependent upon state intervention and commercial protectionism. There also have been a total incapacity to provide the political support required for the accomplishment of the reforms.

The long sequence of frustrated stabilization plans during the 80's and the beginning of the 90's (five plans in six years) has produced a strong economic instability which led to a continuous tendency of inflationary acceleration. Inflation has failed to acquire an explosive character, such as occurred in other countries, solely due to the characteristics of our indexation system (to a large extent guaranteed by the government itself). The financial system developed domestic substitutes for the currency (ultimately, also guaranteed by the government), that allowed a less painful coexistence (and, sometimes, an even profitable one) with the inflationary process for those who had access to such innovations. Nevertheless, excluding those moments when speculative behavior led to the non-sustained growth of the demand (as, for example, along 1989), what is observed is a long run tendency to the increase of unemployment, specially during the second half of the decade. Moreover the investment rates has been reduced all along this period, which contributed to render future growing perspectives even more tenuous.

From 1993 on this picture begins to change. Stimulated by a more favorable external situation - with the recovering of capital flows for the emergent markets in a context of accentuated decrease in the international interest rates - and the surmounting of the political crisis derived from the president impeachment process, the economy starts to show signs of recovery, although still in midst of the strong stability generated by still high inflation rates. This growth already reflected the changes in the conduction of the economic polices, which characterized the turn of the 90's. In particular, the progressive removal of the mechanisms of protection against external competition and steps being taken towards the deregulation process and privatization began already to outline a new economic environment. It leads the enterprises to incorporate, with an increasing tendency, the rationalization of costs and productivity increase in their development strategies.

The proposal of this article - which consists, at the same time, of a retrospective of Brazilian economy during the period in question - is to analyze the first four years of the Real Plan. The perspective is the no stabilization process can succeed if it does not bear the structural changes which eliminate the basic causes for the inflationary process, generally deeply incorporated not only to the behavior of the economic agents, but also to the very essence of the previous development model. Under this perspective, structural reforms acquire a crucial dimension for the consolidation of a new phase of sustained development, even if, in the short run,
stability may be sustained only through the adequate handling of the instruments of monetary and exchange policies, maintaining the economic growth below its potential.

2. The Social and Economic Crisis-1980/92

2.1 The Record of the Crisis

The Brazilian economic crisis, which except for short intervals, has already been lasting for 13 years, has interrupted the dreams of having the country on its way to become a modern industrial economy. In fact, during this period Brazil has substituted annual growing rates of the GDP around its historical post-war average of 7%, and inflation rates that had never been above 8% p.m. by an unprecedented crisis that has combined recession, inflation and a brutal increase of social and economic inequality.

At the end of 1992, the GDP had accumulated a growth of 17.4% in relation to 1980, while the population had increased in about 25.8%, which resulted in a decrease of 7.9% of the per capita GDP. The industrial sector (metal mining, transformation, construction and industrial public utility services), in its turn, presented a lower level(-1.6%) than that of 1980, thus, 21.8% inferior in per capita terms. The most serious consequence, nevertheless, has been the performance of the manufacturing industry, which had been extremely dynamic in the past: its production level, in 1992, has been around 7.3% lower than that of 1980 and thus, 26.3% inferior in per capita terms.

Also alarming has been the reduction of investment capacity of Brazilian economy. The share of the GDP destined to the gross formation of fixed capital has decreased from 23.3% in the 70’s to 18.3% in the 80’s and to 15% at the beginning of the 90’s. The quality of investment and the incorporation of advanced technology have also decreased, from what could be verified from the decrease in machines and equipment participation in total investment and from the imported equipment on the total of machines and equipment destined to the gross formation of capital in the country: while in the 70’s these proportions were respectively of 36.9% and 23.3% in average, during the 80’s they have decreased to 26.4% and 11.2% down to as low as 26.2 and 9% in 1989.

Another perverse aspect of the crisis is the reduction in private per capita consumption, which returned in 1992 to the levels of 1978 both as a result of the decrease of the GDP and the transference of real resources abroad.

Brazilian inflation, an old disease, has even reached, in the post-80 period, an
annual rate above 2,500% (1989), with the average situated around 580%, in contrast to the annual average below 40% of the 70's.

With the decrease of the GDP, and the inflationary acceleration, labor income has been reduced. The minimum wage corresponded in 1992 to less than 50%, in real terms, from that in force at the beginning of the 80's.

In its turn, the rate of open unemployment in 1992 reached higher levels than those of the beginning of the decade. In the case of industrial employment, data from the IBGE show that their level in 1992 has been the lowest ever-registered. With the 1990/92 recession, the level of employment in Brazilian industry becomes 27% inferior to that 1980. In particular, the Sao Paulo industry has destroyed around 450 thousand jobs during the 1990/92 period.

The income concentration, measured by the Gini index, has also become more severe. That happened not only because of unemployment at the less qualified strata of the population, but also and mainly, due to the effects of inflation. It punishes particularly those employed for wages and mainly those pertaining to the basis of the wage pyramid, who detain less power to bargain.

The areas of education and public health are a clear picture of the exhaustion of the State financing capacity, deriving from the erosion of the public accounts. There is a decrease in the quality of basic education, due to scarce resources, exiguous salaries and consequent low performance of the teaching class, and simultaneous increase of the students' evasion from schools. The scrapping of hospitals and other health institutions, as well as the expansion of the areas of rural endemic diseases is the counterpart to the governmental budget restrictions.

2.2 The Origins of the Crisis: The Domestic and External Debts

As we know, the Brazilian strategy of keeping the economy growing at high rates and financing the deficit in current account through loans contracted at floating interest rates, adopted after the first petroleum crisis, left the country in an extremely vulnerable position to face new external shocks. The second petroleum crisis 1979, as well as the relatively fast adjustment of external accounts of the industrialized countries—provoking not only a considerable decrease in the level of activity, and consequently, in the volume of the international trade, but also an abrupt increase of international interest rates—, resulted in a considerable deterioration of Brazilian external accounts, which has been aggravated by the expansionist policies adopted in 1979/80.

The origin of the present crisis, nevertheless, can be referred to the difficulties deriving from the process of adjustment to the reversion of the changes in
international financial pictures as of 1979. The premature transference of real resources abroad resulted in a drastic reduction of investment rates, in spite of the considerable increase of the domestic savings rate, thus restricting the investment opportunities. To this transference abroad did not correspond, nevertheless, an equivalent internal transference that would allow the public sector to face the charges of the debt which had been accumulated, either through direct loans, or by having assumed responsibility for the payment in dollars of the debt originally contracted by the private sector. The result has been an exponential increase of the public internal debt.

Incapable to produce a primary supervit which would allow the payment of the interests on its internal and external debts, the government had to run, along the decade, not only to an increase of the internal debt, which then became indexed “currency”, but also to make use of an increase in the offer of currency, with extremely severe consequences on their inflationary process, moving the emphasis from policies of external adjustment to policies that aimed at the control of inflation, as of 1986.

During the first half of the 80’s, the impacts deriving from recession were added to those deriving from the impacts of external sector on public accounts. Concerning expenditures, even with the reduction of investment as of the end of the 70’s, their high levels from the previous period and the extension of governmental role in national life would already have guaranteed the increase of current expenses, solely on account of the operation and maintenance of a public sector which was both over dimensioned and inefficient.

During the second half of the 80’s, there has been an expressive increase of the payroll of the public sector, due to an also significant expansion of its contingent. This upwards process culminated in 1989 with expenses with personnel (including social changes, inactive and retired personnel) of the Union equivalent to 4.1% of the GDP, after having corresponded to 3% in the 70’s and to 2.5% in the 1980/85 period.

The recession of the beginning of the 80’s, the ample systems of fiscal incentives established in the previous decade and the growth of inflation had led to the decrease of the country’s tributary collection, concomitantly with the increase of expenditures. From 1984 on and until right before the president Collor government, the gross tributary charge had become stabilized at a level close to 22% of the GDP, about 3% below the average level observed in the 1970/83 period, which confirmed the public accounts’ characteristics of being chronically in deficit.

With the increase of inflation and of expenses, and with the reduced collecting capacity of the government, the deficit financing was done by running into new
debts. As the economic instability increased, such financing was being contracted at shorter terms in such a way that when the fiscal crisis of the end of the 80's reached its peak, the federal debt was being daily refinanced. This way, the payment of interests became the main isolated item of public expenses, representing in 1989 almost 65 of the GDP.

In 1990, Collor Plan I, in an attempt to break the deficit-debt-inflation circuit, applied a shock therapy based on the temporary confiscation of 80% of the financial assets of the country. At the same time, the extraordinary incidence of the IOF (Tax on Financial Operations) has been instituted on financial stocks and it became possible to utilize the confiscated resources for the payment of taxes. The combined impact of these measures has initially been favorable, be it by the increase of the tributary charge of more than 6% of the GDP in only one year, or by the reduction of expenses with public bonds of the debt deriving from the confiscation, even if only of a provisory nature. So to say, after 12 months of their adoptions, those effects could no longer be felt.

The failure of prices stabilization has played an important part in the erosion of governmental credibility which, together with the decrease of the level of economic activity, served as an excuse for an increasing movement of evasion (legal or illegal) of tributary responsibilities. The return of pressures with expenditures, including those derived from debts, and high levels of evasion and taxes with holdment constitute the framework of renewed discussions on an ample fiscal reform.

2.3 The Stabilization Programs: A Chronic of Failures

A retrospect of the evolution of inflation and the results of the stabilization policies since 1980 is, to say the least, melancholic. In fact, it is a report on failures of all kinds, which placed Brazil, in 1993, in the singular position as one of the rare countries in the world with a two-digit monthly inflation.

The six years which came in-between the two petroleum crisis(1974/79) had already been characterized by high annual inflation rates: 44.4%, according to the IGP-DI(General Price Index-Internal Availability). The second petroleum crisis, in 1979, followed by the international financial crisis in 1980, established the new level of 100%, until 1982, when the crisis related to the debt came about. The stabilization policies at that time, nevertheless, aimed primarily at the equilibrium of the external accounts. As a consequence, a few pressures of costs have been intensified, mainly the exchange one (maxi-devaluation) and those deriving from real increases in public tariffs. To a certain extent, this could be explained, or at
least be minimized, by the failure in reaching the target of prices stabilization. Between 1983 and 1984 inflation moved up to 200%, reaching 235% in 1985(IGP-DI).

The year of 1986 registers the beginning of a new style of stabilization policies. Leaving orthodox practice aside, to a large extent, economic authorities began to successively interpret inflation as: predominantly interial; of expectations; eventually deriving from distributive conflicts; and, further along, deriving from the public external and/or internal debts.

In February 1986, after the monthly inflation rate for January had reached 16%(IGD-DI), the Cruzado Plan has been implanted. The idea was of a merely interial inflation, without any relevant primary causes. It was not so! The failure to attack the primary causes gave way to the return of the rate, at the end of the year, to the same level previous to the plan.

In June 1987, there has been another attempt at a stabilization shock, with the Bresser Plan. This time there was a combination of the idea of interia with a predominant primary cause: the onus of the internal and external public debts —although the government had already issued the moratorium on the later in February 1987. The monthly rate was of 26%. A new failure! After a three months rest, the monthly rates began to increase again and, in September 1988, reached the same level as that of the month of introduction of the plan.

At the end of January 1989 the Verao Plan has been introduced; the monthly rate had at that time reached 36.6%. Few substantial changes have been incorporated as regards the previous plans, but there were great promises of adjustment in the consolidated accounts of the public sector. The need to attack the structural cause of inflation had then been acknowledged; they had been neglected in the previous plans. The president’s succession and expectations raised with doubts as to the plans of the new governmental team would not allow the government any other action besides completing its term. Monthly rates began to increase once more after the three months of rest, reaching superior levels to those of January after five months of successive increases. the ascending tendency continued, aggravated by expectations on new stabilization shocks after the change in government, reaching 81.3% in March 1990.

The new government initiated its administration march 1990 with an ambitious plan comprising stabilization and structural reforms of the economy(Collor Plan I). In this new attitude, besides a mix of the causes already previously acknowledged, the need for ample reforms in the public, external and financial sectors has also been acknowledged. Inflation, nevertheless, after decreasing to 9% between May and June (annual rate of 181%, again began to increase as of July,
reaching the level of 20% in January 1991.

A new attempt at a “shock plan” has been made in February 1991 (Collor Plan II), this time with greater emphasis on non-orthodox measures, as had been the case with the plans of the previous government. The monthly rate was of 21.1%. After four months of relative rest in prices, the ascending monthly averages strengthened again in the middle of the year, reaching 22.1% in December.

By then the economic agents were already fed up with shock plans, and the government went back to pure orthodoxy; but all it has been able to do was to avoid a new boom in prices. In January 1992 the monthly rate has been able to of 26.8% and, in September, of 27.3%. When the impeachment process was over, expectations created by the new government, added to failures in economic policies, led to an acceleration of inflation. The accumulated rate in 1992 has been of 1,158%, not too far from the annual average of the last three years. Thus, to the failure of the “shock plans” we may certainly add the failure of orthodoxy in the administration of Finance Minister Marcilio Marques Moreira.

The alternation between the programs to fight inflation, often of an even opposed nature, observed along the 80’s and more intensively in the recent period, has contributed to increase uncertainties of the economic agents and to intensify the movements of defensive and speculative nature. After each failing plan, the instruments of the economic policies became more restricted in their struggle against the problem. In spite of the successive efforts on the part of the government to try to avoid indexation, it moved on speedily on the economy, making changes in relative prices extremely painful, to the extent that even seasonal factors seemed to represent an important factor of acceleration of the inflation.

The course of inflation in 1993 has been characterized by this aspect. And an ascending tendency began on its way, as of February, although without any expressive characteristics. In the average of the indexes, about 1 to 1.5 percentile points of increase in the monthly rates. Thus, from a level of about 25%, in February, we arrived at 31% at the beginning of the second semester.

The determinant factors of inflationary acceleration in 1993 were the pressures of costs passed on to prices of goods and services, through a process of increasing indexation. Among these factors we may emphasize the food prices, basically determined by the fluctuations of offer, the prices of public tariffs and wage increases, notably of the minimum wage. The exchange rates and the rates of nominal interests were also indexed to inflation rates, but did not contribute to its acceleration.

The acknowledgment of this reality, amply recognized by specialists of the various different lines of reasoning, strengthens today the conclusion that only
through a policy of income adequately coordinated would it be possible to effectively attack elimination of the fundamental causes of the macroeconomic disequilibrium between global offer and demand, basically derived from the deficit of the consolidated public sector.


3.1 Political Transitions: Development cum Inflation

The behavior of the economy along 1993 clearly reflects the dilemmas which the country was facing in that conjuncture of political transition. Stimulated by the optimism derived from the non-traumatic solution of the impeachment crisis, there has been a fast increase of production during the first months of the year, demonstrating the industrial reacting capacity allowed by the existence of ample margins of idle capacity. Between September 1992 and March 1993 industry has grown 20.2% and the total wage bill increased 7.9% in real terms.

Among the factors which determined the increase of demand we may emphasize the reversion, although partial, of the high interest rates which had characterized the final period of the Collor government. Nevertheless, since mid 1993 the limits of this spell of growth was already being outlined ever more clearly as the increase of production was also accompanied by an intensification of the inflationary process. The monthly inflation rate has grown almost 10% between the first and the fourth quarter of the year, moving from 26.9 to 36.2% p.m. Thus although the year had ended with an expressive rate of industrial growth (8.1% for the transformation industry) and an increase of the GDP(4.2%), the lack of a sustainable economic development in a picture of instability appeared clearly in the behavior of investment rate, which moved from 14% in 1992 (its lowest rate in all the series, since 1975) to 14.4% in 1993.

From an ampler standpoint, it has thus been verified that a repetition of the “inflationary cycles” that had characterized the behavior of economy during the 80’s, when spells of growth of short duration, followed by inflationary acceleration, alternated with periods of decreasing production, and it was not possible to revert the long run tendency to stagnation. This reversion, according to an amply accepted diagnosis, would only occur when the bases for a lasting stabilization were consolidated, centered in the financial equilibrium of the public sector.

It was undoubtedly the perspective of moving towards this direction that allowed for the continuity of growth along 1993 and the beginning of 1994. After successive changes of Finance Ministers, Fernando Enrique Cardoso assumed, at
the end of May, the command of the economic policies with a central proposal of promoting an adjustment of public accounts as a pre-requirement for any effort of inflation reduction. In a concrete manner, the implementation of the Programa de Acao Imediata (PAI, Program for Immediate Action), resulted in a ample cut-down in budget expenses and at the same time steps were taken for the conclusion of agreements concerning the external debt and renegotiation of state debts (a process which had already been dragging itself for almost five years). The public accounts, which after reaching a deficit of almost 7% of the GDP in 1989 were being kept under a relative control along the 90's at the cost of strong expenses constraint, presented at the end of 1993 a small superavit - measured by the Public Sector Borrowing Requirements (PSBR), in the operational concept - of 0.2% of the GDP. Simultaneously, from June on, the policy of higher interest rates, temporarily abandoned during the first months of the year, has been resumed.

Two new elements, revealed by the spell of growth observed along 1993, should be emphasized. The first one refers to the average industrial productivity increase. During the 1985/89 period, industrial productivity had remained practically stagnant, increasing at an average rate of 0.3% p.a. During the following four years (between 1990 and 1994), the rate of the productivity annual average growth moved to around 8% p.a. Even if this movement could result, to a certain extent, from the business sector's cautiousness in the hiring of new workers due to an unstable conjuncture, and the high costs of hiring and dismissing, besides constituting a cycle phenomenon associated to the recovering of production levels, it was also reflecting the investments carried out in a rationalization of the production and new methods of organization and management. This increase in average productivity allowed the accommodation of real wage increase in the industrial sector; the counterpart, nevertheless, has been a practically null increase of employment along the year.

The second aspect refers to the performance of the external sector, which was for the first time facing a liberalization of imports in a heated up economic conjuncture. Although the full impact of this new situation had not yet entirely been felt (as the most recent tariff reduction had only occurred in July 1993), the increase of over 20% of imports has been absorbed with no major traumas. The exports, even not counting on the exchange policy were maintained in expansion (7.6% per year), although at decreasing rates. To this growth has contributed the

---

2) There is a considerable controversy in the discussions regarding the behavior of industrial productivity in the 90's. In this respect, see Regis Bonelli, *Industrial Productivity in the 90's: controversy and almost-facts*, in *A Economia Brasileira em Perspectiva* - 1996, IPÉA. Rio de Janeiro, 1996.
greater diversification of the destiny markets of our exports, with increase of flows to the countries of the Mercosul. The surplus of the commercial balance has reached the end of the year at the comfortable figure of US$13.1 billion, which represented a decrease of 14.4% as compared to 1992.

In December 1993, the government disclosed to the public its stabilization project. Based on a sequence of pre-announced measures, where once again stood out the issue of budget equilibrium - to be achieved through the creation of the Fundo Social de Emergencia (FSE) (Social emergency Fund) and of a set of tributary measures - the government proposed a new approach against inflation, without price freezing or contract breaching. In spite of this new position, there has been during December, and along the first weeks of January, an intensification of expectations which resulted in an acceleration of the inflation rate and in large difficulties for the Central Bank to be able to carry out the control of the liquidity of financial markets. The faster rhythm of price increase suffered, at a first moment, the effects of strong prices increase in agriculture and stock raising, sustained by a heated up year-end demand. Subsequent this first moment, this movement began to reflect natural uncertainties as to the imminent changes in the economic policies. The impasse between the market and the Central Bank has been softened with the offering of bonus indexed to the exchange rate, but at the area of prices formation the uncertainties as to the new index were still high.

These doubts were, in part, a consequence of the inflation dynamics itself, where the distributive conflict, added to the difference in timing in determining prices and salaries created a situation where it became extremely difficult to surmount the inertial component. The demands for the anticipation of the introduction of the URV (Unit of Real Value) reflected, in fact, a demand for coordination rules which the market mechanisms, by themselves, were not able to provide. The crucial issue was centered in the government capacity to lead the way to a new indexation factor and, subsequently, its conversion into a stable currency. It should be noted that from the point of view of expectations, there was always the influence of stabilization based in the prices indexation to the dollar, as occurred in Argentina a few years ago, successfully so far.

The control of the liquidity in the economy was further barred by the potential conflict of the exchange sustaining policies in real terms and the need to fix higher interest rates with the purpose of containing speculative movements which could lead to an even greater acceleration of inflation. The entry of external short term capitals and the consequent accumulation of reverse at the Central Bank could not proceed indefinitely, under the risk of jeopardizing the fiscal adjustment due to the growth of the public debt in bonds, which was being used to sterilize the
external resources. This policy, on the other hand, reveals that, since the end of 1991, the target of reserves accumulation, although not explicit, followed an ampler stabilization strategy based on prices indexation to the dollar.

3.2 The First Semester of 1994: the Transition by the URV

During the first months of 1994, the economy behavior was strongly influenced, on one part, by the expectations relative to the stabilization plan, the second phase of which began on February 28 with the introduction of the URV and, by another, by the first movements of the elections process relative to October elections, since the Finance Minister, that had coordinated and guaranteed the execution of the plan up until its second phase, would have to leave his position to run for the presidency.

The introduction of the URV played an important role in the coordination of expectations and as a focus for the adjustment of relative prices, so as to minimize the residual inflationary pressures when applying the new currency. The scope of this new phase began to be amplified in a rather slow manner, in a sequential strategy that allowed the government to face the problems and resistance associated to the conversion into the URV by concentrating on a reduced number of sectors at a time: first salaries, then prices negotiations, especially the sharing of the expected inflation included sales, then schools fees, financial system operations, rent, etc.

Determining the correct timing for introducing the new currency has certainly been one of the main challenges with the economic group had to be faced, since this was one of the main variables for the determination of inflation in the first months of the real. The excessive duration of the intermediate phase of the URV would leave the cruzeiros inflation excessively volatile, mainly because the salaries, already converted, would reduce the inertial component thus making difficult the desired adjustment of relative process, and carry to the new currency inflationary pressures which, ultimately, had determined the acceleration of the inflation of the previous currency. On the other hand, the same effect could occur if the introduction of the new currency were anticipated, leading desired relative process adjustment to be carried out, to a large extent, in the real currency.

It seemed clear that the solution to the dilemma would be mainly in the definition of the rules that were to guarantee the stability of the new currency, and not in the bet that its introduction would occur the moment that inflationary pressures were minimized. In this respect, the search for mechanisms which would strengthen the credibility of the new monetary system, although at the cost of a
temporary hardening in the economic policy, should be emphasized. The credibility achieved, in its turn, allowed for inflationary control during the transition period itself. The behavior of inflation between March and June - period of duration of the URV - has amply exceeded the most favorable expectations, there having been some retraction in the indexes in April and May, probably already on account of the inflation elimination expected for some of the prices. The determinant factor for the success of the URV, nevertheless, has been the acceptance of the salaries conversion by the average, applying criteria that took into consideration even the effective payment dates.

During the first quarter of 1994 the data relative to the activity level indicated that production and sales were kept at high rates. In March, according to IBGE, the industry still presented an accumulated increase for 12 months of 7.5% : commerce, according to FCESP(Sao Paulo's Foreign Trade Foundation), kept high levels of real sales that had characterized the last months of the previous year. There was, nevertheless, a strong concentration of industrial increase and commerce sales in the group of durable goods, which accumulated a production increase of almost 28%, whereas non-durable goods showed an increase of only 5.2% in their production. By industrial category, transportation material and electric and communication materials (which include electro - domestic goods) had their production increased 23 and 17%, respectively, whereas food and tobacco decreased 0.5% and 0.6%.

In the same direction were also wage negotiations of important working categories in Sao Paulo, which produced significant increases (around 20%) over salaries already nominated in URV. If analyzed in the context of the new rules of indexation, nevertheless, such increases were not worrisome themselves, since, in thesis, they were only trying to anticipate part of the inflation expected along 12 months, during which the salaries would be fixed. But given the condition of a rather heated up demand, repassing the high wage increases to prices would give way to new inflationary pressures, which did not happen after all.

3.3 The New Currency: The Real

The introduction of the new currency on July 1, 1994 occurred without great surprises, since all the main measure had already been announced with sufficient anticipation, and were then effectively implemented. Even so, the transition into the real has been preceded, during the last two weeks in June, of a strong acceleration of consumer prices. This growth has surprised not only for having occurred but mainly by the magnitude of prices increases after four months of
coexistence with the URV. This expresses, any way, both the uncertainties still present as to the effects that high inflation, even in a context of generalized indexation, exerts upon relative prices - in particular, the influence that gains deriving from the financial floating exerted upon the prices.

If during phase 2 of the plan several sectors, mainly retail, had effectively excluded from the costs the inflationary expectations, and the gains derived from the float, the acceleration would certainly not have happened in such magnitude. Still, the inflation indexes for July, even seizing the movements of the end of June, remained within the more moderate expectations. The first IPC-r (Consumer Price Index -Brazilian real) has been a clear example of this. It had been foreseen that its result could reach 10% due to the first "end-to-end" results in June for Rio and Sao Paulo, when in fact the index has been of 6.08%.

Part of this effect can be attributed to the prices reduction verified along July. The elimination of excesses in the prices reflected already at that moment a more cautious behavior on the part of the consumer, which has been kept and intensified during the following months. Nevertheless, a fundamental role must be attributed to the exchange path.

In fact, from an economic policy standpoint, surprise finally came from the exchange administration which, when allowing exchange floating, maintained the quotation of the North-American currency below the expected parity with the real. At the same time, targets were determined for the expansion of the monetary basis which ended up to be extremely restrictive and had to be softened at a second instance. When the real was introduced, the accumulated inflation for 12 months as of 5,153.5%.

3.4 The First Nine Months of the Real: The Overheating of the Demand

Stabilization programs which aim at fastly overturning high inflation rates are usually characterized by and expressive increase in demand for goods and services during the months immediately following their implementation. It may even be said that such phenomenon is inherent to this type of programme, deriving from the effects that the virtually instantaneous elimination of inflation exerts upon the real income of the consumers and on the general expectations of the economic agents. Regarding the latter, the lack of credibility as to the effectiveness for stability could lead to speculative movements, under the form of consumption distribution. The Brazilian experience and that of other countries which have implemented similar programmes clearly demonstrated this point.

This demand pressure will ultimately only be reflected in a return to the
inflationary process if the instruments of the economy policy - especially a fiscal policy which eventually contemplates the generation of budget superavits, which compensate the expansion of the private expenditures - are not used with the required fastness and intensity. International experience shows that, in cases considered to be successful, such as Argentina, Israel and Mexico, rigid monetary policies were adopted right after the implementation of the respective stabilization programmes (with real interest rates around 30% p.a., in most cases). Besides, at the occasion, a deep restructure of the public sector was under way in each of those countries, as well as ample privatization programmes. In Brazil, it can be argued that the failure of the main attempts at stabilization carried out since 1986 can be attributed, to a large extent, to the delay in implementing effective measures to contain consumption.

There is no reason why the Real Plan would follow a different path. In fact, as of July, the sales in commerce and the industrial production entered into an accelerated increasing rhythm. Industrial production in August presented an increase of 3.6% as compared to July, according to the seasonal adjusted index from IBGE, while the invoicing of the general commerce in August (excluding sales of vehicles by concessionaires, which results that were influenced by the strike of the sector) according to the FCESP, increased to 16.8% as compared to July. The accumulated industrial production growth from July to December, as compared to similar period of the previous year, has been of 10.4%, while the real invoicing of the commerce in Sao Paulo, for the same period, has increased 20.1%.

The behavior of employment and average wage reflected in an unequivocal manner the economic activity heating up. The unemployment rate, measured by the Pequisa Mensal de Emprego - PME (Monthly Employment Research) from IBGE, which during the first semester of 1994 (seasonal adjusted average) had been of 5.2%, dropped during the following nine months to 4.6%. The increase of employment has been generalized in all sectors of the economy. The increase of labor income has been higher to the non-registered workers and the autonomous workers, reflecting the strong growth of services prices during the first months of stabilization. During eight consecutive months (September 1994 to April 1995) the level of employment has grown in the Sao Paulo industry. Measured by the PME, the real average income of employed people in March 1995 was 14% superior to that of July 1994 (30% in the case of autonomous workers), whereas the total wage bill had increased 16.6% during the same period.

In this context were adopted, in October 1994, the first measures of credit contention - reduction of the maximum for credit to the consumer and the non-
remuneration of the retention of 15% on loans of the financial system - with the purpose of reducing this excess in demand. The measure of quantitative restrictions followed the need to achieve apparently conflicting objectives: on one side, the need to soften the pressures of demand, requiring a rigid monetary policy in order to avoid its accelerated increase: on the other, the facing of the external problem, particularly the financial flows, which tended to generate a continuous valuation of the exchange rate vis-a-vis an extremely high interest differential. Also, these measures obviously sought to minimize the impact of the interest increase upon the public debt. In return, nevertheless, a strong process of financial disintermediation began to rise and sustain the credit expansion for an additional relatively long period. In spite of the restrictions imposed by the Central Bank, the loans of the financial system to the private sector in December 1994 were 20% higher, in real terms, than those of June-showing an increase, in the same comparison, of 120% in loans to individuals.

The decrease of inflation tends to exert a strong impact upon the financial system, due to the high dependence of the system on inflationary gains-estimates point to inflationary transfers to the banking sector of the order of 2.5% of the GDP p.a., in average, during the period 1987/92.\(^3\)

Thus, the impulse with which the banks began to seek for new income sources is partly explained by this need to recover their profits, thus creating, as will be seen hereafter, a rather undiscerning credit expansion - in certain banks, entire credit departments were created within only a few days - and a large increase of the degree of exposure of the system to eventual cyclic floatings. Concerning the demand, the situation of the most part of consumers during the period of high inflation was that of total consumption limitation, that is, to all effects these individuals were facing infinite interest rates. Thus, it did not matter how high the interest rates were charged, as there would be the desire to incur in debts as long as the installments would "fit" their household budget. These problems, which signaled at high financial instability, were even more aggravated by the difficult situation of some of the state banks which, in face of the strong liquidity restrictions provoked by the measure of the compulsory retention on term deposits and on savings, systematically began to run for help from the Central Bank.

The increase of the GNP in the 1994 has been of 5.9%, with the transformation industry and agriculture leading the process, with variation rates of 7.8 and 10.5%, respectively. In industry, the segments which have mostly increased were those

---

of the capital goods and durable consumption goods (18.6 and 15.53%, respectively), although both in the sector of intermediate goods as of the non-durable goods, there has also been some recovering - variation rates of 6.5% and 1.9%, respectively. These figures, nevertheless, when describing the average behavior along the year, do not express the intensity with which the economy had been operating in the last months. Comparisons of the level of industrial production month to month show, during the second quarter, average growing rates superior to 10%, as compared to the corresponding to months of 1993 (when recovering was already in course), and 15.5% above the level observed during the first semester of the year. The increase also been accompanied of investment returns which have reached 15.5% of the GDP in 1994 as compared to 14.4% I 1993.

The combination of commercial liberalization acceleration, through tariffs reduction and the elimination of bureaucratic obstacles to imports, with valued exchange rates has exposed the national industry to an unprecedented degree of competition. On the other hand, nevertheless, the reversing of the commercial balance results also occurred with surprising speed. In a certain manner, this substantive increase of imports (41% during the period July-December 1994, against the same period of the previous year) refuted the analyst of those who, based on a perception of the Brazilian economy as being an entirely closed one, became skeptical as to the possibility of accomplishing stabilization based on the use of the exchange rate as an anchor.

The impact of these imports (or of their potential) could be felt mainly upon the wholesale prices, with industrial products showing deflation, measured by the IGP-OG (Índice Geral de Preços) - Oferta Global (General Prices Index - Global Supply), in August and September 1994, and average variation of 0.74% p.m. during the last quarter of the year. In the case of consumer prices, during the first months the behavior of the prices of commercial goods had been considerably distinct from that shown for non-commercial goods, especially for services: while services have accumulated a real variations of commercial goods, especially the industrial ones, were for several products strongly negative in real terms. This has been the case, for example, of hygiene and cleaning articles, clothing, other domestic articles, sound and image apparatus, beverages and tobacco.

Perhaps the most emblematic case has been that of the electro-electronics’ prices, surely the sector that has presented the highest sales increase in all the distinct phases the economy has gone through during the last two years. According to the Fipe Index, the real variation of prices of electro-electronics has been of 1.7% during the first six months of the plan and -11% during the following 17 months, in spite of the continuing sales increase, showing that the commercial
liberalization regulates prices even when the internal demand is kept heated up.

The magnitude of the real exchange valuation (between June and December the effective real exchange rate, which uses the IPA - Indice de Precos de Atacado (Wholesale Price Index) as the deflation on the need to maintain a sustainable stabilization on new bases, now under the form of the need to preserve the external equilibrium. After the crisis derived from the devaluation of the new Mexican currency(Peso), there have been great expectations as to the behavior of the Brazilian external sector. These expectations were increased by the announcement of commercial deficits superior to those expected in November and December 1994, giving way to analyses that pointed to an inevitable exchange adjustment. The net flows of external capitals, which in 1994 had accumulated a balance of US$ 10.8 billion, became negative during the first quarter of 1995, resulting in a net outflow of US$ 4.4 billion.

The exceptional situation of the commercial balance during this period, which extended until June 1995, has been partly due to a combination of factors which would now occur again. In the first place, because the record levels of imports, as well as the exports' performance below their potential were, to a certain extent, the result of deliberate measures, adopted by the government along the second semester of 1994 with the purpose of restricting the offer and increasing demand for foreign currency, thus allowing the conduction of the monetary policy without an even greater exchange valuation. The reversion of these measures, as in the case of the ACCs - Adiantamentos sobre de Cambio (Advance on Export Contracts) and the anticipated payment of exports, would once again lead the commercial balance results to more adequate levels with regards to the new situation of instability of the foreign investments in the so-called "emergent markets".

In the second place, because the economy was considerably heated up, showing high rates of increase since the last quarter of 1992, which were maintained up until the first quarter of 1995. The consumption boom that has been verified since the implantation of the real (in March 1995, the retail commerce sales in Sao Paulo, excluding vehicles, according to seasonal adjusted data from the FCESP, were 34.3% higher than in June 1994, with an increase of the sales of durable goods increasing to 59%) has been a natural result of the inflation reduction and has continued in spite of the restrictive measures implemented by the government at the end of October. The levels of industrial production during the first quarter of 1995, although slightly lower in comparison to the peak reached in December (in seasonal adjusted terms), were still 6.1% higher than those of the last quarter of 1994. The investment rate during the first quarter of 1995 has reached 16.8% of the GDP.

4.1 The Impact of the Mexican Crisis

The performance of Brazilian economy in 1995 has revealed both progress achieved and challenges that still had to be surmounted with the purpose of consolidating stabilization. In the first category are included the maintenance of inflation at reduced indexes (20% accumulated rate by the average of the main prices indexes), the recovering of the monetary policy as an effective means of achieving stabilization and the approval of the reforms related to the state monopoly and foreign capital. Concerning the second category, we may emphasize the fiscal issue, which presented a considerable deterioration along the year, and the difficulties in implementing the reforms which aimed at a permanent fiscal adjustment (tributary, administrative and social security reforms), besides the need to further develop the privatization programme.

From 1994 on (after the Mexican crisis), but with particular intensity as of March, the Real Plan began to face the first obstacles that led to the questioning of the bases on which it had been founded. Until then, it had been possible to operate in an environment of fast income increase simultaneous to the maintenance on inflation at reduced levels. More importantly, the partial deindexation had been allowing that eventual shocks on inflation (such as those registered in October and November 1994, deriving from climatic accidents) were absorbed without the occurrence of a new consolidation of higher levels of price increases.

Surely the impact of stabilization on the aggregated demand had been considerably underestimated. The restrictive measure adopted in October 1994, although severe, had been insufficient to hold back the strong impulse derived from an environment of treater stability: the transference of real income to the lower income segment of the population, the modernization and capacity increase on the part of the enterprises, began to allow a strong acceleration of the activity level, leading several sectors to operate close to their limits of capacity, since the economy had already shown high increasing rates for almost two years. The explosive increase of imports, stimulated by the acceleration of the rhythm of the commercial liberalization and by the valuation of the exchange rate, has been the main factor to prevent this picture of overheated economy from degenerating into inflation acceleration, although other factors of a more microeconomic nature

---

(associated to changes in the behavior of enterprises and consumers in an environment of greater stability) have also been responsible here.

The economy in 1995 has presented three distinct moments. The first quarter, as already described, has been characterized by a continuous process of overheating of the economic activity and, mainly, of consumption, which led to an expansion of 10.4% of the GDP as compared to the similar period in 1994. A similar rhythm of growth of the demand could only have been absorbed without any major impact on inflation (which was kept under control during the period, with a monthly average of 1.4%) through a strong increase of imports that grew, in seasonal adjusted terms, about 85% during the January-March/95 quarter, in comparison with the quarter immediately previous to the introduction of the Real Plan. Besides the increase in demand, this increase is explained also by the real exchange rate valuation, of around 23% between June 1994 and February 1995 in terms of effective exchange rate, and by the intensification of the commercial liberalization. The result has been fast and accentuated against the last quarter of 1994 (in seasonal adjusted terms), move from monthly average superavits of US$ 1,206 million to monthly deficits of US$ 1,076 million.

This was a clearly unsustainable path, and the Mexican crisis, - with its negative impacts on the flows of foreign capitals - constituted, no doubt, an important warning factor towards the need to reorient the economy policy. In March, the exchange moves from a floating system to an exchange band procedure, resulting in a discrete devaluation of about 5% in real terms. This new sliding exchange band procedure, with inter-band interventions by the Central Bank, allowed the effective real exchange to accumulate, between February and December 1995, a devaluation of 12.8%. Concerning the commercial policy, the import tariffs have been considerably increased for a group of consumption goods, adapting the rhythm of the economy liberalization to the new external scenery.

Simultaneously to the change in the exchange policy, the Central Bank tightened the monetary and credit controls upon the economy. The basic interest (observed in the Selic - Special System for Settlement and Custody) was led to considerably high levels, increasing from an average of 2% p.m. during the January-March quarter to 2.4% p.m. at the April-June quarter and 3.2% p.m. between July and September (deflation index : IGP-DI centered). Restriction to the credit, that since October 1994 were already heavy - on account of the high compulsory collection, which began to be changed inclusively on active operations - became even more severe. The real interest for loans of working capital increased from an average of 4.4% p.m. in the January-March quarter to 5.5% p.m. between April and June and 6.2% p.m. between July and September.
The impacts of this change in policy on the level of economic activity were noted under the form of an accentuated reduction in the industrial production, which presents an accumulated decrease of almost 9% in the third quarter of the year, as compared to the first one. The policy of high interest rate and the retraction of demand have also affected the investment rate which, according to estimates from the IPEA, had dropped in the second and third quarters of the year after an uninterrupted growth since the beginning of 1993. Still the average rate of 15.9% of the GDP in 1995 has been superior to that of the previous year.

When analyzing the employment, average wage and total wage bill indicators, especially in industry, the path of these variables complements the picture previously described. It becomes necessary, nevertheless, to analyze the deterioration of the employment indicators; the level of employment has continued to grow in all the sectors (with the exception of industry), but since the economically active population -persons that look for jobs - increased more than the creation of new jobs, the rate of unemployment, seasonal adjusted, increased as of September 1995.

The real total wage bill in the Sao Paulo industry, according to the FIESP, dropped 6.4% in the 12 months between April 1995 and March 1996, whereas the level of employment decreased 10%. Nevertheless, in accordance with employment surveys from IBGE, which cover all the sectors of activity, the real total wage bill has grown uninterrupted until December 1995. In spite of the reduction observed at the beginning of 1996, the real average income of the employed persons was still, during the first four months of 1996, 10% above that of the same period of the previous year.

The combination of a deceleration of the economic activity, the recovering of the exchange rate in real terms and the increase of imports tariffs has resulted in the reversion of the commercial deficits, which began to show monthly seasonal adjusted average superavits of about US$ 140 million in the second of the year. The monthly average of seasonal adjusted imports, which during the first semester had been of US$ 4.4 billion, declined to US$ 3.9 billion in the second semester, whereas the exports increased from a monthly average of US$ 3.7 billion to US$ 4 billion between the two periods.

The restriction in the credit conditions has also caused a strong impact on the financial situation of enterprises and families, significantly increasing the levels of unsettled debts, obviously reflecting on a financial system which had already begun to adapt itself to new reality of low inflation rates, eventually leading to the closing of some more fragile institutions. In real terms, the credit to the private sector has expanded 5.4% between March and September, while the credits in delay and/or under moved from 8.6 to 13.5% of the total loans to the private
sector.

The question of the structural changes in the financial system has thus become one of the main restrictions to the actions of the Central Bank, from the moment it begins to deregulate the monetary policy, reducing interests, compulsory collection and restrictions to credit. Another restriction derived from the entry of new foreign resources, attracted by the high interest rate policy and allowed by the fast reversion of the negative expectations derived from the devaluation of the Mexican peso in December 1994. Comparing the first semester with the third quarter, the impact of the operations with the external sector on the monetary basis variation moves from R$ 3.4 billion negative to R$ 13.6 billion positive, thus still high in the last quarter of the year (+ R$ 4.7 Billion). The combination of the effects deriving from the operations of financial assistance to liquidity and those with the external sector demanded an aggressive policy of public bonds placement: the federal public debt in bonds in the market has grown 42% between July and September. During the last quarter of the year, the increase has been smaller (10.3%), and the debt in bonds of the federal government in the market has reached R$ 108.6 billion in December, with an increase of almost 50% per year.

With the return of the flows of external capital and the positive signaling of the commercial balance, the Central Bank began to promote a gradual softening of the monetary and credit restrictions, as of August. This movement becomes more visible in terms of the nominal interest rates at the Selic, which declined from 4% p.m. in July to 2.8% p.m. in December. For this reason, the last four months of 1995 have shown a reversion of the deceleration: positive growing rates of the industrial production have accumulated a variation of 3.7% from September - December average, those observed in equal months of 1994, but seemed to demonstrate that a new increase movement had begun. The increase of industry for the year has been of 1.9%, and that of the GDP of 4.2%, stimulated by the agricultural and stock raising sectors (with growth of 5.9%) and services (5.7%).

The dominant issue in 1995 has undoubtedly been the deterioration of the public accounts. For the consolidated public sector, there has been a movement form a superavit, in the operational concept, of 1.3% of the GDP in 1994 to a deficit of 5% of the GDP. Even if part of this deterioration can be explained by the strong increase in the real financial charges (which jump from 3.8% go 5.4% of the GDP) as a result both of the interests increase as of the stock of public debt, the main factor has been the reduction of the primary superavit from 5.2% to only 0.4% of the GDP. In spite of the fact that the deficit of states and municipalities in 1995 has been responsible for half of the total (reaching 2.5% of the GDP), it has been the central government who responded for the major share
of the shift in relation to 1994 - variation of 3.3% of the GDP. This variation, in its turn, derived from a reduction of the primary superavit equivalent to 2.5% of the GDP, with the remaining derived from the increase of the real interests charges.

Data from the Secretaria do Tesouro Nacional - STN(National Treasury Secretariat), even though not strictly comparable to the performance in terms of Public Sector Borrowing Requirement(PSBR), reveal that in 1995 the fiscal income has increased, in real terms, 8.6% as compared to the previous year, whereas expenses has grown 14.6% by the same criterion. Among the expenses is emphasized the increase with personnel and charges, with a variation of 15.4% in the period, as a result of the significant increases approved at the end of the previous government, as well as of the salaries correction concurred at the beginning of the year, based on the accumulated inflation. This strong growth also applies to the expenses with Social Security, which have grown 23% in real terms as a result of the correction of the benefits themselves and of the value of the minimum wage (an increase of 43% afforded in May).

4.2 Consolidation of Stability and Economic Recovering

The movement of economic recovering, which had already begun to outlined in the last quarter of 1995, has been partially reverted during the first months of 1996. According to data from the IBGE, the industrial production during the first quarter of the year, after the seasonal adjustment, would have become 16% below the average of the last quarter of 1995. The GDP in this period would have remained practically stable as compared to the previous quarter (in seasonal terms), decreasing 2% as compared to the first quarter of 1995.

Even if the Central Bank had proceeded with its policy of gradual interest reduction (the average rate of the Selic during the first quarter has been of 2.4% p.m., against 2.9% in the previous quarter), the response from the standpoint of the credit offer, at the beginning of the year, was still somewhat shy: the loans of the financial system to the private sector in March had been 7.7% higher, in real terms, than those observed during March of the previous year, but the proportion of credits in delay and/or under settlement had increased to almost 18%. Due to this high delinquency ratio, the bank rates for loans still remained considerably high during the first quarter - in the average, the rates for loans of working capital had been of 4.3% p.m. (or about 65% p.a.) against 5.4% p.m., in average, during the previous quarter.

As a counterpart to this picture of relative deceleration of the economic activity, and reflecting the exchange devaluations below the inflation (exchange
variation accumulated for 12 months until March has been of 11.1%, against an average inflation, according to the IGP-DI, of 13%), the average inflation of the first quarter (average of the IPC-Fipe, INPC and IGP-DI) has reached considerably reduced levels. The average monthly rate of inflation in this period (0.85% p.m.) has been almost 0.5% lower than that observed for a similar period in 1995. The average monthly variation of the prices of industrial products has been of only 0.03%, with a deflation of 0.15% in March.

The second quarter of the year has registered inflation rates slightly higher than those of the previous period. Driven by the price increases of the agricultural products, which were then at high levels in the international market (the average IPA-OG of the quarter for agricultural products has been of 2.06% p.m. against 1.72% in the previous quarter and -0.44% between October and December 1995), the average inflation of the quarter has reached 1.28% p.m. Great impact has also been exerted by the variations of public prices, either to correct distortions in the structures of prices of the state owned companies (as in the case of the implicit subsidy to alcohol, which determined the correction of gas prices at the end of March.) or because the indexation still prevails in relation to past inflation (as is the case of public transportation, where prices are determined by the municipalities' administration). In any way, the projections for the yearly inflation point to an continuation of the tendency to decrease, with forecast oscillating between 12 and 15% for the accumulated value until December.

The prices movement between tradable and non-tradable goods (which determine the path of the real exchange rate) have been showing a progressive convergence in the variation rates - even indicating the perspective of some correction of the "excesses" observed in the initial months of the Real Plan (when the prices of services and rent became strongly detached from those prices, due to the close influence of the exchange path). The behavior of the various groups of products within the price index of the Fipe clearly shows this tendency: since the beginning of the Real Plan, up to June, the services group (which includes rent) had accumulated rate for three months, or 1.8% in the monthly average, reducing even more during the April-June quarter, to 0.3%. This convergence in the prices has been effectively conducting the economy to a new prices formation, with less emphasis on the mechanism of automatic correction. Steps still have to be taken towards greater adaptation of the correction of prices and tariffs of the public sector (which will carry an important weight during the months of June and July) to the real costs variations.

Before the results which indicated, during the first quarter, a relative fragility of the economic recovering, the Central Bank has promoted, at the end of April,
a new set of measures aiming at an even greater flexibilization of the credit restrictions. Among them, the increase of financing terms, more favorable conditions of refinancing to micro and small enterprises, the reduction of the IOF - Imposto sobre Operações Financeiras (Tax on Financial Operations) and the elimination of restrictions in the issuance of commercial papers by the enterprises. More recently, new rules amplify the liquidity of the system. Thus, a situation of greater yearly growth has been outlined, industry in the bimester April-May already displayed a recovering of 2.2%, as compared to the first quarter.

As already emphasized, in spite of the deceleration of the economic activity, the mass of income for the employed persons continued to grow, in real terms, at high rates - around 11% when comparing the first four months of 1996 to similar period in 1995. In sectorial terms, this growth reflects the changes which have been occurring in the productive structure: a strong increase in construction (13.7%), commerce (16.1%) and services (15.2%), while the mass of personal income of those employed in the industry, in real terms, has remained stable. Even with an increase in unemployment, from 4.4 to 5.8% in the same period, these results point to the sustaining of the global income and, thus, of demand.

The flows of foreign trade have revealed a higher dynamics of exports. During the first semester of the year, they increased 6.85% as compared to a similar period of the previous year. This aggregate, nevertheless, conceals some important changes in the composition of foreign sales: contrary to what had been observed during last year, the growth of exports has been occurring within a picture of a rather unfavorable prices situation and a lower growth of the developing countries. Thus, a great part of the growth is explained by the expansion of the industrialized exports, with quantities, in the accumulated rate for the year up to June, showing an increase of 15.6% in semi-manufactured goods and 12.1% manufactured goods. In terms of income, these variations have been of 4.3 and 6.9%, respectively.

With regards to imports, there is a decrease of 9.6% in the accumulated rate for the year until June. Nevertheless, if from this total were excluded the imports of automobiles, the remaining imports would have presented, from January to June, a decrease of only 2.7% as compared to a similar period of last Year. By groups of products, while imports of raw materials and intermediate products (including combustibles and lubricants) decreased 5.6%, imports of capital goods increased 10.9%. The consumption goods (excluding automobiles) have had a decrease of 9.1%, highly concentrated on durable goods, 19.5%.

The level of international reserves has reached almost US$ 60 billion in June 1996. The capital flows, which up to that month had resulted in net entries of resources of the order of US$ 12.3 billion, have been progressively moving towards
a larger participation in direct investments (US$4.4 billion) and currency loans of average and long terms (gross captations of the order of US$ 6 billion), effected under price and term conditions each time more favorable. Investments in portfolio that in the period August-December 1995 had presented a net flow of US$ 4.6 billion, dropped to US$ 2.7 billion between January and June 1996.

The counterpart to the entries of foreign resources has been the permanent pressure on the public debt, which continued to grow fastly: between December 1995 and June 1996, the federal public debt in bonds in the market increased almost 42.2%, reaching R$ 154.3 billion. The placement of public bonds had still been necessary to neutralize the expanding impact of the Treasure (R$ 6.8 billion in the accumulated value until June, which nevertheless reflects, to a large extent, the effects of the Bank of Brazil’s capitalization) and of operations of financial assistance to liquidity, already influenced by the Proer (Program for the Strengthening of the National Financial System) (R$ 5.9 billion). These sources of pressure on the public debt, nevertheless, when involving as a counterpart the acquisition of assets by the Central Bank -either under the form of international reserves of through guarantees in case of assistance to the financial system - resulted in a slight increase of the net debt of the public sector, which would have moved from 31.6 to 33.3% of the GDP between December 1995 and May 1996.

The central issue of the process of adjustment continues to be the need to reduce the public deficit on a permanent basis. The perspectives for 1996 are positive in this direction, either through the control of expenses, of by the positive effect that the decrease of the interest rates will exert on the financial charges of the public sector. Also, a great adjustment effort has been undertaken by the states and municipalities as part of a process of renegotiation of their debts with the federal government. Expectations are that, in 1996, the performance of the states and municipalities will show an improvement equivalent to 0.5% of the GDP in the primary result and of 1.5% of the GDP in the operational result. For the consolidated public sector, the primary result would show an improvement of 0.7% of the GDP, and the operational deficit would be situated between 2.5% and 3% of the GDP.

The situation previously described reveals a moderate economic recovering and a relative calm in the foreign front, be it from the point of view of the performance of the commercial balance, or from the standpoint of the financing of the deficit in current account, which in 1996 should be situated slightly below the values observed in 1995 (when the deficit had been 2.7% of the GDP). In spite of this favorable picture, consistent with important gains vis-a-vis inflation, there
have been intense critics as to the sustainability of the programme, especially regarding the real exchange valuation and its implications in terms of the restrictions it imposes upon growth and degree of vulnerability of the balance of payments.

These analyses involve distinct issues. The first one refers to the origin of the critics itself, the real exchange valuation. The second one is related to the effects of such valuation on the policies required to correct the problem. Regarding the first aspect, a distinction must be made, from a theoretical point of view, between the paths of equilibrium and disequilibrium. The real exchange valuation can be associated to a path of equilibrium (thus being sustainable) if the stabilization process involve alterations in the macroeconomic fundamentals derived from the changes in the economic policy - specially concerning the path of the public deficit - which may lead to changes in the pattern of foreign financing.

In the above context, eventual deficits in current account in the balance of payments do not constitute, by themselves, evidence of disequilibrium. The resource to foreign savings is part of a sustainable development strategy if it has, as a counterpart, the recourse to foreign savings is part of a sustainable development strategy, if it has, as a counterpart, the increase of domestic investment and if this investment, responding to adequate signalling of relative prices, is directed to the tradable goods sector. This line of reasoning emphasizes the gains in productivity and the space for reduction of margins of profit derived from the commercial liberalization.

For those who consider the process of exchange valuation to be an expression of disequilibrium basically due to the rigid prices adjustment of non-tradable goods, a characteristic which could be emphasized by an insufficient fiscal adjustment- this would be a fundamental issue, as distorted relative prices would lead to an increase of the production of non-tradable goods and to the reduction of the production of tradable goods. Thus, there would be a structural disequilibrium of the commercial balance, financiable only for a short period of time. In the long run, given the less intensive-capital degree of the production of non-tradable goods, there would be a “shrinking” (or desindustrialization) of the economy.

The depth and scope of these changes that have been occurring in the economy do not yet allow a definite judgement as to tendencies observed in the process of changes occurring in the productive economy. Still, according to estimates from the IPEA/GAC as to the behavior of the quarterly investment, after the introduction of the real, there would have been a strong acceleration in the gross formation of fixed capital, that from a level of 14.2% of the GDP in the second
quarter of 1994 would have increased up to 16.8% of the GDP during the first quarter of 1995. Along 1995, as a result of high interests, of the drop of demand and of the increase of uncertainty as to the path of stabilization, the investment rate would have continuously declined down to 14.8% of the GDP in the last quarter of the year (although the average investment rate had still been higher than in 1994). Estimates for the second quarter of 1996 point to the recovering of investment, which would have reached 16.2% of the GDP.

Furthermore, as important change in the composition of investment has been observed, with lower weight in construction and building, and higher participation of machines and equipment. The strong increase of imports of capital goods in 1994 (45.4%) and in 1995 (50%) reveals that at least in part, the increase of imports would be reflecting an increase of investment in modernization, thus resulting in the incorporation of technological progress and higher productivity. In terms of the composition of investment, a retraction of public investment can be observed, with negative effects upon the areas of productive infrastructure, where the State owns the monopoly of exploration through the state owned companies. In any way, the current investment rates are still significantly below those required to sustain higher development rates. In order for the economy to recover growth rates between 5 and 6% p.a. without stumbling before given limits of capacity, it would be necessary to achieve investment rates (at constant prices) of the order of 20% of the GDP.

In order to finance this investment effort, savings would need to be increased of about 3.6% of the GDP in relation to the estimates for 1995, until reaching 23.3% of the GDP. Considering foreign savings of the order of 2% of the GDP, this would imply in increasing the domestic saving from the 17% of the GDP foreseen for 1995 to 21.3% of the GDP - that is, an increase of about 4.3% of the GDP. Private savings have grown at an average of 16.6% of the GDP in the four previous years to almost 18% of the GDP in 1995. Public sector's savings, on the contrary, decreased from an average of 3.5% of the GDP p.a between 1991 and 1994 to -0.9% of the GDP in 1995. The main share of domestic savings growth effort will, therefore, have to come from the public sector.

The prescription of policies is dependent on the view of each of the tendencies already mentioned with regard to the time required for the adjustment. If seen as a sign of disequilibrium, this time span would be too long and a correction of exchange would inevitably be required at a given moment. It would still be necessary to determine, nevertheless, to what extent this nominal correction would express real variation, as well as its implications on the inflationary process itself. It is based on a long history of inflation, that left as a consequence a strong
tendency to the reindexation of the economy, that we argue against a nominal exchange devaluation to correct the existing disequilibrium.

Thus, the recovering of sustained growth would require an increase in the economy competitiveness as a whole, and with special emphasis the competitiveness of the exporting sector. Since the exchange policy will continue to be an important instrument for stabilization, this increase in competitiveness must also be based on other factors which affect rentability of exports, such as, for example, the need to expand, at low costs, the financing lines to exports (as recently undertaken by BNDES - National Bank for Economic and Social Development - in support of certain sectors) and to carry forth the process of tributary reduction already initiated with the measures of relative compensations to the PIS (Employees' Profit Participation Program) and to the Cofins (Tax and Social Security Financing) included in the input costs. Nevertheless, from a macroeconomic perspective, the possibility of achieving exports growth at higher rates is closely associated to the reduction of the public deficit, to the approval of constitutional reforms and to the implementation of privatization - as these factors determine the possibility of the recovering of investment, thus leading domestic production to become more competitive. Thus, there is still a long way to go until privatization, the concession of public services and other measures of structural adjustment of the public sector, (administrative, tributary and Social Security reforms) can be translated into real conditions for a sustained growth.

In case the inflationary tax be considered as an effective income of the public sector, and is discounted from private savings, the movements of decrease of public savings and increase of private savings in 1995 become even more dramatic.

4.3 The Impact of the Asian Crisis

The year of 1997 was marked by the consideration of the economic stability (the rate of inflation has been reduced to only 5%) by the maintenance of basic line of the economic policy, by the growth of the economy in a reasonable rate (+3%), with the recovering of the industrial production (+4.3%, mainly in the tradable goods sector, and by a significant improvement in the external accounts, due to the growth of exports (+11%) which made the commercial debt (-US$ 8.3 billions) inferior than the previewed at the beginning of the year. There also has been observed a substantial increase in the rate of investment to 18% comparing with the 16.5% of 1996, at 1980 price.

The negative signal was the bad result in the public accounts which registered an operational deficit of 3.14% in the public sector financing requirements concept.
This was due mainly to the increasing in the rate of interests over the public debt after the Asian Crisis.

Nevertheless, the overall picture has changed in the last two months of the year due to the Asian crisis. The government had to implement a very tight monetary policy, doubling the rate of interest to almost 40% per year in order to make it attractive for foreign investor. This was a conjunctural reaction against a massive lost of reserves (US$ 10 billion out of 61 billion) in the first two weeks of the crisis. Afterwards the government made others more structural moving: first it launched a very restrictive fiscal package in order to restrain the public deficit. Besides of getting the approval of the Brazilian Congress for those measures the government also has succeeded on approving some of the structural reforms it has been submitted to the Congress for a long time without success. It might be said that running the risk of loosing the stability, the Brazilian society has preferred to make the sacrifice of less growth in order to maintain it.

The result of that was the return of foreign capital lost during the beginning of the crisis but also a slowdown in the economic growth. The perspectives are to reduce the rate of interest gradually as far as the benefits of the reforms shows to be effective. In the end of February 1998 the rate of interest has been reduced to 28% and is expected to be 20% by July. The expected result in terms of growth is a slowly recover during the second quarter of the year and a rate of 2% growth of GDP with a 2% rate of inflation.

5. Real Plan, Macroeconomic Stability and Social Development-an overview

After reaching its forth year of existence, the Real Plan becomes consolidated as the most successful effort at stabilization of the last thirty one years. The inflation rates have declined from levels which were close to 50% per month in June 1994, to less than 4.5% per year at the beginning of 1998, without the need for any type of direct control on prices or contract breaching between private agents. After the creation of the URV, linked to the exchange rate variations, an adjustment of relative prices were carried out in such a manner as to neutralize the inertial component of inflation and thus recover the confidence in the Brazilian currency. In order to guarantee the initial success of this strategy, the change in the economic environment has been fundamental, with an ample commercial liberalization that would allow competition with imported goods to restrict the international price increased and, on the other hand, impel the national producers towards obtaining gains productivity.
Along the first two years of the plan, we had a significant inflation reduction, mainly through the contention of the prices of the so-called tradable goods, that is, those that were more subject to foreign competition. In that period, the price increases of non-tradable goods, such as public tariffs and services, were considerably above the general inflation rates. As of the second semester of 1996, nevertheless, a larger convergence between the price variations of these two categories of goods has been verified, a tendency which is intensely strengthened along 1997, reflecting the development of the general price deindexation (inclusive of public goods) and economic revenues. On the other hand, the fast rhythm of this process has been strongly directed by the orientation of the exchange policy. At the beginning of the program, there has been a nominal valuation of the domestic currency, as a result of the decision of the Central Bank not to intervene directly on the exchange market. After the exchange crisis occurred in Mexico in March 1995, the exchange floating system was introduced within sliding bands established by the Central Bank, who then began to act directly in the exchange market; this result, in practice, in a mechanism of exchange devaluation effected with no determination of fixed periods nor link to the inflation rate, but adapted to the evolution of the relation between the internal and external prices and to international capital flows. In fact, since then the exchange policy has been allowing profits to the exporters, as the devaluation rates have been higher than the increase of wholesale industrial prices.

Another important factor to the success obtained in the struggle against inflation has been the adequate conduction of the monetary policy. Right after the implantation of the Real Plan, there has been a considerable increase of the monetary aggregates, with the Central Bank approving the increase for the demand of currency resulting from the abrupt decrease of inflation and from the re-establishment of the credit channels. In October 1994, nevertheless, certain measures have been taken towards the contention of credit, with the objective of holding back the consumption increase, that could result in a new inflationary explosion, as it was quite above the growing capacity of the production. These contracting measures, after additional restrictions in April 1995, began little by little to be softened as of the middle of that year, being further followed by a declining path of the interest rates until the end of October 1997, when the intensification of the crisis in the Asian Southeast showed the need for a more conservative monetary policy. Nevertheless, the prompt reaction of the economic policy to the external crisis, through the increase of internal interest rates and the announcement of a set of measures aiming at a fiscal adjustment in 1998, have guaranteed the continuation of the international investor’s confidence in the success of the
stabilization program, in this manner allowing a return to the declining path of the interest rates as a target of the monetary policy already as of December 1997.

The behavior of production along this entire period has followed a path which is typical of a stabilization program dependent on the exchange rate: after a strong increase of the internal demand and of the GDP, it became necessary to impose restrictions to consumption, which led to an intense deceleration of the activity level during the last three quarters of 1995. Nevertheless, still at the end of that year, the levels of production and consumption began to show signs of recovery, which has been intensified during 1996, pointing to the consolidation of the growth process in 1997, when the Asian crisis occurs. The investment rate at constant prices of 1990 reached the mark of 19.1% of the GDP during last year. For the average of the first four years of the Real, it is estimated that GDP has grown 4.2% per year.

Although still below the potential of Brazilian economy, this rhythm indicates the need for the creation of more solid conditions, from the point of view of the macroeconomic fundamentals, in order to allow development to return to its historical post-war average, with rates of the order of 7% per year. Significant steps have been taken in that direction, as for the example, through the constitutional changes which allowed breaking through the state monopoly on sectors such as oil, electrical energy and telecommunications, as well as the elimination of the distinction between national and foreign companies. The definite consolidation of stability in an environment of sustained development, nevertheless, depends on more significant steps towards the control of the public deficit, on a permanent basis, which points to the need of implementing additional reforms, such as the administrative reform and that which involves the official system of Social Security. At the same time, the privatization program requires a reduction in state intervention in the productive activities, which constitutes additional motivation to the resuming of investments in the infrastructure sectors, inclusive through external capital.

On the other hand, economic stability is fundamental to allow for a more intense participation of the state in the social area, as with the decrease of inflation and the elimination of the distortions in the price system derived there from, it becomes easier to plan and evaluate costs and return of the projects, both for the private and the public sectors. In this manner, there will be greater possibilities of more adequately planning the public sector policies, among them the social policies, within a process of redefinition of the role of the State in national life.

In any way, the stabilization process has already produced, along the life period of the Real Plan, significant results on the situation of the less privileged
among the population. The most important of them has been the increase in the consumer power of the poorest share, who did not possess means to protect against the corroding effects of inflation on their incomes, but who still today have the cost that observed after the implantation of the Real.

At the same time, after a temporary increase in the unemployment rates in 1995, increases have been registered both in the levels of employment as in those of average real salaries, in the maintained approximately constant during 1997, which reflects an important contribution of the Real Plan to the improvement of social welfare.
Korea-Brazil Economic Relations at the Turn of the Century
Korea-Brazil Trade and Investment Relations: Boom, Crisis, and Future Prospects

Won-Ho Kim  
Director for the Americas, KIEP

1. Introduction

Although Brazil is the largest economy in Latin America and home to the largest group of ethnic Koreans in the region, it has not dominated Korea’s economic relations with the region for a long time. As Korea’s trade and investment in Latin America had traditionally been seen as part of its North American market strategy, the Caribbean, Central America and Mexico had been spotlighted more than South America as bases for exports to the north by the mid-1990’s. Furthermore, Brazil’s prolonged economic instability in the 1980’s contributed to Korea’s lack of interest in Brazil as a meaningful marketplace. Korean activities in Brazil stagnated, and Korean business people and governmental officials alike expressed serious doubts about Brazil’s future. In short, Korean-Brazilian economic relations have been limited by geographical distance as well as by the relatively low degree of economic interaction.

As Korea emerged as the eleventh largest economy in the world and Brazil took the initiative in pursuing a South American economic integration in the mid-1990’s, however, their policy-makers became more interested than before in the complimentarities and interdependence between the two countries. Since then, Brazil has consolidated its status as Korea’s largest Latin American trading partner, providing crucial products, such as iron ore, steel, pulp, and agricultural commodities, and importing cars, and electronic goods, among others. By September 1996, when Korea’s president made a first-ever Korean state visit to Brazil, a number of major Korean enterprises had invested in the production of electronics in Brazil, and others had announced a number of direct investment projects of up to US$2 billion. All this provided great momentum to the further development of bilateral economic relations.

What will happen in the coming years? This paper argues that Brazil can
become the anchor of Korea’s Latin American activities if it maintains its macroeconomic stability and establishes a consistent trade policy and long-term development plans. At the same time, it argues that improved economic relations between Korea and Brazil can be promoted only by undertaking serious efforts to enhance economic interdependence, given the actual lack of mutual understanding. This paper reviews the trends of bilateral trade and investment in the larger context of Korean-Latin American relations, and then explores their significance at the turn of the century and tries to envision the future.

2. Trade Relations

Prior to 1970, Korea-Brazil trade had been minimal (See (Table 1)). In 1962, Korea launched its first five-year economic development plan under the banner of establishing “an export-oriented country.” Korea’s export volume in 1962 was only US$50 million, subsequently reaching US$100 million in 1964, US$10 billion in 1977, US$50 billion in 1988, and US$100 billion in 1995.

Starting in the 1970’s, as Korea’s economy grew rapidly in the midst of export market diversification, Korea’s exports to Brazil began to increase. At the same time, Korea became more and more interested in Brazil because Brazil possessed, in abundance, the natural resources needed by Korea. Hence, the first-stage of the complementary relationship between the two countries. In the 1970’s, the trade balance was extremely favorable to Brazil because Korean exports to Brazil were limited to light industry items such as machinery, textiles, electrical goods, and watches, while Brazilian exports included steel, machinery, sugar, and coffee. In the 1980’s, the trade imbalance against Korea increased as a consequence of the severe restrictions placed on all Brazilian imports in response to the external debt crisis. To adjust to the new international economic environment, the Brazilian government decided to decrease its total imports through direct controls, while cutting public investments and instigating an economic recession. In 1991, Korea’s trade deficit with Brazil reached US$714 million when the total trade volume amounted to US$1,063 million.

In the 1990’s, however, Korean exports to Brazil continuously increased due to Brazil’s economic stabilization, progressive liberalization and increased consumer purchasing power. Cars and electronic goods exports were the major factors in the expansion of export volumes. During the period 1990-1996, Korea’s exports to Brazil increased by 14 times from US$106 million to US$1,497 million, and its imports from Brazil doubled from US$706 million to US$1,324 million. As a result, Korea recorded a trade surplus of US$130 million in 1995 for the first time since
1981, and this surplus continues today. Bilateral trade from 1995 to 1997 annually reached US$2.9 billion, however, later on decreased to less than US$2.5 billion due to the impact of the international financial crisis. Korean-Brazilian commerce accounted for 2.2 percent to 2.8 percent of total Brazilian foreign trade, and 0.8 percent to 1.1 percent of total Korean trade during the period 1996-1999. Trade with Brazil accounted for 18 percent to 23 percent of Korea’s trade with Latin America during the same period; Korea has traditionally been Brazil’s second largest trading partner in Asia, second only to Japan, a position recently being overtaken by China.

An important characteristic of Korea-Brazil trade relations is that Brazilian exports are still heavily skewed towards primary products, or low value-added primary processed goods, such as iron ore, steel, aluminium, pulp, soybeans, and fruit juice (See 〈Table 2〉 and 〈Table 3〉). Manufactured goods accounted for less than 18 percent of total Brazilian exports to Korea during 1996-1999, just as for exports to Japan.1) This is radically different from the share that manufactured goods have of the Brazilian exports to the United States, which stands at about 50 percent. Brazil’s manufactured goods exported to the United States consist primarily of machinery and transport equipment, clothing, and footwear.2) This difference can be explained by the fact that most of these items compete with Korea’s exports.

As for Korean exports to Brazil, the most important trend was the sharp increase in the total value of exports from 1991, when car shipments to Brazil began to take off. From 1964 to 1994, the number of Korea’s total export items increased from 142 to 7,648. In earlier days, Korea primarily exported marine products, such as lavers and agar-agars, some mineral resources, and graphites. However, nowadays, the industrial product share of total exports amounts to 95 percent, led by heavy and chemical industrial products such as electronic goods, semiconductors and automobiles, which account for 72 percent of total exports. However, Korean exports of high value-added products like capital goods, industrial machinery, installations, and chemical goods, still do not figure prominently in trade with Brazil and other Latin American countries. Therefore, Korea-Brazil trade has shown an “inter-industry trading” pattern rather than an “intra-industry cooperation” pattern.

In conclusion, Korea-Brazil trade is still based on the traditional pattern of

---
complementarity: like other countries in Latin America, Brazil’s primary or primary-processed goods are exchanged for high value-added manufactured products from Korea.

3. Korea’s Direct Investment in Brazil

Compared with major world investors, such as the U.S. and European countries, Korea lagged behind in terms of direct investment overseas. Those countries invested massively in Brazil from the 1950’s through the 1970’s because the Brazilian government pursued policies to protect the domestic market and to encourage greater involvement by foreign companies. Displaying their increasing industrial prowess, the Japanese invested massively in Brazil during the late 1950’s and early 1960’s. The presence of a large ethnic Japanese population was important during this first wave of Japanese direct investment, for they could act as intermediaries for prospective Japanese investors. 3) Unlike the ethnic Japanese in Brazil, the more recently-arrived ethnic Koreans have not played a significant role in Korean investments in Brazil. Korea could not afford direct investment overseas until the early 1980’s, and Brazil actually only became part of this scene as late as the mid-1990’s. The ethnic Koreans had to stand on their own in Brazil, and they primarily involved themselves in trade as well as in the textile and garment industry, independently of the Korean investment projects there. 4)

Korea was actively investing in Brazil in the mid-1990’s. While Korea’s investments in Latin America in the 1980’s were mostly geared towards export opportunities aiming at the North American markets, its investments in Brazil in the 1990’s aimed at the local market with a population of 160 million. As of

3) Japanese large-scale contract immigration to Brazil began in 1908 for work on coffee plantations because rural areas in Japan faced a severe depression after the Russo-Japanese War. Between 1924 and 1941, nearly 160,000 Japanese settled in Brazil. Between 1952 to 1988, nearly 60,000 new Japanese immigrants arrived. There are estimated to be about 1.5 million Japanese immigrants and their descendants living in Brazil. The first long-term Japanese investment in Brazil, the Bratac Company for Brazil Colonization (Bratac Sociedade Colonizadora do Brasil), was established in 1929 by 12 Japanese provinces and private capital; eight years later, it was transformed into a financial institution in order to provide funds for the expansion of the activities of the Japanese-Brazilian community. The active Japanese trade and investment in Brazil after World War II were partly due to the presence of the large immigrant population. See Ermani T. Torres, op. cit., pp. 126～128.

4) Korean immigration to Brazil began in 1963 with 92 Koreans settling in farms near Sa Paulo. In 1964, some 350 new Korean immigrants arrived, and since 1972, nearly 5,000 ethnic Koreans have come to Brazil from their earlier settlements in Paraguay. Now it is estimated that about 50 thousand Korean immigrants and their descendants reside in Brazil.
December 1993, there were only four cases of Korean direct investment in Brazil, amounting to US$2.2 million. By the end of 1995, these figures rose to 10 cases for an amount of US$198.3 million. These investments in Brazil, though, still accounted for only 5.9% of all Korean investments in Latin America. This asymmetry reflected Korea’s former lack of interest in the South American market, which has been hampered by chronic economic instability.

However, the trend changed in the 1990’s. Starting at the end of 1995, Korean appliance companies and carmakers began to invest in Brazil on a mammoth scale. Korean investments in Brazil would increase further with many Korean conglomerates drafting plans for new business ties with Brazil. Aggregate Korean investments in Brazil reached US$206 million by the end of 1999, half of which were made during 1996-1997 (See ‘Table 4’).

The boom in the mid-1990’s was a result of several factors. First, Brazil was considered a good investment opportunity for Korean companies, which expected the Brazilian economy to maintain the stability and moderate growth that it was showing an average 4.1 percent during 1993-1997. Moreover, Brazil’s market-oriented economic reforms, including privatization, deregulation and liberalization, provided welcoming environment to foreign investors. Second, the Southern Common Market (MERCOSUR) was considered the most dynamic developing-world economic bloc under Brazil’s prominent leadership. When MERCOSUR became a customs union in January 1995, many foreign enterprises rushed to Brazil to overcome extraregional disadvantages and enjoy the economy of scale, and Korean conglomerates more seriously felt the need to invest. Third, Brazil’s import tariff hikes in early 1995, to correct the trade deficit, favored local investors, particularly in car production. Fourth, Brazil had a slight comparative advantage due to the fact that interest in Mexico had decreased due to the peso crisis of December 1994. Finally, and probably most importantly, Korea’s globalization strategy drove Korean enterprises to the new frontiers of industrial production.

Korea’s globalization strategy was launched as a new development model for an economic soft-landing in the 1990’s. Until the early 1990’s, Korea had sustained an average annual growth rate of nine percent. At that time, however, Korea’s economy began to slow down. The economic difficulties of the mid-1990’s were characterized by the high trade deficit of US$15.2 billion for 1996, and the current account deficit of US$23.7 billion for the same year. In other words, the external sector’s imbalances had a large and negative impact on Korea’s economy since Korea’s dynamism had been greatly dependent on trade. Some analyses showed that the surging trade deficit was primarily attributable to the sharp price fall in major export goods like semi-conductors, the steady weakening of the Japanese
yen, and pervasive labor strikes. Yet, structurally, the fundamental problem of Korea’s economy came from the loss of its international competitiveness: high costs, and low efficiency. Accelerating these structural problems were the rapid change of the global trade regime and the internationalization of Korea’s economy. Since the conclusion of the Uruguay Round of the GATT negotiations, Korea has been facing fierce international market competition as well as issues related to the trend of forming economic blocs. This is why the serious analysts and policy makers have argued for economic restructuring and the globalization of production in order to increase international competitiveness.

Consequently, the streamlining of organizations and the geographic reallocation of production facilities took place in Korean businesses’ efforts to globalize production. Korean enterprises were promoting globalization strategies in order to take advantage of the new pattern of the international division of labor. This pattern gained momentum from such fundamental changes in the world as the end of the Cold War, and the advancement of information technology. “Global management” became the new motto for Korean corporation executives.

As many industries were no longer price competitive, overseas direct investment became a practical alternative to domestic production. In this context,

5) In particular, wages have recently been rising much faster in Korea compared to other competing nations. During the past ten years, the annual wage increase was 19.7 percent in Korea, while wages in Taiwan and Hong Kong rose 14.5 percent and 10.8 percent, respectively. Manufacturer’s shipping and handling costs in 1994 were 15.7 percent of GDP while the figures for the US and Japan were only 10.5 percent and 8.8 percent, respectively.

6) Basically, the inefficient financial system added to Korea’s loss of international competitiveness in the financially competitive world. The problem of inefficiency was plainly revealed in early 1997, when one of the middle-class conglomerates, Hanbo, failed under the weight of massive debts. Sammi followed, and Jinro, Dainong and Kia, the group which includes Korea’s third largest automaker, are on life support, saved from bankruptcy only by their creditors under the government’s controversial Financial Insolvency Prevention Agreement (FIPA). Poisoned with poor financial structure, most Korean conglomerates had been able to survive in the past due to extra-market conditions including monopolization, government-instigated financing, unreasonable expansion far beyond their means to pay, and collusive practices with politicians. "Continued Bankruptcies and Worries about a Banking Crisis", VIP Economic Report (Hyundai Research Institute), Sept. 1997; Sang-moon Hahn, "Strengthening the Financial Industry's Competitiveness," The Korea Economic Weekly, Sept. 29, 1997.

7) Korea’s decision to join the Organization for Economic Cooperation and Development (OECD) in 1993, and the conclusion of accession negotiations in 1996 were policy choices in this direction. These were decisions that will help Korea face the changing global business environment, further liberalize and deregulate the economy, and give initiative and responsibility to the private sector instead of government protection and regulation.
Korean corporations’ investments became increasingly more active in Western Europe, Eastern Europe and Latin America. Latin America, in particular, was considered one of the last frontiers left to Korean enterprises.

In other words, the economic implications of Korea’s globalization for Korean-Brazilian and Latin American economic relations were bound to be enormous. As Latin American nations lacked accumulated capital, they had to depend heavily on foreign capital, including loans from the developed nations, such as the U.S., Japan and Europe, international financial institutions like the IBRD and the IDB, and commercial banks, in the case of national or large-scale projects. In this context, Korean industries could successfully join in by investing their capital and technology to search for necessary primary resources, new industrial partners and new markets, and Latin American governments had undertaken timely economic initiatives including the deregulation of foreign investments and the privatization of public corporations. Korea’s globalization strategy could be tested by its successful participation in the new economic order in Latin America.

Brazil seemed to be playing a huge role in the new Korean strategy of the globalization of production. Samsung Electronics and LG Electronics began to produce home appliances in Manaus. Asia Motors broke ground in a ceremony for commercial vehicles in Salvador, Bahia in August of 1997 even in the midst of Korea’s financial crisis. Furthermore, Hyundai Motors participated in capital and technology investments in a plant in Bahia. Lastly, several telecommunications companies were eagerly awaiting for the market opening of the industry in 1998.

4. The International Financial Crisis and Its Impact

The 1997 Asian financial crisis, to which Korea became the last country to succumb, devastated its momentum in establishing a stronghold in Latin America. Korean-Brazilian trade was first affected by the sharp decrease in Korean steel imports from Brazil in 1997, and then the crisis paralyzed the Korean chaebols, with their large debts, and forced them to reduce their debts by stopping operations and liquidating assets. Later, Korea’s increasingly stronger relations with Brazil also suffered a setback as a result of the international financial crisis finally affecting Latin America’s emerging markets, particularly the Brazilian economy.

First, Korean entrepreneurs’ aggressive investments in the region were suddenly halted. They suddenly found themselves piled with debts accumulated under their "global management" schemes and surrounded by rather hostile international and domestic creditors. The IMF program and the parallel
government corporate reform initiatives altogether worsened the chaebols' stance on overseas investments. The president-elect Kim Dae-jung, a longtime critic of the chaebols, pressured them to follow a five-point corporate restructuring program in December 1997. While the government forced the chaebols to reduce their debt-to-equity ratios to 200 percent, or lower, in two years, the formerly powerful business groups no longer enjoyed political support for their expansionary projects. Many promises to invest in Latin America were cancelled, reduced in size or indefinitely postponed. Statistics show that Korea’s total investments in Latin America in 1998 decreased by almost half, compared to the previous year. Korea’s investments in Brazil during 1998-1999 totaled about US$60 million, compared to the US$100 million in 1996-1997. Among others, the delay of Asia Motors’ Bahia project has been controversial. Due to its financial problems, the project has been dormant since the official groundbreaking ceremony of August 1997. However, Asia Motors could take advantage of the Bahia project to bypass the high tariff barrier to export their vehicles to Brazil. Asia Motors, and its major affiliate Kia Motors, later were merged with Hyundai Motors, another Korean carmaker. No immediate decision regarding the Bahia project was issued by the new owners, and it soon became an uncomfortable bilateral issue between the two countries. It was not until early 2000 that Hyundai Motors, the new owner, decided to go ahead with Asia Motors’ original project.

Second, the Korean won’s devaluation rapidly led to the recuperation of price competitiveness for Korean products, and opened the door for a possible rush of Korean products into Latin American markets. Brazil, among other Latin American economies, responded to the Asian shock with preventive restrictions by erecting both tariff and non-tariff barriers. Meanwhile, the Korean recession meant a sharp reduction in imports. As many factories were stopped to a halt or operated far under capacity, the demand for raw materials and intermediate goods underwent a drastic contraction. In 1998, imports from Brazil decreased by 44 percent. The sharp decrease in imports and the moderate 4.7 percent in exports combined to produce a widened trade imbalance of US$1,099 million in 1998.

Third, Korean-Brazilian economic relations have had a hard time coping with the preventive adjustments and the economic recession that have taken place in Brazil since late 1997, as well as with the later spread of the international financial crisis to Brazil and other countries in Latin America. The preventive austerity measures and recession in Brazil meant a decrease in the demand for Korean capital and consumer goods. The year 1999, with the Brazilian recession along with the Korean recovery, witnessed the turn-around of their bilateral trade with Korean exports’ decreasing by 32.5 percent and imports increasing by 31.2 percent,
which narrowed the trade surplus in Korea’s favor to US$299 million.

5. Prospects for the Coming Decade

Given the normalization of financial conditions in Korea in the medium and long term, Korea will further accelerate its expansion in the international market through the globalization of production. Korea will also increase its ratio of imports to total production in the manufacturing sector in line with its globalization strategy. Thus, the long-term prospects for Korea-Brazil trade and investment are bright. As further support, the Korean government’s former regulations on overseas investments, which were once restricted by tight foreign exchange control policies, had been eliminated in order to encourage business activities abroad. Worthy of notice is that Korean companies have been free to make outward investments since August 1, 1997 by simply reporting those investments to their prime creditor banks. Under the former regulations, companies had to win approval from the Central Bank if the investment amount was more than US$50 million.

Even given this, the question is whether one can significantly improve Brazil’s traditionally low profile in the Korean framework of international relations or vice versa. Any significant advancement in this regard will require a special effort and a new approach by both countries’ governments and private sectors. What is most important, aside from macroeconomic stabilization, is building credibility by means of consistent trade and investment policies and a long-term development plans that clearly provide a new context for deepening interdependent bilateral economic relations.

Institutionally, two Korea-Brazil Business Councils have been organized: one co-ordinated by the Federation of Korean Industries (FKI) and Brazil’s Federation of Entrepreneurs, and the other co-coordinated by the Korea Chamber of Commerce and Industry (KCCI) and Brazil’s National Federation of Commerce. The former was established in 1969, but the first and last meeting was held in 1987. The latter was established in 1976, and has met six times, the fifth time in Rio de Janeiro in 1992, and the sixth in Sao Paulo in March 1999. The latter Council is more active, partly because of KCCI’s concentration on Latin America vis-a-vis FKI’s concentration on North America in their international activities. However, the lack of recent activity indicates that the private sector’s institutional cooperation efforts were not efficient enough in enhancing mutual business

interests, or that the Council failed to identify appropriate agenda for mutual interests and implement discussions between the two parties through private and public channels. Additionally, the inherent coordination problems have partly been shown by the fact that the latter Council, a rather active one, held its first five meetings in Rio de Janeiro, not alternating the venue between locations in Brazil and Korea; and that the venue for its sixth meeting was Sao Paulo with a different Brazilian counterpart, the Sao Paulo Federation of Commerce, taking part.

At the private sector level, a more sophisticated market approach should be developed. For instance, many Koreans still regard the Brazilian, and other Latin American markets, as an alternate export market for finished products, including consumer goods, when the major export markets, such as the U.S., Japan and Europe, were less accessible. Koreans are still involved in traditional and stereotyped sales methods, and ignore the demand structure of Latin America, largely divided into expensive and cheap products. Therefore, it is not until recently that Korean firms discovered the nature of the Latin American market, exercised flexible marketing strategies, and mapped out a market management program from a new point of view. While Korea’s current investment in Brazil also tends to focus on consumer goods, Korea’s long-term cooperation formula should focus on securing a supply of natural resources, which Brazil and other Latin American countries possess.

Inter-governmental cooperation efforts have not followed the increasingly important developments in bilateral trade and investment. The Joint Commission in the economic field was established through an understanding in 1989, and its first and last meeting was held in April 1991; the Joint Commission on Science and Technology was agreed upon in 1991, but it has never actually met; and the Joint Cultural Commission dictated in an agreement in 1966 has never met, either. At the bilateral level, it was not until September 1996 that the first-ever Korea-Brazil summit meeting was held in Brasilia, and in November 1997 the two countries launched a senior officials’ consultative meeting in Seoul.

However, one optimistic point is that the trend is positive. Inter-governmental contacts have been more frequent recently. As a matter of fact, the science and technology commission made several attempts to hold its first meeting. An intellectual dialogue forum, named the Korea-Brazil 21st Century Commission, was initiated by both governments in 1996 to study and recommend a long-term bilateral cooperation vision for the next century.9 In addition, the Korean

---

government's recent regional-level approach to cooperation with Brazil may offset the sluggish results at the bilateral level. As Brazil is pursuing a regional approach to international issues, group level cooperation is also increasing in importance. Korea has fostered relationships with important Latin American regional organizations and institutions where Brazil plays a leading role, establishing cooperation mechanisms with The Rio Group\(^{10}\), a major policy coordination entity in the region, and MERCOSUR.\(^{11}\)

This recent positive cooperative trend is due to the reevaluation of each other's markets and of their mutual emphasis in interregional trade (See \(\langle\text{Table 5}\rangle\) and \(\langle\text{Table 6}\rangle\)). The function of inter-governmental cooperation in the economic area is to facilitate enhanced trade and investments between the two countries. Korea's immediate policy agenda in inter-governmental cooperation should be to gain diplomatic support for admission to the Inter-American Development Bank (IDB), the key development bank in Latin America. The IDB is the only major financial institution in the world which Korea has yet to join.

Finally, Korea and Brazil have in common a leadership role in their respective regions. Korea, owing to its human resources and technology, has grown from one of the world's poorest countries into a leading industrial country in half a century. Brazil, once called a "sleeping giant" with a territorial sub-continent and strong diversified industries, is turning its potential into reality as it leads regional economic integration. Thus, as Asia and Latin America become increasingly interdependent and as inter-regional trade in the 1990's largely continues to rise, the two countries will be able to play key roles in inter-regional cooperation.

---

10) The first annual ministerial meeting between Korea and the Rio Group Troika was held in September 1996, and the second in September 1997 both at the United Nations in New York.

11) The first annual consultative meeting between Korea and MERCOSUR was held in Asuncion, Paraguay, in April 1997.
## Table 1: Korea’s Trade with Brazil

(US$ thousands, %)

<table>
<thead>
<tr>
<th>Year</th>
<th>Exports</th>
<th>Imports</th>
<th>Total</th>
<th>Balance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>amount</td>
<td>change</td>
<td>amount</td>
<td>change</td>
</tr>
<tr>
<td>1976</td>
<td>2,319</td>
<td>-</td>
<td>6,270</td>
<td>29.8</td>
</tr>
<tr>
<td>1977</td>
<td>7,195</td>
<td>210.3</td>
<td>8,141</td>
<td>275.2</td>
</tr>
<tr>
<td>1978</td>
<td>6,351</td>
<td>-1.7</td>
<td>30,547</td>
<td>99.8</td>
</tr>
<tr>
<td>1979</td>
<td>4,894</td>
<td>21.5</td>
<td>61,024</td>
<td>27.2</td>
</tr>
<tr>
<td>1980</td>
<td>3,675</td>
<td>24.9</td>
<td>44,398</td>
<td>27.2</td>
</tr>
<tr>
<td>1981</td>
<td>22,744</td>
<td>518.9</td>
<td>107,576</td>
<td>142.3</td>
</tr>
<tr>
<td>1982</td>
<td>9,135</td>
<td>-59.8</td>
<td>114,610</td>
<td>6.5</td>
</tr>
<tr>
<td>1983</td>
<td>36,817</td>
<td>303.0</td>
<td>211,026</td>
<td>84.1</td>
</tr>
<tr>
<td>1984</td>
<td>4,531</td>
<td>-87.7</td>
<td>240,801</td>
<td>14.1</td>
</tr>
<tr>
<td>1985</td>
<td>14,858</td>
<td>227.9</td>
<td>213,500</td>
<td>-11.3</td>
</tr>
<tr>
<td>1986</td>
<td>24,550</td>
<td>65.2</td>
<td>184,344</td>
<td>-13.7</td>
</tr>
<tr>
<td>1987</td>
<td>26,466</td>
<td>7.9</td>
<td>305,532</td>
<td>65.7</td>
</tr>
<tr>
<td>1988</td>
<td>31,530</td>
<td>19.0</td>
<td>439,191</td>
<td>43.7</td>
</tr>
<tr>
<td>1989</td>
<td>79,767</td>
<td>153.0</td>
<td>652,241</td>
<td>48.5</td>
</tr>
<tr>
<td>1990</td>
<td>106,171</td>
<td>33.1</td>
<td>706,719</td>
<td>8.4</td>
</tr>
<tr>
<td>1991</td>
<td>174,227</td>
<td>64.1</td>
<td>889,084</td>
<td>25.8</td>
</tr>
<tr>
<td>1992</td>
<td>164,465</td>
<td>-5.6</td>
<td>796,881</td>
<td>-10.4</td>
</tr>
<tr>
<td>1993</td>
<td>448,526</td>
<td>172.7</td>
<td>779,334</td>
<td>-2.2</td>
</tr>
<tr>
<td>1994</td>
<td>844,175</td>
<td>88.2</td>
<td>1,019,063</td>
<td>30.8</td>
</tr>
<tr>
<td>1995</td>
<td>1,518,649</td>
<td>79.9</td>
<td>1,388,224</td>
<td>36.2</td>
</tr>
<tr>
<td>1996</td>
<td>1,497,135</td>
<td>-1.4</td>
<td>1,324,568</td>
<td>-4.6</td>
</tr>
<tr>
<td>1997</td>
<td>1,710,395</td>
<td>14.3</td>
<td>1,238,890</td>
<td>-6.5</td>
</tr>
<tr>
<td>1998</td>
<td>1,792,157</td>
<td>4.7</td>
<td>693,409</td>
<td>-44.0</td>
</tr>
<tr>
<td>1999</td>
<td>1,209,251</td>
<td>-32.5</td>
<td>909,622</td>
<td>31.2</td>
</tr>
</tbody>
</table>

Source: KOTIS.

## Table 2: Korea’s Major Exports to Brazil

(US$ thousands, %)

<table>
<thead>
<tr>
<th>Classification</th>
<th>Year</th>
<th>1997</th>
<th>%</th>
<th>1998</th>
<th>%</th>
<th>1999</th>
<th>%</th>
<th>2000.3</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>1,710,995</td>
<td>100</td>
<td></td>
<td>1,792,147</td>
<td>100</td>
<td>1,209,251</td>
<td>100</td>
<td>365,159</td>
<td>100</td>
</tr>
<tr>
<td>Machinery &amp; transport equipment</td>
<td>524,144</td>
<td>30.6</td>
<td></td>
<td>725,447</td>
<td>40.5</td>
<td>161,428</td>
<td>13.3</td>
<td>64,372</td>
<td>17.6</td>
</tr>
<tr>
<td>Electrical &amp; electronic</td>
<td>534,006</td>
<td>21.3</td>
<td></td>
<td>381,298</td>
<td>21.3</td>
<td>576,740</td>
<td>47.7</td>
<td>177,577</td>
<td>48.6</td>
</tr>
<tr>
<td>Textile products</td>
<td>385,853</td>
<td>22.6</td>
<td></td>
<td>356,291</td>
<td>19.9</td>
<td>227,767</td>
<td>18.8</td>
<td>43,786</td>
<td>13.6</td>
</tr>
<tr>
<td>Rubber &amp; plastic products</td>
<td>106,986</td>
<td>6.3</td>
<td></td>
<td>137,081</td>
<td>7.6</td>
<td>100,083</td>
<td>8.3</td>
<td>27,348</td>
<td>7.7</td>
</tr>
<tr>
<td>Chemical manufacturing products</td>
<td>71,398</td>
<td>4.2</td>
<td></td>
<td>102,958</td>
<td>5.7</td>
<td>78,133</td>
<td>6.5</td>
<td>30,998</td>
<td>8.5</td>
</tr>
<tr>
<td>Primary product</td>
<td>33,724</td>
<td>2.0</td>
<td></td>
<td>10,984</td>
<td>0.6</td>
<td>4,258</td>
<td>0.4</td>
<td>1,412</td>
<td>0.4</td>
</tr>
<tr>
<td>Commodities</td>
<td>22,669</td>
<td>1.3</td>
<td></td>
<td>22,429</td>
<td>1.3</td>
<td>11,567</td>
<td>1.0</td>
<td>2,927</td>
<td>0.8</td>
</tr>
<tr>
<td>Iron &amp; metal products</td>
<td>16,845</td>
<td>1.0</td>
<td></td>
<td>24,623</td>
<td>1.4</td>
<td>10,954</td>
<td>0.9</td>
<td>3,038</td>
<td>0.8</td>
</tr>
<tr>
<td>Others</td>
<td>12,372</td>
<td>0.7</td>
<td></td>
<td>7,391</td>
<td>0.4</td>
<td>6,252</td>
<td>0.5</td>
<td>1,222</td>
<td>0.3</td>
</tr>
</tbody>
</table>

Source: KOTIS.
### Table 3: Korea’s Major Imports from Brazil

<table>
<thead>
<tr>
<th>Classification</th>
<th>Year</th>
<th>1997</th>
<th></th>
<th>1998</th>
<th></th>
<th>1999</th>
<th></th>
<th>2000.3</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Amount</td>
<td>%</td>
<td>amount</td>
<td>%</td>
<td>amount</td>
<td>%</td>
<td>Amount</td>
<td>%</td>
</tr>
<tr>
<td>Agriculture, forestry, &amp; fishery</td>
<td></td>
<td>386,735</td>
<td>31.2</td>
<td>120,734</td>
<td>17.4</td>
<td>221,707</td>
<td>24.4</td>
<td>46,571</td>
<td>20.3</td>
</tr>
<tr>
<td>Iron &amp; metal products</td>
<td></td>
<td>354,405</td>
<td>28.6</td>
<td>192,241</td>
<td>27.7</td>
<td>273,132</td>
<td>30.0</td>
<td>58,687</td>
<td>25.7</td>
</tr>
<tr>
<td>Mining</td>
<td></td>
<td>317,809</td>
<td>25.7</td>
<td>266,010</td>
<td>38.4</td>
<td>268,074</td>
<td>29.5</td>
<td>87,627</td>
<td>38.3</td>
</tr>
<tr>
<td>Chemical manufacturing products</td>
<td></td>
<td>147,716</td>
<td>11.9</td>
<td>102,757</td>
<td>14.8</td>
<td>120,251</td>
<td>13.2</td>
<td>31,571</td>
<td>13.8</td>
</tr>
<tr>
<td>Machinery &amp; Transports</td>
<td></td>
<td>19,529</td>
<td>1.6</td>
<td>1,469</td>
<td>1.1</td>
<td>6,574</td>
<td>0.7</td>
<td>1,768</td>
<td>0.8</td>
</tr>
<tr>
<td>Textile products</td>
<td></td>
<td>5,110</td>
<td>0.4</td>
<td>2,125</td>
<td>0.3</td>
<td>603</td>
<td>0.1</td>
<td>113</td>
<td>0.04</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td></td>
<td>3,995</td>
<td>0.3</td>
<td>1,008</td>
<td>0.1</td>
<td>1,818</td>
<td>0.2</td>
<td>392</td>
<td>0.2</td>
</tr>
<tr>
<td>Electrical &amp; Electronic</td>
<td></td>
<td>3,590</td>
<td>0.3</td>
<td>1,066</td>
<td>0.2</td>
<td>17,463</td>
<td>1.9</td>
<td>2,064</td>
<td>0.9</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>1,238,890</td>
<td>100</td>
<td>693,409</td>
<td>100</td>
<td>909,622</td>
<td>100</td>
<td>228,792</td>
<td>100</td>
</tr>
</tbody>
</table>

### Table 4: Performed Direct Investment in Brazil

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Cases</th>
<th>Amount</th>
<th>Yearly share(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1968-80</td>
<td>2</td>
<td>269</td>
<td>0.13</td>
</tr>
<tr>
<td>1981-90</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1991-93</td>
<td>2</td>
<td>219</td>
<td>0.11</td>
</tr>
<tr>
<td>1994</td>
<td>3</td>
<td>439</td>
<td>0.21</td>
</tr>
<tr>
<td>1995</td>
<td>4</td>
<td>19,158</td>
<td>9.29</td>
</tr>
<tr>
<td>1996</td>
<td>5</td>
<td>50,137</td>
<td>24.3</td>
</tr>
<tr>
<td>1997</td>
<td>3</td>
<td>47,751</td>
<td>23.14</td>
</tr>
<tr>
<td>1998</td>
<td>2</td>
<td>34,677</td>
<td>16.81</td>
</tr>
<tr>
<td>1999</td>
<td>4</td>
<td>26,507</td>
<td>12.85</td>
</tr>
<tr>
<td>Total</td>
<td>27</td>
<td>206,271</td>
<td>100.00</td>
</tr>
<tr>
<td>Balance</td>
<td>22</td>
<td>203,642</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(US$ million,%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>World Total</td>
<td>Ex</td>
<td>37,046</td>
<td>38,783</td>
<td>43,623</td>
<td>46,605</td>
<td>47,747</td>
<td>53,906</td>
<td>51,152</td>
</tr>
<tr>
<td></td>
<td>Im</td>
<td>20,554</td>
<td>28,168</td>
<td>33,079</td>
<td>49,498</td>
<td>58,907</td>
<td>61,938</td>
<td>57,558</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>57,600</td>
<td>66,951</td>
<td>76,702</td>
<td>96,103</td>
<td>106,654</td>
<td>115,844</td>
<td>108,710</td>
</tr>
<tr>
<td>Asia</td>
<td>Ex</td>
<td>5,579</td>
<td>6,166</td>
<td>7,094</td>
<td>8,152</td>
<td>7,796</td>
<td>7,645</td>
<td>5,552</td>
</tr>
<tr>
<td></td>
<td>Im</td>
<td>1,731</td>
<td>3,570</td>
<td>4,973</td>
<td>8,191</td>
<td>8,328</td>
<td>9,151</td>
<td>7,794</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>7,310</td>
<td>9,736</td>
<td>12,067</td>
<td>16,343</td>
<td>16,124</td>
<td>16,796</td>
<td>13,346</td>
</tr>
<tr>
<td>Korea</td>
<td>Ex</td>
<td>547</td>
<td>538</td>
<td>634</td>
<td>827</td>
<td>838</td>
<td>737</td>
<td>467</td>
</tr>
<tr>
<td></td>
<td>Im</td>
<td>131</td>
<td>355</td>
<td>630</td>
<td>1,222</td>
<td>1,271</td>
<td>1,368</td>
<td>992</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>678</td>
<td>993</td>
<td>1,264</td>
<td>2,149</td>
<td>2,109</td>
<td>2,105</td>
<td>1,559</td>
</tr>
<tr>
<td>Japan</td>
<td>Ex</td>
<td>2,306</td>
<td>2,313</td>
<td>2,574</td>
<td>3,102</td>
<td>3,047</td>
<td>3,068</td>
<td>2,202</td>
</tr>
<tr>
<td></td>
<td>Im</td>
<td>1,151</td>
<td>1,664</td>
<td>2,412</td>
<td>3,279</td>
<td>3,032</td>
<td>3,599</td>
<td>3,253</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>3,457</td>
<td>3,977</td>
<td>4,986</td>
<td>6,381</td>
<td>6,079</td>
<td>6,667</td>
<td>5,555</td>
</tr>
<tr>
<td>Thailand</td>
<td>Ex</td>
<td>354</td>
<td>290</td>
<td>384</td>
<td>419</td>
<td>396</td>
<td>362</td>
<td>128</td>
</tr>
<tr>
<td></td>
<td>Im</td>
<td>13</td>
<td>33</td>
<td>73</td>
<td>168</td>
<td>173</td>
<td>235</td>
<td>201</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>367</td>
<td>323</td>
<td>457</td>
<td>587</td>
<td>569</td>
<td>597</td>
<td>329</td>
</tr>
<tr>
<td>Singapore</td>
<td>Ex</td>
<td>203</td>
<td>267</td>
<td>308</td>
<td>294</td>
<td>333</td>
<td>216</td>
<td>155</td>
</tr>
<tr>
<td></td>
<td>Im</td>
<td>100</td>
<td>383</td>
<td>230</td>
<td>364</td>
<td>428</td>
<td>323</td>
<td>272</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>303</td>
<td>650</td>
<td>538</td>
<td>658</td>
<td>761</td>
<td>539</td>
<td>427</td>
</tr>
<tr>
<td>China</td>
<td>Ex</td>
<td>460</td>
<td>779</td>
<td>822</td>
<td>1,024</td>
<td>1,114</td>
<td>1,088</td>
<td>905</td>
</tr>
<tr>
<td></td>
<td>Im</td>
<td>50</td>
<td>171</td>
<td>463</td>
<td>1,039</td>
<td>1,242</td>
<td>1,188</td>
<td>1,023</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>510</td>
<td>950</td>
<td>1,285</td>
<td>2,243</td>
<td>2,356</td>
<td>2,276</td>
<td>1,928</td>
</tr>
<tr>
<td>Hongkong</td>
<td>Ex</td>
<td>311</td>
<td>331</td>
<td>376</td>
<td>405</td>
<td>433</td>
<td>465</td>
<td>407</td>
</tr>
<tr>
<td></td>
<td>Im</td>
<td>91</td>
<td>269</td>
<td>249</td>
<td>434</td>
<td>359</td>
<td>1,188</td>
<td>370</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>402</td>
<td>600</td>
<td>625</td>
<td>839</td>
<td>792</td>
<td>1,653</td>
<td>777</td>
</tr>
<tr>
<td>Indonesia</td>
<td>Ex</td>
<td>137</td>
<td>257</td>
<td>219</td>
<td>366</td>
<td>291</td>
<td>348</td>
<td>247</td>
</tr>
<tr>
<td></td>
<td>Im</td>
<td>10</td>
<td>31</td>
<td>128</td>
<td>217</td>
<td>257</td>
<td>254</td>
<td>204</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>147</td>
<td>288</td>
<td>347</td>
<td>583</td>
<td>548</td>
<td>602</td>
<td>451</td>
</tr>
<tr>
<td>Malaysia</td>
<td>Ex</td>
<td>220</td>
<td>244</td>
<td>211</td>
<td>244</td>
<td>233</td>
<td>343</td>
<td>195</td>
</tr>
<tr>
<td></td>
<td>Im</td>
<td>33</td>
<td>84</td>
<td>182</td>
<td>333</td>
<td>415</td>
<td>581</td>
<td>439</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>253</td>
<td>328</td>
<td>393</td>
<td>577</td>
<td>648</td>
<td>924</td>
<td>634</td>
</tr>
<tr>
<td>Table 6</td>
<td>Korea’s Trade with Latin America</td>
<td>(US$ million, %)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------</td>
<td>---------------------------------</td>
<td>------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>World</td>
<td>Ex</td>
<td>Im</td>
<td>Total</td>
<td>Ex</td>
<td>Im</td>
<td>Total</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>125,058</td>
<td>135,119</td>
<td>260,177</td>
<td>129,715</td>
<td>150,339</td>
<td>280,054</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>136,164</td>
<td>144,616</td>
<td>280,780</td>
<td>132,313</td>
<td>93,282</td>
<td>225,595</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>143,685</td>
<td>119,752</td>
<td>263,437</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Latin America</td>
<td>Ex</td>
<td>Im</td>
<td>Total</td>
<td>Ex</td>
<td>Im</td>
<td>Total</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7,370</td>
<td>3,964</td>
<td>11,334</td>
<td>(100)</td>
<td>4,392</td>
<td>13,353</td>
<td>(100)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8,668</td>
<td>4,076</td>
<td>12,744</td>
<td>(100)</td>
<td>2,197</td>
<td>11,064</td>
<td>(100)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8,645</td>
<td>2,865</td>
<td>11,510</td>
<td>(100)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Panama</td>
<td>Ex</td>
<td>Im</td>
<td>Total</td>
<td>Ex</td>
<td>Im</td>
<td>Total</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2,246</td>
<td>406</td>
<td>2,652</td>
<td>(23.4)</td>
<td>3,195</td>
<td>3,742</td>
<td>(28.0)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1,918</td>
<td>439</td>
<td>2,358</td>
<td>(18.5)</td>
<td>2,021</td>
<td>2,048</td>
<td>(18.5)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1,812</td>
<td>26</td>
<td>1,897</td>
<td>(16.5)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brazil</td>
<td>Ex</td>
<td>Im</td>
<td>Total</td>
<td>Ex</td>
<td>Im</td>
<td>Total</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1,518</td>
<td>1,388</td>
<td>2,906</td>
<td>(25.6)</td>
<td>1,497</td>
<td>1,324</td>
<td>(21.1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1,710</td>
<td>1,238</td>
<td>2,821</td>
<td>(23.1)</td>
<td>1,792</td>
<td>693</td>
<td>(22.5)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1,209</td>
<td>909</td>
<td>2,118</td>
<td>(18.4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mexico</td>
<td>Ex</td>
<td>Im</td>
<td>Total</td>
<td>Ex</td>
<td>Im</td>
<td>Total</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>941</td>
<td>306</td>
<td>1,247</td>
<td>(11.0)</td>
<td>1,191</td>
<td>408</td>
<td>(12.0)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1,471</td>
<td>344</td>
<td>1,815</td>
<td>(14.2)</td>
<td>1,404</td>
<td>190</td>
<td>(14.4)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2,016</td>
<td>291</td>
<td>2,307</td>
<td>(20.1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chile</td>
<td>Ex</td>
<td>Im</td>
<td>Total</td>
<td>Ex</td>
<td>Im</td>
<td>Total</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>636</td>
<td>1,020</td>
<td>1,657</td>
<td>(14.6)</td>
<td>640</td>
<td>1,102</td>
<td>(13.1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>655</td>
<td>1,162</td>
<td>1,817</td>
<td>(14.3)</td>
<td>566</td>
<td>706</td>
<td>(11.5)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>455</td>
<td>815</td>
<td>1,270</td>
<td>(11.1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: KOTIS.
The Brazilian Economy, MERCOSUL, and Cooperation between Brazil and Korea

Luiz Felipe de Seixas Corrêa
Secretary-General of External Relations of Brazil

In this paper are presented some thoughts on Brazil’s present situation, on our foreign trade policies, as well as on the positive outlook we envisage as far as the bilateral partnership with Korea is concerned.

Starting with Brazil, which by many standards is a renewed and revitalized country. A country that is proud of its democratic institutions and of the impressive steps it has taken towards economic stability. Brazil obviously still faces formidable challenges—chief among them the construction of a more equal society. But there can be no doubt that today we are standing on much more solid ground.

The first and most fundamental transformation in the eighties and in the nineties was the consolidation of democracy, which stands as the basis for political and economic stability, for confidence in the financial markets and for the respect of human rights.

The economic reforms which have been implemented are also remarkable. The economy has been opened up. Between 1995 and 1999, foreign direct investment entering the country was approximately twice the amount accumulated up to 1994. In rough numbers: more than US$ 80 billion in the last five years, while the FDI-stock accumulated up to 1994 was around US$ 40 billion.

Our privatization program is one of the most important in the world. Brazil’s GDP last year (after the devaluation) amounted to some US$ 550 billion. Measured by the purchasing power parity of the national currency, however, it exceeded US$ 1 trillion in 1998 according to the World Bank. The car industry, already by a large margin the largest in Latin America, should be included among the biggest in the world in the near future. Also the success of EMBRAER air industry highlights our technological progress.

After the exchange-rate regime was changed in January 1999, in the wake of the international crisis in financial markets, the national currency—the Real—plunged. For a moment, many feared the return to former instability. That
moment of crisis, however, came as a confirmation that structural reform had grown firm roots. In the past, such a dramatic devaluation would have had a tremendous impact on inflation. This time, society as a whole and the economic agents successfully took a positive bet on stabilization.

The country's pace of recovery in 1999 has dismissed bleak forecasts. The Brazilian economy has not fallen into a recession. GDP even posted a small growth of 0.8%—a surprise indeed, but also a confirmation of the structural dynamics of the Brazilian economy, as well of the government's firmness in steering the course of reform and fiscal responsibility. Targets for 1999 under a stand-by agreement with the IMF have been reached. The primary fiscal surplus even slightly surpassed the target of 3.1% of GDP. Inflationary pressures resulting from the devaluation have been successfully controlled. The Central Bank steadily lowered interest rates, from a high of 45% in March to 19% at year-end.

External accounts improved considerably in 1999. The current account deficit fell from US$ 33.6 billion in 1998 to US$ 24.3 billion last year. This deficit has been entirely financed by non-speculative capital: FDI net inflows reached the impressive amount of slightly less than US$ 30 billion. Even in such a difficult year as 1999, Brazil consolidated its position as the second most important destination for FDI among emerging countries. Only China has been doing better.

Foreign trade was the one field which brought worse-than-expected results last year: a trade deficit of US$ 1.2 billion. Much of this result came from a very unlucky combination of different trends such as high oil prices, low prices for commodities exported by Brazil, as well as stagnation in South American economies—which represent the main market for Brazilian industrial goods. Although much lower than the deficit in 1998—US$ 6.6 billion—, the result in 1999 was nevertheless frustrating. Improvement came from a big reduction in imports. Exports also fell, although significantly less so.

As a whole, however, it can definitely be said that Brazil did its homework in 1999.

Prospects are now much brighter for 2000 and the years ahead. The government initially forecast a GDP expansion of 4% in 2000, but more recently even a higher figure is deemed possible. The inflation rate will remain in the target area, as well as the primary fiscal surplus. Again, FDI-inflows shall more than compensate a current account deficit of approximately US$ 23-24 billion. Foreign debt amortizations will be substantially lower. The balance of trade will now switch to a surplus, after five years in the red. Exports are resuming an upward trend.

As it successfully takes up the challenge of achieving growth and stability,
Brazil undoubtedly expands its capacity to attract foreign investment. In so doing Brazil also gives particular importance to the consolidation and strengthening of MERCOSUL—the single market being formed by Brazil, Argentina, Paraguay and Uruguay, a powerful new reality, which adds up to the potential of the Brazilian market. Prospects for MERCOSUL are now much better than they have ever been in the last two years.

Last year we went indeed through the most difficult period of MERCOSUL since its creation in 1991. Brazil and Argentina, the main economies of the bloc, faced at the same time a period of economic slowdown. Besides that, 1999 was an election year in Argentina and Uruguay. Protectionist pressures stepped up. The Real devaluation brought an additional element of pressure.

After growing from approximately US$ 5 to 20 billion from 1991 up to 1997, intra-bloc trade stagnated in 1998 and even fell by some 25% in 1999. Difficulties were real, therefore. But let me tell you that this challenge has only served to reinforce our common political will to consolidate and strengthen MERCOSUL.

Countries in MERCOSUL which will soon be fully joined by Chile are defining the agenda for a new period. In 2000 our economies are growing again. New presidents have just taken office in Argentina and Uruguay. The Brazilian government had been preparing itself for such a moment. In the second semester of 1999 we have mapped out our negotiation priorities. Consolidation of the Customs Union is the first task we must absolutely carry out. A new common regime for trade in the automobile sector has just been negotiated between Brazil and Argentina. We will continue to deepen MERCOSUL beyond the Customs Union. Negotiations on the liberalization of trade in services as well as on government procurement are already underway. We remain fully committed to the goal of a Common Market. We are even holding talks about macroeconomic coordination, beginning by common fiscal targets. President Fernando Henrique Cardoso stated the goal of negotiating a sort of MERCOSUL version of the EU’s Maastricht.

The road ahead is clear. Further consolidating and deepening of MERCOSUL is Brazil’s most important foreign policy goal. Investors may be reassured that MERCOSUL is a framework they can count on in the future, in their strategies about South America.

Integration with Argentina and MERCOSUL are the main instruments for attaining the twin goals of our foreign policy in South America: shared prosperity and stability in the region as a whole. With that spirit in mind, President Fernando Henrique Cardoso has just sent invitations for a Meeting of South American Presidents, to be held in Brasília, in August or September. Such a meeting will
give impetus to the goal of articulating MERCOSUL with the Andean Community. Brazil is determined to promote a free-trade agreement between these two groups no later than July 2001. Together, our countries will have a better chance to promote our legitimate common interests in different negotiations: the Free Trade Area of the Americas - FTAA, trade liberalization with the EU or WTO issues.

Actually, we see the creation of more active links within the South American area as a building block to promote closer hemispheric relations. Brazil is fully committed to the goal of a Free Trade Area of the Americas. We believe that this course of action is positive, if we want to increase our exports and become an even more attractive FDI destination. But we are still waiting for further clarifications on the evolution of this matter in the United States. It seems evident that we can not press the fast-forward button on the FTAA as long as the U.S. Administration does not get the fast-track authority.

The FTAA must be a tool to address present imbalances between developed and developing countries' interests. We will follow this same guiding principle in other important trade negotiations which lie ahead in the WTO or between MERCOSUL and the EU. Agriculture is a priority for Brazil. The Uruguay Round results in this field were very unsatisfactory. There is in Brazil deep frustration at what President Fernando Henrique Cardoso has described as "asymmetric globalization": we open, but developed countries' markets remain as closed as they have always been for many products in which we enjoy competitive advantages. Korea shares with Brazil similar concerns in many of her exports to other OECD countries.

MERCOSUL-EU negotiations, aiming eventually at free trade between the two blocs, will begin at two week's time in Buenos Aires. Initial contacts will deal with non-tariff barriers and other economic issues, as the EU does not wish to discuss tariffs before mid-2001. We do hope to be able to get Europe to fully focus on the negotiations with MERCOSUL now that they finally concluded a free trade agreement with Mexico.

Brazil will conduct negotiations both with the U.S. and the EU on their own intrinsic potential benefits—but ideally we want to conduct these negotiations at the same pace. Traditionally, our foreign trade and FDI-inflow pattern shows a remarkable degree of equilibrium among different partners and regions. We would like to keep it that way. This is vital. It has to do with our foreign policy autonomy.

Lastly, as the importance for Brazil of a strong partnership with Korea is growing, they have reached a promising turning point. Over the course of the previous decade, our two countries have made important efforts towards bridging the geographical distance. Among the initiatives accomplished, we could mention
the exchange of high level official visits and the signing of important bilateral agreements.

Since 1991, when the Brazilian Minister of External Relations, Francisco Rezek, visited Korea, several high-level visits have occurred, including visits to Brazil by the then-President Kim Young-sam, in 1996, and then-Prime-Minister Kim Jong-pil, in 1999. They gave momentum to a new dynamism in the fields of commerce, economy and technology.

Trade turnover between our two countries has oscillated, over the last five years, around US$ 2 billion. There are direct air links between Seoul and São Paulo. Korean investments in Brazil are spread out in the automotive, electronics, construction and telecommunications sectors. These investments, however, are still far below the potential of both our economies, and considering the size of the Brazilian market and the opportunities opened by the MERCOSUL. With the unfolding of the privatization program in Brazil, the pace of Korean investments should accelerate, as shown during the visit to Brazil, last year, of the Korean Minister of Commerce, Industry and Energy, Park Tae-young, accompanied by 138 businessmen. During his discussions with Brazilian authorities, he expressed Koreas keen interest in participating in large Brazilian infrastructure projects.

Korea and Brazil have also made significant advances in the identification of opportunities for cooperation in the field of science and technology. Presidents Kim Young-sam and Fernando Henrique Cardoso created, in 1996, during the former’s visit to Brazil, the Korea-Brazil Commission for the 21st Century, a forum which brought together businessmen, academics, researchers and politicians with a view to stimulating bilateral cooperation. After four meetings—the last and final of which was held in Kyongju, last October—, the members of the Commission were able to identify a significant mutual interest in developing mechanisms of cooperation in the area of science and technology. This fact is reflected in the final report of the Commission, whereby the members propose that a bilateral Fund for Research and Development be created, in order to finance cooperation in areas such as information technology, telecommunications, electronics, biotechnology applied to agriculture and health and academic exchange. The timeliness of the Commissions proposal should be evident to anyone who is aware of the important similarities and potential synergies between the Brazilian and Korean scientific communities.

Symmetry, rather than being unique to the scientific and technological dimensions of the Brazilian-Korean relations, permeates the whole bilateral relation. One easily perceives this characteristic in the traditionally harmonious relationship developed between such giant enterprises as Brazils Companhia Vale do Rio Doce
and Pohang Iron and Steel Company, as well as in the relevant complementarity existing between the information technology industries of both countries, where Brazil has important achievements in the field of software, matched by Korea's accomplishments in hardware.

In the political dimension, as well, both countries have attained a remarkable degree of democratic maturity, which was an important foundation that supported us in overcoming the economic crisis that afflicted our respective regions in recent years.

Although cultural relations are not nearly as developed as they could be, the harmonious manner in which the Korean community living in Brazil—which amounts to more than 40,000 people—has adapted itself to the Brazilian melting pot demonstrates the plasticity of the communication between our two cultures.

It seems clear to us that Brazil and Korea, having reached comparable stages in various aspects of our economic, social and political development, are natural candidates for a rich and mutually beneficial partnership, in which the achievements and potentialities of each side point to strategic and highly synergistic complementarities.

To make the best of this opportunity, the Brazilian Government has identified four priority areas in its relations with Korea in the coming years. These are:

· The intensification of the political dialogue at a higher level;
· The expansion of economic and commercial relations;
· The implementation of the recommendations stemming from the Korea-
  Brazil Commission for the 21st Century, which underscores the importance
  of providing strong stimulus for the expansion of scientific and technological
  exchange; and
· The active promotion of exchanges in the fields of culture and sports, taking
  into consideration, inter alia, the upcoming Soccer World Cup, to be co-
  sponsored by Korea and Japan in 2002.

This program will require a long list of initiatives, a number of which might be implemented in the near future, such as increasing high-level contacts, holding meetings of our Joint Commissions on Commerce and on Science and Technology, signing new Agreements concerning Visa Exemption and Nuclear Cooperation and strengthening ties between MERCOSUL and Korea. To cap this program, President Fernando Henrique Cardoso shall visit Korea within the next 12 months.

The development of relations between Korea and Brazil can and should still be greatly enhanced. The moment could not be more favourable. Korea has overcome the crisis of 1997. Brazil, on its part, has overcome the turbulent period
which followed the currency devaluation last year. Growth and stability in both countries will contribute to bring further consolidation of a special partnership between Brazil and Korea.
Brazil-Korea Cooperation: Perspectives and Questions
- The Role of Small-Scale Businesses -

Mauro M. Durante
President of the Executive Board of the Brazilian Service for Support to Micro and Small Companies (SEBRAE)

Brazil is currently experiencing a very special moment in its history. We have left behind us a long period of high inflation. Sweeping and irreversible changes are taking place, with the opening up of our market to international competition and benefit to the Brazilian consumer and offer excellent opportunities for investment from abroad.

All of this brings into greater focus the importance and potential of Brazil’s 8.5 million square kilometers of territory, and its population of 160 million.

Within this bright and optimistic context, small-scale businesses have an extremely important role to play. Ninety-eight percent (98%) of Brazil’s companies are small businesses, and they employ 60% of our labour force. They respond for forty-three percent (43%) of the income generated by industry, trade and services, and account for roughly 20% of Gross Domestic Product (GDP).

There is ample scope for growth in the micro and small business segment in Brazil. In our country there is a phenomenon which is generally regarded as being negative: the vast informal economy which is not governed by formal labour rules, does not pay taxes and does not figure in national accounts. This informal sector, however, is also the nursery for future businesses. It is the breeding ground from which millions of potential entrepreneurs, on a daily basis, transform informal activities into new companies, and all that they require to do this is a favourable business environment and a minimum of support so as to enable them to overcome initial obstacles and allow them to flourish.

It is within this context that the Brazilian Service for the Support of Micro and Small Businesses-SEBRAE performs its role.

Before providing you with details on the experience of our institution and its
policies and strategies for the development of small-scale businesses, allow me to make some general remarks on the small-business environment worldwide.

It is believed that, small and medium-size businesses will be the great driving force behind national economies in the 21st Century. The striking development of such companies in recent decades, throughout the world, has led to such conviction.

Gone are the days when conventional wisdom predicted that, in a new era of advanced technologies, our economic scenario would be totally dominated by giant corporations, since only they would be capable of taking on the high levels of investment required for technological development. Small and medium companies, according to this view, would be relegated to a marginal position.

It was also predicted that all economic power would be concentrated in relatively few countries - and particularly the United States - which would be the only ones capable of generating the critical mass necessary to provide continuity for the technological revolution. All the countries, it was alleged, would be condemned to play a merely supporting role. They could, at best, expect to be suppliers of low value-added goods and, to the extent that their weak position in foreign trade permitted, they could serve as markets for surplus goods produced in the countries at the centre.

This scenario foresaw a perpetuation of the already alarming imbalances between nations and predicted slow-down of growth in the majority of countries and consequently on the legitimate aspirations of all people fully to develop their potential.

It is worth noting that in parallel, largely as a consequence of the technological revolution, another great trend was also taking root throughout the world. Those are the improvement in the quality of life of the population as a whole, which is today perceived as a requisite, rather than a consequence, for material progress. Increasingly, business decisions with respect to the establishment of new production units are based much more upon this factor than those which had been regarded as insuperable obstacles, such as tax incentives and low cost labour.

Those nations which have best responded to the challenges posed by the technological revolution, and which have taken most advantage of technology to embark upon a sustainable development process- besides protecting their quality of life, making investments in research and development, and the training of human resources-have in common a concern for the development of their micro, small and medium-size businesses. They do this because they recognize that these businesses are, in many respects, a driving force for change. What they lack in size is amply compensated for by their flexibility and adaptability to market
changes. They are quick to adapt to technological change, they have a modern outlook and they contribute directly to the achievement of social justice. When the logic underlying automated production points to the end of fixed employment, small businesses respond by swiftly creating conveniently-located new jobs. And better still, besides generating new jobs, small businesses stimulate a factor which is much in demand at the end of the millennium: the spirit of free enterprise and deep-seated human quality which seeks fulfillment through the building of better future.

The countries which have been the leaders in this new phase of world progress fostered by technological evolution have also been the first to promote their micro, small and medium businesses. All such countries, without exception, conceived policies, drew-up strategies and created institutions to lend support and manage benefits provided for their small businesses.

In Brazil, our experience of support for small-scale firms goes back a number of years. Furthermore, in recent times we have made significant progress, especially on terms of simplifying administrative and tax procedures and making credit mechanisms available for small-scale businesses.

SEBRAE is the Brazilian agency in charge of implementing the policy of providing support of small businesses. It was conceived and created as an initiative of the Executive branch, in partnership with the employer's con-federations which represent the Brazilian productive sector, and it also receives support from the principal Brazilian development and research institutions.

SEBRAE constitutes a national system, guided and coordinated by the National SEBRAE, with affiliates in each of Brazil's 27 states. This system was set up to provide support for the establishment, expansion and modernization of micro and small businesses, and for training them fulfill their role in national development in an efficient manner, in line with a national objective.

Thus, in brief, SEBRAE's basic mission is to foster micro and small-scale businesses in the sectors of industry, trade, agriculture and services, stimulating the development of technology, management and human resources, with a view to helping them achieve optimum business results and strengthen their social role.

In the pursuit of these objectives SEBRAE seeks constantly to focus attention of all of society on the importance of the economic and social role played by small businesses. It also represents the interests of the small-business segment before the Executive and Legislative branches.

In a document issued in the first half of the present year, SEBRAE's National Deliberative Council ratified its strategic commitment and established basic guidelines. Among them:
· expansion of the lines of credit available to micro and small companies;
· simplification of the standards governing their activities;
· attending to the most essential needs of small-scale improvements of the
  quality of their products and of their productive operations; providing
  education, especially in the area of human-resource training; and the
  preparation of new entrepreneurs;
· the focusing of actions on economic and social development in the less
  prosperous areas of the country, which includes a reorientation so as to
  focus the activities of the SEBRAE system towards the interior of the
  country;
· coordination with employer’s entities and associations, universities, schools
  and other institutions, both in Brazil and abroad, to foster joint initiatives
  in the technology and management-training programmes.

One of the basic guidelines underlying all of SEBRAE’s action is the struggle
to consolidate an entrepreneurial culture, which is regarded as an essential
ingredient for responding to the challenges and posed by the modern world.

Allow me now, in a few words, to describe the structure and activities of
SEBRAE.

At SEBRAE central headquarters roughly 250 employees are dedicated to
providing leadership and coordination for initiatives aimed at supporting micro
and small companies throughout Brazil.

At the level of Brazil’s 27 states, approximately 3,500 SEBRAE employees
provide services directly to micro and small businesses from 594 SEBRAE business
advisory offices located in state capitals and in other Brazilian towns, and a
network of SEBRAE Desks is maintained through partnerships with business
organizations, universities, Mayor’s offices and other entities.

I shall now give a brief description of the activities carried by SEBRAE in
various areas.

In terms of technological development, wherein lies the competitive edge
which is so often the key to keeping a company in the market, SEBRAE plays
an active role by promoting technological training programmes and the diffusion
of technologies by means of rounds of lectures, and the publication of manuals
and special supplements distributes in newspapers and magazines. Themes covered
include the development of new processes and products; environmental manage-
ment; improvements in productivity; energy conservation; support for the funding
of new technology-based companies; and the training of small-scale suppliers.

Furthermore, SEBRAE supports initiatives in the fields of basic industrial
technology (metrology, standards, information technology, certification and technology management) and participates in technological fairs and rounds of technological negotiations. In 1996, the SEBRAE System provided such services for roughly on hundred and ten thousand (110,000) companies.

There is great demand for business information. To Fulfill this, in 1996, the SEBRAE Desks responded to roughly two point eight million (2.8 million) requests, which in turn led to 6.5 million consultations, mostly from owners of small businesses and persons seeking advice on how to set up their own companies. The SEBRAE Desks are supported by an integrated computer network which has an internet interface on which SEBRAE’s Homepage can be visited, and by other Brazilian and regional computer networks, notably the Latin American Organization of Micro, Small and Medium Companies-OLAMP network, and the REDSUL network which was designed to promote business opportunities within the scope of MERCOSUR.

SEBRAE also maintains a line of publications specifically aimed at the small business segment. In 1996, 535 titles were available with print runs of up to 1.3 million copies, covering themes such as how to set up a firm, current business opportunities, and other related subjects.

Another area in which SEBRAE participates is studies and research, which results in the production of information on themes such as business opportunities, economic environment, company positioning and sectorial performance, all of which are of interest to the small-business segment. SEBRAE is also involved in gathering of data on the evaluation and monitoring, and the evolution of small businesses, with the aim of providing inputs for its own actions and for government initiatives for promoting small-business activity.

Many of these studies receive wide publicity in the media, and others form the basis for periodic SEBRAE publications, as in the case of those especially targeted at the manufacturing, retailing, services and agribusiness segments.

In the field of management and human-resources development the SEBRAE System provides a broad array of programmes for the modernization of business management, aimed at consolidating the values of free enterprise and fair competition in Brazilian society. These include total quality programmes, initiatives for improving of working environments and the quality of life within companies, business training—(with roughly one million people trained in 1996)—, support for computerization, leadership training and special projects, such as those designed to promote the creation of jobs and income generation in small communities, and in the tourism sector.

In this context, the "SEBRAE Open School" project, which is developing
methodologies for large-scale distance education to overcome basic educational deficiencies among the owners of small businesses and their employees, deserves special mention.

In the area of access to credit, which almost invariably constitutes a bottleneck and places constraints on the capacity of the companies to grow, and even on the survival of some small-scale businesses, SEBRAE has implemented an ambitious programme aimed at ensuring access to financing through the providing of feasible guarantees. This consists of a Guarantee Fund, whereby priority projects are offered supplementary collateral, and is being carried out in partnership with the Bank of Brazil (which is the most prominent governmental credit agency), and with certain other private financial institutions. This project also counts on support from the Brazilian system of the development agencies, headed by the National Bank of Economic and Social Development-BIDES. Before setting up the Guarantee Fund, SEBRAE sent missions to study the experience of other countries which have significant experience in this field, notably the United States, Japan and Korea. It was precisely the successful experience of the Korea Guarantee Fund served as one of the most important sources of inspiration for the setting up of this system in Brazil.

Also in the credit area, SEBRAE has placed a new product at the service of its customers: the Business Exchange. Using a computerized database, this exchange has made a permanent supply of business opportunities available. This instrument makes it possible to discover new markets and to exchange technologies among companies both in Brazil and abroad, the launching of new products, and the identification of suppliers and new business partners. Access to the Exchange can be made through the SEBRAE Desks, over the Internet, or through consulting the "Business Exchange Newspaper".

Lastly, SEBRAE's activities in assisting small-scale businesses to realize their potential for international business is described below.

The global economy demands that the productive structure of each country adapt to the prevailing conditions, at a time when economic frontiers are no longer of such great significance and even political frontiers have lost many of their former connotations. Access to technology today is a prerequisite for competitiveness and consequently for survival. All over the planet, the availability of information is a powerful lever for those who possess it, and those who are left behind cannot hope to survive. Capital moves throughout the world in such volumes and at such a speed that minutes, or even seconds, may make the difference between great profits or disastrous losses.

SEBRAE seeks to enable small-scale enterprises in Brazil to participate in this
new world. This is not merely an issue of interest to individual firms. The modernization of all nations and their capacity to participate in the global economy depends, in turn, upon the agility, modernity and the skill with which small businesses, through outsourcing, promote the growth, efficiency and efficacy of the productive structure, and thus acquire the capacity to compete.

One of the points of leverage leading us towards the building of the global economy are the regional economic blocks. Brazil is a member of MERCOSUL, whereby its productive forces are allied to those of Argentina, Paraguay and Uruguay—which will shortly be joined by other countries of the region—in what has proved one of the most successful integration initiative currently underway anywhere in the world. Brazilian small-scale businesses have begun to participate in this integration, and the SEBRAE System has been an active participant in the process.

In order for the benefits of continental integration to spread throughout all of Brazilian territory, and thus to consolidate the integration process, SEBRAE is providing support for small businesses in the less developed regions of Brazil, notably the Northeast, the North and the Central-West, so that they too can participate in opportunities opened up by this newly-integrated market. Among the services provided for the small-business sector are initiatives aimed at promoting trade in foreign markets. To give a few examples of such actions: the specific training programmes targeted at managers and technical staff; the forming of groups of enterprises with a common interest in offering similar products and services which are able jointly to achieve better placement in large markets, both in terms of exports and imports; support for the participation of the small-business segment in trade fairs and other events, both in Brazil and abroad.

Also, SEBRAE currently responds for the General Secretariat of the Latin American Organization of Micro, Small and Medium Enterprises-OLAMP, in which eighteen(18) Latin American and four(4) European countries are represented, and by means of which fifty-five(55) public and private institutions are seeking to promote international cooperation among small-scale businesses.

It should be clearly noted that SEBRAE is essentially a partnership between government and private enterprise in Brazil. The National Deliberative Council of SEBRAE, the Chairman of which is Dr. Pio Guerra Junior is made up of representatives of thirteen(13) organizations. Of these, six(6) are private sector entities representing businesses in the sectors of agriculture, industry and trade, and by industrial and technological research and development institutions. Five others represent the Brazilian state sector and include one Ministry-Trade, Industry and Tourism; two financial institutions with a long tradition for supporting small-
business initiatives-Banco do Brasil and Social Development(Banco Nacional de Desenvolvimento Economico e Social)-BNDES; and an agency of the Ministry of Science and Technology responsible for financing scientific and technological research-FINEP.

Also represented on this Council are the Brazilian Association of Financial and Development Institutions and the Association of State-level SEBRAEs.

This mixed institutional profile helps to stimulate close cooperation between the public and private sectors, and such cooperation has been constantly reinforced by government policies and actions.

Yet another striking example of the permanent partnership we have enjoyed with the Brazilian government is our participation in the present Seminar which, under the leadership of the Ministry of External Relations, aim to provide support for small-scale companies and to help them participate in the global economy. SEBRAE's activities seek to provide small businesses in the less developed parts of Brazil with opportunities to participate, within the scope of this overall programme.

These then, in broad outline, are the principal components of the Brazilian experience in the promotion of micro, small and medium businesses carried out by SEBRAE. We are certain that we are on the correct path and that we have made significant progress, though much still remains to be done.

Small-scale enterprises will have a vital role to play in the 21st Century. Their role can be even more greatly enhanced if we pursue deeper and more intense cooperation between nations, and such is the goal of the Brazil-Korea Commission, in which we are proud to participate with dedication and confidence in the results.
1. **The Activities of SEBRAE**

SEBRAE is a non-profit entity of civil society, responsible for providing support for small-scale businesses in Brazil. It is funded by resources collected directly from enterprises and maintains offices in the 27 capital cities of the Brazilian states and in other towns throughout the country.

SEBRAE’s National Deliberative Council is composed of: representatives of the federal government; of financial institutions; of technological institutes; and of businesses which include farming enterprises and companies from the sectors of industry, trade and services. In each state of Brazil, SEBRAE maintains a separate corporate structure and provides basic support services, in accordance with guidelines established by the National Deliberative Council.

This unique structure differentiates SEBRAE from development institutions for the small-business sector in other countries. The SEBRAE System carries out an array of activities aimed at providing an integrated set of service to its customers.

2. **Areas of Basic Action**

2-1. Information

- Publication of the books in various formats and in language appropriate to its various publics, under the Edicao SEBRAE brand name, aimed at providing guidance for small businesses and potential entrepreneurs on various aspects of the world of business.
- Maintenance of a computerized information system to provide customers at its advanced services outlets - the SEBRAE Desk network.

2-2. Surveys and Research

- Conduct studies and research aimed at generating information to support decision making at small enterprises, and also for the planning of actions to be taken by the SEBRAE System itself.
- Evaluate the performance of small enterprises in various sectors.
- Monitor and accompany the results of work carried out by the SEBRAE System with its customers at the small enterprises.

2-3. International Affairs

- Seek to promote integration between the SEBRAE System and international
agencies. The aim of such cooperation is to keep SEBRAE customers up to date on new developments in the market, in terms of both business methods and new technology.

2-4. Trade Promotion
· Identify potential markets for the products of Brazilian small businesses, both in Brazil and abroad.
· Facilities access for small enterprises to new national and international markets.

2-5. Credit
· Seek to develop, in partnership with its associates in the financial sector, systems and mechanisms for financing to facilitate access by small firms to lines of credit from government banks, private financial institutions and international agencies.

2-6. Technological Development
· Promote technological innovation on the part of small firms through the development of their own projects and seek to introduce new methodologies developed by partner institutions, both in Brazil and abroad.

2-7. Business Development
· Provide guidance ranging from basic information on how to open a company to advanced concepts of business management and company administration.
· Create and enhance work methodologies aimed at increasing business competitiveness, including initiatives to promote Total Quality Management and the automation of productive processes at small businesses.

2-8. Institutional Relations
· Serve as the spokesman for small businesses with the Public Authorities, to transmit their demands and concerns at the national level and to serve as the interlocutor for lobbying the Legislative branch with respect to the legislation on the issues of interests to the small-business sector.

2-9. Special Projects
· Execute projects aimed at income generation and the creation of new jobs, the development of poor communities and of new tourism centers, through
providing stimulus for the growth of small firms in the tourism segment.

**〈Table 1〉** Total participation of small and micro enterprises as a proportion of total industrial, trade, services, construction and transport businesses in Brazil

<table>
<thead>
<tr>
<th>SECTOR</th>
<th>ME(1)</th>
<th>PE(2)</th>
<th>MGE(3)</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industry</td>
<td>65.24</td>
<td>19.44</td>
<td>15.32</td>
<td>100.00</td>
</tr>
<tr>
<td>Trade</td>
<td>76.54</td>
<td>15.91</td>
<td>7.55</td>
<td>100.00</td>
</tr>
<tr>
<td>Services</td>
<td>93.21</td>
<td>5.50</td>
<td>1.29</td>
<td>100.00</td>
</tr>
<tr>
<td>Construction</td>
<td>46.10</td>
<td>26.84</td>
<td>27.06</td>
<td>100.00</td>
</tr>
<tr>
<td>Transport</td>
<td>46.42</td>
<td>29.85</td>
<td>23.74</td>
<td>100.00</td>
</tr>
<tr>
<td>TOTAL</td>
<td>80.69</td>
<td>12.83</td>
<td>6.48</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Note: size criteria based upon annual income, in accordance with the criteria established in Law 9.317, of 5/Dec/96; 1) Micro enterprise: billings of up to R$ 120,000.00; 2) Small enterprise: billings above R$ 120,000.00 and lower than R$ 720,000.00; 3) Medium or Large Enterprise: billings above R$720,000.00.
Source: IBGE-Economic Census-1995

**〈Table 2〉** Activities performed by SEBRAE 1991-1997(unitary)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>- Enterprises served</td>
<td>227,463</td>
<td>509,473</td>
<td>1,488,623</td>
<td>1,910,918</td>
<td>2,699,389</td>
<td>3,121,659</td>
<td>2,347,364</td>
</tr>
<tr>
<td>- Consultations</td>
<td>176,125</td>
<td>465,408</td>
<td>1,572,635</td>
<td>3,557,184</td>
<td>5,677,215</td>
<td>7,199,956</td>
<td>5,245,920</td>
</tr>
<tr>
<td>- Courses/Seminars/Lectures</td>
<td>3,367</td>
<td>9,193</td>
<td>18,640</td>
<td>24,695</td>
<td>29,828</td>
<td>41,993</td>
<td>29,271</td>
</tr>
<tr>
<td>- Instructors trained</td>
<td>81,277</td>
<td>278,748</td>
<td>618,943</td>
<td>814,401</td>
<td>948,539</td>
<td>1,320,258</td>
<td>982,857</td>
</tr>
<tr>
<td>- Class-hours(Courses/Seminars/Lectures)</td>
<td>48,456</td>
<td>128,059</td>
<td>257,584</td>
<td>348,912</td>
<td>403,588</td>
<td>514,325</td>
<td>369,173</td>
</tr>
<tr>
<td>- Fairs</td>
<td>167</td>
<td>552</td>
<td>1,152</td>
<td>1,216</td>
<td>1,450</td>
<td>1,449</td>
<td>1,002</td>
</tr>
<tr>
<td>- Missions/ Road Shows</td>
<td>53</td>
<td>2)</td>
<td>383</td>
<td>634</td>
<td>901</td>
<td>1,411</td>
<td>767</td>
</tr>
</tbody>
</table>

Notes: 1) Principal units of measurement used by the SEBRAE System.
2) Included together with the number of Fairs for 1992.
Source: SEBRAE.
Table 3: One day in the SEBRAE System\(^3\) 1991-1997 (unitary)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Enterprises served</td>
<td>896</td>
<td>2,022</td>
<td>5,884</td>
<td>7,583</td>
<td>10,885</td>
<td>12,290</td>
<td>14,313</td>
</tr>
<tr>
<td>Consultations</td>
<td>693</td>
<td>1,847</td>
<td>6,216</td>
<td>14,116</td>
<td>22,892</td>
<td>28,346</td>
<td>31,983</td>
</tr>
<tr>
<td>Courses/Seminars/Lectures</td>
<td>13</td>
<td>36</td>
<td>74</td>
<td>98</td>
<td>120</td>
<td>165</td>
<td>174</td>
</tr>
<tr>
<td>Instructors trained</td>
<td>320</td>
<td>1,106</td>
<td>2,446</td>
<td>3,232</td>
<td>3,825</td>
<td>5,198</td>
<td>5,993</td>
</tr>
<tr>
<td>Class-hours(Courses/Seminars/Lectures)</td>
<td>191</td>
<td>508</td>
<td>1,018</td>
<td>1,385</td>
<td>1,627</td>
<td>2,025</td>
<td>2,251</td>
</tr>
<tr>
<td>Fairs</td>
<td>0.70</td>
<td>2.20</td>
<td>4.60</td>
<td>4.80</td>
<td>5.85</td>
<td>5.70</td>
<td>6.11</td>
</tr>
<tr>
<td>Missions/Road Shows</td>
<td>0.20</td>
<td>0.20</td>
<td>1.50</td>
<td>2.50</td>
<td>3.63</td>
<td>5.56</td>
<td>4.67</td>
</tr>
</tbody>
</table>

Notes: 1) Principal units of measurement used by the SEBRAE System.
       2) Included together with the number of Fairs for 1992.
       3) Refers to the number of business days.
Source: SEBRAE.

Table 4: How micro and small enterprises evaluate the services provided by SEBRAE

<table>
<thead>
<tr>
<th>PRODUCTS/SERVICES</th>
<th>Surpassed initial expectations</th>
<th>Totally fulfilled expectations</th>
<th>Partially fulfilled expectations</th>
<th>Failed to fulfill expectations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Credit/financing</td>
<td>42</td>
<td>33</td>
<td>18</td>
<td>07</td>
</tr>
<tr>
<td>Total quality</td>
<td>39</td>
<td>35</td>
<td>22</td>
<td>03</td>
</tr>
<tr>
<td>Business training</td>
<td>42</td>
<td>35</td>
<td>22</td>
<td>03</td>
</tr>
<tr>
<td>PATME</td>
<td>37</td>
<td>37</td>
<td>21</td>
<td>04</td>
</tr>
<tr>
<td>SEBRAE Desk</td>
<td>45</td>
<td>30</td>
<td>18</td>
<td>05</td>
</tr>
<tr>
<td>Fairs</td>
<td>37</td>
<td>28</td>
<td>27</td>
<td>07</td>
</tr>
<tr>
<td>Proder</td>
<td>40</td>
<td>41</td>
<td>13</td>
<td>02</td>
</tr>
<tr>
<td>Empretect</td>
<td>60</td>
<td>26</td>
<td>12</td>
<td>01</td>
</tr>
<tr>
<td>Business Exchange</td>
<td>43</td>
<td>24</td>
<td>22</td>
<td>09</td>
</tr>
<tr>
<td>Total</td>
<td>42</td>
<td>31</td>
<td>21</td>
<td>05</td>
</tr>
</tbody>
</table>

Source: SEBRAE-Half-yearly survey on the Evaluation of the Quality of SEBRAE Services-carried out with 4,400 customer at micro and small enterprises, referring to the first half of 1997.

Interest on the part of Brazilian micro and small enterprises in the international market.

In the micro and small-business segment there is a small group of enterprises which possess some experience, or have an interest in participating in foreign
trade. A survey of these carried out by SEBRAE, in partnership with the Dom Cabral Foundation, found that:

- generally, exports are not the main priority for small-scale businesses, but rather a complementary feature in their marketing strategy;
- generally, their exports are consumer goods and are characterized as mature products, i.e., those which have been on the market for over five years;
- their main foreign markets for goods produced by micro and small companies tend to be the United States (28%) and Argentina (16%);
- MERCOSUL takes 24% of the exports of the small businesses covered by the survey;
- almost half of the small-scale businesses surveyed responded that MERCOSUL is their major area of interest for the future expansion of their exports;
- bureaucratic barriers are, in the opinion of the small-scale businesses surveyed, the principal obstacle to their exporting of their production;
- micro and small companies with an eye to the international market expressed great interest in participating in business missions, fairs and exhibitions abroad. A significant proportion of them (14%) expressed an interest in acquiring technology from third parties abroad.
Korea’s Financial Crisis and Financial Cooperation between Korea and Brazil

Jae-Yoon Kim
Former Member of the Monetary Board of the Bank of Korea

1. Foreword

Toward the end of last year, Korea was hit by a financial and foreign exchange crisis, and had to turn to the IMF for emergency funds as foreign currency liquidity conditions deteriorated rapidly. Thanks to its prompt support together with other international financial institutions, the crisis passed its peak, but Korea is now pushing ahead boldly with structural adjustment to root out those factors that allowed a crisis to develop.

I think that people in Brazil, which is now looking for a second economic take-off from the implementation of the Real Plan\(^1\) and harsh stabilization policies following the outbreak of a currency crisis in the late eighties, may want to find out more about the financial crisis in Korea.

Let me now therefore look at what caused the crisis, and at the policy responses to it and then address the current financial status and prospects of the Korean economy. I would like to end by putting forward some suggestions for financial cooperation between Korea and Brazil.

2. How and Why the Financial Crisis Occurred

2-1. How the Financial Crisis Occurred

Until the financial crisis broke out, Korean macroeconomic performance in 1997 was broadly favorable. Real GDP grew by 6 percent during the first three

\(^1\) Three-stage economic stabilization plan announced by the Brazilian Government in June 1993 to cure chronic hyper-inflation.
- First Stage(Dec. 1993): raising of income tax rate so as to reduce the fiscal deficit.
- Third Stage(July 1994): new real linked at one-to-one parity to US dollar.
quarters of 1997, inflation declined slightly to 4 percent, and the current account
deficit was narrowing. The fiscal account was roughly in balance and money
supply was nudging the bottom of its target range, in line with the objective of
price stability.

But, from the beginning of last year, an unprecedented number of large,
highly-leveraged companies belonging to conglomerates went bankrupt, and
symptoms of the gathering financial crisis began to appear. The crisis in Korea
really started early last year with the bankruptcy of the Hanbo Group, which
ranked tenth among conglomerates. Large interlinked business groups known as
Chaebol had long led the Korean economy. As a result, there was a widespread
myth that ‘Chaebol never fail’. But that myth has finally been shattered. Many
firms whose finances had become shaky were pushed to the brink of bankruptcy
in the wake of the Hanbo Group’s failure. The final blow was when Kia Group,
which was ranked seventh among the Chaebol and was Korea’s second largest car-
maker, failed in July last year. The wave of large corporate bankruptcies was
followed by the expansion of financial institutions’ bad loans. The Korean economy
went into a tailspin as firms’ fragility worked through into the fragility of financial
institutions. Besides this, as the share devoted to the Asian region by global fund
managers was adjusted downward in reaction to the turmoil in foreign exchange
markets that began in Southeast Asian countries, especially Thailand and Indonesia,
foreign investors’ misgivings about the soundness of the Korean economy
increased, and the flow of foreign investment reversed to a net outflow from last
August.

Accordingly, Korea’s international creditworthiness began to deteriorate. From
early October, international credit rating agencies such as Moody’s and S&P began
to downgrade abruptly the country’s sovereign rating as well as the ratings of
Korean financial institutions.2)

New borrowing by financial institutions from the international financial market
became almost impossible and they came under severe pressure to repay their
existing borrowings. As a result, the country’s foreign exchange reserves fell
rapidly3), there was a shortage of foreign currency liquidity, and the possibility of
a debt moratorium was raised. Thus the government applied to the IMF for stand-
by credit on November 21. On December 4, the Korean government and the IMF
agreed on a letter of intent, to which was appended a list of the conditionalities
upon whose observance Korea would receive supporting-funds.

IMF decided to put together a package of 58.4 billion dollars with other
international financial institutions, such as IBRD and ADB, and some advanced
countries including the U.S.A and Japan. Since the agreement on the letter of
intent was reached, 23.1 billion dollars, that is, 40 percent of the total amount of support scheduled, has been supplied, as of the end of this April. The conditionalities attached to the IMF’s support-funds called for a shift to an austere monetary and fiscal stance to bring about exchange rate stabilization; the toleration of high interest rates; the resolution of troubled financial institutions and non-performing loans; the improvement of the soundness of bank management; the upgrading of accounting & disclosure standards; the liberalization of foreign trade; corporate restructuring; and so forth.

2)  

(Table 1) Trend of Moody’s and S&P adjusting credit rating of domestic banks  

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Moody’s Korea Development Bank</td>
<td>A(5) (90.8)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S&amp;P Korea Development Bank</td>
<td>A+(5) (90.9)</td>
<td>AA-(4) (5.3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: 1) Moody’s classifies credit ratings in nineteen grades. S&P issues twenty-two grades.  
2) Parentheses indicate ranking of credit rating among domestic financial institutions.  
3) < > indicates date when credit rating was changed.  
4) Moody’s classifies B1 or lower, as non-investment grade. S&P classifies BB+ or lower, as non-investment grade.

3)  

(Table 2) Trend of Foreign Exchange Holdings  

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreign exchange reserves(A)</td>
<td>33.2</td>
<td>20.4</td>
<td>29.2</td>
<td>33.3</td>
<td>30.4</td>
<td>24.4</td>
<td>24.4</td>
<td>20.4</td>
</tr>
<tr>
<td>Deposits opened at the offices of banks located overseas(B)</td>
<td>3.8</td>
<td>11.3</td>
<td>8.0</td>
<td>8.0</td>
<td>8.0</td>
<td>16.9</td>
<td>16.9</td>
<td>11.3</td>
</tr>
<tr>
<td>Others(C)</td>
<td>-</td>
<td>0.2</td>
<td>-</td>
<td>-</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
</tr>
<tr>
<td>Usable foreign exchange reserves(A-B-C)</td>
<td>29.4</td>
<td>8.9</td>
<td>21.1</td>
<td>25.3</td>
<td>22.4</td>
<td>22.3</td>
<td>7.3</td>
<td>8.9</td>
</tr>
</tbody>
</table>

Note: 1) as of the end of the period.  
Source: The Bank of Korea(BOK)
2-2. Why the Financial Crisis Occurred

The views as to why financial crises occurred in East Asia basically fall into two groups. The first sees the crises as having been home-grown: the second sees them as having arisen from imprudent flows of international capital. In fact, they are best seen as resulting from a combination of the two. The same goes for Korea, but in its case domestic and structural factors such as the frail financial industry and firms’ weak capital structure played a particularly large role.

In the past, Korea supported its growth oriented development policy by distributing financial funds to specific sectors through close regulation of the financial sector. But, in the course of this process, financial institutions failed to develop and strengthen their credit screening functions. For a long time, they clung to the practice of providing loans without thorough checks into credit status or business prospects, where the loan applicant belonged to a large conglomerate or had sufficient collateral. What was worse, with access to foreign financing virtually freed up by the financial deregulation of the early nineties, financial institutions competed to extend funds raised abroad to the corporate sector. Accordingly, financial institutions failed to prevent firms from heavy, inefficient and often duplicate investments, with the result that they themselves as well as the firms became extremely fragile.

Meanwhile, companies pursued expansion strategies in a situation where there was no external scrutiny of their investment plans, and borrowed funds when making new investment, without properly considering arrangements for their

---

(4) (Table 3) IMF's Funding Package (as of the end of April 1998)

<table>
<thead>
<tr>
<th></th>
<th>amount agreed to be supplied</th>
<th>supplied</th>
<th>Supply schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>May</td>
<td>June-DEC.</td>
</tr>
<tr>
<td>International Financial Institutions</td>
<td>35.0</td>
<td>23.1</td>
<td>1.8</td>
</tr>
<tr>
<td>IMF</td>
<td>21.0</td>
<td>15.2</td>
<td>1.8</td>
</tr>
<tr>
<td>IBRD</td>
<td>10.0</td>
<td>4.9</td>
<td>-</td>
</tr>
<tr>
<td>ADB</td>
<td>4.0</td>
<td>3.0</td>
<td>-</td>
</tr>
<tr>
<td>Other Stand-by* funds</td>
<td>23.4</td>
<td>-</td>
<td>not</td>
</tr>
<tr>
<td>Total</td>
<td>58.4</td>
<td>23.1</td>
<td>1.8</td>
</tr>
</tbody>
</table>

Note: 1) U.S.A(50), Japan(100), England(12.5), France(12.5), Germany(12.5), Italy(12.5), Canada(10), Australia(10), Belgium, Netherlands, Sweden, Swiss(12.5), New Zealand(1).

Source: IMF.
\(\text{Table 4}\) Trends of non-performing assets of commercial banks and merchant banks (As of the end of period) (billion won)

<table>
<thead>
<tr>
<th></th>
<th>1996</th>
<th>June 1997</th>
<th>1997</th>
</tr>
</thead>
<tbody>
<tr>
<td>commercial banks(^1)</td>
<td>15,208</td>
<td>21,877</td>
<td>32,289</td>
</tr>
<tr>
<td>merchant banks(^2)</td>
<td>1,264</td>
<td>-</td>
<td>3,847(^0)</td>
</tr>
</tbody>
</table>

Notes:  
1) Substandard+Doubtful+Estimated Loss  
2) Overdue Bills+Court Receivership Bills+Payments on Acceptances & Guarantees+Credit Arrears over 6 months  
3) As of the end of October 1997  
Source: The Bank of Korea(BOK).

Repayment. In particular, the Chaebol boosted their fund-raising ability through interlocking loan guarantees within their interconnected companies.

As a result, the capital structure of Korean firms worsened considerably. This was particularly so in the case of the thirty largest conglomerates, whose average debt-equity ratio stood as high as 519 percent at the end of 1997. This is very much higher than the average 160 percent of the U.S.A, the 200 percent of Japan, or the 90 percent of Taiwan. In this situation, as competition in domestic and overseas markets intensified and the economic recession dragged on for a long time from early 1996, companies which had lost their competitiveness collapsed like a house of cards.

\(\text{Table 5}\) Comparison of corporations’ reliance on external borrowings (in %)

<table>
<thead>
<tr>
<th></th>
<th>Korea(96)</th>
<th>U.S.(95)</th>
<th>Japan(95)</th>
<th>Taiwan(95)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Debt-equity ratio</td>
<td>317.2(^\text{b})</td>
<td>159.7</td>
<td>206.3</td>
<td>85.7</td>
</tr>
<tr>
<td>Financial expenses to sales</td>
<td>3.9</td>
<td>-</td>
<td>1.6</td>
<td>2.2</td>
</tr>
</tbody>
</table>

Notes:  
1) Manufacturing  
2) Average debt of thirty largest conglomerates was 518.9%(Dec 1997).  
Source: The Bank of Korea(BOK).

It can be said that another cause of the financial crisis was that financial institutions, and particularly merchant banks, borrowed funds imprudently from overseas once the financial sector opened up. Although merchant banks did not have much business experience, they induced foreign funds at low nominal interest rates from abroad and invested them in bonds issued in Southeast Asia and Russia. But, as Southeast Asian countries had difficulty in repaying their debt due to their currency crises, the merchant banks’ asset books turned sour in a short period. And as the foreign creditor banks became concerned about this situation,
they called in their loans to the merchant banks. This worsened the problem of liquidity still further.

Moreover, because most corporations as well as merchant banks had mobilized short-term funds for use in long-term investment, the mismatch within the term structure of their debts became still wider.

3. Policy Responses to the Financial Crisis and Recent Economic Trends

3-1. Policy Responses to the Financial Crisis

In the early stage of the crisis, the Korean financial markets went into turmoil. The Korean won, which had stood at 844.2 to the dollar at the end of 1996, sank to the 1,900 won level for a while in December. The composite stock price index, which was 651 at the end of 1996, plunged to the 300 level, the lowest since 1987. Market interest rates rose vertically to two to three times their normal levels in the wink of an eye. Call rate and yields on corporate bond stayed at around 25 percent, and yields on commercial paper(CP) recorded around 30 percent.\(^5\)

To get over the financial crisis, the Korean government is carrying out a wide range of measures on the basis of letter of intent agreed with the IMF. It is now implementing bold structural reforms in the areas of the financial market, the corporate sector, the labor market and virtually every sector of the economy to recover from the financial crisis by enhancing the international creditworthiness of Korean economy at an early stage. But it has also tightened the monetary and fiscal policy stance, and undertook wider trade and capital account liberalization. It has put the currency on a free float, and it is building up a system of information disclosure so as to allow the free play of market forces in the economy.

Let us now look in greater detail at three important policy tasks, namely, financial sector restructuring, corporate restructuring, and the liberalization of foreign trade.

3-1-1. Restructuring of the Financial Sector

It was judged that the most crucial pending task was to enhance financial institutions' fund-raising capacity through the restoration of their soundness and creditworthiness at the earliest possible stage. So the government is pressing ahead with various policies for their restructuring.

As a first step the Korean government and the central bank are accelerating

---

5) Refer to Table 7
the resolution both of financial institutions’ non-performing loans and of troubled financial institutions themselves.

To resolve financial institutions’ non-performing loans at an early stage, a Non-performing Asset Resolution Fund was established. This has already purchased, at a discount, loans from them with a book value of about 13.9 trillion won. And plans are actively underway to enlarge the Fund’s capital to its authorized 20 trillion won and to resolve the remaining non-performing loans as soon as possible.

Meanwhile, the government closed down thirteen merchant banks whose turnaround was considered out of the question. Many of the original merchant banks had stirred up trouble due to their imprudent borrowings from overseas. Korea First Bank and Seoul Bank were the worst hit by bad loans among the twenty-six domestic commercial banks. After placing responsibility on the shoulders of stockholders by taking measures for the capital reduction of the two banks, the government took a large stake in their equity, in exchange for government-owned stocks. The government’s shares in them, and that is pretty much to say the two banks, will be sold on the open market to the public including foreign investors. Moreover, the government has ordered another 12 commercial banks with BIS capital adequacy ratios less than 6 per cent to file plans to improve their capital structure by taking measures for management improvement.

In addition, it is drawing up and implementing differing restructuring plans according to the degree of each financial institution’s soundness. It is planning to induce financial institutions in good credit standing to enlarge their size through merger, capital increase, link-ups with foreign partners, etc., and to enhance their capacity to attract foreign capital by raising their international creditworthiness. For troubled financial institutions, exit from the market as independent entities through merger with superior financial institutions, sale to third-parties, etc. is to be enforced as soon as possible. Meanwhile, although the public purse must take charge of the costs required for the protection of depositors and the resolution of non-performing loans costs, which will inevitably arise in the course of financial industry restructuring, the government will minimize the burden on the budget by clarifying its criteria for fiscal support.

In addition, restructuring will be implemented on the basis of definite and fixed criteria for the assessment of soundness for non-bank financial institutions such as investment companies, insurance companies, leasing companies, about whose possible failure there is considerable concern.
(Table 6) Details of the Non-performing Asset Resolution Funds’ Purchase of Non-performing Assets (billion won)

<table>
<thead>
<tr>
<th>Subject of purchasing</th>
<th>Face value of non-performing assets</th>
<th>Purchase price at a discount</th>
</tr>
</thead>
<tbody>
<tr>
<td>First stage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Nov. 28th 1997)</td>
<td>Korea First Bank</td>
<td>2,436</td>
</tr>
<tr>
<td></td>
<td>Seoul Bank</td>
<td>1,959</td>
</tr>
<tr>
<td></td>
<td>Merchant Banks</td>
<td>2,699</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1,528</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1,383</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1,756</td>
</tr>
<tr>
<td>Second stage</td>
<td>Thirty Commercial banks</td>
<td>3,951</td>
</tr>
<tr>
<td>(Dec. 15th 1997)</td>
<td></td>
<td>2,474</td>
</tr>
<tr>
<td>Third stage</td>
<td>Two credit guarantee insurance companies</td>
<td>2,817</td>
</tr>
<tr>
<td>(Dec. 19th 1998)</td>
<td></td>
<td>412</td>
</tr>
<tr>
<td>Fourth stage</td>
<td>Korea First Bank</td>
<td>2,378</td>
</tr>
<tr>
<td>(Apr. 24th 1998)</td>
<td>Seoul Bank</td>
<td>1,183</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>16,239</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8,736</td>
</tr>
</tbody>
</table>

Source: The Bank of Korea (BOK).

3-1-2. Corporate Restructuring

Reforms to improve the governance and management of Korean corporations, the weaknesses of which also played a large role in the financial crisis, are also being put in place. As a means to check large shareholders’ arbitrary power, listed companies are now required to have at least one outside director, and minority shareholders’ rights *vis a vis* management have been significantly strengthened. To correct firms’ practice of heavy and excessive borrowing, new cross guarantees of debt repayment within interlinked business groups have been prohibited, and all existing guarantees of this type must be completely withdrawn by the end of March 2000. The information on these groups and their member companies will be made much more transparent as they are obliged to publish combined financial statements in accordance with international standards from fiscal 1999. In addition, in order to speed up restructuring of the corporate sector by hostile takeovers, the ceiling on the amount of stock any one foreigner can acquire without the prior approval of the company’s board of directors was raised from 10 percent to 33 percent. To give effective backing to corporate restructuring, institutional arrangements were revised so as to allow redundancies where inevitable for corporate restructuring, following an agreement reached by a tripartite committee made up of representatives of labor unions, management and government.

Considering active inducement of foreign capital essential for smooth corporate restructuring, the government established an Equity Fund, which purchases stocks
of promising firms, and a Debt Restructuring Fund, for the conversion of short-
term debt into long-term debt, and it will actively court foreign capital’s 
participation in them.

3-1-3. Liberalization of Foreign Trade

To accelerate the inflow of foreign capital and competition among financial 
institutions based on market principles, the wider opening of financial and capital 
markets was carried out earlier than originally planned.

To correct the distortion of the foreign exchange market, a free floating 
exchange rate system was introduced, and the domestic bond market was 
completely opened to foreigners in December 1997. Foreign financial institutions 
were allowed to establish bank and securities company subsidiaries and joint 
venture banks from this March, earlier than the original schedule which was 
toward the end of 1998. The ceiling on share-holdings by individual foreigners 
was raised from 7 percent of a company’s outstanding shares to 50 percent on 
December 30, 1997. The aggregate ceiling on holdings by foreigners in an 
individual company was also raised from 26 percent to 55 percent and this ceiling 
will be abolished completely by the end of this year.

Meanwhile, the remaining restrictions on the maximum equity holding which 
a foreigner can acquire without the approval of a company’s board of directors 
are to be completely scrapped during the first half of this year. It is hoped this 
will lead to active M&A activity by foreigners, including hostile takeovers.

3-2. Recent Economic Trends

3-2-1. Financial Sector

Recently the financial markets have shown a generally stable pattern, thanks 
to efforts to rebuild foreign exchange holdings after the financial crisis, which 
have coincided with the further monetary tightening as agreed by the government 
with the IMF, and moves to restructure the financial and corporate sectors.

The current account has recorded a surplus of more than 3 billion dollars 
every month since last December and usable foreign exchange holdings have 
increased to the level before the currency crisis as the provision of the IMF’s 
financial support, and the restructuring of foreign debt maturities, passed off 
smoothly. The value of the Korean won against the U.S. dollar, which had touched 
its lowest-ever level of 1,960 won per dollar last December 24 and stood around 
the 1,600 won level early this year, recently strengthened to the 1,300~1,400 won 
level due to the improvement in foreign exchange reserves. Market interest rate
### Trend of Main Financial Sector Indicators

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Usable Foreign Exchange Reserves (billion dollars)</td>
<td>29.4</td>
<td>22.3</td>
<td>7.3</td>
</tr>
<tr>
<td>Interest Rate(%)&lt;sup&gt;1)&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Call Rate (overnight)</td>
<td>12.4</td>
<td>13.6</td>
<td>14.0</td>
</tr>
<tr>
<td>Yields on CP (3 month)</td>
<td>13.1</td>
<td>14.2</td>
<td>16.9</td>
</tr>
<tr>
<td>Yields on Corporate Bonds</td>
<td>11.9</td>
<td>12.5</td>
<td>14.1</td>
</tr>
<tr>
<td>(3 year)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exchange Rate&lt;sup&gt;1)&lt;/sup&gt;</td>
<td>844.2</td>
<td>965.1</td>
<td>1,163.8</td>
</tr>
<tr>
<td>(won/dollar)</td>
<td>(804.8)</td>
<td>(921.9)</td>
<td>(1,025.6)</td>
</tr>
<tr>
<td>Composite Stock Price Index&lt;sup&gt;2)&lt;/sup&gt;</td>
<td>651.2</td>
<td>470.8</td>
<td>407.9</td>
</tr>
<tr>
<td></td>
<td>(833.4)</td>
<td>(584.0)</td>
<td>(494.1)</td>
</tr>
<tr>
<td>Ratio of Cheques and Bills&lt;sup&gt;3)&lt;/sup&gt;</td>
<td>0.14</td>
<td>0.43</td>
<td>0.38</td>
</tr>
<tr>
<td>Dishonored(%)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: 1) As of the end of the period, Figures in parentheses indicate average during the period. 2) On an average basis. 3) On an amount basis.

Source: The Bank of Korea (BOK).

(yields on corporate bonds) eased from 23 percent to the 18 percent level. The ratio of cheques and bills dishonored, which had risen to 1.49 percent, ten times that in normal years, last December, also dropped to the 0.5 percent level at the turn of this year. However, the stock market remains decidedly bearish owing to concerns about possible corporate failures.

#### 3-2-2 Real Sector

In the real sector, in contrast to the financial sector, the recession is still deepening.

Industrial output, consumption, facilities investment, and construction investment are all showing negative growth. As a result, in March, unemployment rose sharply to 6.5 percent, which was three times that before the financial crisis. Prices continue to show very steep upward trends as the effects of the massive depreciation feed through. Meanwhile the current account is greatly improved, but this is due to stagnant domestic demand and the contraction in the value of imports thanks to lower international raw material prices.
(Table 8) Trend of Main Indicators in the Real Sector

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial Output(%)</td>
<td>7.1</td>
<td>9.2</td>
<td>4.2</td>
</tr>
<tr>
<td>Retail Sales(%)</td>
<td>10.4</td>
<td>2.7</td>
<td>3.3</td>
</tr>
<tr>
<td>Domestic Construction</td>
<td>21.4</td>
<td>50.5</td>
<td>-23.3</td>
</tr>
<tr>
<td>Domestic Machinery Orders(%)</td>
<td>16.5</td>
<td>4.6</td>
<td>-33.6</td>
</tr>
<tr>
<td>Unemployment Rate(%)</td>
<td>2.0</td>
<td>2.1</td>
<td>2.6</td>
</tr>
<tr>
<td>Consumer Prices(%)</td>
<td>4.9</td>
<td>4.2</td>
<td>4.3</td>
</tr>
<tr>
<td>Current Account Balance (billion dollars)</td>
<td>-23.0</td>
<td>-0.7</td>
<td>0.5</td>
</tr>
<tr>
<td>Exports(%)</td>
<td>3.7</td>
<td>5.2</td>
<td>3.8</td>
</tr>
<tr>
<td>Imports(%)</td>
<td>11.3</td>
<td>-7.0</td>
<td>-12.4</td>
</tr>
</tbody>
</table>

Notes: 1) Manufacturing.  
2) Rates of increase compared with the same period of the previous years.  
3) On a customs-clearance basis.  
Source: The Bank of Korea (BOK).

4. Prospects

As I have pointed out, Korea is implementing its harsh economic restructuring programs under the agreement with the IMF to restore the international creditworthiness of its economy. The government’s program is built around: i) a strong macroeconomic framework designed to continue the orderly adjustment in the external current account, build up international reserves, and contain inflationary pressures, through the adoption of a tighter monetary stance and significant fiscal adjustment; ii) a comprehensive strategy to restructure and recapitalize the financial sector, and make it more transparent, market-oriented, and better supervised; and iii) measures to reduce the high degree of reliance of corporations and financial institutions on short-term debt and allow a better diversification of risk in the economy.

The Korean economy is expected to suffer much pain in the process of fulfilling the conditionality elements of the IMF loan agreement. For one thing, the burden of financial costs on firms’ and households’ is increasing because interest rates, despite easing slightly recently, are still at a very high level. Financial
institutions are operating their funds very conservatively, because they are concerned about the fragility of their assets due to additional bankruptcies and must observe the BIS capital adequacy ratios. Accordingly, the credit crunch is likely to persist for the time being.

On the macroeconomic side, more firms whose financial structure is fragile, are expected to go bankrupt while other firms are actively down-sizing, and facilities investment is shrinking. As a result, consumption is likely to be at a standstill due to increased unemployment and decreased earnings and GDP growth is expected to be negative.

Meanwhile, international creditworthiness is expected to be rebuilt, and the inefficient economic structure should also show gradual improvement over the mid and long term, provided the Korean government forces through bold economic restructuring successfully in line with the policy programs agreed with IMF. In fact, international financial institutions, such as the IMF, the IBRD, and major advanced countries have recently evaluated Korea’s efforts for economic reforms favorably. As long as the economic reforms in Korea are carried out successfully, the Korean economy should within one to two years’ time return to close to its sustainable growth track and benefit in terms of price stabilization and structural improvement of the balance of payments position.

5. Suggestions for Financial Cooperation between Korea and Brazil

The way in which the financial crisis occurred in Korea differs from that in Brazil where it arose from the public sector due to the large fiscal deficit. However, because market principles did not work properly in either case due to over-regulation, inefficiencies in every sector of the economy deepened the financial crisis. Thus the financial crises in both nations can be said to have the same root. Another thing that both nations have in common in a strong possibility of financial instability in their neighbor countries, which would have a great impact on their own economies.

If both nations share information on the causes of their financial crises, policy responses to them, and on post-crisis economic trends, it will be very helpful to both in devising economic policies in the future. For example, Brazil had the experience of declaring a unilateral moratorium on the mid-and-long-term foreign debt of private banks, when it agreed on economic restructuring plans with the IMF in 1983 to overcome financial crisis but decided not to carry out the agreement and ignored the IMF’s advice. In view of this experience, the Korean government has to work in close cooperation with IMF and implement measures for reform
of the economic structure. There are many lessons for Korea in Brazil’s operation of an economy based on market principles, its easing of regulations, and its efforts to control over-consumption and to attract foreign capital by a high interest rate policy. Meanwhile, Brazil could usefully profit from the Korean consensus on sharing the pain and improving the flexibility of the labor market, which was reached through the agreement by tripartite committee made up of labor unions, management and government. This could be very helpful for a new take-off of the Brazilian economy. It would also be very meaningful if both our governments and central banks could engage in reciprocal exchanges of staff to study matters of concern, and then reflect the results of their studies in formulating monetary and economic policies.

Considering that flows of speculative funds deepened the financial instability, it would be very beneficial for both countries to exchange information on hedge funds which have a history of speculative manipulation.

In addition, if our respective financial authorities devise supportive polices so that companies which run businesses in the other country can raise funds smoothly, it will be helpful in building up a two-way flow of investment and stabilizing our financial markets.

Besides this, I suggest that both countries discuss the provision of funds to support the other country’s financial institutions where these have an operating presence in the host country or neighboring countries, in the event of either country facing a temporary lack of foreign exchange liquidity. For this, I hope that the Brazilian government will work to support Brazilian financial institutions advance into Korea just as Korea Exchange Bank now operates in Brazil.
SMEs in Mercosur and Korea: Searching for New Sources of Economic Development

Gilmar Masiero
Professor of the State University of Maringa

1. Introduction

Small and Medium Enterprises (SMEs) are again the central attention of researchers, policy makers and young businessmen. In South Korea, where a huge industrial restructuring process is underway, it is not difficult to distinguish the new role of SMEs played within this environment. In South America, especially in Brazil and in the Mercosur countries, after a decade of neoliberal reforms small companies became the main focus of government authorities and the private sector. In 1996 a large seminar on the subject was held in Sao Paulo, 1) and in 1998 another more focused in the Mercosur region was held in Curitiba. 2) Some of the discussions of these two seminars will be presented in this paper.

It is not easy to consider all the scope of SMEs. They are present in all economies of the world and have strong potential to innovate, raise employment and contribute to the economic growth of a cluster, region or a country. In Latin America, different from developed nations or some Asian countries, companies with less than 10 employees normally work under precarious conditions that constrain their potential for growth and development. In Brazil, for example, only


2) The Seminar on the Participation of Mercosur Micro-Small and Medium Size Businesses in Exports: Problemas e Solucoes was held in Curitiba, capital city of Parana, Brazil, on October 8 to 10, 1998, pursuant to decision of the Common Market Group.
24.55\% of the workers in the urban sector have formal jobs and 44.8\% are working in the informal sector or are just looking for a job.\textsuperscript{3}

The present transformations in the world economy, mainly the ones been carried out by information technology industries, are closing some opportunities while opening some others. On one side, unemployment around the world and the "precariousness" of jobs is a common fact. On the other side, the number of new technology based companies is growing faster than never before. Traditionally as well as technologically based SMEs represents more than 95\% of 4 millions legal companies in Brazil. They are the ones that invest, save, accumulate and hire more workers. The situation in Mercosur countries is not much different.

As one of the fastest growing industrializing country in the world, in Korea, SMEs is a legal and administrative term used to define companies which employ fewer than 300 persons and whose total capital amounts to less than US$ 66 million. There are 2.67 millions of companies that employ around 8.2 million workers. They compose 69.3\%, 46.3\% and 46.5\% respectively, of total employees, production and value-added activities.\textsuperscript{4} Together they are also responsible for more than 40\% of Korea's total exports. By contrast, just less than 3 \% of the exports from Mercosur countries come from SMEs. Is it possible to learn some lessons from the historical experience of export-driven strategy of the Korean SMEs?

Economic statistics are not sufficient to explain the strategic role of the SMEs in a national economy. The special role reserved for the SMEs is to build and to be a mediator in a democratic social and political structure. Economic growth and development of society should be carried out by all, especially by entrepreneurs, technicians and liberal professionals from SMEs sector. They normally form the middle classes that traditionally played an important role in stabilizing political democratic regimes. They are also the ones in Korea or in Mercosur that can work toward an increasing democracy in the spheres of politics and economics in Asia and in Latin America.

Historical experiences of development vary from country to country. By analyzing some statistical facts, the main purpose of this paper is to bring to the fore the similarities and differences between SMEs in Mercosur and in Korea. Strong emphasis is placed upon the experiences of the Mercosur member countries in their efforts to create and develop SMEs. In the first part of the paper, after discussing the difficulties in defining the small- and medium-size companies, the


restructuring of the production process is presented owed to the formation of Mercosur. Following is an analysis of the main problems related to the SMEs' difficulties to grow and to export. The last two points summarize the historical development of the Korean SMEs and the role industrial policies played upon them.

2. Defining Small and Medium Enterprises (SMEs)

Is it possible to define the SMEs? If we look forward, we can see North American, European and Japanese large companies. We can see GE, GM, IBM short abbreviations but of great power and interests; Siemens, Mercedes Benz, Volkswagen long established large companies or we can see the world known keiretsus: Mitsubishi, Toyota, Mitsui etc. But if we look backwards, it is not so difficult to find the Korean conglomerates like Samsung, Hyundai, Daewoo or other much smaller Brazilian companies like Petrobras, CVRD, Votorantin etc. Which of these companies is a large company?

How do we define a large, small- or medium-size company? Are they large because of their internal market as well as their international one? By simply examining from the largest to the smallest company, it will be difficult to answer the above questions. However, if the observation is made in the other direction, from the smallest to the largest company, several similarities can be found in the definitions of SME presented by government institutions or researcher all over the world. Table I describes few examples of possible classifications.

*(Table 1)* Classification of SME in Korea

<table>
<thead>
<tr>
<th>Industry</th>
<th>Small and medium enterprise</th>
<th>Small enterprise</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Employes</td>
<td>Assets amounts</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>300 or fewer emp.</td>
<td>less than 80 billion won</td>
</tr>
<tr>
<td>Transportation</td>
<td>300 or fewer emp.</td>
<td>no standard</td>
</tr>
<tr>
<td>Construction</td>
<td>300 or fewer emp.</td>
<td>no standard</td>
</tr>
<tr>
<td>Commerce</td>
<td>20 or fewer emp.</td>
<td>no standard</td>
</tr>
<tr>
<td>Other Services</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Framework Act on Small and Medium Enterprises.

In general, companies in Korea are classified as a SME if the number of employees in a company does not exceed 300. Further specific standard on the classification of SME is stipulated in Article 2 of the Framework Act on Small and Medium Enterprises. There are certain types of businesses that are classified as
small or medium even though the number of employees exceeds the above standard. Some labor-intensive businesses such as leather or fabric footwear, household or sanitary ceramic products, and parts and accessories for motor vehicles & engines belong to this exceptional category.

In capital-intensive industries, some companies that meet the standard on the number of employees are excluded from the small business category due to their exceeding capital assets. In case of not meeting the above standards, a three-year grace period is granted (Framework Act on Small and Medium Enterprises, Article 2). In terms of the number of employees due to the expansion of scale, the company is regarded as a SME for three years. However, the three-year grace period is not provided in the following cases: a) in the case of a merger with a SME which has already been granted a grace period; b) in the case of designation as a subsidiary of one of the 30 largest firms.\footnote{Hong, Soon-Yeong. Park, Jang-Hyuk. Park, Jong-Young. Status and Prospects of Small & Medium Enterprises (SMEs) in Korea. Seoul: Korean Small Business Institute, July 1999. 138p.}

As it is well-known in Korea, there are clusters of 5, 10 and 30 large conglomerates that represent one of the most concentrated industrial structure in the world. Through the selection of a small group of entrepreneurial families, the Korean government chose a development strategy of export-led growth from the early 1960s. Thus, economic development was pursued in this context. To push these strategies successfully, the Korean government initiated a heavy and chemical-oriented industrial policy in the 1970s. This, in turn, resulted in large enterprises playing a major role in terms of production, employment and exports.

In the 1980s, some serious imbalances between classes, regions and company sizes started surfacing due to more than a decade of large conglomerates-led economy. The industrial economic structure was completed but without a large SME sector to work as suppliers of the conglomerates. In the second half of the 80's they began to explore the international market more actively. Hence, it was in the 80's that the government started taking positive actions in promoting SMEs. In the 90's, it established well-designed policies and efficient execution systems. The Kim Dae-Jung administration has also proclaimed the 21st century as the "Age of SMEs" to overcome the economic crisis and achieve further market democracy.

On the other side of the Pacific Ocean, industrialization efforts based on the import substitution strategies were been pursued by South American countries. Brazil and Argentina were the two countries that reached the status of New Industrialized Countries in the 70's. With the "forced" industrialization process, SMEs flourished and have been doing their best to survive and grow. Their
contribution to economic growth in each country of those new industrializing economies differed from time to time as well as differed in each country. The definitions of SMEs were also contrasting as it is shown Table 2.

**Table 2** Classification of SME in Mercosur

<table>
<thead>
<tr>
<th>Sectors</th>
<th>Number of employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industry</td>
<td></td>
</tr>
<tr>
<td>Micro company</td>
<td>up to 19</td>
</tr>
<tr>
<td>Small company</td>
<td>29 to 99</td>
</tr>
<tr>
<td>Medium company</td>
<td>100 to 499</td>
</tr>
<tr>
<td>Services/Com.</td>
<td></td>
</tr>
<tr>
<td>Micro company</td>
<td>up to 9</td>
</tr>
<tr>
<td>Small company</td>
<td>10 to 49</td>
</tr>
<tr>
<td>Medium company</td>
<td>50 to 99</td>
</tr>
</tbody>
</table>

Source: Adapted from Gatto 1999.7

The above table presents only an overview of the multiple classifications that countries of the South Cone have for SMEs. The definitions are different from country to country as well as different depending on the institution even within the same country. Perhaps, the definitions of the Mercosur will become the standard for all member countries. The SMEs in Argentina, for example, are classified by broad economic sectors: industry, mining and fishing up to 300; commerce and services up to 100; transportation up to 300 and the agribusiness sector is by sales and not by persons employed.

A series of programs for SMEs under the Law 24.467 are implemented in Argentina. The central object of this law is to support the management of enterprises in having access to three fundamental aims: getting financial resources, improving quality and technology. All financial resources of this program should be directed to improve the competitiveness of companies to export more, create more jobs and growth. This financial support is given considering not only the basic aspects of sound economic principles, but also the organizational and technological aspects.

According to the law, the intervention criteria were established by a territorial

---

basis. It creates centers of sector and technical assistance and webs of companies. As an instrument for the implementation of the law, there is a Complementation Found of Operational Expense in the Consorcios, Societies of Reciprocal Guarantee, Suppliers Development Program, Unique Integrated System for Information and Consultancy to SMEs, the Export Enterprise Reconstruction Program (PREX) and the Restructuring Enterprise Program.

In Brazil, besides the broad definitions normally used by banks for credit concession reasons the National Congress recently approved the Estatuto da Microempresa.\textsuperscript{9} The more favored treatment of SMEs in Brazil by the Government is expressed in the articles 170 and 179 of the Federal Constitution. The recent voted law - Estatuto da Microempresa, establishes for micro companies and for companies of small size juridical and simplified treatment in the administrative, tax, welfare, industrial relations, credit and entrepreneurial development fields. It considers as micro companies the legal person or individual firm which annual sales are lower or equal to US$ 120.000.00 and, it regards a company of small size the one which receives between this value and US$ 60.000.

The main purpose of this new legislation is to motivate informal worker to become formal entrepreneurs and to reduce the high unemployment rates in Brazil. There exist consensus in the business and economics literature that the main purpose of SMEs is to create jobs and reduce unemployment rates. In this case, should we consider an individual person as a company? In this case perhaps not. But if this individual is a former manager controlling other subcontracting parts of a large company, can we consider him as small company or not?

Perhaps an appropriate definition or classification of SMEs is the one that takes into account at least three important things: number of employees, volume of capital and economic sectors. The main reason to consider economic sectors is the wide differences between them. A better definition can help develop and implement political and economic mechanisms to assist SMEs in improving not only their management capabilities, but also their technological innovation, fiscal, credit and financial aspects. Above all, they can also improve the quality of goods and life as well.

Because of downsizing and strong emphasis in outsourcing by the North American companies, definitions of size become more relevant than before, when companies were vertically integrated in all business aspects. To the quantitative aspects of a definition, we should add qualitative ones. A broad discussion should be carried out in this direction. A consensus about definitions should be reached.

\textsuperscript{9} \url{http://www.congressonacional.com.br/noticia/extra/esta_micr.htm}.
Companies like Amway, Avon, Coca-Cola are large or small? A dealer of the Hyundai Motor Co. in Brazil or even a small company working for the Modular Consorcio of Woskwagem should be considered small?

Not only quantitative and qualitative aspects should be considered in any definition of SMEs, but also the form in which they are organized. There are different schemes in organizing enterprises like the Japanese keiretsus or the Korean chaebols, which are clear examples that there are different ways to be a small or medium company. One is to be independent and work under the pressures of the market forces. The other one is to be coordinated by companies that once were considered small but now are considered large. Lean production, outsourcing, follow sourcing, just in time are common words of the restructuring process happening in the international production scenario.

Considering that everybody wants to be large or larger than others and participate in a more internationalized market each year, it is important for SMEs around the world to be present in all kind of restructuring industrialization process. Nowadays, these processes happen because of some financial crisis or by political decisions of different countries to join in regional integration agreements. Almost all countries want to build long-term perspectives and large common markets through regional integration agreements. It is important that SMEs pay attention to the restructuring process happening and take the advantage of them. They should also participate in the increasing volumes of international trade and foreigner investments. Besides, they should build a well-designed industrial policy to help them co-exist with the already large companies.

3. Market Integration and Technological Modernization

Mercosur was created with the Treaty of Asunción signed by Argentina, Brazil, Paraguay and Uruguay on March 26, 1991. Chile and Bolivia became associate members in 1996 and 1997 respectively. With a population of 220 million and a GDP of US$ 1.3 trillion in 1997, Mercosur is the fastest growing trading bloc in

---

the world. It experienced a trade growth of 400% in the period 1990-97. The actual implementation of Mercosur will not affect the special free-trade zones (Manaus, Brazil, and Tierra del Fuego, Argentina) organized in light of their special geographic situations. These two free-trade zones may continue normal operations until 2013.

Since the Asuncion Agreement and the Ouro Preto Treaty, SMEs of the South Cone have been looking for new horizons in a more competitive market context. Even though the external experience of the Mercosur companies is in its embryonic stage, it is easy to notice the presence of Brazilian products in Argentina’s market and vice-versa. Even though the interregional trades are growing faster than never, before it was difficult for companies in general to get into the existing distribution channels or build new ones.

Developing new distribution channels and the post sales services have been one of the most important problems to overcome by local and international companies operating in the Mercosur. An adequate positioning in the enlarged market of Mercosur is one of the key strategic factors for any company for not only improving its participation in the international markets, but also consolidating its position in the domestic one. Scale and specialization factors have been determinants in the success of any enterprise. The expanding demand created by the agreement between 4 countries in the South Cone has been rebuilding the hopes of a new cycle of economic development in the region.

Local SMEs have a few or no experience in international trade and FDI. They are not considering the Mercosur as their best opportunity for growing. Due to the import substitution strategy maintained for a long period in Latin American, local companies are suffering a painful transition and learning how to build capabilities to explore new market niches. When compared with companies from the developed countries, some of SMEs, due to the technological backwardness, are not even able to supply their traditional markets.

Searching for new external partners, mainly internationals, has traditionally been one of the most rational ways to activate businesses and looking for technological innovations. The efficient articulation of knowledge and multiple partners may enlarge the competitive capabilities of companies operating in the Mercosur market. These companies need to imitate and innovate in a way to reduce their contrasting differences with them and companies from developed countries.\textsuperscript{11)

\textsuperscript{10) http://mercosur.org.  
11) According to Linsu Kim in his book about South Korea technological development all the process of technological upgrading was based first in imitation and later in innovation.
The Brazilian imports in 1998, for example, came from EU (29.24%), U.S. (23.56%) and Japan (5.5%) [1.78 China and 1.72 Korea] and just 16.38% from Mercosur. In 1995, studying imports of capital goods for the industry: computers, communications equipment and machines of Argentina and Brazil, Gallo found that just 11.2% were from the Mercosur countries. Companies from the US supplied 25%, Germany 10%, Italy 10%, Japan 9% and Korea 5%. Major part of them was intracompany trade and even though the companies of the region are not so large, FDI in the Mercosur is one of the largest in the world.

The competitive advantages of companies come from the skills of managers in articulating the best of their internal as well external capabilities. In the production and commercialization process, tangible and intangible assets are incorporated in companies’ products. The first ones, as the work factor are easily tradable within national borders, but the second ones, as for example the productive experience of a company, are not. Even though the low cost of the first are important for the final performance of a company, they are not sufficient to sustain the economic growth in the long run.

In the long run intangible assets like innovation capacity, reliability or company image are more important than fixed and tangible assets. The dynamic competitive advantage, owed to the fast technological chances, comes from the technical and organizational changes. In competitive international markets, SMEs as well as the largest ones should adapt to the constant technological and organizational changing process.

By many reasons, some SMEs in the Mercosur region have been unable to follow the trend of changes which is hampering their growth. Some others are suffering from adapting to a new scenario where markets are opening and FDI is being invested. On one side, local companies are looking to the world and discovering how technologically backward they are. On the other side, international investments are internalizing new technical and organizational innovations. The main challenge of the SMEs in the South Cone is the capability of following the speed of its own changing.

The speed has been increased by the 90's new waves of FDI. "Green money" has been invested in buying State enterprises and building new technological advanced companies. According to Weiss, in the Brazilian automobile sector some of the strategic issues of the old and new assemblers are: a) technological modernization of cars produced in the country; b) reducing the number of direct suppliers of auto parts; c) modernization of all productive processes; d) intensively

---

buying from global suppliers and e) entrance into the Mercosul market.

〈Table 3〉 Automotive Planned Investments in Brazil: 1996/2000.

<table>
<thead>
<tr>
<th>Company</th>
<th>Investments (US$ million)</th>
<th>Capacity (units)</th>
<th>City</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiat</td>
<td>200</td>
<td>100,000</td>
<td>Betim</td>
<td>Minas Gerais</td>
</tr>
<tr>
<td>Ford</td>
<td>1,000</td>
<td>100,000</td>
<td>-</td>
<td>Bahia</td>
</tr>
<tr>
<td>GM</td>
<td>600</td>
<td>120,000</td>
<td>Gravati</td>
<td>Rio G. do Sul</td>
</tr>
<tr>
<td>Mercedez</td>
<td>400</td>
<td>70,000</td>
<td>Juiz de For a</td>
<td>Minas Gerais</td>
</tr>
<tr>
<td>Renault</td>
<td>750</td>
<td>100,000</td>
<td>S.J.Pinheis</td>
<td>Parana</td>
</tr>
<tr>
<td>Toyota</td>
<td>150</td>
<td>15,000</td>
<td>Indaiatuba</td>
<td>Sao Paulo</td>
</tr>
<tr>
<td>Honda</td>
<td>100</td>
<td>15,000</td>
<td>Sumare</td>
<td>Sao Paulo</td>
</tr>
<tr>
<td>Chrysler</td>
<td>315</td>
<td>40,000</td>
<td>Campo Largo</td>
<td>Parana</td>
</tr>
<tr>
<td>BMW</td>
<td>150</td>
<td>15,000</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Audi/Volks</td>
<td>500</td>
<td>60,000</td>
<td>S.J.Pinheis</td>
<td>Parana</td>
</tr>
<tr>
<td>Asia</td>
<td>500</td>
<td>60,000</td>
<td>Camacari</td>
<td>Bahia</td>
</tr>
</tbody>
</table>


From the point of view of industrial organization, the automotive sector is one of the most highly concentrated in the world. Just 10 companies are responsible for 70% of more than 51 millions cars produced each year. It is also one of the most integrated. Argentina and Brazil are the only two South American countries to host international cars makers. With investments of more than 10 billions dollars in the second half of the 90’s, car-makers in Brazil want to produce 2.05 millions units a year in the turn of the millenium. In the Brazilian case, a special Automotive Regime was established in 1993. It stimulated companies to produce small cars and 1 million car units produced in 1992 almost doubled in 1997. Table 3 shows the investment plans in the automotive sector in Brazil.

The automotive industries are the leading ones in terms of industrial organization and technological development. In some sense, the ones from the US are following the mass production style of building cars. The ones from the east, the Japanese and the Korean ones, are worldwide known as the lean production manufacturers.  

Toyota Co. and have been emulated by other companies since the 80's. The Japanese *keiretsu* or the Korean *chaebol* structures of organizing the production in a wide range of aspects are different than the individual western companies.

The mass production companies are normally vertically framed while the lean ones are horizontally integrated. The first concentrates financial, research and development activities demanding SMEs to produce as required by the lowest price, the price established by market competition. The second coordinates a group of SMEs of different sizes organized in a hierarchical order to develop all the auto parts to be assembled by the main company. Being a SME supplier of one system or another is the best way to participate in maybe the longest and more advanced production chain in the world.

Even though the cooperative structures and competitive strategies of the Japanese enterprise system\(^\text{14}\) appears to be superior to the western model, Brazilian and Argentina auto assemblers are looking for global suppliers. The main motivation to look for global auto parts is to incorporate technological development in their final products. International large or SMEs are the most capable to associate high standards of technological capacity with large scale of production. Some of them are supplying assemblers from their native countries some others are following the assemblers and establishing new facilities in the Mercosur region.

The Brazilian automotive restructuring process of the 90's in some way is responsible for the reconfiguration of industrial production in the country. The mass production companies are searching low labor cost in different states of Brazil. They are also enjoying the fiscal benefits of the Automotive Regime building their facilities in Rio Grande do Sul, Parana or Bahia instead of in the traditional ABC paulista region. Perhaps to be close to the final consumer market and the already established suppliers, Japanese assemblers are building their factories in the interior of Sao Paulo.

The adjacency of traditional industrial areas is no longer the reason for mass production companies to establish their facilities. Most of the assemblers or auto parts makers are establishing their factories to explore the advantages of the Automotive Regime as well as the expanded Mercosur market. Following the positioning strategies of one or another large international company, be it of the automotive sector or not, seems to be the most rational decision of any local or international SMEs. The second best decision seems to be the specialization and integration within social and economic behavior that benefits the collective growth.

---

This behavior is been built in the Mercosur region where local SMEs are just at the beginning of their internationalization process. They are just recovering from the one side while abruptly opening market strategies of the 90's. They are discussing their main problems and possible solutions in order to be more competitive and internationally integrated thought trade or FDI.

In the context of an open market with strong competitive pressure, SMEs will survive just in case they are specialized to take advantages of scale and grow levels of productivity. They should also strengthen their reciprocal complementary in the labor division as an indispensable part of their own specialization process. All this process should have the group effectiveness as the core final goal. Besides, they should share the eager to innovate and grow together as partners. SMEs companies are too insignificant in the internationalization process not to accept acting with other companies and institutions.

The largest and more important institutional innovation in Latin America has been the creation of the Mercosur. The regional integration in the South Cone has been searching three main goals: a) to consolidate democratic political systems in the region; b) to restructure productive systems and renovate the infrastructure and c) to ease the flow of international trade and capital.

Following these objectives, exports became one of the potential economic activities of countries and companies in the Mercosur market. All statistics, analysis and studies are clearly showing that trade between the countries of Mercosur has been increasing significantly in recent years. In the next millenium companies will be more and better positioned in value-added production chains. After countries and companies can recover from the recent financial crisis, a new balance between big and SMEs will be reached and everybody can be part of a win-win game.

The regional integration cannot be thought as an end in itself. It should be thought as the most adequate means for member countries to be capable to offer to their residents better products with higher quality and lower prices. The industrialization efforts of the past cannot be lost and companies operating in Mercosur should increase their participation in the international chains of production and commerce. The integration should expand the links with the most dynamic economies to rapidly restructure the production system.

Besides been integrated in international production chains, SMEs companies can also explore their local knowledge to take better care of the post sales activities. Traditional as well as new local companies operating in the region have more implicit knowledge of the market trends and tastes. They are the ones that, even though are not technologically advanced in the production field, have experienced in creating business in the region. Some of their main problems and recommended
possible solutions have been recently much discussed in the Latin American context, which are described in the next item.

4. Main Programs and Policies of SMEs in the Mercosur Market\textsuperscript{(15)}

To better explore the new opportunities that the regional integration process as well as the technological modernization led by foreigner companies, a lot of activities have been taking place. Searching for new forms of cooperation and promotion of old ones has been the daily activities of public and private authorities of the sphere of the Mercosur. Because the size of their economies experiences in Brazil and Argentina are the most visible ones.

Some examples from Brazil can be briefly described. In the exporting sector, the government established the goal of improving 100 million dollars the value of its exports by the year 2002. As nowadays the amount is half, a great effort should be done to improve the number of exporting companies as well as exporting products and services. There are thousands of companies that export in Brazil but just a few are responsible for last year 52 millions dollars in exports.

To encourage exports, there are some programs that are trying to give more consistency to the government policies and objectives. They have been implemented by government or non-governmental institutions closely related to assist the SMEs. The close cooperation between them and the SMEs has been increasing recently. Due to this, some hope of success in the micro level seem to be increasing faster than the ones related to the macro level. The macroeconomic level is intensively pressured by internal and external government debts and international flows of hot money.

Even though the scale of the programs are not large enough, one of the most visible program related to explore new market niche based on local capabilities is the New Exporting Poles been carried out by SECEX.\textsuperscript{(16)} The program aims to improve the exports and technological modernization through import of machines and equipment freer from taxes, in ten out 24 priority sectors. The ten priorities are: leather products, shoes, chocolate and sweets; textiles, cosmetics, fruits and juice; jewels and semi-jewels, furniture, ceramic products, and ornamental stones.\textsuperscript{(17)}

Why new poles of exports and in this sectors? Because they are located outside of the metropolitan areas in small cities or micro regions with strong potential to

\textsuperscript{15} When not mentioned this item is based in the two seminars quoted in note 1 and 2.

\textsuperscript{16} In Portuguese: Novos Polos de Exportacao - SECEX - Secretaria de Comercio Exterior do Ministerio da Industria, do Comercio e do Turismo.

\textsuperscript{17} http://www.mdic.gov.br/secex/scindex.htm.
jump for the relative isolated geographical influence to the international market. The variety of chosen products indicates that not only the predominance of small companies in the cities, but also their geographical position matters. Ornamental stones are close to mines, furniture close to wooden, fruits and juices close to large extensions of land etc. The current advancements in the logistic sector, mainly the ones related to transport, are reducing the distances and time from the local production to final consumption.

In the 90's, the emphasis in Quality Management has also been stimulated. The Brazilian Program of Quality and Productivity wants to improve the quality in 20% of all activities till the end of 2000. The program aims to create a sustainable exports mentality in the country. The results are already optimistic and the program is been extended to others sectors of activity and not just the industrial ones. Improving not only the quality of goods and services, but also the quality of management has been the central focus of this national effort. There is strong consensus in the literature and government authorities that the low quality of management is one of the main bottlenecks of the SMEs development process.

The country presently has the 6th greatest rate of growth in the number of companies certified by quality certificates according to the rules of ISO 9000. Only 18 of them had the certification in 1993, and at the beginning of 1998 the number was almost 2500. The Brazilian infrastructure for ISO 14000 certification was implanted almost at the same time that in developed countries. At the end of 1997, more than 20 companies were already certified. There was also an increase in C&T expenditures in the country. From just 0.7% of GNP, more than 10 billion dollars were invested in 1997, the equivalent of 1.2% of the GNP. It is estimated to reach to 1.5% before 2000.\(^\text{18}\)

Other programs closely related to very small companies or poor families are implemented: the Family Agriculture National Program, the Employment and Income Program and the SEBRAE's Guarantee Fund. Even though it is more direct to finance large projects of big companies, there is also the Competitiveness Promotion Collateral Fund at the BNDS. This Brazilian development bank, which traditionally directed its action toward large projects, is becoming more conscious of the pressing necessity to support SMEs in their financial troubles.

Brazil is not alone in the effort to restructure its industrial sector and be more competitive and integrated in the international scenario. Argentina, the second largest economy of South America, is doing the same. One of the most visible programs being implemented is the Exporting Restructuring Entrepreneurial

Program that aims to increase and consolidate the Argentina’s economy in the world market.

There are expectations that the results of the Program will show an increase in the exports of more kinds of products and in the number of companies operating with the external market. The Program was designed to help SMEs have potential capacities to enter in the international market. For SMEs reaching external markets in better conditions, technical assistance, information and commercial promotion are also considered in the initiative.

The program assists the development of exports co-financing the needed consultant services for projects that aims to improve or just start activities toward international market. It is also co-financing the improvement of companies that works close to the exporting sector as market research companies, quality management and ISO’s certificate consultants etc. It also helps restructure the public sector that deals with the external trades and investments.

This program is the main mechanism which the Argentine government has to modernize the external trade. The financial resources have been coming from different sources and directed toward five lines of action: a) Productivity improvement through cost reductions, b) Improvement of quality control methods, c) Innovation and modernization of products, c) Development of new markets, d) Development of projects and, e) External trade promotion.

An interesting aspect of the program is selecting companies with export potential capacity, help them to select consultant and other services and gives back 50% of the exporting expenses. It is the primary goal to build and consolidate the Argentina’s SMEs (companies with the annual amount of sales of less than 20 millions dollars). Around 90% of the projects already financed are oriented to explore a new country or a new market. Mercosur is the final destination of 46% of the total exports of the program and other Latin American countries, NAFTA and EU with 16%, 15% and 14% respectively are the others recipients of exports.

Aside from this important program, there are some others that simplify tariffs, promote exports like the Pymexport and also one that was designed to help women entrepreneurs, the Pyme Mujer. All the above programs have been implemented in Argentina, Brazil or even the ones not mentioned Paraguay and Uruguay are motivating SMEs to modernize and become more present in the international market. Most of them are strong indicators of the inexperience of the countries in exporting activities. Even though exporting activities are similar than the importing ones, selling in a competitive market is much more difficult. Some of the main problems and recommended actions to overcome the difficulties are listed in the Table 4.
### Table 4: Main problems of SMEs in the Mercosur

<table>
<thead>
<tr>
<th>Problems</th>
<th>Recommended actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bureaucracy in the borders</td>
<td>Simplifying the bureaucratic mechanisms for exporting and importing; to facilitate technological, marketing and financial cooperation strategies of companies in the Mercosur; to facilitate the international traffic of trucks; borders authorities should respect the agreements and stimulate other means to mediate conflicts through conciliation, mediation, negotiation and arbitration.</td>
</tr>
<tr>
<td>Bureaucracy in registering a company</td>
<td>To simplify the mechanisms to get a company registered; to facilitate the international cooperation. Investments should not be tributed. Taxes only to final products and not for productive inputs.</td>
</tr>
<tr>
<td>Technology</td>
<td>To stimulate technological transfer mainly between companies of different countries. Do surveys to identify companies that want to transfer or receive technology; to build a database of supply and demand of technology. To identify institutions and their main mechanism to technology transfer. Stimulate SMEs to participate in circles of invention and innovation.</td>
</tr>
<tr>
<td>Training and development</td>
<td>To stimulate universities, faculties, research centers to define programs for training technical and managerial skills. To disseminate plans, projects and programs which helps the modernization of SMEs.</td>
</tr>
<tr>
<td>Information</td>
<td>Consolidate database of exports and imports of SMEs and industrial complementary opportunities. Subcontracting possibilities. Promote systematic actualization and utilization of the information available to consolidate business. Dissiminate information and how to use it. Eg. Manual of opportunities in Mercosur and how to export to it.</td>
</tr>
</tbody>
</table>

Participation of Micro, Small and Medium Companies in Mercosur Exports: Problems and Solutions.


<table>
<thead>
<tr>
<th><strong>Table 4</strong> continued</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Financing</strong></td>
</tr>
<tr>
<td>There are just a few financial mechanisms to help SMEs. There are no innovative ideas to develop new entrepreneurs. No guarantees to leverage investments and loans.</td>
</tr>
<tr>
<td>To systematize financial mechanisms for SMEs. Create alternatives to finance new entrepreneurs and innovative ideas that contribute to develop a large number of new businesses. Built different modalities of financing according to strategic sectors and size of companies. To viabilize new credit and collateral funds.</td>
</tr>
<tr>
<td><strong>Market and Export Promotion</strong></td>
</tr>
<tr>
<td>To much bureaucracy for new exporters. No enough knowledge about the exporting paths. Few information about market opportunities. No dissimination of the available information to SMEs.</td>
</tr>
<tr>
<td>To simplify and rationalize the export procedures. To develop studies and projects to search niche markets and complementarity opportunities between companies of different sizes. To stimulate universities, faculties, consultants and students to develop studies to discover new business opportunities. Stimulate new international cooperation initiative brought consorcius, joint ventures, clusters, teamnets, networks.</td>
</tr>
<tr>
<td><strong>Production</strong></td>
</tr>
<tr>
<td>Difficulties for SMEs to produce with standards of quality, productivity and scale that can be competitive in the national and international market.</td>
</tr>
<tr>
<td>To facilitate for SMEs to access technological mechanisms that can help to introduce new management techniques and improvements in scale, quality, productivity and standards of competitiveness.</td>
</tr>
<tr>
<td><strong>Classification of Micro, Small and Medium Company</strong></td>
</tr>
<tr>
<td>There are no reliable information and studies about the role of the SMEs in Mercosur countries. Everybody says that SMEs are very important but the information and data to prove it is lack</td>
</tr>
<tr>
<td>To develop studies to mensurate and evaluate the real participation of the SMEs in the social and economic development of the nation and the national market.</td>
</tr>
<tr>
<td><strong>Integration</strong></td>
</tr>
<tr>
<td>There are necessities of identification of complementarity entrepreneurial opportunities in the national as well international level. Almost nobody knows nothing about the international entrepreneurial cooperation mechanisms.</td>
</tr>
<tr>
<td>To identify partnership opportunities, alliances, and business complementarities that stimulate the creation of new companies. To stimulate mental changing processes which can help to develop new business cooperation strategies as development mechanisms instead of isolated actions.</td>
</tr>
</tbody>
</table>

Source: Seminar held in Curitiba, Parana, Brasil, October 8, 1998 (see note 2).

All the above listed problems show the lack of experience in international trade of the SMEs in the Mercosur. The suggested solutions can be summarized
in few words: an export-led culture should be promoted. In this direction, it is recommended the mobilization of private entrepreneurs and the sharing of information between all economic agents. They should be stimulated to form

<table>
<thead>
<tr>
<th>(Table 5) SMEs Recommended Policies to Improve Competitiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small and Medium Companies: A Strategic Challenge for Globalization</td>
</tr>
<tr>
<td><strong>Politics:</strong></td>
</tr>
<tr>
<td><strong>Institutional Aspects</strong></td>
</tr>
<tr>
<td><strong>Taxation and Legal Aspects</strong></td>
</tr>
<tr>
<td><strong>Financing</strong></td>
</tr>
<tr>
<td><strong>Technical Assistance:</strong></td>
</tr>
<tr>
<td><strong>Human Resources</strong></td>
</tr>
<tr>
<td><strong>Associationism</strong></td>
</tr>
<tr>
<td><strong>Information</strong></td>
</tr>
</tbody>
</table>
Cooperation

The main motivation of the seminar was the role of International Technical Cooperation for promoting exchanging SMEs experiences. It was recognized important and of great utility. There was consensus between the participants that priority actions toward SMEs should be done by national organisms. These should be helped by other regional and international institutions.

Integration

The structure of a Cooperation Program should consider not only strategies but also connections between the SMEs and the present opportunities. The mechanisms to help and promote improvements in the SMEs sector and the diffusion of successful exchanged experience should be available to all interested individuals. Everybody should be involved in the formulation of a regional cooperation program for SMEs. A working group integrated by the Brazilian Cooperation Agency (ABC) CLAMPI, OLA MP, PNUD and SELA to formulate regional projects and programs was established. All these programs and international organisms like CEPIAL and ESCAP should be more integrated. The establishment of a Mercosur Working Group was also suggested.

Source: Seminar held in Sao Paulo, Sao Paulo, Brasil, October 28 to 31, 1996 (see note 1).

associations, consortiums and any other kind of collective joint effort toward the external markets. More credit funds not only for exports, but also to invest in technological innovation should be provided to SMEs. All international, regional or national institutions should act in a coordinated manner to build this export culture and help companies to be more competitive and internationalized.

These recommended measures are not much different than the ones proposed in another seminar about the globalization process of the SMEs held in Sao Paulo. It was coordinated by SELA - PNUD, and the Brazilian Government through the Brazilian Cooperation Agency (ABC) and the Brazilian for Supporting Micro and Small Companies (SEBRAE). The main results of those discussions are presented in the Table 5. The main problems related to SMEs in the Mercosur or Latin American context are summarized to show that the integration process of the Mercosur SMEs in the world economy is just at the beginning of a continuous collective effort.

From the expositions of national and international representatives in the above and others seminars about SMEs, it is not difficult to see that SMEs in different countries have many similarities. They have a large impact on the economies; they can be a kind of mattress for macroeconomic crises; they are an important source of growth for exports and for the economy as whole. Normally SMEs are more flexible than the larger ones and support the success of them. They are also the
most innovative.

However, SMEs have been traditionally suffering from some problems that lessen their positive impacts on the economy growth of a country or region. Inadequate credit lines or lack of it, is one of the main problems. This makes SMEs to rely too much on self-generated funds and short-term bank loans. Even though it is hard to know how much equity funds are sufficient to expand economic activities, there is a consensus that for the Mercosur companies it is insignificant. Korean SMEs, for example, normally have 350% of equity ratio while the ones in South America just around 75%.

In SMEs, there is also a lack of managerial and organizational skills. Research and development resources are non-existent or are not enough to systematically explore new opportunities. They lack of the information that larger companies have and are not eager to share it and they normally suffer from the lack of attention by government institutions. On this particular point, there is great consensus that government and regional policy can have a great effect on SMEs. As one of the most emphasized political suggestions in the two seminars was the necessity of a new industrial policy toward to SMEs, it is interesting to describe, in the next item, the Korean SMEs industrial policy experience.

5. Development Process of Korean SMEs\(^{19}\)

In general, there are two broad industrialization strategies that countries can adopt to promote the development of SMEs. Following Yeo-Gyeong Yun,\(^{20}\) one is to create as many industries as possible and help them survive in their first stages of development. The other is to create and help industries to grow through import substitution for domestic market and eventually export promotion for the international market. The Korean industrialization experience is a well-balanced model of the second approach.

There is no quick method for promoting SMEs. Regardless of its size, the prerequisite for success is its ability to penetrate into expanding markets, to secure


steady sources of raw material, to acquire reliable production know-how and technology. Besides this, the most important factor is to build management capabilities. Therefore, in order to build a large and strong SMEs sector in an economy, governments must establish the required social infrastructure, including technical training, engineering extension services and R&D facilities. This was realized during the fast industrialization period of the Korea economic growth.

The real growth of the Korean economy started from the early 60's. The Korean government changed the direction of economic policy, placing importance on stabilization into one with a rapid growth strategy focusing on industrialization under the control of government. For its industrialization strategy, the Korean government moved from an import substitution into an export-oriented policy. Due to this export-oriented and high-speed development policy, the Korean economy was able to start growing very rapidly centering around the manufacturing industry.

At the beginning of the 70's, the Korean government changed its macroeconomic policy by focusing more on heavy and chemical industry rather than light industry. As a result of those changes, the primary industry rapidly shrank and the industry structure was promptly revamped. While the 1970s was the period of the Korean economy's high growth, the 1980s can be considered that of economic restructuring and stable growth.

The annual economic growth hit 9.6% in the 1970s; however, this time Korea confronted worsening imbalance in macroeconomics. Thus, the Korean government implemented a very strong economic stabilization policy from the end of the 70's up until the early 80's. This stabilization policy helped the Korean economy revitalize. And Korea became able to enjoy high economic growth due to such advantages as low US dollar, low interest rate and low oil price.

When considering the Korean economy of the 90's, one sees a transformation period of distorted industry and market structure that resulted from excessive investment in heavy and chemical industry along with preferential development policy for specific industries. As of 1997, the proportion of agriculture, forestry and fishing industry was down to less than 6% of GDP. However, the share of manufacturing industry also dropped. The ratio of manufactures to GDP was the highest at 32% in 1988, then gradually dropping to 25.7% in 1997. Instead, much more weight was given to construction/electricity industry, and the service industry including wholesale/retail trade, restaurants/hotels, transport/storage/telecommunication, finance/insurance, real estate/business services, community/social/personal service, import duties and others.

Now the Korean government is aggressively pursuing financial and corporate
restructuring to overcome the financial and foreign currency crisis, which occurred in 1997. The Korean government is also actively carrying out the internationalization of their economic system and improvement on customary economic practices. The changing industrial structure of the Korea economy can be easily seen in the Table 6.

(Table 6) Percentage Share of GDP by Industry (in %)

<table>
<thead>
<tr>
<th>Year</th>
<th>Agriculture, Forestry and fishing</th>
<th>Mining &amp; Manufacturing</th>
<th>Construction, electricity</th>
<th>Service</th>
<th>Government &amp; Private non-profit services</th>
<th>Manufacturing Structure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Manufac-</td>
<td></td>
<td></td>
<td>Government &amp; Private non-profit services</td>
<td>Manufacturing Structure</td>
</tr>
<tr>
<td></td>
<td></td>
<td>turing</td>
<td></td>
<td></td>
<td>services</td>
<td>Light Ind.</td>
</tr>
<tr>
<td>1953</td>
<td>47.3</td>
<td>10.1</td>
<td>9.0</td>
<td>2.6</td>
<td>40.0</td>
<td>-</td>
</tr>
<tr>
<td>1955</td>
<td>44.5</td>
<td>12.6</td>
<td>11.6</td>
<td>3.6</td>
<td>39.3</td>
<td>-</td>
</tr>
<tr>
<td>1960</td>
<td>36.8</td>
<td>15.9</td>
<td>13.8</td>
<td>4.1</td>
<td>43.2</td>
<td>-</td>
</tr>
<tr>
<td>1965</td>
<td>38.0</td>
<td>20.0</td>
<td>18.0</td>
<td>4.7</td>
<td>37.2</td>
<td>-</td>
</tr>
<tr>
<td>1970</td>
<td>26.6</td>
<td>22.5</td>
<td>21.0</td>
<td>6.6</td>
<td>34.8</td>
<td>9.4</td>
</tr>
<tr>
<td>1975</td>
<td>24.9</td>
<td>27.5</td>
<td>25.9</td>
<td>5.9</td>
<td>33.3</td>
<td>8.4</td>
</tr>
<tr>
<td>1980</td>
<td>14.7</td>
<td>29.7</td>
<td>28.2</td>
<td>10.1</td>
<td>36.0</td>
<td>9.5</td>
</tr>
<tr>
<td>1985</td>
<td>12.5</td>
<td>30.5</td>
<td>29.3</td>
<td>10.6</td>
<td>37.0</td>
<td>9.5</td>
</tr>
<tr>
<td>1990</td>
<td>8.7</td>
<td>29.7</td>
<td>29.2</td>
<td>13.7</td>
<td>38.2</td>
<td>9.7</td>
</tr>
<tr>
<td>1991</td>
<td>7.7</td>
<td>29.0</td>
<td>28.5</td>
<td>16.0</td>
<td>37.6</td>
<td>9.7</td>
</tr>
<tr>
<td>1992</td>
<td>7.4</td>
<td>28.1</td>
<td>27.8</td>
<td>15.9</td>
<td>38.2</td>
<td>10.4</td>
</tr>
<tr>
<td>1993</td>
<td>7.0</td>
<td>27.3</td>
<td>27.0</td>
<td>16.2</td>
<td>38.9</td>
<td>10.5</td>
</tr>
<tr>
<td>1994</td>
<td>7.0</td>
<td>27.2</td>
<td>26.8</td>
<td>15.8</td>
<td>39.4</td>
<td>10.5</td>
</tr>
<tr>
<td>1995</td>
<td>6.5</td>
<td>27.1</td>
<td>26.8</td>
<td>16.2</td>
<td>39.6</td>
<td>10.5</td>
</tr>
<tr>
<td>1996</td>
<td>6.3</td>
<td>26.1</td>
<td>25.9</td>
<td>16.8</td>
<td>39.9</td>
<td>10.9</td>
</tr>
<tr>
<td>1997</td>
<td>5.7</td>
<td>25.9</td>
<td>25.7</td>
<td>16.9</td>
<td>40.1</td>
<td>11.2</td>
</tr>
</tbody>
</table>


The growth rate of the manufacturing SMEs during the 60’s was only half the amount recorded in large manufacturing enterprises in all factors including number of establishments, number of employees, gross output, value of shipments and value added. The manufacturing SMEs in the 70’s continued to grow less than the large manufacturing enterprises due to the Korean government’s heavy and chemical industry promotion policies that benefited to large enterprises.

From the 80’s, the manufacturing SMEs exceeded the large manufacturing enterprises in all growth indicators as a result of the government’s active SME promotion policy to remedy structural imbalance steaming from the government’s
large enterprise preference policy. From the 90's, the manufacturing SMEs continuously showed higher growth rates than the large manufacturing enterprises while the large manufacturing enterprises showed negative growth rates in the number of establishments and employees.

This development process in the manufacturing SMEs can be explored further by analyzing and comparing with the large manufacturing enterprises with respect to contribution to Korean economic growth as shown in the Table 7. In the 60's, Korean manufacturing SMEs contributed 94.0% in the increment of total manufacturing establishments. However, they contributed less than 40% in terms of growth in employment, gross output, value of shipments and value-added due to the government's export-oriented policy favorable to large enterprises, while the large manufacturing enterprises contributed with more than 60% during the cited period.

(Table 7) Contribution Ratios to Economic Growth by Firm Size (in %)

<table>
<thead>
<tr>
<th></th>
<th>Contribution rate&lt;sup&gt;1&lt;/sup&gt;</th>
<th>1960s (63-69)</th>
<th>1970s (70-79)</th>
<th>1980s (80-89)</th>
<th>1990s (90-97)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of establishments</td>
<td>SMEs&lt;sup&gt;2&lt;/sup&gt;</td>
<td>94.0</td>
<td>93.1</td>
<td>99.6</td>
<td>101.6</td>
</tr>
<tr>
<td></td>
<td>Large firms</td>
<td>6.0</td>
<td>6.9</td>
<td>0.4</td>
<td>-1.6</td>
</tr>
<tr>
<td>No. of employees</td>
<td>SMEs</td>
<td>38.1</td>
<td>45.3</td>
<td>89.2</td>
<td>3.4</td>
</tr>
<tr>
<td></td>
<td>Large firms</td>
<td>61.9</td>
<td>54.7</td>
<td>10.8</td>
<td>96.6</td>
</tr>
<tr>
<td>Gross output</td>
<td>SMEs</td>
<td>26.5</td>
<td>32.1</td>
<td>44.6</td>
<td>48.4</td>
</tr>
<tr>
<td></td>
<td>Large firms</td>
<td>73.5</td>
<td>67.9</td>
<td>55.4</td>
<td>51.6</td>
</tr>
<tr>
<td>Value of shipments</td>
<td>SMEs</td>
<td>26.7</td>
<td>32.2</td>
<td>44.5</td>
<td>48.4</td>
</tr>
<tr>
<td></td>
<td>Large firms</td>
<td>73.3</td>
<td>67.8</td>
<td>55.5</td>
<td>51.6</td>
</tr>
<tr>
<td>Value added</td>
<td>SMEs</td>
<td>25.7</td>
<td>35.5</td>
<td>46.9</td>
<td>47.1</td>
</tr>
<tr>
<td></td>
<td>Large firms</td>
<td>73.3</td>
<td>64.5</td>
<td>53.1</td>
<td>52.9</td>
</tr>
</tbody>
</table>

Note: 1) The contribution ratio is the percentage share of each enterprise to total increasing quantity. 2) 5-299 employees.


Given the government's heavy and chemical industry development policy favorable to large enterprises, the manufacturing SMEs, likewise, in the 70's, contributed to only the growth in number of establishments, whereas the large manufacturing enterprises contributed 55~70% to the growth in employment, gross output, value of shipments and value-added during the same period. Beginning
of the 80’s, the government started supporting SMEs in order to reform the worsening economic distortion, which in fact resulted from the government’s policy of favoring large enterprises, and boosted SMEs to take a more important part in contributing to economic growth. Regarding job creation, the contribution ratio of the manufacturing SMEs was only 38.1% and 45.3% in the 60’s and in the 70’s, respectively.

However in the 80’s, they showed a high contribution ratio of 89.2% in the number of employees, indicating that SMEs started fully playing their intrinsic role of job creation. In addition, the contribution ratios of the manufacturing SMEs to the growth in gross output, value of shipments and value added were in the level of 45~47% in the 80’s, far higher than 25~35% recorded during the period of 60’s and 70’s, respectively. This seems to be that well designed industrial policies to support SMEs are one of the most important promoting factors of economic development of a country.

In the 90’s, as observed in the 80’s, the contribution ratios of the manufacturing SMEs to the growth in gross output, value of shipments and value added continued to grow. However, due to the concentration of economic power in large enterprises, the contribution ratio during the cited period stayed under 50%. Significantly, large manufacturing enterprises recorded minus 96.6% in the growth of employment, which implies that they continued to show the rapid plunge in growth in employment.

Looking at the number of establishments and employees in the 80’s and 90’s it is easy to formulate hypothesis about the downsizing restructuring trends of the large companies. For some, the era of large companies is over but for others SMEs are just becoming more important in the economic growth process of the Korean economy. As shown above, Korean SMEs made a great contribution to Korean economic growth and continued to develop. As a result, following Hong et.al, SMEs (1~299 employees) accounted for 99.1% in the number of establishments and 74.4% in the number of employees in all industries.

6. Korean SMEs Exports and Foreign Direct Investment (FDI)

All this transformations in the Korean industrial structure was supported by policies for promoting SMEs. In the late 70’s and during the 80’s the Korean government has played an active role in establishing the institutional infrastructure and policies measures aimed at encouraging SMEs. According to Yun,21) the more

---

important elements of the institutional and policy framework are the Small and Medium Industry Promotion Corporation (SMIPC), Korea Institute for Economics and Technology (KIET), Research and Development Institutes and the Development of Venture Capital financing.

The Small and Medium Industry Promotion Corporation was established in 1979 as a government agency to provide management and technical extension services and training. It provides financial assistance to enterprises in the form of loans for the purchase of production equipment and facilities and for working capital at slightly more favorable terms than those of commercial banks. It operates a business start up program under which new businesses are given financial assistance for the commercial use of innovative technologies and development of new products.

Another government-sponsored autonomous economic research institution and technical information service center, the Korean Institute for Economic and Technology (KIET), was established in 1982. Its major activities consist of area and industry studies as well as information dissemination and business consulting services. Besides research and industry studies at national and international level, KIET provides consulting activities covering technology, marketing and financing in cooperation with some other major economic and financial institutions.

Maybe one of the strongest role in supporting the Korean technological upgrading was done by KIST Korean Institute of Science and Technology funded in the 60's as a joint project between the US and Korean government. In the 80's, the government encouraged the larger organizations to established their own research facilities and redirect the action of KIST. It changed the name to KAIST introducing the word "Advanced" and concentrates on long-term applied research for the development of new and advanced technologies, such as new materials, bioengineering, electronic devices and new chemical processes to conserve energy and materials.

Due to the increase in the need of technical services and in order to carry out short-term applied research activities especially for SMEs, the government decided to established research institutes in the fields of electronics, telecommunications, energy, natural resources, chemical and mechanical engineering. Besides the research institutes created in the 1980s, research associations promoted by the government agencies to solve their common problems were fundamental to help consolidate the SMEs sector. Under the associations, costs and results of R&D has been shared by associated members.

Not only technological but also legislation aspects contributed to the growth and development of Koreans SMEs. During the 80's the Korean government was
active in passing various laws in support of SMEs. The laws included mechanisms to facilitate the purchase of goods produced by smaller companies (1981), to reserve certain businesses for small to medium-sized firms (1982), to provide finances for these companies (1983), to guarantee fair trade in subcontracting (1984), to support localization of machinery, components, and materials (1986), and to encourage new ventures (1989).22)

The 80's was a prosperous era for SMEs and led to the increasing significance of their role in Korea's industrialization. In 1994, new special measures to assist the SMEs was implemented by the Korean government. At this time the policies were oriented toward the development of SMEs in the interior to get a more balanced regional development. The new government economic plan stressed the creativity and the popular participation in the country's development. A series of new programs were implemented.

The most commented programs are: the structural readjustment; the improvement of competitiveness and quality of products; expanded access to the domestic market through collective contracts, subcontracting, transference of business lines from the large to SMEs, building warehouses and keeping a fair behavior between large and small companies. Through the action of the national and local governments, the access to financial, human resources development, start up new companies and internationalization of SMEs programs was more intensively promoted.

The government as well as the SMEs efforts of the 80's and 90's resulted in the consolidation of the small and medium industry sector. Korean SMEs that typically exported less than 20% of their output in the 60's and 70's became more internationalized in the 80's and exports increased to more than 40% in the beginning of 90's. Korean exports in the 1990s continued growing every year. However, in 1998, under the IMF intervention, Korea recorded minus 2.8% in export growth. This shrinkage in exports was more significant in large companies that showed minus 4.2% in export growth in 1998, while SMEs recorded minus 1.0% during the same year. Table 8 shows the increasing participation of the SMEs in the total Korean exports.

In the early 90's, the former protectionist government polices began to shift toward a new policy intended to foster self-reliance among SMEs. The government started to support than to meet the challenges of liberalization and globalization. Strong emphasis has been placed on technology development, automation and

Table 8 Exports by Size and by Year

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>82,236 (7.3)</td>
<td>96,013 (16.8)</td>
<td>125,038 (30.3)</td>
<td>129,715 (3.7)</td>
<td>136,164 (5.0)</td>
<td>132,313 (-2.8)</td>
</tr>
<tr>
<td>SMEs</td>
<td>35,169 (14.6)</td>
<td>40,701 (15.7)</td>
<td>49,474 (21.6)</td>
<td>54,205 (9.6)</td>
<td>56,910 (5.0)</td>
<td>56,349 (-1.0)</td>
</tr>
<tr>
<td>Large</td>
<td>46,947 (2.3)</td>
<td>55,157 (17.5)</td>
<td>75,283 (36.5)</td>
<td>75,321 (0.1)</td>
<td>79,091 (5.0)</td>
<td>75,777 (-4.2)</td>
</tr>
<tr>
<td>firms</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SMEs/Total</td>
<td>42.8</td>
<td>42.4</td>
<td>39.6</td>
<td>41.8</td>
<td>41.8</td>
<td>42.6</td>
</tr>
</tbody>
</table>

Note: ( ) is increase and decrease rate;

Data management system. Venture capital has also been emphasized since 1987 when a Market Organization Plan for Vitalizing the Stock Tradings of Small and Medium Sized Business was announced by the government.\(^{23}\) Since the objective of venture capital is to maximize capital gains through equity investment, it constantly seeks business opportunities with growth potential.

Later, in 1996, the Korea Securities Dealers Association (KSDA) adopted a computerized quotation system to trade listed stocks of all member securities companies. The Korean Securities Dealers Association Automated Quotation (KOSDAQ) was modeled after the NASDAQ Stock Market, the second largest market in the world. It aims to facilitate corporate financing for venture businesses and emerging businesses by providing new and diverse investment opportunities for investors.\(^{24}\)

The restructuring process of the Korean Conglomerate after the financial crisis of 1997 is revigorating in some manner the Korean SMEs sector. Some of the large chaebol are been “forced” to sell off their affiliate companies. Since the mid 80′s, Korean SMEs following their conglomerates or not start investing abroad and some of them even doubled the investments in a short period of time. In 1998, on account of shrinking investment-psychology stemming from the national economic crisis, the total overseas investment of Korean enterprises numbered only 550 cases, far smaller than 1,282 cases in 1997. As a result of the aggressive overseas investment by large companies, however, the overall amount of overseas investment in 1998 was higher than 1997. The large growth of FDI from the 80′

\(^{24}\) http://www.kosdaq.or.kr
s, 2.5 times from 1985 to 1994 and the impact of the financial crisis can be seen in the Table 9.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total (A)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of cases</td>
<td>433</td>
<td>1,226</td>
<td>4,132</td>
<td>1,436</td>
<td>1,282</td>
<td>550</td>
</tr>
<tr>
<td>Amount</td>
<td>461</td>
<td>2,297</td>
<td>7,497</td>
<td>4,233</td>
<td>3,216</td>
<td>3,722</td>
</tr>
<tr>
<td>SMEs (B)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of cases</td>
<td>78</td>
<td>455</td>
<td>2,715</td>
<td>831</td>
<td>769</td>
<td>294</td>
</tr>
<tr>
<td>Amount</td>
<td>37</td>
<td>286</td>
<td>1,517</td>
<td>734</td>
<td>513</td>
<td>256</td>
</tr>
<tr>
<td>Ratio of SMEs (B/A)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of cases</td>
<td>18</td>
<td>37.1</td>
<td>65.7</td>
<td>57.9</td>
<td>60.0</td>
<td>53.5</td>
</tr>
<tr>
<td>Amount</td>
<td>8.1</td>
<td>12.5</td>
<td>20.2</td>
<td>17.3</td>
<td>16.0</td>
<td>6.9</td>
</tr>
</tbody>
</table>

Source: Korea Federation of Banks. * Ungson at al.

In considering SME overseas investment by region in both the amount and number of cases, SMEs have focused more on Asian countries due to their adjacency to Korea and cheap labor. According to the Korea Federation of Banks, Asia, North America, Europe and Latin America are the main host regions of the Korean SMEs investments. In the Latin American case, countries of Mercosur, especially Brazil, have been the target for investments not only by large Korean conglomerates but also by Korean SMEs.²⁵

7. Final Remarks

There is a consensus in the public and private sectors that SMEs are the best social and political actors in any economy. They are the ones that can build and consolidate political and economic democracy processes in the national or the regional level. The rapid economic growth of Asia Pacific in the last decades provided a solid foundation for improving exports, FDI and inter-firm networks with few institutional or government-led integration schemes. From the mid-1980s, Korean SMEs has become more internationalized in terms of trade and investments not only with their neighboring countries, but also with the Mercosur member countries.

Since the beginning of the 1990s, Latin America has been making cooperative

agreements to deepen the economic integration in the region. The most visible example is the Mercosur where stronger intra-regional trade and investment linkages as well as a restructuring industrial process is taking place. Even though countries of the region are suffering from the financial crisis, the microeconomic level is stressing itself to overcome the new challenges of a more competitive and internationalized market.

SMEs under regional integration agreements or not are the ones demanding for a vast revision in the operation of the international financial system. They are the ones that have been suffering from high interest rates, scarcity of credit and also lack of attention by national, regional or international authorities. SMEs should be considered in all the national economic restructuring process and also be incorporated as an integral part of regional integration efforts like the Mercosur. A Working Group encharged of the SMEs matters in the institutional structure of the Mercosur should be implemented to formulate strategies and policies for member countries.

Mercosur countries should study and learn from other successful experiences. To print the brand name "Made in Mercosur" in the products of the region like the European Union has been doing for long is just one small example. The social and marketing net results are great. Emulating other experiences like the successful Korean SMEs industrial policies of 80's and 90's should be other possible rational and political priority action.

If countries in the Mercosur region are not able to build strong conglomerates like the Koreans chaebols or the Japanese keiretsu that in some way led their industrialization process, they can emulate the Korean experience toward SMEs. Otherwise, they can also emulate other experiences like the Taiwanese or the Spanish that even though they do not have large conglomerates they have a strong international competitive SMEs sector. While taking the State out of the direct process of economic production, with the privatization processes still in execution, Mercosur countries should direct their actions toward creating and supporting the development of SMEs.

Private and public authorities of the region have been discussing this matter in multiple seminars and conferences. In the two large conferences described in this paper, problems such as excessive bureaucracy and lack of management capabilities are internal and in some way easy to solve. General education of citizens and, training and developing professional skills are recommended for increasing competitiveness in today's world market. The recommended actions have been already outlined. It is imperative for Mercosur countries to implement them.
In order to do so, an industrial policy toward SMEs sector should be established for Mercosur or for each member country. This policy should be designed after a better discussion about the concept or classification of SMEs. This classification should consider not only the number of employees or the companies' capital, but also the different sectors of the economy. This should be done to further build public policies and implement them successfully.

Domestic or international SMEs can benefit from the economic dynamics of the integration process as well as from the clear public policies targeting them. They can be integrated within the international production or distribution chains in the most dynamic and technological advanced products. Otherwise, they can continue manufacturing traditional products for local niche markets. They can also and should put more value in their implicit knowledge of the domestic market.

This domestic market has strong potential to grow with the new wave of FDI of the 90's. Korean conglomerates as well as SMEs have been heavily trading and investing in the Mercosur region. Other transnational companies from Japan, North America and European Union have also been doing the same. Through mergers and acquisitions or building their own new modern factories, they are rebuilding a new and more integrated industrial sector in the South Cone.
Economic Cooperation between Asia\textsuperscript{1}) and Mercosur: Searching for Economic Cooperation Directions between Korea and Mercosur

\textit{Ki-Su Kwon}

\textit{Country Specialist, Korea Institute for International Economic Policy}

1. Preface

Asia's economic relations with Mercosur (Common Market of Southern Cone) have been getting closer due to intensification of investments and trade with Mercosur, as Mercosur, consisting of Argentina, Brazil, Paraguay and Uruguay, launching as Free Trade Agreement (FTA) in 1991, has deepened the process of integration through creation of customs union in 1995 and changed its trade policies from traditional inward-oriented ones to outward-looking ones.

Since 1996, Asian countries, recognizing Mercosur's large potential for development, have been directing their cooperation toward Mercosur as a single entity, escaping from the traditional cooperation in the level of individual countries, and have established some kinds of inter-governmental consultations with Mercosur.

The Asian financial crises of mid-1997 and 1998 and the contagion of Brazil's currency devaluation of 1999 have greatly affected the economic interaction between the two regions. However, it has been reactivating with the help of fast recovery of both regions' economy. But Asia's cooperation with Mercosur still remains incipient and loose in terms of cooperative tools, when compared with those of EU and U.S., which have actively negotiated FTA with Mercosur in order to strengthen their economic links.

In the light of these developments concerning Asia and Mercosur, this paper examines the economic relationship between Asia and Mercosur. Section 2

\textsuperscript{1}) Here Asia includes Japan, Australia and New Zealand.
examines the development of cooperation between Asia and Mercosur including trade and investment relations as well as inter-governmental cooperation. Section 3 presents some characteristics and prospects of economic cooperation of two regions. Finally, section 4 searches for cooperation directions between Korea and Mercosur.

2. Economic Cooperation between Asia and Mercosur

2-1. Trade Relations

Since mid-1990s, Asian countries’ export to Mercosur has grown remarkably due to some favorable factors: first, gradual reduction of external tariffs of Mercosur members, which have abandoned their protective trade policy based on traditional import substitution industrialization policy; second, stable economic growth derived from performances of strong economic reform policies (Figure 1); third, expansion of market scale through creation of Mercosur (Figure 2).

(Figure 1) Mercosur's Real GDP Growth Rate in 1990s

![GDP Growth Rate Chart]

Source: Centro de Economia Internacional (http://cei.mrecic.gov.ar)

During the period of 1990-1998, Asian countries' export to Mercosur increased 421 percent, exceeding 84 percent of their export growth rate as a whole and 182 percent of their total export to Latin America in the same period. Asia’s export to Argentina increased more than 600 percent, to Uruguay 575 percent, and to Brazil 452 percent. Reflecting rapid increase in Asia’s export to Mercosur, the share of Mercosur in Asia’s total export increased from 0.3 percent in 1990 to 0.9 percent in 1998. Its importance of Asia’s export to Latin America expanded from 15 percent to 30 percent in the same period, which contributed to raising the position of
Economic Cooperation between Asia and Mercosur 175

(Figure 2) Gross Domestic Product by Economic Integration and Country(1988)

![Graph showing GDP by economic integration and country.](Graph.png)

Source: Centro de Economia Internacional (http://cei.mrecic.gov.ar)

(Table 1) Asia’s Export to Mercosur

<table>
<thead>
<tr>
<th>Year</th>
<th>Argentina</th>
<th>Brazil</th>
<th>Paraguay</th>
<th>Uruguay</th>
<th>Total (A)</th>
<th>Asia’s total export (B)</th>
<th>Asia’s export to LatinAmerica (C)</th>
<th>(A)/(B)</th>
<th>(A)/(C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>------</td>
<td>-----------</td>
<td>--------</td>
<td>----------</td>
<td>---------</td>
<td>----------</td>
<td>------------</td>
<td>------------</td>
<td>--------</td>
<td>--------</td>
</tr>
<tr>
<td></td>
<td>514</td>
<td>2,127</td>
<td>2,495</td>
<td>2,656</td>
<td>2,089</td>
<td>2,464</td>
<td>3,365</td>
<td>3,611</td>
<td>2,071</td>
</tr>
<tr>
<td></td>
<td>1,533</td>
<td>2,111</td>
<td>2,024</td>
<td>3,781</td>
<td>4,981</td>
<td>8,494</td>
<td>8,346</td>
<td>9,480</td>
<td>8,471</td>
</tr>
<tr>
<td></td>
<td>415</td>
<td>472</td>
<td>387</td>
<td>494</td>
<td>713</td>
<td>939</td>
<td>857</td>
<td>677</td>
<td>592</td>
</tr>
<tr>
<td></td>
<td>100</td>
<td>170</td>
<td>278</td>
<td>241</td>
<td>267</td>
<td>333</td>
<td>403</td>
<td>619</td>
<td>675</td>
</tr>
<tr>
<td></td>
<td>2,562</td>
<td>3,957</td>
<td>4,816</td>
<td>7,011</td>
<td>8,617</td>
<td>11,855</td>
<td>12,070</td>
<td>14,141</td>
<td>13,349</td>
</tr>
<tr>
<td></td>
<td>788,513</td>
<td>883,597</td>
<td>978,755</td>
<td>1,061,588</td>
<td>1,223,926</td>
<td>1,444,641</td>
<td>1,463,636</td>
<td>1,459,357</td>
<td>1,450,738</td>
</tr>
<tr>
<td></td>
<td>17,339</td>
<td>22,464</td>
<td>29,272</td>
<td>31,443</td>
<td>36,754</td>
<td>40,889</td>
<td>41,193</td>
<td>48,561</td>
<td>48,952</td>
</tr>
<tr>
<td></td>
<td>0.3</td>
<td>0.4</td>
<td>0.5</td>
<td>0.7</td>
<td>0.7</td>
<td>0.8</td>
<td>0.8</td>
<td>0.9</td>
<td>0.9</td>
</tr>
<tr>
<td></td>
<td>14.8</td>
<td>17.6</td>
<td>16.5</td>
<td>22.3</td>
<td>23.4</td>
<td>29.0</td>
<td>29.3</td>
<td>29.1</td>
<td>27.3</td>
</tr>
</tbody>
</table>

Note: 1) Including Japan, Australia and New Zealand. 2) Increase Rate between 1990 and 1998.
Source: IMF/DOTS.

Mercosur as one of the Asia’s major export markets.

On the other hand, the increase in Asian countries’ import from Mercosur has not been higher than that from other regions. For the period between 1990 and 1998, Asia’s import from Mercosur increased around 18 percent, while its import from Latin America rose about 22 percent and its total import increased 64 percent. As a result, the share of Mercosur in Asia’s total import declined from 1.2 percent in 1990 to 0.9 percent in 1998 and its importance in Asia’s import from Latin America lowered from 50 percent to 48 percent in the corresponding
### Table 2: Asia’s Import from Mercosur (US$ million, %)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina</td>
<td>1,705</td>
<td>1,826</td>
<td>1,492</td>
<td>1,500</td>
<td>1,625</td>
<td>2,340</td>
<td>2,587</td>
<td>3,132</td>
<td>3,149</td>
<td>2,055</td>
<td>84.7</td>
</tr>
<tr>
<td>Brazil</td>
<td>7,233</td>
<td>7,600</td>
<td>7,263</td>
<td>7,608</td>
<td>9,112</td>
<td>10,291</td>
<td>10,310</td>
<td>10,211</td>
<td>7,334</td>
<td>4,251</td>
<td>1.4</td>
</tr>
<tr>
<td>Paraguay</td>
<td>78</td>
<td>73</td>
<td>82</td>
<td>51</td>
<td>55</td>
<td>128</td>
<td>139</td>
<td>174</td>
<td>98</td>
<td>33</td>
<td>25.6</td>
</tr>
<tr>
<td>Uruguay</td>
<td>146</td>
<td>225</td>
<td>207</td>
<td>163</td>
<td>171</td>
<td>199</td>
<td>212</td>
<td>276</td>
<td>183</td>
<td>114</td>
<td>25.3</td>
</tr>
<tr>
<td>Total(A)</td>
<td>9,162</td>
<td>9,724</td>
<td>9,044</td>
<td>9,322</td>
<td>10,963</td>
<td>12,958</td>
<td>13,248</td>
<td>13,793</td>
<td>10,764</td>
<td>6,453</td>
<td>17.5</td>
</tr>
<tr>
<td>Asia’s total import(B)</td>
<td>752,553</td>
<td>819,898</td>
<td>892,386</td>
<td>976,566</td>
<td>1,136,941</td>
<td>1,397,884</td>
<td>1,463,864</td>
<td>1,473,524</td>
<td>1,236,172</td>
<td>859,967</td>
<td>64.3</td>
</tr>
<tr>
<td>Asia’s import from Latin America(C)</td>
<td>18,453</td>
<td>19,637</td>
<td>19,046</td>
<td>18,322</td>
<td>21,704</td>
<td>27,433</td>
<td>28,975</td>
<td>29,898</td>
<td>22,478</td>
<td>14,415</td>
<td>21.8</td>
</tr>
<tr>
<td>(A)/(B)</td>
<td>0.12</td>
<td>0.12</td>
<td>0.10</td>
<td>0.10</td>
<td>0.10</td>
<td>0.09</td>
<td>0.09</td>
<td>0.09</td>
<td>0.09</td>
<td>0.08</td>
<td>-</td>
</tr>
<tr>
<td>(A)/(C)</td>
<td>0.97</td>
<td>0.49</td>
<td>0.47</td>
<td>0.50</td>
<td>0.50</td>
<td>0.47</td>
<td>0.45</td>
<td>0.46</td>
<td>0.47</td>
<td>0.44</td>
<td>-</td>
</tr>
</tbody>
</table>

Note: 1) Including Japan, Australia and New Zealand. 2) Increase Rate between 1990 and 1998.
Source: IMF/DOTS.

### Table 3: Major Asian Countries’ Trade Share with Mercosur (in %)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>EX 0.6</td>
<td>0.6</td>
<td>0.6</td>
<td>0.7</td>
<td>0.7</td>
<td>0.8</td>
<td>0.7</td>
<td>0.9</td>
<td>1.0</td>
<td>138.3</td>
</tr>
<tr>
<td></td>
<td>IM 1.6</td>
<td>1.6</td>
<td>1.5</td>
<td>1.4</td>
<td>1.4</td>
<td>1.3</td>
<td>1.3</td>
<td>1.3</td>
<td>1.3</td>
<td>-1.6</td>
</tr>
<tr>
<td>Korea</td>
<td>EX 0.4</td>
<td>0.7</td>
<td>0.9</td>
<td>1.2</td>
<td>1.4</td>
<td>1.4</td>
<td>1.5</td>
<td>1.5</td>
<td>1.9</td>
<td>927.2</td>
</tr>
<tr>
<td></td>
<td>IM 1.2</td>
<td>1.3</td>
<td>1.1</td>
<td>1.0</td>
<td>1.1</td>
<td>1.0</td>
<td>0.9</td>
<td>1.0</td>
<td>0.9</td>
<td>1.1</td>
</tr>
<tr>
<td>ASEAN(^4)</td>
<td>EX 0.1</td>
<td>0.2</td>
<td>0.2</td>
<td>0.4</td>
<td>0.4</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>645.2</td>
</tr>
<tr>
<td></td>
<td>IM 1.1</td>
<td>1.0</td>
<td>0.8</td>
<td>0.8</td>
<td>0.7</td>
<td>0.7</td>
<td>0.7</td>
<td>0.5</td>
<td>0.5</td>
<td>-24.3</td>
</tr>
<tr>
<td>CER(^5)</td>
<td>EX 0.5</td>
<td>0.5</td>
<td>0.6</td>
<td>0.8</td>
<td>0.5</td>
<td>0.6</td>
<td>1.0</td>
<td>0.6</td>
<td>0.7</td>
<td>116.5</td>
</tr>
<tr>
<td></td>
<td>IM 0.8</td>
<td>0.8</td>
<td>0.7</td>
<td>0.7</td>
<td>0.6</td>
<td>0.7</td>
<td>0.6</td>
<td>0.5</td>
<td>0.4</td>
<td>-18.5</td>
</tr>
<tr>
<td>China</td>
<td>EX 0.2</td>
<td>0.2</td>
<td>0.3</td>
<td>0.5</td>
<td>0.6</td>
<td>0.8</td>
<td>0.8</td>
<td>0.9</td>
<td>1.0</td>
<td>1,268.7</td>
</tr>
<tr>
<td></td>
<td>IM 1.7</td>
<td>1.2</td>
<td>1.0</td>
<td>1.1</td>
<td>1.2</td>
<td>1.3</td>
<td>1.5</td>
<td>1.6</td>
<td>1.4</td>
<td>106.8</td>
</tr>
</tbody>
</table>

Note: 1) Excluding Brunei, Laos, Cambodia and Myanmar among the 10 members of ASEAN. 2) Change Rate between 1990 and 1998.
Source: IMF/DOTS.

During the period of 1990 and 1998, China’s export to Mercosur increased
tremendously by 1,269 percent, the highest growth rate among Asian countries, followed by Korea’s 927 percent, ASEAN’s 645 percent, Japan’s 138 percent and CER’s 116 percent. These results caused in enhancing the share of Mercosur in each Asian country’s total export. As of 1998, the importance of Mercosur in Korea’s total export, the highest among Asian countries, recorded 1.9 percent, Japan’s and China’s 1.0 percent equally, and CER’s 0.7 percent. Concerning Asian countries’ import from Mercosur, however, the trend is quite a contrast to export. From 1990 to 1998, Asia’s import from Mercosur declined in most countries. Only China and Korea showed an increase in imports from Mercosur during the same period. Especially China’s import rose about 107 percent, the higher increase rate between two countries. But ASEAN’s, CER’s and Japan’s import from Mercosur declined 24.3 percent, 18.5 percent and 1.6 percent respectively.

In the standpoint of Mercosur, trade relation with Asia is characterized by gradual increase in import and decrease in export. The share of Asia in Mercosur’s total export gradually declined from 20 percent in 1990 to 13 percent in 1998, when Asia’s financial crises peaked. To the contrary, the importance of Asia in

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>EX</td>
<td>8.1</td>
<td>8.3</td>
<td>6.6</td>
<td>6.3</td>
<td>6.0</td>
<td>6.3</td>
<td>5.9</td>
<td>5.3</td>
</tr>
<tr>
<td></td>
<td>IM</td>
<td>5.4</td>
<td>5.5</td>
<td>5.4</td>
<td>5.4</td>
<td>4.6</td>
<td>4.5</td>
<td>3.2</td>
<td>4.0</td>
</tr>
<tr>
<td>Korea</td>
<td>EX</td>
<td>1.7</td>
<td>2.2</td>
<td>1.8</td>
<td>1.6</td>
<td>1.7</td>
<td>2.0</td>
<td>1.8</td>
<td>1.8</td>
</tr>
<tr>
<td></td>
<td>IM</td>
<td>0.9</td>
<td>1.5</td>
<td>1.8</td>
<td>2.0</td>
<td>2.2</td>
<td>2.6</td>
<td>2.2</td>
<td>2.6</td>
</tr>
<tr>
<td>ASEAN</td>
<td>EX</td>
<td>4.0</td>
<td>4.0</td>
<td>3.2</td>
<td>3.2</td>
<td>3.1</td>
<td>3.7</td>
<td>3.6</td>
<td>3.0</td>
</tr>
<tr>
<td></td>
<td>IM</td>
<td>0.7</td>
<td>1.0</td>
<td>1.1</td>
<td>1.6</td>
<td>1.7</td>
<td>2.2</td>
<td>2.0</td>
<td>1.9</td>
</tr>
<tr>
<td>CER</td>
<td>EX</td>
<td>0.8</td>
<td>0.8</td>
<td>0.6</td>
<td>0.7</td>
<td>0.6</td>
<td>0.7</td>
<td>0.6</td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td>IM</td>
<td>0.7</td>
<td>0.7</td>
<td>0.8</td>
<td>0.9</td>
<td>0.5</td>
<td>0.6</td>
<td>0.8</td>
<td>0.5</td>
</tr>
<tr>
<td>China</td>
<td>EX</td>
<td>2.0</td>
<td>1.7</td>
<td>1.6</td>
<td>2.1</td>
<td>2.2</td>
<td>2.4</td>
<td>2.8</td>
<td>2.7</td>
</tr>
<tr>
<td></td>
<td>IM</td>
<td>0.5</td>
<td>0.4</td>
<td>0.6</td>
<td>1.0</td>
<td>1.3</td>
<td>1.6</td>
<td>1.4</td>
<td>1.7</td>
</tr>
<tr>
<td>Asia</td>
<td>EX</td>
<td>19.6</td>
<td>21.2</td>
<td>17.5</td>
<td>17.2</td>
<td>17.4</td>
<td>18.5</td>
<td>17.6</td>
<td>16.5</td>
</tr>
<tr>
<td></td>
<td>IM</td>
<td>8.7</td>
<td>11.5</td>
<td>12.4</td>
<td>14.4</td>
<td>14.3</td>
<td>15.9</td>
<td>13.6</td>
<td>14.3</td>
</tr>
</tbody>
</table>

Source: IMF/DOTS.

2) Australia-New Zealand Closer Economic Relations.
Mercosur’s total import continuously increased from 8.7 percent to 14 percent over the same period.

As of 1998, Japan is the biggest export market for Mercosur among Asian countries, followed by China, ASEAN, Korea, and CER. On the import side, Japan is also the largest player, and Korea the second, followed by China, ASEAN and CER.

The trade balance between Asia and Mercosur traditionally has been characterized by Asia’s deficit. But the situation has reversed since 1997, as Asian countries’ export to Mercosur increased significantly in the wake of opening market of Mercosur countries in 1990s, which resulted in lessening the gap of trade deficit between two regions. The trade balance that posted US$6.6 billion of Asia’s deficit in 1990 reversed to Asia’s surplus worth US$0.348 billion in 1997 and keeps that trend on.

2-2. Investment Relations

Until the early 1990s, Asian countries’ direct investment in Mercosur had been minimal because of political and economic instabilities in Mercosur countries in 1980s, geographical and cultural differences, and Asian countries’ lack of capacity to invest. Since the mid-1990s, however, Korea, Australia, Taiwan, China and Malaysia, including Japan, the major existing provider of direct investments, have remarkably increased investments in Mercosur and though small, Philippines and Singapore also started to invest there. But their investments in Mercosur has not included more advanced and complicated forms such as joint venture and strategic alliances, including interaction between both regions’ SMEs. The major motives for Japan’s as well as most of Asian countries’ firms undertaking ODI(Outward Direct Investment) in Mercosur was found in development of natural resources and its process rather than in manufacturing sectors. But since 1997, the change of investment forms started to be seen in Japan’s and Korea’s investment in automobile sector in Mercosur.

In the period of 1990 and 1997, Japan made up of 7.3 percent of Mercosur’s total FDI stocked or US$79.2 billion. During the period of 1957 and 1997, Japan’s direct investment in Mercosur recorded US$11.9 billion(accumulated base), which

3) According to Japan International Cooperation Agency(JICA), Asian firms’ major interests in Mercosur are found in ① expansion of market scale through creation of Mercosur ② possibility to establish joint venture with local firms ③ food security in Asia ④ the participation in infrastructure projects that will make it easy to get access between Asia and Mercosur ⑤ Mercosur countries’ opening of mining and forestal sectors to foreign investors.
### Table 5: The Plan of Major Asian Countries’ Direct Investment in Mercosur (1998-2000)

<table>
<thead>
<tr>
<th></th>
<th>Argentina</th>
<th>Brazil</th>
<th>Chile</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>291</td>
<td>3,495</td>
<td>2,297</td>
<td>6,083</td>
</tr>
<tr>
<td>Malaysia</td>
<td>34</td>
<td>0</td>
<td>1,033</td>
<td>1,067</td>
</tr>
<tr>
<td>China</td>
<td>355</td>
<td>62</td>
<td>0</td>
<td>417</td>
</tr>
<tr>
<td>Philippines</td>
<td>99</td>
<td>0</td>
<td>0</td>
<td>99</td>
</tr>
<tr>
<td>Korea</td>
<td>20</td>
<td>20</td>
<td>0</td>
<td>40</td>
</tr>
<tr>
<td>Total</td>
<td>799</td>
<td>3,577</td>
<td>3,330</td>
<td>7,706</td>
</tr>
</tbody>
</table>

Source: Argentine Ministry of Economy, SICYM-CEP.

### Table 6: Trends of Japan’s Direct Investment in MERCOSUR

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina</td>
<td>213</td>
<td>40</td>
<td>18</td>
<td>34</td>
<td>21</td>
<td>301</td>
<td>13</td>
<td>57</td>
<td>67</td>
<td>11,213     1.8</td>
</tr>
<tr>
<td>Brazil</td>
<td>615</td>
<td>171</td>
<td>464</td>
<td>419</td>
<td>1,235</td>
<td>117</td>
<td>882</td>
<td>1,182</td>
<td>186</td>
<td>731          0.1</td>
</tr>
<tr>
<td>Paraguay</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>7</td>
<td>-</td>
<td>43           0.0</td>
</tr>
<tr>
<td>Uruguay</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-            -</td>
</tr>
<tr>
<td>Total(A)</td>
<td>828</td>
<td>211</td>
<td>482</td>
<td>453</td>
<td>1,256</td>
<td>418</td>
<td>895</td>
<td>1,239</td>
<td>253</td>
<td>11987       1.9</td>
</tr>
<tr>
<td>Japan’s total direct investment(B)</td>
<td>56,911</td>
<td>41,584</td>
<td>34,138</td>
<td>36,025</td>
<td>41,051</td>
<td>50,694</td>
<td>48,019</td>
<td>53,972</td>
<td>16,782</td>
<td>616,292</td>
</tr>
<tr>
<td>Japan’s direct investment in Latin America (C)</td>
<td>3,628</td>
<td>3,337</td>
<td>2,726</td>
<td>3,370</td>
<td>5,231</td>
<td>3,877</td>
<td>4,446</td>
<td>6,336</td>
<td>3,395</td>
<td>69,807</td>
</tr>
<tr>
<td>FDI Flow in MERCOSUR(D)</td>
<td>2,943</td>
<td>3,658</td>
<td>6,378</td>
<td>4,305</td>
<td>6,314</td>
<td>1,1067</td>
<td>17,392</td>
<td>27,205</td>
<td>34,774&lt;sup&gt;3&lt;/sup&gt;</td>
<td>-</td>
</tr>
<tr>
<td>(A)/(B)</td>
<td>1.5</td>
<td>0.5</td>
<td>1.4</td>
<td>1.3</td>
<td>3.1</td>
<td>0.8</td>
<td>1.9</td>
<td>2.3</td>
<td>1.5</td>
<td>1.9         -</td>
</tr>
<tr>
<td>(A)/(C)</td>
<td>22.8</td>
<td>5.8</td>
<td>17.7</td>
<td>13.4</td>
<td>24.0</td>
<td>3.8</td>
<td>20.1</td>
<td>19.6</td>
<td>7.5</td>
<td>17.2        -</td>
</tr>
<tr>
<td>(A)/(D)</td>
<td>28.1</td>
<td>5.8</td>
<td>7.6</td>
<td>10.5</td>
<td>19.9</td>
<td>3.8</td>
<td>5.1</td>
<td>4.6</td>
<td>-</td>
<td>-           -</td>
</tr>
</tbody>
</table>

Note: 1) Until June 1998. 2) Share of Mercosur countries in Japan’s Total ODI. 3) 1998’s total.
Source: JETRO.

Japan’s investment in Argentina amounted to 1.9 percent of Japan’s total outward direct investment. Japan’s investment in Brazil posted US$11.2 billion or 94 percent of Japan’s total investment in Mercosur. Over the same period, Japan’s investment in Argentina amounted to
US$0.7 billion, and its investment in Paraguay and Uruguay recorded less than US$0.1 billion$. Recently, the most distinguished case of Japanese companies' investments can be seen in automobile sector. In July 1997, Honda started to produce Civic model's cars with investment of US$100 million. In August 1998, Toyota auto maker also invested US$150 million in construction of plant and started to produce 150,000 units per year.

〈Table 7〉 Japan’s ODA in Mercosur(by the end of 1997, stock base)

<table>
<thead>
<tr>
<th>Country</th>
<th>Grant Aid</th>
<th>Technological Cooperation</th>
<th>Loan Aid</th>
<th>Total ODA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(US$ million, %)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Argentina</td>
<td>40.93 (12.0)</td>
<td>261.20 (77.0)</td>
<td>35.38 (10.0)</td>
<td>337.50</td>
</tr>
<tr>
<td>Brazil</td>
<td>2.84 (0.0)</td>
<td>667.46 (58.0)</td>
<td>486.69 (42.0)</td>
<td>1,156.95</td>
</tr>
<tr>
<td>Paraguay</td>
<td>146.44 (18.0)</td>
<td>379.84 (48.0)</td>
<td>266.09 (34.0)</td>
<td>792.36</td>
</tr>
<tr>
<td>Uruguay</td>
<td>4.11 (4.0)</td>
<td>65.87 (67.0)</td>
<td>28.55 (29.0)</td>
<td>98.54</td>
</tr>
<tr>
<td>Total(A)</td>
<td>194.32 (8.1)</td>
<td>1,374.37 (57.6)</td>
<td>816.61 (34.2)</td>
<td>2,385.35</td>
</tr>
<tr>
<td>Japan’s ODA in Latin America(B)</td>
<td>2,289.62 (23.0)</td>
<td>3,645.34 (36.7)</td>
<td>4,033.93 (40.5)</td>
<td>9,968.92</td>
</tr>
<tr>
<td>(A)/(B)</td>
<td>8.5</td>
<td>37.7</td>
<td>20.2</td>
<td>23.9</td>
</tr>
</tbody>
</table>

Note: Parenthesis is each item's share of Japan’s ODA in each country.
Source: JICA.

It is in ODA policy that Japan’s economic cooperation with Mercosur has the most outstanding features. During 1990 and 1997, Japan’s ODA in Latin America recorded US$6.5 billion representing 19 percent of DAC members' ODA in Latin America in the same period. Japan’s ODA in Latin America is classified into grant aid, technological cooperation, and loan aid. By the end of 1997, Japan’s grant aid in Latin America registered US$2.29 billion, its technological cooperation posted US$3.65 billion, and its loan aid reached US$4.03 billion, which totaled US$9.97 billion. The share of Mercosur in Japan’s total ODA in Latin America reached

4) In spite of its importance, only 5.5 percent(941 cases) of Japan’s companies abroad have invested in Latin America since 1995 and among them, in Brazil 33 percent, in Chile 5 percent and in Argentina 3 percent respectively.
23.9 percent, which amounted to US$2.385 billion, and especially of Japan’s ODA technological cooperation has been prominent. The share of grant aid in Japan’s ODA in Mercosur was 8.5 percent, loan aid 20.2 percent, and technological cooperation 37.7 percent. The main feature of Japan’s ODA in Mercosur is that the share of grant aid is relatively low, but that of technological cooperation is higher. It can be explained by the fact that GDP per capita of Mercosur countries is higher than that of other Latin American countries.5)

CER’s direct investment in Mercosur has been led by Australian companies. Australia’s major investments in Brazil are in mining (BHP in iron ore and WMC in gold). While mining is likely to remain as the major destination for Australian investments, there has been a trend to diversify in the manufacturing and agricultural sectors. Entertainment is also a sector now attracting Australian attention. Australian investors have shown considerable confidence in the Argentine economy in recent years. Australia is now Argentina’s ninth largest foreign direct investor, with total investments of just under US$1.5 billion. The mining sector is undoubtedly where interest and performance has been strongest, with Australia among the biggest investors. Other sectors of interest include entertainment, agribusiness and food processing.

ASEAN’s investment in Mercosur has been performed mainly by Malaysia and Philippines. Malaysian companies have interests in service and infrastructure, recently in cultivation of Argentine farms to supply beef for her country. They have invested in wood sector (Samling and Y.Bhg Dato Wong Ke Nai) and Helicopter service (MHS Aviation Sdn Bhd). Philippine firms invested US$40 million up to date, in which 50 percent flowed toward construction (IJM Corporation), the remaining 50 percent invested in service (Berjaya Corporation) and exploration of petroleum (Peronas, joint company between Argentina and Canada).

China is considered to be high potential for investment in Mercosur, though it remains minimal in terms of investment amounts. Until now, China has invested in Mercosur mainly for supply of prime materials, exploration of natural resources and its process, but has expanded manufacturing sector’s investment. China’s investment in Argentina is responsible for only 0.01 percent or US$5 million of Argentine FDI inflow during 1990 and 1998, with its investment being carried out in fishing and plant of truck assembly. China also has a plan to invest US$350 million in construction of a fertilizer plant, which will account for 1.02 percent of Argentine FDI inflow between 1999 and 2000.

Taiwan’s investment in Mercosur has been performed mainly by SMEs, which is different from other Asian countries’ led by large firms.\(^6\) Taiwan’s investment is very diverse from textile industry to retail, fishing, auto parts and small petrochemical plants. Most of Taiwan’s investments in Brazil consist of trading, while its main investments in Argentina can be seen in fishing and restaurants. Paraguay is the most important political partner of Taiwan in Mercosur. Recently, Taiwan has extended its economic interests through the strategy of positioning its companies in Paraguay and the establishment of strategic alliances with local firms in order to produce accessories for automobiles directed to the internal market of Mercosur.

2-3. *Inter-governmental Cooperation*

Each Asian country led to pay attention to cooperation with Mercosur as a block, as Mercosur has been developed in level of customs union in 1995. As a result, most of Asian countries, including CER, Japan, Korea, China and ASEAN, have established and run some kinds of cooperative entities.

Since mid-1990s, CER, consisting of Australia and New Zealand, have intensified ties with Mercosur. CER continues to work through CER-Mercosur dialogue in order to strengthen ties and address outstanding bilateral trade and investment concerns. Ministerial and senior officials’ meetings have formulated programme to facilitate trade and investment. The programme included the compilation of a customs compendium, exchange of information on recognition of qualifications, and signature of CER-Mercosur declaration on investment principles in June 1999. Furthermore, senior officials will be looking more closely over the next few years at possible trade and investment opportunities in the transport and science and technology areas.

Japan showed first attention to cooperation with Mercosur through Brazilian representative at the fifth meeting of Common Market Group of Mercosur between March 30th and April 1st, 1992. Mercosur also sent official position to Japan, which Mercosur intentioned to launch relation, at the 8th meeting of Common Market Council of Mercosur between December 6th and 7th, 1995. At last, Japan and Mercosur held the first meeting on October 1st, 1996, in Sao Paulo, and then both sides have held meetings annually and alternatively.\(^7\)

---

6) The amount of Taiwanese investments in Latin America that reached US$398 million in 1990 was increased to US$1,214 millions in 1997, in other words, 0.32 percent of Taiwan’s total FDI.

China also established a forum of dialogue with Mercosur in 1997 in an effort to increase ties with Mercosur. China has already participated as an observer in the Inter-American Development Bank (IDB) and maintains a permanent representation in the Latin America Integration Association (LAIA). It also sustains regular contacts with member countries of Rio Group, in order to observe the regionalization process in the region.

The relation between ASEAN and Mercosur started from the discussion of Free Trade Agreement (FTA) between two blocks, which was more advanced level than other Asian countries' loose cooperative forms like bilateral dialogues and fora. Brazilian president, Fernando Henrique Cardoso, proposed for the first time the negotiation of FTA between two regions, when he visited Malaysia in December 1995. When he visited Malaysia in August 1996, Argentine president, Carlos Saul Menem also supported negotiation of FTA between two blocks. Economic ministers of both regions agreed to finalize FTA discussion earlier in December 1996 when they held first unofficial meeting in the ministerial meeting of WTO. On the ASEAN side, in 1997, Ajit Singh, General Secretary of ASEAN, agreed to create business forum of both regions, when he visited Argentina and Brazil.\(^8\) But, the discussions related to FTA did not become on hand due to financial crises in both regions.

3. Economic Cooperation between Asia and Mercosur: Characteristics and Prospects

The economic cooperation between Asia and Mercosur is characterized in the following manner.

First, on the trade side, trade relations of both regions have been developed unequally. While Asian countries' export to Mercosur has increased tremendously since 1990s, Mercosur's export to Asia has gradually reduced. Consequently, trade surplus that Mercosur had enjoyed until 1996 has reversed to Asia's surplus from 1997. If deepened, this trend could play a restrictive role in increasing commerce of two regions. Trade relations between two regions, which had been dominated by Japan before 1990, have been diversifying due to rapid increase in exports of China, Korea, ASEAN and CER. It is also noted that trade between China and Mercosur has grown the fastest rate among Asian countries, which will result in raising China's influence on the relation between both regions.

---

\(^8\) Ministerio das Relacoes Exteriores Infocred N°117 in http://www.mre.gov.br/infocred/info97bkp/info117.htm)
Second, on the investment side, Asian countries’ direct investment in Mercosur remains in the incipient stage in terms of investment scale, its form and sector compared with those of some developed countries, although Japan’s as well as major Asian countries’ investment in Mercosur has increased since the mid-1990s. On the other hand, led by Argentine firms, Mercosur’s investment in Asia has been restricted to only ASEAN countries with its amounts being small. For example, investments by Argentine companies in Asia are concentrated in joint ventures to produce turbines and cranes in Malaysia and Japan, steel products in Indonesia and leather in Hong Kong. Through Nexus, the YPF petroleum company has made important investments in Indonesia.9

Third, inter-governmental cooperation between Asia and Mercosur has been reinforced in the process of consolidation of Mercosur. Japan, China, Korea, ASEAN and CER have created and carried out consultations with Mercosur respectively. But these consultations have not productive results. Recognizing necessity to cooperate with Mercosur, Asian countries, in spite of establishing each cooperative entity, have failed to develop in a more advanced pattern because of lack of cooperative strategy and development of cooperative tools. It is no denying that financial crises in both regions from the mid-1997 throughout 1999 also played obstructing roles in improving their cooperation. In this circumstance, it should be noteworthy that relation between CER and Mercosur has been consolidated through CER’s positive development of cooperation instruments and signing of various trade pacts.

Economic cooperation between two regions will be intensified, considering that Mercosur has made strong efforts to strengthen links to Asian countries with the view to diversifying their export market and Asian countries also have many interests in Mercosur in order to increase export and investment. Since the establishment of the customs union, Mercosur’s external agenda has been enlarging impressively, covering processes of negotiation and consultation with individual countries and regional arrangements, across and beyond the hemisphere. Mercosur already signed free trade agreements with Chile and Bolivia and recently has been under negotiation with Andean Community in order to create South America Free Trade Area(SAFTA) by August 2001. Mercosur also is in the process of negotiation of FTA with EU, aside from being an active force in Free Trade Area of the Americas(FTAA) negotiating process for 2005. As a result, Asian countries will accelerate their investment in Mercosur, targeting expansion of Mercosur market.

But Mercosur’s free trade agreement with some developed countries could have two impacts on Asian countries: first, to provide for the opportunities to get access to enlarged market; second, to pose a critical threat to Asian countries which have been loose and weak in terms of inter-governmental cooperation with and investment in Mercosur.

Accordingly, cooperation between Asia and Mercosur will be focused on enhancing inter-governmental cooperation, coping with some developed countries’ intensive cooperation with Mercosur. Recently this trend could be observed in creation of East Asia-Latin American Forum.  

4. Economic Cooperation Directions between Korea and Mercosur

Korea’s economic relation with Latin America including Mercosur has been very similar to other Asian countries’. The main feature of trade between Korea and Latin America has been characterized by inter-industry trade that Korea has mainly sold manufacturing goods to Latin America and bought primary products such as mining and agricultural products from there. The composition of exports to Latin America has been centered on some products such as automobiles, electronic & electric appliances based on completely manufactured goods, which has been vulnerable to economic turbulence in Latin America.

Another feature of trade with Latin America is that Latin America has been rising as a attractive trade surplus market for Korea basically due to the results of aggressive opening market policies performed by Latin American countries since the late 1980s. This trend is very welcomed to Korea which has been eager to widen current accounts surplus in the period of IMF, but has been provided major trade conflicts between both sides, because Latin American countries have demanded strong correction of trade deficit.

Korea’s trade with Mercosur which had increased steadily before 1997, started to decrease due to the fallouts of both region’s financial crises since 1997. Commerce of both sides which hit a record of US$4 billion in 1997, declined by

---

10) The East Asia-Latin America Forum (EALAF) was first mooted by Singapore Prime Minister Goh Chok Tong during his visit to Chile in October 1998. It is meant to bridge the gap between East Asia and Latin America, two regions that have had little interaction with each other traditionally. The first meeting of senior officials from 27 East Asian and Latin American countries was held in Singapore from 1 to 3 September 1999. The next meeting of EALAF will be at the foreign ministers’ level. This inaugural meeting of officials decided that it will take place in Chile in the first quarter of 2001. http://www.gov.sg/mfa/policy/ealaf.htm.

The striking feature of trade of two sides is that Korea has enjoyed trade surplus with all Mercosur countries. Trade balance which had enjoyed Mercosur’s surplus by 1992 reversed Korea’s one and peaked US$1.744 billion in 1998.

Since 1990s, Korea’s export to Mercosur has increased significantly due to favorable economic conditions of Mercosur countries. Export to Mercosur increased 623 percent between 1990 and 1999. Over the same period, its export to Brazil increased ten times and to Argentina five times, exceeding 121 percent of total export and 311 percent of export to Latin America. As a result, the share of Mercosur in Korea’s total export expanded from 0.4 percent in 1990 to 1.9 percent in 1999 and its importance in Korea’s export to Latin America increased from 11.9 percent to around 30 percent over the same period.

While Korea’s export to Mercosur has increased tremendously since 1990s, its import from Mercosur has grown lower than that from other regions.

For the period between 1990 and 1999, Korea’s import from Mercosur increased 33 percent to US$1,079 million, lagging behind 72 percent of its import growth rate as a whole and 66 percent of its total import from Latin America over the same period. As a result, the share of Mercosur in Korea’s total import declined from 12 percent in 1990 to 0.9 percent in 1999 and its importance in Korea’s total import from Latin America also lowered from 47 percent to 38 percent in the same period.

On the other hand, Korea’s direct investment in Latin America is lower when compared with the importance of Latin American markets and trade scale between two sides. The share of Latin America in Korea’s total direct investment remains around 5 percent while the share of Latin America in Korea’s total export reaches

<table>
<thead>
<tr>
<th>Table 8</th>
<th>Korea’s Trade with Mercosur</th>
</tr>
</thead>
<tbody>
<tr>
<td>Export</td>
<td>250</td>
</tr>
<tr>
<td>Import</td>
<td>813</td>
</tr>
<tr>
<td>Trade</td>
<td>1,063</td>
</tr>
<tr>
<td>Trade Balance</td>
<td>-563</td>
</tr>
</tbody>
</table>

Note: 1) Change rate between 1990 and 1999.
Source: KOTIS.
### Table 9: Korea’s Export to Mercosur Countries

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina</td>
<td>75</td>
<td>256</td>
<td>463</td>
<td>535</td>
<td>477</td>
<td>305</td>
<td>443</td>
<td>630</td>
<td>584</td>
<td>439</td>
<td>485.3</td>
</tr>
<tr>
<td>Brazil</td>
<td>106</td>
<td>174</td>
<td>164</td>
<td>449</td>
<td>844</td>
<td>1,519</td>
<td>1,497</td>
<td>1,711</td>
<td>1,792</td>
<td>1,209</td>
<td>1,040</td>
</tr>
<tr>
<td>Paraguay</td>
<td>52</td>
<td>56</td>
<td>48</td>
<td>74</td>
<td>115</td>
<td>175</td>
<td>92</td>
<td>78</td>
<td>59</td>
<td>34</td>
<td>-34.6</td>
</tr>
<tr>
<td>Uruguay</td>
<td>17</td>
<td>32</td>
<td>38</td>
<td>48</td>
<td>54</td>
<td>65</td>
<td>87</td>
<td>105</td>
<td>132</td>
<td>95</td>
<td>458.8</td>
</tr>
<tr>
<td>Total(A)</td>
<td>250</td>
<td>518</td>
<td>713</td>
<td>1,106</td>
<td>1,490</td>
<td>2,064</td>
<td>2,119</td>
<td>2,524</td>
<td>2,567</td>
<td>1,807</td>
<td>622.8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Export to World(B)</th>
<th>Export to Latin America(C)</th>
<th>(A)/(B)</th>
<th>(A)/(C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina</td>
<td>65,016</td>
<td>2,104</td>
<td>0.4</td>
<td>11.9</td>
</tr>
<tr>
<td>Brazil</td>
<td>71,870</td>
<td>2,879</td>
<td>0.7</td>
<td>18.0</td>
</tr>
<tr>
<td>Paraguay</td>
<td>76,632</td>
<td>4,922</td>
<td>0.9</td>
<td>14.4</td>
</tr>
<tr>
<td>Uruguay</td>
<td>82,236</td>
<td>6,430</td>
<td>1.3</td>
<td>22.5</td>
</tr>
<tr>
<td>Total(A)</td>
<td>125,058</td>
<td>7,370</td>
<td>1.6</td>
<td>23.2</td>
</tr>
<tr>
<td></td>
<td>129,715</td>
<td>8,961</td>
<td>1.7</td>
<td>28.0</td>
</tr>
<tr>
<td></td>
<td>136,164</td>
<td>8,668</td>
<td>1.9</td>
<td>23.6</td>
</tr>
<tr>
<td></td>
<td>132,313</td>
<td>8,867</td>
<td>1.9</td>
<td>29.1</td>
</tr>
<tr>
<td></td>
<td>143,685</td>
<td>8,645</td>
<td>1.3</td>
<td>29.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>20.9</td>
</tr>
</tbody>
</table>

Note: 1) Change rate between 1990 and 1999.
Source: KOTIS.

### Table 10: Korea’s Import from Mercosur Countries

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina</td>
<td>86</td>
<td>108</td>
<td>116</td>
<td>67</td>
<td>68</td>
<td>132</td>
<td>224</td>
<td>252</td>
<td>126</td>
<td>163</td>
<td>89.5</td>
</tr>
<tr>
<td>Brazil</td>
<td>707</td>
<td>889</td>
<td>797</td>
<td>779</td>
<td>1,019</td>
<td>1,388</td>
<td>1,325</td>
<td>1,239</td>
<td>693</td>
<td>910</td>
<td>28.7</td>
</tr>
<tr>
<td>Paraguay</td>
<td>12</td>
<td>10</td>
<td>12</td>
<td>3</td>
<td>7</td>
<td>2</td>
<td>1</td>
<td>14</td>
<td>0.4</td>
<td>0.4</td>
<td>-113.3</td>
</tr>
<tr>
<td>Uruguay</td>
<td>8</td>
<td>13</td>
<td>11</td>
<td>5</td>
<td>9</td>
<td>8</td>
<td>8</td>
<td>9</td>
<td>3</td>
<td>6</td>
<td>-25</td>
</tr>
<tr>
<td>Total(A)</td>
<td>813</td>
<td>1,020</td>
<td>936</td>
<td>854</td>
<td>1,103</td>
<td>1,530</td>
<td>1,558</td>
<td>1,514</td>
<td>822.4</td>
<td>1,079.4</td>
<td>32.8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Import from World(B)</th>
<th>Import from Latin America(C)</th>
<th>(A)/(B)</th>
<th>(A)/(C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina</td>
<td>69,844</td>
<td>1,726</td>
<td>1.2</td>
<td>47.1</td>
</tr>
<tr>
<td>Brazil</td>
<td>81,525</td>
<td>2,298</td>
<td>1.3</td>
<td>44.4</td>
</tr>
<tr>
<td>Paraguay</td>
<td>81,775</td>
<td>2,521</td>
<td>1.1</td>
<td>37.1</td>
</tr>
<tr>
<td>Uruguay</td>
<td>83,800</td>
<td>2,384</td>
<td>1.1</td>
<td>35.8</td>
</tr>
<tr>
<td>Total(A)</td>
<td>102,348</td>
<td>3,280</td>
<td>1.1</td>
<td>33.6</td>
</tr>
<tr>
<td></td>
<td>135,119</td>
<td>3,964</td>
<td>1.1</td>
<td>38.6</td>
</tr>
<tr>
<td></td>
<td>150,339</td>
<td>4,392</td>
<td>1.0</td>
<td>35.5</td>
</tr>
<tr>
<td></td>
<td>144,616</td>
<td>4,076</td>
<td>1.0</td>
<td>37.1</td>
</tr>
<tr>
<td></td>
<td>93,282</td>
<td>2,197</td>
<td>0.9</td>
<td>37.4</td>
</tr>
<tr>
<td></td>
<td>119,752</td>
<td>2,865</td>
<td>0.9</td>
<td>37.7</td>
</tr>
</tbody>
</table>

Note: 1) Change rate between 1990 and 1999.
Source: KOTIS.

above 6 percent.

Before mid-1990s, Korean firms' penetration into Latin America had been led
by SMEs and concentrated in Central American and Caribbean countries. By industries, encouraged by lower wage, manufacturing investments in Latin America have been focused on textile sectors on a small scale aimed at exporting to U.S. markets, while non-manufacturing investments has been centered on fishing in Argentina and Panama. But, since mid-1990s, Korea’s investment flowed towards complex of electrical products in Mexico and Brazil based on high advanced technology with larger scale.

Korea’s investment in Mercosur has increased on a large scale since 1994. As of January 2000, Korea’s direct investment in Mercosur recorded US$288.28 million with total 61 cases, which made up of 24.6 percent of Korea’s total direct investment in Latin America. The share of Mercosur in Korea’s total outward direct investment, which amounts to US$22.636 billion with 9,525 cases, reached 1.3 percent. As of January, 2000, Korea’s outward direct investment in Brazil recorded US$188 million with 27 cases, which reached 13.6 percent of Korea’s total investment in Latin America. The major interesting sectors in Brazil have been concentrated in manufacturing and trading sectors. In the same period, Korea’s investment in Argentina, starting from 1985, registered US$121 million with 38 cases. Korean firms’ interests in Argentina have been diverse from trading to mining, fishing, manufacturing and constructing sectors. In the same period, Korea’s investment in Paraguay and Uruguay recorded US$1.85 million and US$0.6 million respectively.

(Table 11) Korea’s Direct Investment Stocked in Latin America by Country and Economic Integration (to January 2000)

<table>
<thead>
<tr>
<th></th>
<th>Mexico</th>
<th>CACM(1)</th>
<th>CAN(2)</th>
<th>MERCOSUR</th>
<th>Others(3)</th>
<th>Latin America</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cases</td>
<td>42</td>
<td>93</td>
<td>31</td>
<td>61</td>
<td>104</td>
<td>331</td>
</tr>
<tr>
<td>Amounts</td>
<td>191,173</td>
<td>87,859</td>
<td>185,269</td>
<td>288,283</td>
<td>418,580</td>
<td>1,171,164</td>
</tr>
<tr>
<td>Ratio 1(4)</td>
<td>16.3</td>
<td>7.5</td>
<td>15.8</td>
<td>24.6</td>
<td>35.7</td>
<td>100.0</td>
</tr>
<tr>
<td>Ratio 2(5)</td>
<td>0.8</td>
<td>0.4</td>
<td>0.8</td>
<td>1.3</td>
<td>1.8</td>
<td>5.2</td>
</tr>
</tbody>
</table>

Note: 1) Central American Common Market (El Salvador, Nicaragua, Costa Rica, Guatemala, Honduras); 2) Andean Community (Colombia, Venezuela, Ecuador, Bolivia, Peru); 3) Chile, Panama, and Caribbean countries; 4) The share of each country and economic integration in Korea’s direct investment in Latin America; 5) The share of each country and economic integration in Korea’s total direct investment.

Source: The Export-Import Bank of Korea.

Concerning inter-governmental cooperation, Korea has held two official meetings with Mercosur, starting from 1997. In 1997, Korea and Mercosur held
the first Consultative Committee Meeting in Asuncion, Paraguay. At that meeting are agreed annualization of consultive dialogue, expansion of investment and trade, regular holding of international seminar, and indication of information center on Mercosur in Korea in order to analyze on Mercosur’s trends and also monitor efficiently information on investment opportunities. The second meeting was held in Brasilia, Brazil on October 5 1998. At the meeting, both sides explained recent economic situations and pointed out the necessity for establishment of collective measures to control the international speculative capital. In addition, the two parties exchanged views on the state of regional integration in Latin America, including the negotiations for the founding of FTAA.11)

As observed earlier, economic relation between Korea and Mercosur has been developed closely similar to relation between Asia and Mercosur. Accordingly, like other Asian countries, Korea’s economic cooperation with Mercosur should be focused on inter-governmental cooperation, coping with enlargement and consolidation of Mercosur. For these purposes, in the short term, Korea, recognizing Mercosur as a substantial entity, should intensify institutional ties with Mercosur such as creation of Korea-Mercosur Business Forum, agreement of cooperation of SMEs and Science & Technology cooperation between Korea and Mercosur. On the basis of these results, in the long term, Korea should seriously take into consideration negotiation of FTA with Mercosur, in the process of extension of negotiation of FTA between Korea and Chile.

11) http://www.mofat.go.kr\web\samerica\nsf.
Korea-Brazil Science and Technology Cooperation in the New Millennium
Korea-Brazil Science & Technology Cooperation: Trends and Issues

Sung Chul Chung
Director, Center for International Science and Technology

1. Introduction

Korea and Brazil concluded an inter-governmental agreement on scientific and technological cooperation in 1991, which took effect in 1992. The agreement was based on the shared recognition that Korea and Brazil have very much to offer to each other through mutually beneficial cooperation in science and technology. As a means to maintain policy dialogue on the pertinent issues, the agreement stipulates that a Korea-Brazil joint committee on science and technology meet every two years. Despite the agreement, there has not been a great deal of scientific and technological interaction nor exchanges between the two countries. It was in 1991 when Korea made the proposal to hold the first meeting of the joint committee the following year in 1992. Since then, there have been several proposals exchanged regarding the meeting, but the meeting has yet to take place.

The conclusion of the inter-governmental agreement aroused interests among research institutions in Korea in the science and technology activities underway in Brazil. Around the time that the agreement was concluded, Korean research institutions took initiatives to develop new cooperative relationships with their counterparts in Brazil. In 1991, the Korea Technology Development Corporation (KTDC) had some degree of interaction with the Brazilian Agency for Funding Research (FINEP) in an effort to establish an agreement on bilateral cooperation. The Korea Ocean Research and Development Institute (KORDI) also showed strong interest in developing a cooperative arrangement with the Brazilian Marine Research Center (CIRM) for research collaboration, scientist exchange, and collaboration in Antarctic research. The Korea Aerospace Research Institute (KARI) sought an agreement on cooperation with the National Institute for Space Research (INPE). At the First Meeting of the Korea-Brazil Joint Committee in 1991, the two countries explored the possibility for cooperation between the National Council
for the Development of Science and Technology (CNPq) of Brazil and the Korea
Advanced Institute of Science and Technology as well as the Korea Science and
Engineering Foundation. These efforts, however, have not come to fruition due to
unknown reasons.

The above description suggests that cooperation in international science and
technology is not an easy task to accomplish, and more so when it is between
countries that are geographically and culturally distant from each other. The lesson
is simple but clear: we knew too little about each other to enter into a collaborative
relationship. That is, our first prerequisites is to develop a mutual understanding
on the systems, practices and institutions pertaining to science and technology, if
we are to establish a productive partnership in science and technology between
our two countries.

This essay briefly reviews the industrial and technological activities in both
Korea and Brazil, and then poses and answers the following three questions: first,
why do we seek cooperation in science and technology with Brazil? Second, in
what areas do the two countries have mutual interests? And third, how can we
reap the maximum benefits out of the bilateral relationship?

2. Korea: Its Industry, Market, and Technology

Korea is not only small geographically, it is also poor in natural resources.
As one of the most densely populated countries in the world, it depends heavily
on foreign countries for the natural resources it requires for industrial production.

Korea is, however, one of the fastest growing economies of the world,
sustaining an average annual growth rate of over 8% since the early 1960s. It is
now the world’s tenth largest economy (GDP in 1995: US$4,565 billion) and the
eleventh largest trading country, with a per capita GDP of over US$10 thousand.
In 1995, Korea exported US$125.1 billion and imported US$135.1 billion in goods
and services. Korea is the world’s tenth largest market and has the distinctive
potential for continued rapid market growth particularly in natural resources such
as iron ore, coal, and others.

Korea has made an enormous transformation from being a poor, agrarian
economy bound in tradition, to becoming a newly industrializing economy in a
relatively short period of time. Over the past three decades, Korea has established
itself as a major producer of such industrial products as electronic goods,
automobiles, ships, steel, and so on. In 1995, Korea produced 2,530 thousand units
of automobiles, and exported 989 thousand units, emerging as the fifth largest
producer and the eighth largest exporter of automobiles. Korea is also a major
steel maker, producing 39 million tons a year (sixth largest in the world). In shipbuilding, Korea is ranked second in the world, trailing Japan. Korea and Japan command more than 70% of the world's shipbuilding market.

Korea's electronics industry has developed very rapidly from the simple assembly of transistor radios in the early 1960s to the current sophisticated fabrication of state-of-the-art memory chips. Korea's world market share for the 16 Mega DRAM memory chip is about 32%, and it is even higher, 37.5%, for the 64 Mega DRAM chip. (1997) In the early 1990s, Korea had already become one of the world's six largest electronics producing nations. More importantly, the Korean electronics industry has been quickly shifting its emphasis from consumer appliances toward the higher value-added industrial electronic products, such as computers, telecommunications equipment, production automation equipment, etc. In 1993, electronics production exceeded US$36 billion, of which US$8.2 billion was that of industrial electronics. In the same year, electronics exports accounted for 61% of the total production, or US$22 billion, making the electronics industry in Korea the largest export sector.

It can be inferred, based on the above, that Korea is now established with a fairly solid technological base in some industrial sectors. On the basis of the its developments, Korea is now aiming to further strengthen its capabilities in the above industries and to challenge new technology-intensive fields, such as aerospace, bio-technology and so on. This is well reflected in the current technology development plans initiated by the government. The Highly Advanced National R&D Project, or HAN Project, which is an inter-ministerial project to develop the key technologies for Korea's industrial development toward the new century, shows in what technology areas Korea seeks to build comparative advantage over others in the coming decades. The HAN Project, a ten-year program, started in 1992 with eleven sub-projects, and five years later, in 1996, six more new projects were added(Table 1).

As suggested by the R&D projects listed under the HAN Project, electronics, information and telecommunications, and automobiles will remain Korea's major industries in the decades to come. It is also anticipated that bio-technology, energy, and aerospace will grow to become major industries in the coming decade. To support such industrial development, the government has prepared the Strategic R&D Programs in those areas. The Bio-Tech 2000 Program (1994-1997) aims at building a foundation for the development of the bio-technology industry by supporting R&D in bio-material, health, agriculture and food, environment (biosafety, bio-resource preservation and utilization), bio-energy, and basic life sciences. A total of US$2 billion is being invested in this program.
In the area of energy, the government formulated a Long-term Nuclear R&D Program to enhance technological capability and to achieve self-sufficiency in nuclear energy.

〈Table 1〉 HAN Projects

<table>
<thead>
<tr>
<th>Category</th>
<th>Projects</th>
<th>Period</th>
<th>Investment (US$ million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product Technology</td>
<td>1. New medicines and new agro-chemicals</td>
<td>92-97</td>
<td>246</td>
</tr>
<tr>
<td></td>
<td>2. B-Integrated Service and Digital Network</td>
<td>92-01</td>
<td>859</td>
</tr>
<tr>
<td></td>
<td>3. Next-generation automobile</td>
<td>92-96</td>
<td>563</td>
</tr>
<tr>
<td></td>
<td>4. Development of ASIC technology</td>
<td>95-99</td>
<td>128</td>
</tr>
<tr>
<td></td>
<td>5. Flat panel displays(^1)</td>
<td>95-01</td>
<td>228</td>
</tr>
<tr>
<td></td>
<td>6. Bio-medical engineering(^1)</td>
<td>95-01</td>
<td>217</td>
</tr>
<tr>
<td></td>
<td>7. Micromachining technologies &amp; micromachines*</td>
<td>95-01</td>
<td>103</td>
</tr>
<tr>
<td>Fundamental Technology</td>
<td>8. Next-generation semi-conductor</td>
<td>93-97</td>
<td>244</td>
</tr>
<tr>
<td></td>
<td>9. Advanced materials for electronics and energy</td>
<td>92-01</td>
<td>240</td>
</tr>
<tr>
<td></td>
<td>10. Advanced manufacturing system</td>
<td>92-01</td>
<td>549</td>
</tr>
<tr>
<td></td>
<td>11. New functional biomaterials</td>
<td>92-01</td>
<td>483</td>
</tr>
<tr>
<td></td>
<td>12. Environmental technology</td>
<td>92-01</td>
<td>289</td>
</tr>
<tr>
<td></td>
<td>13. New energy technology</td>
<td>92-01</td>
<td>357</td>
</tr>
<tr>
<td></td>
<td>14. Next-generation nuclear reactor</td>
<td>92-01</td>
<td>297</td>
</tr>
<tr>
<td></td>
<td>15. Advanced superconducting Tokamak(^1)</td>
<td>95-01</td>
<td>188</td>
</tr>
<tr>
<td></td>
<td>16. Human sensibility ergonomics(^1)</td>
<td>95-01</td>
<td>81</td>
</tr>
<tr>
<td></td>
<td>17. Satellite image data processing technology(^1)</td>
<td>96-01</td>
<td>TBD</td>
</tr>
<tr>
<td>Total</td>
<td>17 Projects</td>
<td></td>
<td>5,069</td>
</tr>
</tbody>
</table>

Notes: 1) New additions.

The projects under this program involve the nuclear reactor, nuclear fuel cycle, nuclear waste management, nuclear safety, and nuclear power plant construction. During the program period (1997-2006), a total of US$2.65 billion will be invested
in nuclear R&D.

Korea launched scientific satellites, KITSAT-I and KITSAT-II in 1992 and 1993 respectively, and sounding rockets, KSRI-I and KSRI-II in 1993. The Korea Multi-purpose Satellite (KOMPSAT) Program was initiated by the Korean government in 1994, and is being implemented in collaboration with the Space and Electronics Group of TRW Inc. The KOMPSAT is scheduled for launching in 1999. The Korean government also started a program to develop a mid-size passenger plane (a 100 seater) in 1994. The objectives of the Aerospace R&D program include the development of a medium-sized passenger plane, a helicopter, and a gas turbine engine; and a multi-purpose satellite, a two-stage sounding rocket, and materials and parts; and testing facilities for satellites.

To attain these technological goals, the Korean government has taken several important policy measures over the recent years. First, to boost innovation in Korean society, the government enacted the Special Law for S&T Innovation earlier this year. In accordance with the mandate of the law, the government has drawn up a Five-Year Plan for S&T Innovation that contains specific action plans and investment schedules. The Plan calls for the government to increase its R&D investment from the current 3% to 5% of the total government budget by the year 2002.

Second, it is clearly recognized that the technological leap cannot be made without a strong scientific base. In order to enhance scientific capability, the government has been strengthening its support for university research, on the one hand, while on the other, it launched the Creative Research Initiative program as a means to encourage creative scientific research. This program is designed to support research based on new and creative ideas.

Third, to strengthen the linkage between science and technology and the economy, emphasis has been placed on encouraging and promoting private leadership in science and technology development.

Lastly, Korea is pursuing international cooperation in science and technology because its technological targets will remain unattainable unless maximum effective use of international scientific talent and facilities is achieved. This is especially so because modern technologies are multidisciplinary and complex in nature. Therefore, Korea seeks active international cooperation, bilateral as well as multilateral, on the principles of mutuality, reciprocity, and equality.

3. Brazil: Its Resources, Market, and Technology

With a GDP of US $560.4 billion(1995), Brazil is the ninth largest economy
in the world, and one of the emerging markets. Brazil is one of the worlds most important producers of agricultural and mineral products. Moreover, its industries also deliver a diverse assortment of products ranging from shoes and textiles to computers and jet planes. It competes in the world market in such areas as engineering, telecommunications, and aerospace. Brazil is now going through a time of change: it has opened up its economy, stabilized its currency, and embarked on an extensive process of privatization. These new developments in Brazil open up new prospects for cooperation in science and technology with Korea.

Brazil has a fast growing agricultural sector. It is the world’s largest exporter of tobacco, orange juice concentrates (85% of the world market), and coffee (US$2.6 billion), the second largest exporter of soya, and the worlds major supplier of sugar, meat, hides, and wood. Agriculture accounts for 40% of Brazil’s exports, and 22.5% of the country’s total employment.

Brazil is also one of the richest countries in the world in mineral resources. Its proven mineral resources are extensive and have been increasing in recent years due to the continuous exploration. Brazil is endowed with about one third of the proven iron ore reserves on the earth, and also rich in such minerals as manganese ore, nickel, tin, chromite, bauxite, beryllium, copper, lead, tungsten, zinc and gold. Brazil produces about 150 million metric tons of iron ore and exports 100 million metric tons every year.

Brazil has been emerging very strong in industrial sectors too. It has grown to be the ninth largest automobile producer. It assembled around 1.4 million units and exported 379 thousand cars, buses, and trucks in 1994. Brazil also ranks seventh in cellulose production. Its mechanical industry grew by 15% in 1994, exporting three billion dollars of goods in this sector. In steel production, it is ranked eighth in the world, surpassing France, the UK and Canada. Another booming industry is electronics. In 1994, the sector’s overall production reached US$23 billion, a 40% increase from 1992. Production in Brazil, however, is concentrated on consumer appliances such as the VCR, color TV, transistor Radio, microwave oven, refrigerator, gas stove, etc.

Brazil is well known for its aviation industry, which is sixth largest in the world. The Embraer Tucano, an aircraft developed by Brazil, is used by air forces in twelve countries; the Embraer Bandeirante is widely used as a commuter plane in both the United States and Brazil.

The factual account about Brazil suggests that Brazil has obvious strength in science and technology, because without a scientific base, it is not possible for a country to rise so rapidly in the high technology industries. First of all, Brazil
has a large number of university graduates and postgraduates, and it accounts for almost 50% of all South American R&D. Brazil stands out in commuter aircraft, missiles, and deep sea oil exploration. Yet, on a less positive note, R&D expenditures in Brazil is less than 1% of GDP; about 90% of the expenditures are financed by the government; and the university-industry linkage is so weak that university research results are not effectively translated into industrial innovation (Miles 1997).

Recently, Brazil fixed a new set of goals for science and technology: to raise the R&D investment to the level of 1.5% of GDP; to focus the R&D efforts on such areas as information, telecommunications, aerospace, nuclear energy, environment, marine resources, and health; to strengthen scientific and technological infrastructure; to expand efforts for human resource development; to encourage and support private industrial R&D; and to stimulate university-industry cooperation in technology development (Verges 1997).

More specifically, the Brazilian government considers the following as part of its plan to strengthen the scientific and technological infrastructure:

- Building a National Synchrotron Lab
- Improvement of the facilities of the Technological Center on Informatics
- Strengthening the National Lab for Scientific Computation
- Creation of a National Network for Advanced Computation
- Creating a National Research Network
- Launching of a research program on computation (PROTEM)
- Program of the Centers of Scientific Excellence

Along with the policy programs, Brazil is vigorously pursuing international cooperation as a means to encourage and stimulate international flow of knowledge and know-how. So, it is maintaining various programs for international cooperation in science and technology, including joint research, exchanges for research and training, etc.

In order to facilitate international cooperation in science and research, Brazil has also revised domestic law and regulations on intellectual property rights and other pertinent laws, liberalized domestic markets, and adopted international standards, among many other measures.
4. Korea-Brazil Cooperation in Science and Technology: the Korean Perspective

4-1. Why Cooperation?

Cooperation takes place only when the parties involved are convinced that cooperation is mutually beneficial. Mutually beneficial outcomes result when they can complement each other in some way or another through cooperation. More directly put, cooperation arises out of mutual needs. Therefore the question is: Does Korea need Brazil and vice versa?

Brazil is a large country not only geographically but also in terms of population and economic size. Brazil harbors almost 50% of the economic activities and population of the South American Continent. It is the ninth largest economy in the world, and being endowed with rich natural resources, is world's major supplier of mineral resources as well as agricultural products. Brazil is also a economic and political leader in such regional bodies as the Latin American Integration Association, which pursues a Latin American Community as its ultimate goal, MERCOSUR (a regional customs union), and the South American Free Trade Area.

In contrast, Korea is a very small geographic country endowed with virtually no valuable natural resources. Despite the extremely unfavorable environment, Korea has been able to build one of the fastest growing economies in the world. It is now the tenth largest economy in the world and the eleventh largest trading country. Korea's economic dynamism has also contributed to the growth of the Pacific basin economies. In achieving economic growth, Korea has had to rely heavily on foreign countries for the natural resources required for industrial production, since it lacks natural resources. Therefore, international trade and cooperation have been basic tools for the survival and development of Korea. Through international trade and cooperation, Korea has been able to take its place as a new industrial economy.

This simple comparison tells us that Korea offers to be an important market for Brazil's natural resources, agricultural products and other industrial goods, while Brazil has great potential as a market for Korea's industrial products. But, the current trade relationship between the two countries falls way short of the level that the potential indicates. Korea is still ranked only as Brazil's seventeenth largest partner in trade, and Brazil has not been a major trade partner of Korea, either. Among the various possible reasons behind this, one main reason may be the lack of a relationship between the two countries in science and technology.
It does not require much in-depth reasoning to explain how a technological relationship affects trade. Korea's trade relationships with the United States, Japan and other major trade partners are largely based on the technological cooperation that enabled Korea's industrial development. In general, technological cooperation results in increased trade and investment and leads to a long-term stable trade relationship. This is one of the reasons why Korea and Brazil need to cooperate in science and technology.

The second reason has something to do with the industrial technological mentality that exists between the two countries. The earlier discussions suggest, among other things, that Brazil shows technological strength in aerospace, while Korea performs better in the world electronics market. These relative technological strengths and weaknesses create the need for mutual cooperation. If the technological capability of Brazil and that of Korea are combined in an effective way, it will enhance the technological competitiveness of both countries.

Third, the two countries need each other because they pursue almost the same scientific and technological targets. Korea's R&D programs aim at developing technological capabilities in such areas as information/telecommunications, electronics, new materials, bio-technology, next-generation automobiles, new energy (including nuclear energy) and aerospace. Brazil also seeks to develop technological strengths in telecommunications, aerospace, electronics, biotechnology, and nuclear energy. By working together in these areas, not only would there be a pooling of scientific talents and resources, but there would also be a spreading out of the technological and financial risks that are inherent in scientific ventures.

4-2. In what areas?

It is meaningless to attempt to make an exhaustible list of areas that are deemed desirable and feasible for mutual cooperation. There exist many areas where Korea and Brazil can cooperate for mutual benefits as mentioned in the previous section. But, I would like to focus the discussion here on a few areas that are considered the major source of interests among scientists and engineers of Korea and possibly those of Brazil.

They are: Electronics/Information/Telecommunication, Bio-Technology, and Aerospace.

Electronics/Information/Telecommunications

These indeed have been the major areas of R&D concentration in both Korea
and Brazil over the past years and will continue to be so in the coming years. More specifically, Korea has been pursuing technological competitiveness in the following fields through national research programs: B-ISDN, next-generation semiconductor, advanced material for electronics, ASICs, flat panel display, and computer software. Brazil has been placing emphasis on such fields as system technology, satellite communication, mobile communication, digital signaling process, optical communications, switching system, etc.

Bio-technology

Korea considers bio-technology as the key source of industrial development in the coming decades, and it is also vital for the development of the Brazilian agriculture and industry. This indeed offers to be an area of mutual interests.

The rich bio-diversity confers on Brazil a great potential for the development of new agricultural products. Many genes of wild species of plants, microorganisms and animals, encoding for important proteins and toxins, have yet to be isolated and cloned or utilized. Utilization of bio-diversity that uses molecular techniques will enable us to develop new species of products, for instance, plants resistant to insects and/or diseases, and so on.

For the development of bio-technology, the Brazil government plans to increase its annual investment to US$2 billion by the year 2000. The major projects of the EMBRAPA (Brazilian Agricultural Research Corporation) include such topics as: method micro-propagation, regeneration, transformation, and gene expression; factors affecting the resistance to insects and diseases; albuminoid gene expression in transgenic plants, and etc. Korea’s research interests in bio-technology are in developing new functional bio-materials and bio-medical engineering; genome research; utilization of biological functions; molecular breeding; bio-diversity and environment; and bio-energy.

Aerospace

It appears that Brazil takes a bifocal approach to the development of aerospace technology: one to develop aircraft technology, the other to develop satellite technology for the surveillance of natural and environmental disasters and for other scientific purposes. Korea takes the same approach in that it pursues both aircraft and space technology. More specifically, Korea’s Aerospace R&D Programs target at developing aircraft, satellites, sounding rockets, materials, parts and equipment, and testing facilities, including the sub-sonic wind tunnel.
Brazil has already built a solid base in this field through domestic research as well as international cooperation. Korea is still at the formation stage, but has been developing quite rapidly over the recent years. Additionally, these R&D programs offer abundant opportunities for collaboration between the two countries.

4-3. How?

The main actors in international scientific and technological cooperation are scientists and engineers, because they are the ones who generate, diffuse, and utilize new knowledge and inventions. They are the most efficient modes of technology and knowledge flow. This is why cooperation starts with the exchange of scientists and engineers. Therefore, the method suggested here first is the exchange of scientists and engineers in areas of mutual interest. One way of initiating the exchange may be for the two countries to form science and technology missions and exchange them to explore in a more practical manner the desirable areas for and possible modes of cooperation. The Korea Science and Engineering Foundation has also expressed an interest in developing a joint post-doctoral research fellowship program with its counterpart in Brazil (CNPq).

Second, joint research is the most frequently employed method of cooperation. However, that may turn out to be not so effective, unless there exists mutual confidence among the scientists and engineers of the two countries. Nevertheless, this can be an effective tool for cooperation in the case of less sensitive areas, such as basic scientific research. Basic sciences are very appropriate not just because of the less sensitive nature, but also because they are the areas in which both countries have to develop capabilities.

Despite the difficulties inherent in international joint research, some Korean research institutions responded in a very positive way to a recent survey of the Ministry of Science and Technology regarding joint research with Brazilian institutions. The condition of course was that the government fund the research. The responses to questions included such subjects as: software for auto design and manufacturing (KIST), determination of pesticide residues in agricultural products (KIST), intelligent robot system (KAIIST), natural fibre-cement composites (KIMM), mineral exploration (KIGAM), isolation of novel streptomyces strains producing bioactive products (KRIBB), production of pharmaceutical proteins from plants (KRIBB), and a comparative study on science and technology policies in Korea and Brazil.

Third, to facilitate cooperation, it may be useful to maintain an intergovernmental channel for dialogue. This is already included in the Korea-Brazil
Agreement on Science and Technology in the form of a joint committee, but the committee has not convened for the past five years. So, instead of adding new ideas, it is strongly suggested that the agreed upon mechanism for cooperation be properly utilized first. As long as the agreement remains defunct, cooperation will hardly materialize.

Fourth, private participation in scientific and technological cooperation is very important, if the results of cooperation are to be utilized in an economically meaningful way. There have been business interactions between the industries of the two countries and Korean business operations in Brazil have been increasing quite rapidly over the recent years. But, it appears that such interaction has not yet reached the dimension of technological collaboration.

Fifth, inter-institutional cooperation will prove to be more effective, because institutions are the operating arms as far as research and development is concerned. For this, the governments as well as the Korea-Brazil Commission for the 21st Century will have to play the role of a linker. To support inter-institutional cooperation, a mechanism for the exchange of scientific and technological information needs to be created. One simple suggestion is that the embassies, both in Seoul and Brasilia, provide information and guidance to those who seek cooperation.
Science and Technology in Brazil: Possibilities of Cooperation with Korea

Eduardo M. Krieger
Chairman, Brazilian Academy of Science

1. A Chronology of the National Science and Technology System

The Brazilian Academy of Science was founded in 1916 which was followed by the foundation of the Brazilian Society for the Advancement of Science in 1949.

In 1951, after the Second World War the National Research Council (CNPq) was created, inspired by the British Science Research Council, aiming at financing individual research project through grants and scholarships. The plan approved by the government was conceived at the Academy, whose President Alvaro Alberto da Motta e Silva was appointed as the first president of the Council. The highest level of decision making in science and technology national policy was a board located at CNPq. This board included in its membership, in addition to representatives of the government, a representative of the Academy and a large number of scientists, most latter members of the Academy. Various important institutions such as the Atomic Energy Commission (CNEN), the National Institute of Space Research (INPE) and the National Institute of Amazon Research (INPA) have their origins in committees set up by the board.

During that year the Ministry of Education created the Commission for the Improvement of Higher Education Personnel - CAPES, aimed at the professional training of university professors.

In 1970, graduate courses (MS and PhD) were recognized or created under new legislation. Graduates courses and research centers were consolidated through the financial support given by BNDE, the Brazilian Investment Bank. These centers were later funded by the Financing Agency for Studies and Projects - FINEP, an agency established by the federal government to support R&D projects, particularly those aiming at the development of new technologies. FINEP also became the executive secretariat of the National Science and Technology Fund(FNDCT), a major instrument of support and funding for basic and applied research projects.
A Ministry of Science and Technology was created in 1985 and incorporates CNPq and FINEP, as well as INPE and INPA.

A National Council of Science and Technology, chaired by the President of the Republic initiated its activity in 1996.

2. Institutional Framework

The institutional framework of S&T is rather complex. R&D activities are financed by several ministries or carried out through their own research institutions, such as FIOCRUZ (Ministry of Health), EMBRAPA (Ministry of Agriculture), among others. Some Brazilian states are also responsible for research institutions and finance through their own local agencies.

In Brazil, as a whole, S&T are mainly developed at public universities, financed by the Ministry of Education, and largely dependent of grants bestowed by the Ministry of Science and Technology, which is also responsible for some independent research institutes.

The total expenditures in S&T in Brazil(1996) reached US$8.1 billion, equivalent to 1.1% of our GNP. The industry participates with 22% of the total expenditures, approximately. Important to observe that the private sector contribution is growing, and the expectations are that we may reach 30 to 35% before the end of the century.

3. Higher Education

Illiteracy rate is still high in Brazil, approximately 17% above age of ten years. This fact associated with overall deficiencies in basic and secondary education explain the relatively low number of students in the university (approx. 1.6 million) which represents 1% of the total population, or 11% of individuals at age of entering the university. Only 40% of the students are in public universities, where most of the academic research is concentrated, whereas 60% of them are in private universities with very low research activity. A large number of students are in humanities and social areas (near 60%) while less than 20% are in engineering and technology programs.

The new system created in 1970 includes nowadays more than 560 PhD's courses, 1,000 MS courses with an output of 2,500 PhD/year and 7,500 MS/year. The number of students in the engineering MS programs are 7,200 of 41,400 and 3,800 of the 16,300 in PhD courses.

The total number of fellowships provided by CNPq and CAPES is
approximately 80,000 (circa US$800 million/year).

4. Personnel Engaged in S&T Activities

From the total number of 145,000 scientists and engineers, the majority (82%) are in universities (39% as faculty and 43% as graduate students). In addition, there are 31,000 technologists (BS level), which make the total personnel working in the area 176,000 with the private sector having only 11% of the total. From the approximately 20,000 PhD’s working in S&T, only 700 are in industry.

5. Scientific Production

During the last 20 years, Brazilian participation in the total number of international scientific production measured by the number of published articles increased from 0.4% to 0.82% in almost all the areas of scientific knowledge.

In general, the profile of the Brazilian scientific production is similar to that of the world scientific articles in ISI. More than 50% of the articles are in life sciences areas (biology, biomedicine and medicine). The engineering area is less represented than in the world scenario (6% versus 10%). The same is true for the social areas (3% versus 10%) which usually are publishing in local journals and in Portuguese.

The contribution of Brazil to the world scientific articles published in ISI is much greater than the contribution to the number of patents deposited in USA. Brazil accounted for 1.2% of the world articles and only 0.06% of the patents, a relation 20 times greater of articles compared to patents. This relationship is 0.62 for USA (33.6% of articles versus 54.1% of patents), 1.26 for Korea (1% of articles versus 0.69% of patents), and 3.1 for Israel (1% of articles versus 0.32% of patents). These facts illustrated the low impact of science for the development in Brazil. This scenario will change rapidly in consequence of the new law of patents, which now recognize patents in the area of food, pharmaceutical products and processes.

6. Major Contribution of S&T for the Development of Brazil

Brazil has shown major developments in various fields of S&T. In agriculture, it has transformed the unproductive Central Brazil (Savannah- "Cerrado") into a fertile land which produces 50% of the total Brazil grain crop. Also the development of the nitrogen fixation by grass species has enhanced the success of the largest world biomass alternative program. Other contributions include, the
development of the most advanced technology for off-shore deep water oil drilling, the development of high power turbines for hydro-electric plants, medium range jet and engine powered aircraft. Also the space program, especially satellites to collect information on tropical forest, in water reservoirs and sea and information technology, particularly in microelectronics and software sectors, has been notable.

7. Major Challenges for S&T in Brazil

These are the major challenges faced by Brazil: to promote generalized education; to increase the number and the quality of the personnel engaged in S&T; to increase linkage between the university and the productive sector, public and private, to use knowledge for the benefit of the socio-economic development; to increase the percentage of S&T investment in relation to the GNP, with greater contribution of industry; to promote simultaneously basic science and strategic projects of S&T with socioeconomic impact; to achieve sustainable development and to preserve the environment.

8. Agenda for Cooperation

Projects for cooperation include mission oriented projects of bilateral interest in the areas of health and agriculture (vaccines, phytopharmatology, biotechnology); information and telecommunication; minerals and new materials; joint-ventures among enterprises; co-financing technological projects. Education in Science (basic, technical and PhD’s programs) and exchange of S&T personnel, multidisciplinary projects are also part of the plan.
### Table 1: National Expenditures in S&T (Estimated Figures)

<table>
<thead>
<tr>
<th>Category</th>
<th>1996</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Federal Government</strong></td>
<td>3.24</td>
<td>39.72</td>
</tr>
<tr>
<td>Ministry of S&amp;T</td>
<td>1.24</td>
<td>15.20</td>
</tr>
<tr>
<td>Other Ministries</td>
<td>1.55</td>
<td>19.00</td>
</tr>
<tr>
<td>Fiscal waive &amp; incentives</td>
<td>0.45</td>
<td>5.52</td>
</tr>
<tr>
<td><strong>State Government &amp; Municipalities</strong></td>
<td>1.38</td>
<td>16.92</td>
</tr>
<tr>
<td><strong>Business Sector</strong></td>
<td>2.64</td>
<td>32.34</td>
</tr>
<tr>
<td>State Corporations</td>
<td>0.75</td>
<td>9.19</td>
</tr>
<tr>
<td>Investments benefited by Fiscal Policy</td>
<td>0.45</td>
<td>5.52</td>
</tr>
<tr>
<td>FINEP(excluding Treasury)</td>
<td>0.24</td>
<td>2.92</td>
</tr>
<tr>
<td>Other Companies</td>
<td>1.20</td>
<td>14.71</td>
</tr>
<tr>
<td><strong>Faculty Working on R&amp;D</strong></td>
<td>0.90</td>
<td>11.03</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>8.16</td>
<td>100.00</td>
</tr>
<tr>
<td><strong>GDP</strong></td>
<td>760.40</td>
<td></td>
</tr>
<tr>
<td><strong>S&amp;T/GDP</strong></td>
<td>1.10</td>
<td></td>
</tr>
</tbody>
</table>


### Table 2: Personnel Engaged in S&T Activities in Brazil

<table>
<thead>
<tr>
<th>Institutions</th>
<th>Faculty/Researcher</th>
<th>%</th>
<th>Tech</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Universities</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faculty</td>
<td>119,373</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Federal</td>
<td>56,760</td>
<td></td>
<td></td>
<td>56,760</td>
</tr>
<tr>
<td>State</td>
<td>32,652</td>
<td>39</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private</td>
<td>17,062</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Postgraduate</td>
<td>7,046</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>students</td>
<td>62,613</td>
<td>43</td>
<td></td>
<td>62,613</td>
</tr>
<tr>
<td><strong>Institutes</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Federal</td>
<td>26,142</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>State</td>
<td>7,632</td>
<td>5.5</td>
<td>5,946</td>
<td>13,578</td>
</tr>
<tr>
<td>Public Centres</td>
<td>4,704</td>
<td>3.0</td>
<td>7,457</td>
<td>12,161</td>
</tr>
<tr>
<td>Private Centres</td>
<td>5,041</td>
<td>3.0</td>
<td>8,952</td>
<td>13,933</td>
</tr>
<tr>
<td></td>
<td>8,765</td>
<td>6.5</td>
<td>8,241</td>
<td>17,186</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>145,515</td>
<td>100.0</td>
<td></td>
<td>176,291</td>
</tr>
</tbody>
</table>

Source: Brito Cruz (Forthcoming study CPCI-1/CCT/1997).
(Table 3) Graduate Education in Brazil (1994)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctorate courses</td>
<td>562</td>
</tr>
<tr>
<td>Master courses</td>
<td>1,074</td>
</tr>
<tr>
<td>Faculty doctors</td>
<td>25,800</td>
</tr>
<tr>
<td>Master degree students</td>
<td>41,400</td>
</tr>
<tr>
<td>Doctor degree students</td>
<td>16,300</td>
</tr>
<tr>
<td>Dissertations presented (1993)</td>
<td>7,500</td>
</tr>
<tr>
<td>Doctoral theses presented (1993)</td>
<td>1,700</td>
</tr>
</tbody>
</table>

Biotechnology in Korea
and Prospects for Cooperation with Brazil

Young Hoon Park
Korea Research Institute of Bioscience and Biotechnology (KRIBB)

1. Introduction

Biotechnology, together with telecommunication or information technology, is currently being recognized in Korea as one of the most important frontier technologies of the 21st century. Very recently, when Prof. Alvin Tofler, the author of *Powershift* and *The Third Wave*, was visiting Korea, he indicated that biotechnology with information technology will create an enormous social and economic impact in the future world economy. Examples include increased food production through genetically engineered crops and satellite-delivered weather information.

Not necessarily to quote Tofler’s commentary, biotechnology is already regarded as the key technology which can be successfully utilized to develop new methods for food production and high value-added health-care products like vaccines and new anticancer agents. It also can be used to develop new and efficient methods for environmental protection. Bioremediation technology is a good example. New further applications are being developed for cleaner industrial products and processes.

The Korean government has already recognized this and has taken an initiative to develop biotechnology in Korea; "Biotech 2000 Program", a 14-year (1994-2007) national program, is an example. Other examples include HAN projects, which focus applied research to develop functional biomaterials, and "Braintech 21 Program" which started in 1997 for studies in neurobiology and brain functions.

Although Korean bioindustry is experiencing a difficult time these days, and is yet too weak to compete with world market leaders, it still has strong competitiveness in some biotechnological products. Fermentative productions of antibiotics such as rifamycin and cephalosporin C, and amino acids such as MSG (monosodium glutamate) and lysine are good examples. High technological levels
in this fermentation industry and its high quality manpower are believed to be the solid basis and motive power that can support the Korean bioindustry.

Very little information is available to me at the moment about biotechnology and bioindustry in Brazil, but I believe there exists vast opportunity for bilateral cooperation between Korea and Brazil in the field of biotechnology. One example can be the joint production of hepatitis vaccine, since Korea already has technology to produce it and has vaccinated almost all of her people. The experience of Korean bioindustry in developing recombinant proteins can be shared with Brazilian counterparts. Scientific collaborations including information exchange and joint research projects are of course important to build-up a get-to-know-each other atmosphere between scientists of the two nations.

Brazil’s abundant bioresources and Korea’s experience and technology in screening novel bioactive substances may also result in new bioproducts which can sweep over the world market. Of course, a successful cooperative relationship between two nations can be established only by serious efforts to enhance mutual understanding and technological interdependence.

I would like to share this opportunity with you to introduce the current status of bioindustry and Biotechnology R&D in Korea, and to suggest some ideas to promote or start bilateral cooperation in the field of biotechnology.

2. National Policy and Strategic Plans for the Promotion of Biotechnology in Korea

2-1. Government Policy to Promote Biotechnology

Korea has a traditionally sound basis for biotechnological research and related industrial capabilities. Many fermentation products, including soy sauce and fermented vegetables, kimchi, have been used for thousands of years in Korean society, and modern bioindustries producing alcoholic beverages, amino acids and antibiotics by fermentation already possess strong competitiveness in the world market. However, it was not until the 1980s that a systematic effort for developing biotechnology was launched at a national level.

Recognizing the potential of biotechnology, the Korean government took a step-by-step approach to develop national capabilities for biotechnology. The government started with the enactment of the "Genetic Engineering Promotion Law" in 1983. It has greatly contributed to the establishment of a solid foundation for biological science and technology in Korea. It provided the government with the legal basis of support for biotechnological R&D and training of manpower in
the academic sector, and for building up public supporting functions for biotechnological R&D, such as a gene bank, a biopilot plant and a biotechnology information center. With the help of the law, The Korea Research Institute of Bioscience and Biotechnology (KRIBB) was founded in 1985, and has been playing the vital role in developing advanced biotechnology in Korea. Many universities also opened new departments related to genetic engineering and biotechnology, and started to establish research centers (ERC and SRC) within the universities with aid from the government. The industrial sector, realizing the growing worldwide bioproduct market and the need to cultivate biotechnological R&D capability, also established the Bioindustry Association of Korea (BAK) in 1991.

To induce or stimulate R&D investment from the private sector, the Korean government started the HAN (Highly Advanced National) Project in 1992. Industry participation was a prerequisite for the HAN projects, since the government supported them only by giving matching funds equivalent to 30 to 50%.

Furthermore, realizing the need for fundamental research capability in biotechnology, the government started an ambitious 14-year research program, so called “Biotech 2000 Program” in 1994.

Table 1. shows the R&D investment in biotechnology from the Korean government and industry. It is noteworthy that the investment in biotechnology increased sharply in 1991, 1993 and 1995 from both government and industry sectors. They correspond to the start of the new national biotechnology programs, HAN projects and Biotech 2000. As can be seen, the role of government to stimulate and promote investment from the industrial sector is quite significant.

As a result, the biotechnology R&D input resources such as research funds and human resources have significantly increased along with the strengthened R&D infrastructure during the last decade.

The government ministries involved in biotechnology R&D are the six ministries shown in Table 2. The average rate of increase in government investment between 1993 and 1996 is 31.9%, which is significantly higher compared to other technological areas.

Human resources trained in universities and working in industry are also increasing significantly (Table 3 and 4), but at a rather modest rate of about 16%. Manpower in industry increased more rapidly (annual growth rate of 27.7%) indicating the efforts in biotechnology R&D by industry. The total manpower in the industry exceeded the total in academia from 1993 and this trend is expected to continue. Despite the rapid growth of manpower in the industry, the growth rate of R&D investment from industry does not match the growth rate of manpower, indicating that Korean bioindustry is still trying to establish a research
basis by spending a large portion of investment securing manpower. It should also be noted that the annual growth rate (16%) of total biotechnology R&D manpower is lower than that of R&D investment (23%). This may indicate the possibility of a future manpower shortage and the need to strengthen investment for training and education in universities and public research institutes.

The role of government can also be appreciated in building up the national infrastructure for biotechnology R&D. It includes the facilities for a gene bank, a biopilot plant, experimental animals and bioinformatics.

As noted, the government has played a major role during the last decade in establishing the scientific and technological basis of biotechnology in Korea. The government support also prompted the industry to engage in biotechnological R&D, resulting in several successful examples of new bioproducts including hepatitis vaccine, human growth hormone and potato microtubers. However, as the overall industrial basis of biotechnology in Korea is still considered weak, it is important to encourage more active investment from the industrial sector. A more aggressive government role is therefore expected in order to support industrial R&D activities. Continuous support for fundamental research and the establishment of the national infrastructure for biotechnological R&D are good examples for such efforts.

2-2. Strategic Plans for Biotechnology Promotion in Korea

In Korea, a number of S&T related ministries carry out various research programs and/or take supportive measures depending on their needs. The overall co-ordination of national S&T policy is assured through two major channels, program co-ordination and budgetary control.

With respect to budgetary control, the Ministry of Finance and Economy (MOFE) exercises substantial influence on the other ministries’ programs. MOST is entitled to play the decisive role for co-ordination of S&T programs, at least in principle. However, since each ministry competes for funds from MOFE, program co-ordination by MOST has not often been successfully made.

MOST therefore proposed in 1993 a national basic plan for the promotion of biotechnology R&D capabilities, co-ordinating multi-ministrial activities; that is, the "Biotech 2000 Program". The background of the basic plan can be attributed to the need for reformation in the national R&D direction and a system in such ways as to absorb the changing waves of the international R&D environment and to accommodate the growing domestic R&D interest and demand. The global movement and concern on issues of ESSD (Environmentally Sound and Sustainable Development), and the "Green
Round movement after the Rio Declaration in 1991 forced the relevant ministries in the Korean government to consider measures to develop biotechnology in the related fields. In addition, there has been a strong demand for reformation of national strategies for technology development to secure international competitiveness of Korean industry.

Therefore, the basic directions of the national policies and strategies for the promotion of biotechnology has been particularly focused

a) to lead new bio-industrial groups through the development of new biotechnology on the strong basis of conventional biotechnology
b) to accelerate diffusion of the public consensus for the recognition of the early establishment of environmentally sound and sustainable technology
c) to realize the importance of bioresources and to seek strategic support for biodiversity conservation in conjunction with biotechnological R&D.

Under these basic principles, the aim and strategic approaches of the "Biotech 2000 Program" were given as;

a) leveling up the Korean scientific and technological capabilities and infrastructure to the standard of the world's leading countries,
b) accelerating commercialization of R&D output to attain international competitiveness of Korean biotechnological products in the world market.

It is also proposed in the program that biotechnology R&D is to be supported by six different ministries (Table 5) due to its broad application areas. Ten major research projects were thus suggested in six categories. (Table 6)

To achieve the goals imposed in the "Biotech 2000 Program", the major implementation strategies (10 Action Plans) were suggested as shown in Table 7.

MOST is currently preparing an annual implementation action plan for the Biotech 2000 Program by collecting plans from six different government ministries (MOST, MOTIE, MOHW, MOEN, MOE, MOAFF).

3. Current Status of Bioindustry and Biotechnology R&D in Korea

The world market of Biotechnology products is being forecasted (by A. D. Little Corp. of the United States) to be US$ 100 billion in 2000 and US$ 305 billion in 2005. At present the US market is the largest (about 50%) and is followed by Europe and Japan. It is expected that biopharmaceuticals will lead the market but bio-foods, agricultural and environmental products will increase steadily.

Similar observations can be applied to the domestic market of biotechnology
in Korea.

The Bioindustry Association of Korea (BAK) recently reported the result of questionnaire survey of 150 bioindustries in Korea conducted in September 1997. The domestic sales of new biotechnological products (Table 8) in 1996 was US$410 million, of which domestically developed products constitute 68% and the imported 32%. It should be noted that biopharmaceuticals constitutes 68% (US$280 million) of the total Korean bioprocess market.

Table 9 summarizes the changes in the domestic market size of bioproducts. The Korean biotechnology market in 1996 increased eight-fold from 1991 (US$ 65 million), indicating the potential for growth of bioindustry. On the other hand, it should also be noted that the market shows a high dependency on imports which constitute more than 30%.

Table 10 shows the domestic market sizes of bioproducts in various categories. The biopharmaceuticals leads the market followed by the environmental and bio-food products. The market prediction in Table 10 can be criticized for being much too optimistic; some modification is believed to be necessary considering the current economic difficulty in Korea.

It should be noted that the market for agricultural products and biochemicals is very small yet and the market for bioenergy (for example, ethanol) has not really been established in Korea. The main reason for this is that Korea is short of biomass resources while Brazil is obviously the opposite case.

The concerted efforts in the biotechnology R&Ds by the government and industry resulted in many successful examples of bioproducts. The recent evaluation of the 6 year performance of HAN project showed that the project has been carried out very successfully, and the examples of bioproducts developed during the period of 92 - 97 are listed in Table 11.

4. Suggestions for Korea-Brazil Bilateral Cooperation in Biotechnology

As mentioned earlier, biotechnology is recognized as a technology that will make a significant contribution to economic growth in the next century. It is also regarded as a strong measure against global movements for environmental protection, including the conservation of biodiversity.

The market capacity of bioproducts is expected to increase rapidly worldwide including Latin America.

Korea already has a sound basis for bioindustry, especially in fermentation and pharmaceutical industries, and also possesses high quality human resources. Investment from the industrial sector is increasing rather rapidly, and Korean
bioindustry is quite ready to seek international cooperation. In contrast, Brazil has vast territory and abundant natural bioresources.

In that sense, one of the most plausible areas for bilateral cooperation in biotechnology is research in conservation of biodiversity. Utilization of tropical plant resources for screening of novel bioactive substances is an example for joint cooperative research projects. Microbial sources are also important in the same sense. The Korean Collection for Type Cultures (KCTC) of KIRIBB is seeking research collaboration with Colecao de Culturas Tropical (CCT), Brazil. The goal of the collaboration is to search for novel microorganisms producing bioactive compounds, taxonomic circumscription and the exchange of relevant microbial data bases. In addition, the joint development of health-care related bioproducts, i.e., recombinant therapeutic proteins is another possible area of joint cooperation.

Suggested priority areas for Korea-Brazil bilateral cooperation are:

a) Health-care related R&D
   - Production of recombinant therapeutic proteins
     (human growth hormone, interleukins, interferons, G-CSF, etc.)
   - Screening of novel bioactive substances

b) Manufacturing/bioprocessing related R&D
   - Biomolecular process engineering
   - Metabolic pathway engineering
   - Bioconversion engineering

c) Environmental biotechnology related R&D
   - Bioremediation technology

d) Agriculture related R&D
   - Transgenic animals and plants
   - Plant biotechnology

The cooperative program for extending the foundation of R&D infrastructure shall include exchange of scientists and necessary data bases. Suggested priority areas for biotechnology infrastructure are:

a) Gene bank program
   - Identification, preservation and exchange of microbial strains and their gene sources
   - Exchange of related data bases

b) Biological activity screening program
   - Exchange of experts and collaboration through joint research projects
   - Training opportunities for screening specialists

c) Exchange of biotechnology information data bases
5. Conclusion

Korea is one of the most rapidly growing countries in the world. Her economic capability has been rated as the world’s 12th largest trading nation. Although Korea is currently suffering from an economic difficulty these days, as noted by the recent introduction of the IMF system, the potential of her economy can be rated highly especially in terms of its progress in science and technology. The strong commitment made by the Korean government in S&T ensures its future role in the Asia-Pacific Rim to be a promising one.

Based on its strong industrial basis, Korea is now ambitious enough to nourish its bioindustry to become a leading economic sector in the next century. According to the “Biotech 2000 Program”, Korea is planning to invest US$ 2 billion over the next five years, of which more than 30% will come from government funding to build up the S&T basis of biotechnology. International cooperation is one of the major concerns of the program in fulfilling its aim.

Brazil, once called a “sleeping giant” with a territorial sub-continent and diversified strong industrial capability, is turning its economic potential into reality. Its capability in biotechnology has already been proved by commercializing gasohol first in the world. I believe there exists ample room for scientific and industrial cooperation in biotechnology between the two nations. Of course, it will be necessary for us to open up and pave a road first before we start.

Therefore I would like to propose the following three things to promote Korea-Brazil bilateral cooperation in biotechnology;

a) to re activates the Korea-Brazil Joint Commission on Science and Technology, which was agreed upon in 1991, and discuss joint efforts to promote cooperation in biotechnology
b) to hold a ”Korea-Brazil Joint Biotechnology Forum” to understand mutual needs for cooperation in biotechnology
c) to establish a joint cooperative fund to support the exchange of scientists and joint cooperative research projects.

These things all require inter-governmental contacts first, and the Korea-Brazil 21st Century Commission will be a good initiation for such contacts. Important are continued effort and patience that will yield fruitful results of mutual benefit, and I believe it will greatly contribute to building the friendship and common prosperity of both nations.
### Table 1: R&D Investment in Biotechnology from the Government and Private Sectors ('84 - '98)

<table>
<thead>
<tr>
<th>Year</th>
<th>Government(%)</th>
<th>Industry(%)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1984</td>
<td>28.2(19.6)</td>
<td>116(80.4)</td>
<td>144.2</td>
</tr>
<tr>
<td>1985</td>
<td>39.6(20.2)</td>
<td>156(79.8)</td>
<td>195.6</td>
</tr>
<tr>
<td>1986</td>
<td>45.5(22.4)</td>
<td>158(77.6)</td>
<td>203.5</td>
</tr>
<tr>
<td>1987</td>
<td>52.9(21.3)</td>
<td>192(78.7)</td>
<td>247.9</td>
</tr>
<tr>
<td>1988</td>
<td>62.8(20.9)</td>
<td>237(79.1)</td>
<td>299.8</td>
</tr>
<tr>
<td>1989</td>
<td>86.4(29.8)</td>
<td>203(70.2)</td>
<td>289.4</td>
</tr>
<tr>
<td>1990</td>
<td>99.9(21.9)</td>
<td>356(78.1)</td>
<td>455.9</td>
</tr>
<tr>
<td>1991</td>
<td>200.0(27.7)</td>
<td>522(72.3)</td>
<td>722</td>
</tr>
<tr>
<td>1992</td>
<td>247(31.9)</td>
<td>527(68.1)</td>
<td>774</td>
</tr>
<tr>
<td>1993</td>
<td>468(38.3)</td>
<td>754(61.7)</td>
<td>1,222</td>
</tr>
<tr>
<td>1994</td>
<td>544(40.4)</td>
<td>801(59.6)</td>
<td>1,345</td>
</tr>
<tr>
<td>1995</td>
<td>868(45.0)</td>
<td>1,062(55.0)</td>
<td>1,930</td>
</tr>
<tr>
<td>1996</td>
<td>1,233.6(49.6)</td>
<td>1,252(50.4)</td>
<td>2,485.6</td>
</tr>
<tr>
<td>1997</td>
<td>1,716.5</td>
<td>n.a</td>
<td>-</td>
</tr>
<tr>
<td>1998</td>
<td>3,120(11)</td>
<td>n.a</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>8,812.4</td>
<td>(6,336)</td>
<td>(10,314)</td>
</tr>
</tbody>
</table>

Note: 1) Total budget asked by the 7 ministries related to biotechnology.

Source: (1) Ministry of Science and Technology, '97 Annual Plans for Biotechnology Promotion (1997),

(2) Bioindustry, Vol.18(Spring), Bioindustry Association of Korea,


### Table 2: Biotechnology R&D Investment by the Government Ministries

<table>
<thead>
<tr>
<th></th>
<th>1993</th>
<th>1994</th>
<th>1995</th>
<th>1996</th>
<th>Annual Growth Rate(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOST</td>
<td>41</td>
<td>45</td>
<td>55</td>
<td>70</td>
<td>19.5</td>
</tr>
<tr>
<td>MOE</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>6</td>
<td>43.2</td>
</tr>
<tr>
<td>MOAFE</td>
<td>12</td>
<td>13</td>
<td>27</td>
<td>32</td>
<td>38.4</td>
</tr>
<tr>
<td>MOTIE</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>10</td>
<td>78.7</td>
</tr>
<tr>
<td>MOEN</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>32.6</td>
</tr>
<tr>
<td>MOHW</td>
<td>1</td>
<td>4</td>
<td>6</td>
<td>15</td>
<td>169.9</td>
</tr>
<tr>
<td>Total</td>
<td>59</td>
<td>69</td>
<td>97</td>
<td>135</td>
<td>31.9</td>
</tr>
</tbody>
</table>

Note: MOST: Ministry of Science and Technology; MOE: Ministry of Education; MOAFF: Ministry of Agriculture, Forestry and Fisheries; MOTIE: Ministry of Trade, Industry and Energy; MOEN: Ministry of Environment; MOHW: Ministry of Health and Welfare.

(Table 3) R&D Manpower in Biotechnology

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Industry</td>
<td>652</td>
<td>921</td>
<td>1,290</td>
<td>1,357</td>
<td>27.7</td>
</tr>
<tr>
<td>Academia</td>
<td>1,034</td>
<td>1,145</td>
<td>1,184</td>
<td>1,224</td>
<td>5.8</td>
</tr>
<tr>
<td>GSRI</td>
<td>483</td>
<td>625</td>
<td>707</td>
<td>801</td>
<td>18.4</td>
</tr>
<tr>
<td>Total</td>
<td>2,169</td>
<td>2,091</td>
<td>3,181</td>
<td>3,382</td>
<td>16.0</td>
</tr>
</tbody>
</table>

Note: GSRI: Government supported research institutes.
Source: IBID.

(Table 4) Manpower engaged in production by industry

<table>
<thead>
<tr>
<th>Year</th>
<th>Ph.D.</th>
<th>MSc</th>
<th>BSc</th>
<th>Others</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1992</td>
<td>6</td>
<td>31</td>
<td>114</td>
<td>531</td>
<td>682</td>
</tr>
<tr>
<td>1994</td>
<td>4</td>
<td>51</td>
<td>137</td>
<td>979</td>
<td>1,171</td>
</tr>
<tr>
<td>1996</td>
<td>10</td>
<td>82</td>
<td>234</td>
<td>1,054</td>
<td>1,380</td>
</tr>
</tbody>
</table>

Source: IBID.

(Table 5) Major Areas of Biotechnology for Inter-ministerial Cooperation

<table>
<thead>
<tr>
<th>Ministry</th>
<th>Major Task Areas</th>
<th>Approaches</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOST</td>
<td>Biomaterials related to technology</td>
<td>Interministerial co-operation</td>
</tr>
<tr>
<td></td>
<td>Target-oriented fundamental research</td>
<td>Interdisciplinary</td>
</tr>
<tr>
<td></td>
<td></td>
<td>R&amp;D basis</td>
</tr>
<tr>
<td>MOHW</td>
<td>Health care products related to biotechnology</td>
<td></td>
</tr>
<tr>
<td>MOTIE</td>
<td>Bioenergy production technology</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Industrial application of biotechnology</td>
<td></td>
</tr>
<tr>
<td>MOAFE</td>
<td>Agricultural biotechnology</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Food biotechnology</td>
<td></td>
</tr>
<tr>
<td>MOE</td>
<td>Basic research in biological science and technology</td>
<td></td>
</tr>
</tbody>
</table>
(Table 6) Ten Strategic R&D Projects in the Biotech 2000 Program

I. Biomaterials
   1. Development of new functional biomaterials
   2. Industrial application of biological functions
II. Health care
   3. Molecular biological study of human functions (Human biotechnology)
   4. Biomedical engineering
   5. Genome Analysis
III. Agriculture and Foods
   6. Molecular breeding of biological resources and cell culture technology
   7. Food biotechnology
IV. Environment, Bio-safety, and Biodiversity
   8. Environmental biotechnology and biodiversity
   9. Assessment study of environment and bio-safety
V. Alternative Energy
   10. Technology for bio-energy production
VI. Basic Life Sciences

(Table 7) Ten major implementation strategies for the Biotech 2000 Program

1. promote inter-ministerial co-operation to establish the interdisciplinary R&D basis of biotechnology;
2. provide concentrated support for major strategic R&D projects identified;
3. accelerate the development of medium-technology and transfer to commercial applications;
4. provide an increased and continued support for on-going biotechnology projects in HAN projects;
5. promote basic and fundamental research in life science;
6. expand education and training programs to ensure the human resources needed for the development of biotechnology;
7. establish a Bio-Technobelt for the promotion of a regional R&D basis of biotechnology;
8. strengthen the infrastructure and supporting of a regional R&D basis of biotechnology;
9. promote international co-operation for biotechnology development;
10. improve the institutional and legislative systems to foster the development of biotechnology.
### (Table 8) Domestic Market Size of Bioproducts in 1996

(US$ million)

<table>
<thead>
<tr>
<th>Classification</th>
<th>Bioproducts</th>
<th>Market Size</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Domestic</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>developed</td>
<td>imported</td>
</tr>
<tr>
<td>Biopharmaceuticals</td>
<td>antibiotics</td>
<td>80.0</td>
<td>8.4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vaccines</td>
<td>28.3</td>
<td>8.8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>insulin</td>
<td>21.0</td>
<td>5.3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>anticancer agents</td>
<td>6.8</td>
<td>4.9</td>
<td></td>
</tr>
<tr>
<td></td>
<td>anti-anemia</td>
<td>5.4</td>
<td>4.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>anti-inflammatory</td>
<td>9.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>agent</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>hormones</td>
<td>17.4</td>
<td>2.7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>blood/immunologics</td>
<td>6.6</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>other therapeutics</td>
<td>9.6</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>diagnostics</td>
<td>11.6</td>
<td>47.2</td>
<td></td>
</tr>
<tr>
<td>Food</td>
<td>functional foods</td>
<td>2.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sweeteners</td>
<td>16.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental</td>
<td>microbial inoculum</td>
<td>9.6</td>
<td>2.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>waste water treatment</td>
<td>7.9</td>
<td>1.3</td>
<td></td>
</tr>
<tr>
<td>Fine chemicals</td>
<td>cosmetics/biopolymers</td>
<td>1.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>enzymes/reagents</td>
<td>5.8</td>
<td>13.3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>amino acids</td>
<td>16.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agriculture</td>
<td>animal feed/additives</td>
<td>8.3</td>
<td>1.8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>pesticides/fertilizers</td>
<td>6.8</td>
<td>4.4</td>
<td></td>
</tr>
<tr>
<td>Bioprocess</td>
<td>instruments/bioreactors</td>
<td>8.2</td>
<td>25.8</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>279.1</td>
<td>131.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>410.6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Bioindustry, Vol.18(Spring), Bioindustry Assoc. of Korea(1998).

### (Table 9) Increase of domestic market size of bioproducts(91-'96)

(US$ million)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>domestically developed</td>
<td>44</td>
<td>74</td>
<td>119</td>
<td>152</td>
<td>215</td>
<td>279</td>
</tr>
<tr>
<td>imported</td>
<td>21</td>
<td>49</td>
<td>91</td>
<td>94</td>
<td>112</td>
<td>131</td>
</tr>
<tr>
<td>total</td>
<td>65</td>
<td>121</td>
<td>210</td>
<td>246</td>
<td>327</td>
<td>410</td>
</tr>
</tbody>
</table>

〈Table 10〉 The Domestic Market of Biotechnology Products

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Biopharmaceuticals</td>
<td>83</td>
<td>175</td>
<td>279</td>
<td>1,636</td>
<td>5,133</td>
</tr>
<tr>
<td>Agricultural products</td>
<td>3</td>
<td>6</td>
<td>20</td>
<td>285</td>
<td>1,556</td>
</tr>
<tr>
<td>Bio-foods</td>
<td>17</td>
<td>17</td>
<td>19</td>
<td>533</td>
<td>2,800</td>
</tr>
<tr>
<td>Environment</td>
<td>14</td>
<td>20</td>
<td>21</td>
<td>356</td>
<td>1,711</td>
</tr>
<tr>
<td>Biochemicals</td>
<td>6</td>
<td>6</td>
<td>37</td>
<td>356</td>
<td>1,711</td>
</tr>
<tr>
<td>Bioenergy</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>249</td>
<td>1,867</td>
</tr>
<tr>
<td>Bioprocess</td>
<td>-</td>
<td>21</td>
<td>34</td>
<td>142</td>
<td>778</td>
</tr>
<tr>
<td>Total</td>
<td>123</td>
<td>245</td>
<td>410</td>
<td>3,577</td>
<td>15,556</td>
</tr>
</tbody>
</table>

Source: IBID.

〈Table 11〉 Examples of Korean biotechnology R&D products obtained from HAN projects (92-97)

- A new Regionella antibiotic from a streptomyces sp.
- Commercialization of Anticancer/Immuno-stimulating agent from Pellinus Linteus
- A whitening agent for cosmetic application
- Virus-free potato microtuber
- Transgenic cow with human lacferin gene
- A new osteoporosis treating agent using recombinant parathormone
- Development of Recombinant Erythropoietin(DA3285).
- Development of Anticancer agent Taxol from Korean native yews.
- Development of IL-6 ELISA kit.
- Development of bioinsecticide BT.
- Phytase of bacterial origin
Biotechnology in Brazil and Korea: Possibilities for Cooperation

Antonio Paes de Carvalho
Professor, Institute of Biophysics Carlos Chagas Filho,
Federal University of Rio de Janeiro

1. Introduction

The present paper focuses primarily on enterprises that: (a) produce biotechnological innovation, by developing new methods, processes and products; and or (b) develop and produce critical equipment and/or supplies for biotechnology R&D and for biotech based industrial production. Little space will be given to enterprises that restrict themselves to the acquisition and use of biotechnological supplies and processes in their production lines of goods and services. There are looked upon as markets for truly biotech companies.

As a consequence of the above limitations, we shall focus on the small and medium size biotechnological enterprises (biotech SME’s); but will also consider large and medium size enterprises which are active both in biotech R&D and biotech based industrial production.

Alongside the entrepreneurial actors in biotechnology, the proximity between scientific research and industrial development in this sector forces us to consider interactions with and among scientific institutions in each country. Those institutions are also responsible for education and training of experts in the multiple working areas of biotechnology R&D and industrial production.

The institutional and regulatory environment for furthering binational cooperation and business in biotechnology is discussed. Government financing of science related to biotechnology; incentives to the technological modernization of industry; support of R&D initiatives between small/medium size enterprises and the knowledge generators within the scientific institutions (with special reference to technology parks); and the role of small and medium size enterprises as partners and contractors for large industry, are basic issues for the effective flow of biotechnological innovation through production and commercialization channels,
for the final benefit of society.

The present comparative analysis of biotechnology in both Countries will hopefully set the stage for better cooperation mechanisms. Opportunities for new alliances and partnerships are discussed, including prospects for small, medium and large enterprise involvement in the local and global networking of biotechnology.

2. Potential Markets and Opportunities

Most of the global demand for biotechnological products and services lies within the following large economy sectors:

a) Human and Animal Health / Pharmaceutical Industry: novel diagnostics, vaccines, drugs and therapies. Biodiversity based drug discovery; gene therapy; industrial quality control and sterilization; microorganisms, plants and animals (Transgenic or simply improved) that produce biomolecules of medical and veterinary interest.

b) "Agribusiness": modernization and innovation in agriculture, cattle breeding, industrialization and commercialization of foods and beverages. Genetic markers and transgenesis for genetic improvement and nutritional value; biopesticides; modern diagnostics for phytosanitary control; biofertilizers; post-harvest technologies; integrated food quality control systems from agricultural production to final consumer; food processing; biomass production for other industrial usage (e.g. energy, chemicals, food additives).

c) Energy, Mining, Environment and Sustainable Development: energy from renewable biological sources; oil field biotechnology; bioprocessing of low grade mining wastes; biological treatment of industrial and urban wastes; pollution detection; bioremediation of degraded/polluted environments (soil, water); characterization and preservation of the biochemical and genetic biodiversity within ecosystems: sustainable and productive usage of the biodiversity; certification of products for environment quality.

d) Equipment, Supplies and Ancillary Technologies for Bioproduction: special equipment and supplies for bioindustrial production (biochemical engineering, integration of biosensors and biochips) and for R&D activities in biotechnology (molecular biology supplies and related equipment); data processing applied to the storage and use of biochemical and genetic information; high throughput screening robotization; isolation and characterization of biomolecules of industrial interest; information technologies for the management of environment and biodiversity.
Table 1 shows the approximate market size of these Sectors in Korea and in Brazil. The appreciation of the size and structural complexities of these sectors constitute an important basis for the estimation of target niches for biotechnology companies. Table 1 shows for each case a gross estimate of the potential market for improved or novel biotechnologies developed by biotech industry. It also shows in parenthesis the percentage of the total sector market used for the estimation.

〈Table 1〉 Gross Estimates for Year 2000 Potential Markets of Advanced Biotechnology Industry in Korea and Brazil  

<table>
<thead>
<tr>
<th>Economic Sector</th>
<th>Korea Total Market</th>
<th>Biotech Market (%)</th>
<th>Brazil Total Market</th>
<th>Biotech Market (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health</td>
<td>12,620</td>
<td>1,262(10%)</td>
<td>29,250</td>
<td>2,925(10%)</td>
</tr>
<tr>
<td>Agribusiness</td>
<td>5,000</td>
<td>250(5%)</td>
<td>158,756</td>
<td>7,938(5%)</td>
</tr>
<tr>
<td>Energy &amp; Environment</td>
<td>4,440</td>
<td>88(2%)</td>
<td>55,704</td>
<td>1,114(2%)</td>
</tr>
<tr>
<td>Equipment &amp; Supplies (for above)</td>
<td>967</td>
<td>145(15%)</td>
<td>48,742</td>
<td>7,311(15%)</td>
</tr>
<tr>
<td>Total</td>
<td>23,027</td>
<td>1,746</td>
<td>297,182</td>
<td>19,288</td>
</tr>
<tr>
<td>National GDP</td>
<td>437,400</td>
<td>5.3%</td>
<td>696,300</td>
<td>42.0%</td>
</tr>
<tr>
<td>% of GDP</td>
<td></td>
<td>0.4%</td>
<td></td>
<td>2.8%</td>
</tr>
</tbody>
</table>

Estimates for total economic sector markets in Korea: Health=Biopharmaceuticals;
Agribusiness=Food + Agriculture + 50% Fine Chemicals; Equipment + Bioprocess.
GDP stable from 1997 to 2000.

Brazil estimates for total economic sector markets: Health: 150% over Health, Education & Welfare Federal Expenditures in 1996; Agribusiness: 100% Agriculture + 10% Industry + 20% Services; Energy & Environment: 8% total GDP; Equipment & Supplies: 20% over Health, Agribusiness, Energy & Environment. GDP taken to be stable from 1997 to 2000.

Sources: a) “Biotechnology in korea and Prospects for Cooperation with Brazil”, by Young Hoon Park, Korea Research Institute of Bioscience and Biotechnology(KRIBB), 1998, based on 1997 data from a survey by BAK, the Bioindustry Association of Korea.
b) Bak bio-markets projection for Year 2000
(at http://www.kotra.or.kr/e_main/e2_1/industries/bioindus.html).
c) National Statistics Office, Korea, 1998(Korea Economic Indicators through Graphics).
d) IBGE, CNPq.
e) ABRABI-Brazilian Association of Biotechnology Enterprises(best estimates projected from 1993).

The above projections for Korea in Year 2000 shown above resulted from an estimate of potential Korean market for bioproducts and technologies, with a total
market of 1.7 billion dollars. The breakdown of this general number was done by applying the same percentile distribution reported for the 1997 market survey carried out by BAK among 150 biotech companies. It would be expected the actual number of Biotech companies in Korea might be today above 200.

Although the market for biotech companies remains open both in Brazil and in Korea, it is clear that these markets and their culture, although evolving rapidly towards modernization, still pose difficulties to foreign small and medium companies, biotech or otherwise. Large multinational companies are present and are often dominant in certain niches (in Brazil much more than in Korea). Large international companies can be beneficial because they bring their competitive technologies and if necessary, their own small and medium high tech partners. But the unattached SME will face large non-tariff entry barriers to penetrate Brazil or Korea, among which distance and little knowledge of the local scenario looms high.

Latin America, led by the expanding Mercosul is an interesting emerging market for biotech companies. Brazil occupies an important strategic position in Mercosul, with nearly 1.5 times the Korean GDP, more than three times its population and nearly 86 times its territorial extension, sunny Brazil is an important world asset where food, water and biodiversity is concerned. Agribusiness is a strong sector in Brazil today. Yet, a sizable portion of its agricultural frontier remains undeveloped and its biodiversity untapped, awaiting for knowledge and technologies that will bring them to the realm of a socially and economically sustainable development. It is also a country of huge inequalities, both in actual development and in distribution of income, education and health. Huge and complex problems await good technological solutions.

The scenario for Brazilian Biotech is positive. It is felt that progress in this arena can be powerfully expedited if Brazilian entrepreneurs and scientists match their efforts with technology and investment brought from abroad. Predominance of traditional biotechnologies in our ample agribusiness constitutes a prime target for modernization in biotechnology. The accelerated increase of the purchasing capacity of the lower income half of the population over the last four years tends to expand the internal agriculture market and to force several mechanisms of expansion of the Brazilian potential in their sector. Expansion of traditional and modern biotechnology applications are also expected in energy, mining and environment, stimulated by international agreements as those enabled by Rio 92 and due to new international trade requirements such as ISO 14,000. Expansion is also expected in modern biotechnologies markets turned to human health, with special reference to tropical diseases. Action in all these fields has been spurred
further by the approval of the new and modern Law of Industrial Property (patents, trademarks and industry secrets) in 1996.

Interesting as the Brazilian biotech internal market may seem, Brazilian biotech industry will have to move towards a presence in the global markets. Partering in Brazil is therefore an interesting basis for unattached SME's to experiment in international partnerships, strategic alliances and joint ventures.

3. The Biotechnology Enterprises

We have little knowledge of the Korean Biotech Industry, beyond what was already mentioned. It is however clear that the segment which is by far the most characteristics of Korea. The national route of development through excellence in industrial production leads to strong urbanization. Today only 10% of the population of Korea lives on farmland (as compared to nearly 30% in 1980). It is also interesting to note the accelerated development of high level personnel in scientific and industrial environments, a success that can be ascribed to the enormous effort of personnel training abroad developed by Korea (about 5 years ago, korea had nearly 60,000 students training in industrialized countries, mostly in scientific disciplines). Thanks to this, Korea has been and plans to remain globally competitive in several industrial areas; and biotechnology is definitely a priority among national policy planners. Given this general contour, it may be noted that Korea is basically a trading company, where imports and exports account for nearly 50% of GDP (against 11-12% in the case of Brazil).

In 1993, a study performed by ABRABI - the Brazilian Association of Biotechnology Enterprises - listed in Brazil 250 enterprises with some type of productive activity in biotechnology, several of which were engaged on innovation of their products and services and in the modernization of their productive technologies. Arranged by sector as in Table 1, the clustering of companies is as follows:

a) Human and Animal Health (including pharmaceutical industries): 28%
b) Agribusiness (including biomass production): 40%
c) Energy, Environment and others: 15%
d) Equipment and Supplies: 17%

Figure 1 below shows the spread of these companies in different areas (numbers add up to more than 250 because some companies are active in more than one area). It also shows the relative prevalence of national and international control in each area.
In 1995, Americo Craveiro (Valle S.A.) carried out a careful study on Brazilian biotechnology enterprises in collaboration with ABRABI (Latin American Directory of Biotechnological Industries, see http://www.bdt.org.br/bdt/biotech/index). He showed that 76 enterprises were responsible for the R&D activity requirement. Among them, the 20 largest companies (of which half Brazilian-controlled) ranged in annual sales from US$ 21 million to US$ 1.5 billion. Unfortunately, the data was not refined enough to allow an estimate of their biotech revenues per se. ABRABI’s best guess for biotech sales of produces and services in 1996 Brazil is in the range of US$ 500 million, which compares with US$ 410 million found in the survey of the BAK in Korea.

4. The Scientific Ambiance of Biotechnology

The Korean effort in training people abroad resulted in a very steep rise in trained personnel in the country between 1980 (only 18, 400 scientists and engineers) and 1996 (132, 000 scientists and engineers, or one scientist per 351 inhabitants, better than most Industrialized Countries). The fact the rate of increase has leveled off since 1995 may signify that this model has already accomplished its ends and
that the internal training capacity is now high enough to sustain an adequate
growth towards the United States level of one scientist per 200 inhabitants (which
would mean pushing numbers towards 232,000 scientists and engineers).

Korean manpower actually deployed in Biotechnology was 3,382,000 profes-
sionals, with an average annual growth rate of 16% between 1991 and 1994. Of
these, 40% where employed by industry, 36% by Academia and 24% by Government
supported research institutions. Of the 1,380 employed by Industry in 1996, only
92 held PhD or MSc degree. These levels are considered to be an important
requirement in Faculty positions.

Brazil is the largest science producer in Latin America and second only to
India in the developing world. Nearly 40,000 scientists work in universities and
governmental institutions. The employment of scientists and engineers by industrial
R&D is still small by comparison (probably around 10% of the total). The Brazilian
scientific effort amounts to less than 1% of World science and Brazil has one
scientist per 4,000 inhabitants, a ratio nearly 1/10 of that found in developed
economies. Brazilian science funding depends mostly on the Federal Government
Agencies. With the exception of Sao Paulo, other State Agencies are virtually
inoperative. Research funding by enterprises only recently has received some
incentive. CNPq, the “National Council for Scientific and Technology 1990-95”,
according to which private and state companies have spent US$ 1.8 billion R&D,
which amounted to 30% of the national expenditure. The country as a whole is
still spending directly less than 1% of its GDP in Science and Technology (although
new computation methods in measuring S&T moneys has increased the actual
total to 1.2% of GDP). Furthermore, if we were to scrutinize expenditures one
would certainly note that truly innovative research projects linking academia and
industry are still a small part of the whole Brazilian effort.

In Brazil, as in other emerging economies in Colonial America, research in
the biosciences (health, agriculture and “natural history”) developed well before
scientific activities took root in physics, chemistry and engineering. Biosciences
represent still today nearly 40% of Brazilian Science in all fields, and more than
that in scientific productivity (papers in refereed journals). In gross terms, the State
of Sao Paulo represents about 50% of the scientific effort of the country, with 20% located in Rio de Janeiro. Another 20% is represented by Minas Gerais and the
southernmost States, especially Rio Grande do Sul. The rest of the country shares
the remaining 10%.

Biotechnology related R&D activities take place mostly (about 80%) in
Governmental Institutes and Universities. Most of them are Federal Institutions,
with the sole exception of the State of Sao Paulo, in which the State Universities
and Institutes are amply dominant. ABRABI listed in 1993 a total of 266 groups active in biotechnology-related research and development, some of which were large institutions by any standards (e.g. FIOCRUZ, in Health; and EMBRAPA, in agriculture). Figure 2 illustrates the distribution of these groups by area of interest. (By "group we mean a scientifically independent operational unit composed of at least one scientific leader and 4 assistants/graduate students, engaged in a clearly defined scientific project.

Institutions engaged in biotech-related R&D harbor around 3,200 scientists and engineers (by engineer we mean the bearer of any higher education university degree in the science and/or the university level professions). Beyond producing good science and technology, their task is to educate and train scientists labor market enough people to support a sizable increase in industrial R&D and to spur the emergence of dedicated biotech SME’s.

What is the size of the educational task imposed on the Brazilian scientific community? Let us suppose that indeed there is in Brazil a potential biotech market of nearly US$ 20 billion, to be developed in another 10-20 years. Suppose also that Brazilian Biotech SME’s should try to secure for themselves at least 10% of this market. Consider also that the average biotech SME needs one scientist/engineer for each US$ 150,000 of annual revenues. It follows that Brazil would need to incorporate in industrial biotech jobs around 13,000 scientists/engineers until Year 2007, in order to reach that rather modest goal in 10 years. Taking into consideration different types of inefficiencies, the Brazilian science education system would have to turn out at least 25,000 trained people in 10 years. This task is too large for the number of biotech groups and people involved
today. This task is too large for the number of biotech groups and people involved today. Their present rate of graduation is of the order of 500-700 MSc and PhD. degree annually.

Considering the above, one may draw the tentative conclusion that Brazilian biotech related science can use all the support it can get from abroad to accelerate scientific education. This conclusion has to be qualified by the fact that we have enough graduate education activity to provide for formal courses in Master’s and Doctor’s programs; what is lacking is the chance to offer to enough good candidates the occasion to participate in a “bona fide” research project, under adequate scientific leadership, geared for the exercise of the full spectrum of scientific activity: from project planning to reaching measurable goals.

Besides cooperation in education and training of scientists, there is a role to be filled: that of collaborative research involving not only students and research centers, but also associated biotech SME’s on both sides. This ideal situation demands an interlocking of interests that will be best discussed in the following section.

5. The Flow of Knowledge, Technology and Investment

Biotechnology is at a stage of development in which it must reside in or very near institutions where fundamental knowledge on molecular biology is being made. There is no doubt in our minds that fundamental research is an extremely important asset biotech innovation is concerned.

It is no longer admissible that biotech intermediary R&D should use without rewards the ideas, discoveries and inventions made by “basic” scientists. The existence of a flow of both knowledge and funding exists today between Academia and the Biotech Industry. On the other hand, large global enterprises display impressive R&D budgets in the billion dollar range. But they have an increasing difficulty in channeling this money to really innovative endeavors inside their domains. Mainly for this reason, and for the competition for better products for the larger markets, transnational giants are using R&D project outsourcing and partering with dedicated biotech SME’s, wherever the appropriate combination of creativity and reliability can be found. By using SME’s more than they resort directly to Academia, large corporations are rationalizing their interactions with science. SME’s function here not only as a contractor, but also as a source of fundamental knowledge, what they do well owing to their close proximity to Academia. It is a fact that dedicated biotech SME’s spend 15-40% of their revenues in subcontracting work at university laboratories.
The combination of the two concepts above-science-industry flow of knowledge and funding and universal tendency to outsource R&D through dedicated biotech SME's-leads us to propose a flow chart for bilateral cooperation in biotech, as shown in Figure 3.

Brazil research institutions and their scientists have always maintained strong relations with their counterpart entities and peers throughout the developed world. The United Kingdom has been important in this action. On the other hand, modern times have taxed severely the spontaneity of these relations in several countries, due to both budgetary constraints and the growing connection between high level science and competitive innovation in the global market.

We do not wish to cast doubts as to the continued validity and cost effectiveness of purely scientific interactions in education and fundamental research. However, we submit that the knowledge interchange in biotechnology and related advanced technologies will be easier and flow stronger if research institutions in both sides are linked to the chain of actors that lead to the markets of products and services in health, agribusiness, environment, equipment and special supplies, in Brazil and worldwide. The reason behind is that such links create the environment for diverting into science and technology a fraction of investment in business.

〈Figure 3〉 Knowledge & Technology
The Flows of Generation and Transference

```
BRAZIL          INTERNATIONAL

RESEARCH          RESEARCH
INSTITUTION       INSTITUTION

\[\text{\downarrow}\] \[\text{\uparrow}\]

SMALL HIGH TECH  SMALL HIGH TECH
COMPANY          COMPANY

\[\downarrow\]

MEDIUM / LARGE   MEDIUM / LARGE
CLIENT COMPANY   CLIENT COMPANY
```

Figure 3 depicts parallel systems for the flow of generation and transference of knowledge and technologies between Academia and Industry. In the international set, developed countries do that today either by direct contracts between large companies and universities (the traditional way) or by partnering and outsourcing through small, dedicated, high tech companies (the modern way, discussed above). On the Brazilian side, this modern flow through dedicated SME's
is largely theoretical. Brazilian research excellence is 10% of that needed for equilibrium with the existing target market demands. This ratio is perhaps more critical in the modern biotechnologies. Furthermore, the concept of SME’s dedicated to innovation is indeed recent in Brazil. Mechanisms to allow for the deployment of private investment in such companies are in the conceptual and maturation stage, as well as the work force to man them. Decisive efforts in Brazil started in 80’s with the first science parks and incubators around our main centers of knowledge in Academia. The science parks, technology parks and incubators number today over 70 throughout Brazil. to take an example, the Bio-Rio Science Park, a private initiative occupying 200,000m² in the campus of the Federal University of Rio de Janeiro, houses today fourteen SME’s. of these, eleven are “incubator companies” and three have already set up their buildings on park land. All of them are present in the market with their products and services. Their 1996 revenues bordered on US$ 5 million. Yet, none of them had access to public money. All were initiated with very small amounts of owner’s capital. As a result, albeit strong interactions with academia, they market today good non-proprietary technologies only. Financing has been equally difficult due to the high interest rates prevalent in Brazil and to rather stiff conditions for loan collateral. Only recently this situation began to change. Venture capital is appearing in more significant amounts. Public capital is also becoming available to innovative SME’s through an over-the-counter stock trading system recently regulated by the Securities Exchange Commission.

It is clear that Brazilian medium and large companies still have to resist strongly to the purchase of technology abroad. This has been their way into the club of the ten largest economies in the world. More often now, we find that really competitive frontier technologies are no longer for sale: they are available only through co-investment and partnering. In their effort to be competitive, they continue to resort to partnerships abroad. There are many instances of joint venturing between established Brazilian companies and their foreign technology providers, and this is certainly an immediate avenue for further cooperation in biotech between Brazil and industrialized countries, where small SME are either partnered with local giants or are left to occupy a marginal position. Through joint endeavors with Brazilian biotech SME’s foreign high tech SME’s have the advantage of direct access to the Brazilian market, without an enormous deployment of capital and personnel abroad.

It is our viewpoint that true maturation of the science-industry flow will not occur in Brazil until a healthy competitive sector of high tech SME’s appears and becomes an able provider of advanced technologies, products and services in Brazil.
This is perhaps the greatest present challenge for international cooperation in Brazil at this moment. Can Korea fit in this picture? Can some of our companies fit in a similar Korean picture? How often is Korea to venturing inside and outside its own borders now that it has reached a developed country stage in terms of scientist to citizen ratio?

From the Brazilian side, the Federal Government still holds the larger fraction of S&T funding and innovation financing. The mechanisms to mobilize these valuable resources ought to be made simpler and more “user friendly” in the case of science-industry interactions. Also, tax incentives to innovative R&D by companies, which is already a reality in Brazil for the large enterprises since 1995, must now be extended to encompass SME’s.

7. The Scenery of Cooperation in Biotechnology

7-1. Perception of Biotechnology by Society

The international concern for the conservation of the environment and the extensive argument about intellectual property and the moral and ethical aspects of the applications of biotechnology involving mammals and Man has been followed by Brazilian scientists, the Brazilian congress and the Government regulatory agencies for health, environment and science. This discussion has not really reached the Brazilian society as a whole. It is relevant to note the natural curiosity of Brazilians towards novelty, but most of the modern biotech products have not yet reached the larger food chains or the pharmacies.

Environmentally concerned NGO’s in Brazil, mostly schooled by their European counterparts, have in the recent attempted to bar biotech products from markets, and continue to do so now. Several attempts have been made to hamper the introduction of GMO’s (genetically modified organisms) into agricultural practice. So far, both the government and private enterprise have been able to buffer these efforts efficiently. Today, over 50 companies have received their Biotechnology Quality Certificates from the Governmental Technical Committee for Biosafety. such Certificates enables them to work with GMO’s in their laboratories and Factories. The same Committee has judiciously studied and has granted licenses for 33 experiments which include GMO release in Nature, mostly using engineered plants.
7-2. Intellectual Property

Brazil has a fair patent legislation (1995), which grants full patents to inventions relating to microorganisms and to chemicals of any type (including genes), provided the universal requirements of novelty, inventiveness and industrial purpose are respected. Animals and plants, even if transgenic, are not patentable per se; but the interpretation of the law tends to accept plant and animal cells as microorganisms for "in vitro" industrial uses (such as monoclonal antibody production by hybridomas), provided such uses are not meant to form or reproduce animals and plants per se. In May 1997 another law was passed to protect cultivars (Plant Variety Protection), according to the 1978 UPOV Convention. It is expected that Brazil will soon adhere to the last form of that Convention. Joint interpretation of the Patent and Plant Variety Protection laws tends to protect special patented genes inserted in specific plant genomes for plant breeding purposes.

Other aspects of intellectual property, such as trade secrets, trademarks and author's rights are also covered adequately by Brazilian law. But only the actual practice of the Patent Office and the Courts will ensure the full development of IPR in Brazil.

8. Conclusions

8-1. "Classical Cooperation Mechanisms"

a) The desirability and adequate intensity of both academic and industrial cooperation and partnering in Biotechnology should be examined jointly by Brazilian and Korean stakeholders (in Academia and Industry) and Governments.

b) It will be important to set up a review mechanisms to evaluate progress, effectiveness and cost efficiency of the inter-Academic cooperation, as this will be crucial for the needed acceleration of specialized training in the different fields of biotechnology action.

c) Large industry interests are mostly covered already, but more room should be sought for a better access of small and medium sized Brazilian and Korean industry to advanced biological technology abroad.
8-2. "Modern" Cooperation Mechanisms

Here we emphasize the horizontal relationship between dedicated biotech SME's in Brazil and Korea. An effort in this direction might take the form of:

a) Better information mechanisms between SME's in Brazil and the UK, such as creation of interactive data bank available on the Internet. There is clearly a role to be played by Governmental entities on both sides; it is crucial that a similar degree of mutual acquaintance should develop between ABRABI-the Brazilian Association of Biotechnology Enterprises-and its Korean equivalent, BAIk-Bioindustries Association of Korea. It would be a good start if Korea should send representative industrial observers to BIOLATINA 98, an international meeting of industrial Biotech geared at the Brazilian, Mercosul and Latin American markets, to be held in Rio de Janeiro in October 1998 (see http://www.abrabi.org.br/biolatina98/).

b) Special mechanisms to promote actual partnering between Brazilian and Korean initiatives geared for the Brazilian biotech market. A regional and global focus on the commercialization of innovative products, services and technologies is essential to both sides. These mechanisms should range from preparatory meetings and early project financing, to actual financial mechanisms for capital formation and financing of facilities and equipment at international rates of interest.

c) Special training and scientific exchange fellowships to assist in the formation and development of those joint ventures and to promote academic interactions in and around such projects.

d) Special innovative project grants to finance really creative projects by Brazilian SME's formed as joint ventures between Brazilian and Korean groups (in the style of the American SBIR grants).

e) Revision of the tax incentives in Brazil and the Korea in order to abet contract R&D carried out by dedicated biotech SME’s joint ventures in either country.
The Korean Initiatives Towards the Information Society: Opportunities for Cooperation with Brazil

Carlos J. P. Lucena and Mario D. Ripper

1. Introduction

The present report describes the observations compiled by the authors during a one week visit to Korea (May 24 to 28, 1999) as part of the activities of the Korean/Brazilian Commission for the 21st Century. The Commission has selected the themes Information Technology and Bio-Technology as candidates for cooperation between the two countries. The present report covers the infrastructure and the applications of Information Technology for the development of the Information Society in Korea.

The visit also coincides with the Brazilian interest in learning from the approach adopted by Korea for the development of an Information Society in the country. Similar initiatives are taking place in Brazil after its National Council for Science and Technology (CCT) produced a document entitled “Science and Technology for the Construction of the Information Society in Brazil” (http://www.cct.gov.br/gtsocinfo). The implementation of the proposals contained in this document is being led in Brazil by the Ministry of Science and Technology.

The wide spectrum of initiatives taken by Korea for the promotion of its Information Society project required visits by the authors to a number of different organizations. The following organizations have been visited.

The strategy used by the authors to achieve a better understanding of the Korean approach was to pre-select a number of issues to be examined in all

1) Carlos J.P. Lucena: Full-Professor of Computer Science at PUC-Rio (since 1982); Adjunct Professor of Computer Science and Senior Research Associate, Computer Systems Group, University of Waterloo, Ontario, Canada (since 1993). Full member of the Brazilian Academy of Sciences (area: Engineering Sciences). Mario Ripper: Partner, Fang & Ripper, A Consulting Company in Strategic Planning and Technology Assessment in the IT Sector.
### Table 1 List of Visiting Organization

<table>
<thead>
<tr>
<th>Sector</th>
<th>Institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government</td>
<td>(i) Korea Institute for International Economic Policy (KIEP)</td>
</tr>
<tr>
<td>Agencies</td>
<td>(ii) Ministry of Information and Communication (MIC)</td>
</tr>
<tr>
<td></td>
<td>(iii) National Computerization Agency (NCA)</td>
</tr>
<tr>
<td></td>
<td>(iv) Ministry for Science and Technology (MOST)</td>
</tr>
<tr>
<td>Research</td>
<td>(v) Korea Information Society Development Institute (KISDI)</td>
</tr>
<tr>
<td>Institutes</td>
<td>(vi) Science and Technology Policy Institute (STEPPI)</td>
</tr>
<tr>
<td></td>
<td>(vii) Korea Institute of Industrial Technology (KITECH)</td>
</tr>
<tr>
<td></td>
<td>(viii) Electronics and Telecommunications Research Institute (ETRI)</td>
</tr>
<tr>
<td>Universities</td>
<td>(ix) Korea Advanced Institute of Science and Technology (KAIST)</td>
</tr>
<tr>
<td></td>
<td>(x) Information and Communications University (ICU)</td>
</tr>
<tr>
<td>Companies</td>
<td>(xi) Samsung, SDS</td>
</tr>
<tr>
<td></td>
<td>(xii) LG-EDS Systems Inc.</td>
</tr>
</tbody>
</table>

interviews in which they participated. We knew before hand that the size and complexity of the Korean economy and society would not allow a single organization to concentrate all the responsibilities related to the promotion of the Information Society in the country. The issues proposed helped us to structure the interviews and the information we had access to.

Below, the list of issues that oriented the discussions with our hosts in Korea:

a) Which are the pre-requisites for countries like Korea to participate in the Global Information Society?

b) Which changes need to take place in the present day industries for them to succeed in the Information Society?

c) Which are the characteristics of IT industries in the Information Society? Which are the industries to target? ex.: Content Industry, new forms of Software Industries etc.

d) Which will be the businesses of Telephone Operating Companies three years from now?

e) How curricula and research agendas of universities and research industries in Korea match the needs for solutions to problems raised by the Information Society?

f) What is the role of your organization in the promotion of the Information Society in Korea?

g) How the Information Society effort in Korea is funded? How is it funded in your organization?

h) What, in your opinion, are the major cultural, social and economic problems
that the Information Society will pose to countries like Korea?

I) How your organization perceives international cooperation with emerging countries such as Brazil? Suggested specific initiatives?

Starting in section 3 of the report we are going to describe the different organizations's reaction to these issues. In the next section we briefly describe the new organizational approach taken by the government of Korea relative to R&D and how these changes affected the activities of some of the visited institutions.

2. New Institutional Context for R&D and the Cyber Korea 21 Document

In this year (1999) several reorganizations took place in the R&D institutional arrangements in Korea. This was also the year when the Cyber Korea 21 plan, representing Korea's vision for a knowledge-based Information Society was announced.

Almost all research institutes, reporting to the different ministries of Korea, reports now directly to the Prime Minister through five research councils. These councils are: the Basic Science Council, the Public Technology Council, the Industrial Technology Council, the Social-Economic Council and the Humanities Council. From our sample of visited institutions, ETRI and KITECH are now under the Industrial Technology Council and STEPI is under the Social-Economic Council.

The rationale for this reorganization included: providing for more independence for the research institutes from the one they had under their original ministries, allow increased mobility of personnel among institutes and give more administrative flexibility to the institutes under a new "umbrella" law by transforming them in independent "legal entities".

The government also created early in 1999 a National Council for Science and Technology (similar to CCT in Brazil). This council is presided by the President of the Republic and has 18 other members. Twelve members are cabinet ministers from areas that carry out R&D programs, two are ministerial level members and 3 are representatives of the private sector. The new council will also have Committees that are presently being structured.

The highest coordinating authority in Korea in the area of Information Technology is the Information Promotion Committee chaired by the Prime Minister. The executive responsibility in most IT activities and in the implementation of the Information Society in Korea is the Ministry of Information and Communications, MIC, with several of its organizations (ex.: National Computerization Agency, Korea Information Society Development Institute and Information and Commu-
ations University among many others).

Cyber Korea 21 expresses the Korean government's vision for building an Information Society. It has evolved from the Master Plan for Informatization Promotion (1996-2000) drawn out in June 1996. The government started working on the first draft of this new document in 1997. On March 31, 1999 the document was finalized and made public as an orientation for the Korean Society by the Prime Minister.

In the evaluation of the issues presented in the next several sections we will recurrently refer to the Cyber Korea 21 document.

3. Pre-Requisites for Participation in the Global Information Society

Korean government has indicated along these years its serious intent to face the challenges and opportunities of the Information Society.

During the various interviews held in the above mentioned Korean organizations we could verify that there already exists a clear convergence towards the goals expressed in the Cyber Korea 21 document. For short, the pre-requisites for participation in the global information society, from a Korean perspective include:

- Government political will
- Conversion of the economy to one based on knowledge
- The existence of a Korean National Information Infrastructure
- Promotion of various Internet businesses
- Ensuring a society without "information-have-nots"

Government political will is symbolized by the fact that the issuing authority of the Cyber Korea 21 document is the Prime Minister as head of the Informatization Promotion Committee. In the document's preface there are statements from both the President of the Republic and the Prime Minister.

The President statement is taken from his inaugural speech:

"The Information Age means that everyone will have access to information at any time and any place and will be able to easily and affordably make use of it. The new Administration will make efforts so that young people will be able to become main players in the Knowledge-Based Information Society. We will lay a firm foundation for leadership in the Information Age by enhancing IT literacy".
The Prime Minister stated:

"...Our future lies here. We must build a knowledge-driven nation as soon as possible... Cyber Korea 21 is our blueprint to achieve this goal... The Information Society is no longer a matter of choice. We must realize that it is vital for us to continue to prosper in the coming century... The future belongs to those who prepare for it...".

Korea developed an index to reflect its position relative to other countries in the implementation of the Information Society. According to this index they are now in the 24th place between nations. Their objective is to be one of the ten better positioned nations by 2002.

Some of the major targets for the Korean National Information Infrastructure are described in the Cyber Korea 21 document:

By 2002, 144 call zones in Korea will be interconnected by fiber-optic cables. The installation of ATM switches of Korean Technology will start with the major cities and later expand to the entire country. The digitalization of all local exchange networks will be completed by 2001. The combined use of fiber optics cables, ISDN, cable modems, xDSL, wireless local loops and satellite communications will contribute to upgrading local access. The cost of upgrading telecommunications networks is projected at US$8.67 billion.

The Cyber Korea 21 document also targets knowledge-based management as a way to improve existing business conventions and management systems. Agriculture, fisheries, manufacturing, and other existing industries will be revamped as knowledge-based industries. This issue will be further developed in the next section.

The authors perception is that in the Korean experience, it is already seen that it is easier to induce the creation of new Internet businesses than to revamp existing industries. We believe that the support provided to small companies through incubators like those at KAIST and to Small and Medium Enterprises - SMEs by ETRI are similar to the efforts provided in university incubators all over Brazil.

Large knowledge-based companies such as the ones we visited: Samsung SDS and LG-EDS Systems Inc. are still focused on traditional consulting alongside with outsourcing and access provision. There seems to be no business model for new areas such as e-commerce and distance education over the Web even in
these sophisticated knowledge-based companies.

A very relevant portion of the Cyber Korea 21 document is devoted to enhancing IT literacy. In particular, by 2002 Korea is targeting that ten million students and 900,000 civil servants will take computer courses. Also 600,000 soldiers in military service will attend special computer education programs.

An additional effort will be done to change the educational environment at schools to meet the new needs. An Internet-based distance learning system will be developed to reinforce conditions for distance learning. Also a lifelong learning system will be created based on virtual campuses of existing universities.

4. Changes to Take Place in Present Day Industries for them to Succeed in the Information Society

The authors find this goal one of the most difficult to be accomplished in the plan. Our observation at KITECH [8] and its relationships with Small and Medium Enterprises (SMEs) is that it takes a long time to traditional industries to adhere to IT technologies. It is not only a question of training. It is most of all a question of changing a business culture. Many companies will probably fail to perform this transformation process.

Another important requirement is placed in the creation of jobs. New jobs in new industries but also new jobs in the transformation of existing businesses. Again a very difficult task.

The Cyber Korea 21 document has also a chapter on enhancing corporate productivity by knowledge management. The approach includes promotion of business informatization (government procurement activities will be done by an electronic data interchange - EDI - system to promote business informatization), more effective knowledge management in finance and agricultural distribution and informatization to increase efficiency of social overhead capital (information system linking distribution station facilities, cargo terminals and warehouses will be set up to substantially reduce distribution costs).

5. Characteristics of IT Industries in the Information Society

We have not seen a good characterization of what is called knowledge based companies or Internet business in our visit to Korean institutions. This perception holds even for the two industries that call themselves knowledge-based companies. Their current business plans stress mostly consulting, outsourcing and IP provision. Their strategies in the area of content providing seems not to be established yet.
It appears that they still do not offer their services and provide other information services through the Internet. In Brazil, the situation appears to have evolved more, here all newspapers, magazines, radios and TVs are already on the Internet as are some major "portals" oriented towards electronic commerce. Banking and financial system services are not yet available on the Internet in Korea as they are in Brazil.

A preliminary study conducted by KISDI six months ago identifies the major difficulties with electronic commerce in Korea at the present:

a) trust in electronic commerce was not developed yet
b) high logistics cost (delivery)
c) no price advantage is found in cyber-shopping
d) unnecessary regulations (ex.: Internet banking is prohibited for network security reasons)
e) slow network access

The Cyber Korea 21 document calls for a boost in electronic commerce. The document states that electronic marketplaces will be formed to match information providers with information users. The reliability of transactions and security will be improved to reinforce on-line privacy protection and a digital signature and authentication system will be developed for this purpose. The document also states that English-spoken Internet shopping malls aimed at millions of potential customers will be opened to promote the export of high-quality indigenous products of SMEs.

To promote IP businesses, a part of telecommunications charges generated by information provision services will be given to information providers and public data bases will be commercialized to boost the IP industry.

Venture incubators facilities (similar to CNPq's InfoGenesis project in Brazil) will be set up in universities and research institutions. Also hubs of software developers (similar to Softex program in Brazil) will be designated as regional software promotion areas and interconnected by the high-speed network.

6. The Future Businesses of Telephone Companies

The authors have discussed this issue in several occasions during the visit in particular with the presidents of ETRI, ICU and NCA and the Assistant Minister for the Ministry of Information and Communications. The president of ETRI, for instance, believes that a key enabling technology for the Information Society is the third generation mobile telephone.
Our conversations coincided with a long interview by Mr. Lee Kye-Cheol, president of Korea Telecom, published in the Korea Times on May 27, 1999. In this interview he states that Korea Telecom in 1999, will be the through a great jump forward. The target sales were set to 8 billion dollars in 1999 with a net profit of US$281 million. In the future the company plans to become a multimedia service provider and to have this services as one of their primary sources of revenue.

The company also plans to increase their investment in other future-oriented businesses including data communications, Internet, electronic commerce and wireless communications, where the value added is very high.

Korea Telecom will also invest about 8 billion dollars to build Korea’s high speed network by 2002 while installing fiber-optic cables and digitizing the semi-automatic switches. Multimedia services based on the Koreasat satellite will be available to offer high-speed Internet and PC communications services to remote areas.

7. Matching Curricula and Research to the Needs of the Information Society

In most educational and research systems in the world universities’ curricula and research agendas move quite slowly towards meeting the challenges of the new IT area. In most universities the Computer Science Departments and Electrical Engineering Departments (with Telecommunications) have very independent curricula and research activities. Initiatives similar to MIT’s Media Lab are still quite rare in the world. It is not different in Korea’s top universities such as KAIST.

The creation of an Information and Communications University is a very interesting initiative in the direction of the creation of a new professional for the IT area. Nevertheless its present curriculum suggests the kind of difficulties that may occur while moving from design to implementation. The present ICU Graduate Catalog and the experience of the present staff has a very strong hardware bias that in the authors’ opinion will need to be balanced with more emphasis on software and management science.

A similar hardware bias phenomenon can be noticed in ETRI’s research agenda. We suspect that in the years to come ETRI or the Korean Telephone Lab will need to have a much greater emphases in the direction of software technologies and its applications (like CPqD in Brazil).
8. The Role of Organizations in the Promotion of the Information Society in Korea

As it was described earlier in this report the Ministry of Information and Communications (MIC) plays the central role in the promotion of the Information Society in Korea. Several of its institutions play important supporting roles required for this implementation. The National Computerization Agency (NCA) is its policy formulation branch. Research required for policy formulation is provided by the Korean Information Society Development Institute (KISDI). The Information and Communications University (ICU) newly established has as its major role to provide the new type of specialists that will be needed in the Information Society.

ETRI, as a large professional Lab, provides the R&D capability that was required and is needed to support the industrial policy of Korea in IT technology. The large Korean private conglomerates (Chaebols) work very closely with ETRI for the development of IT products and services that will be required in the Information Society.

A key requirement for achieving success in the Information Society is a very large contingent of university trained specialists in a large spectrum of specialties. Our visit did not cover many universities (only 2) but during our interviews we have learned about the concerted efforts done in Korea to strengthen its university system including the creation of a large contingent of specialists with Ph.D. degrees (proportional to the present size of the economy). In this context, the technological universities of the Ministry for Science and Technology (KAIST and the Kwang-Ju Institute of Science and Technology which we did not visit) are playing an important role in establishing a quality paradigm to be followed by all the university system.

There exists in Korea a consistent view that a strong agency is required to lead the efforts of the Korean Society in this new age. This role is held very consciously by the Ministry of Information and Communication.

A regulatory agency has been established under the Ministry to deal with issues of regulation of competition between operating companies. The creation of this agency is not seen as a loss of power of the Ministry (almost the reverse, the Ministry is said to have a strong influence on the agency).

The active role of the Ministry, its considerable resources, its explicit role as expressed in the Acts on “Framework Act on Informatization Promotion” whose last review was enacted by Act 4.969 of August 4, 1995 and in the “Framework Act on Telecommunications” whose last version was enacted by Act 5.454 of December 13, 1997, both in supporting R&D as in being responsible to build up
the communications infrastructure are in a stark contrast with the present Brazilian situation, where the Ministry of Communications is seen as a dying institution, waiting only that a new law to regulate the Media Communication be enacted to disappear and where the role in supporting the new Information Society framework is almost nil including a hands off position in R&D after many years supporting the CPqD of Telebrs and other important initiatives.

9. Funding the Information Society Initiatives

The availability of the required funding is an important element in the Information Society blueprint. In Korea a large part of this funding will came from Korean companies (major Chaebols) that already control the major part of the new Korean communication operating companies: two Cellular, three PCs, one long lines and International and one local lines besides Korea Telecom (while we were in Korea the LG group was just selling its assets in microelectronics in order to increase its control in the new local lines operator they already had a participation in the long lines and controlled a PCs operator). The Korean Government has still 67% of Korea Telecom, while foreign investors have only 5%.

In order to have a significant leverage and say in the evolutionary direction of the Information Society, mainly in infrastructure, R&D and education, the Korean Government besides giving the Ministry of Information and Communications with significant power has also provided along the years with significant resources.

One of its strategies to protect these investments from potential vagaries of the annual budgeting is to set up special funds, both in the Ministry and in some of its Agencies. Additional resources, returns from loans and interest on these funds create a buffer that guarantees the continuos resources required to finance long term objectives.

Most of the information about funding to the Information Society, were provided to the authors by the presidents of ICU and NCA and by the Assistant Minister of the MIC. The bulk of the resources that are used in the promotion of the Information Society in Korea comes from a fund established 15 years ago: The Informatization Promotion Fund (IPF). This fund is managed by the MIC and its resources come primarily from a percentage of the gross revenue of the telecommunications companies (primarily Korea Telecom).

The IPF had 200 million dollars 15 years ago and it has grown to an estimated 2 billion dollars today. A smaller part of resources for the fund (about 30%) comes
regularly from the government budget and its major use is on the development of public communications infrastructure, as per example in the required investments of Korea Telecom. The larger part of the fund (70%) comes from service operators and is invested in Research and Development, personnel training and the development of standards. The operating companies pay to the IPF, a value ranging from 3% to 7% of their estimated future revenues in order to obtain for their license and pay additionally an annual fee of somewhat less than 5% a year from their annual revenue. Additional annual funds, in the range of US$ 70 million came from wireless operators for the right to use the spectrum.

ETRI’s budget, for instance, comes 10% from government ministries and 90% from the Informatization Promotion Fund (IPF).

10. Cultural, social and economic problems posed by the Information Society

The Cyber Korea 21 document addresses two major social problems associated with Information Societies: how to ensure a society without “information-have-nots” and how to generate and preserve employment in this new form of society.

The most difficult aspect for the implementation of the plan seems to be how to manage the transition process for existing industries to become knowledge-based industries.

One aspect we have failed to see in the Cyber Korea 21 document or to discuss during our interviews was the issue of preservation of Korea’s cultural heritage (this is a central issue in, for instance, the Information Society plans of Canada and Australia). Even though there is a strong values and cultural background in the Korean Society, we think that there should be more projects associated with virtual museums and libraries to account for the preservation of the Korean culture. This is especially important when the development of the local Information Society calls for “Korea to strengthen foreign language training programs” especially in English which is particularly important because it is the common language among Internet users.

11. International Cooperation With Brazil

Perhaps the most important issue in making it difficult to construct a continuous and rewarding cooperation, even when compared with Brazil and Korea location in opposite sides of the world and the very different languages and cultures, is the direction both our countries are taking. Korea is certainly taking the “high
road” in its development strategy, constructing a society based on innovation and skilled human resources as a way to increase its value added output, supported as a consequence in an industrial policy, a clear view of the value of Science and Technology as an essential element and of the need for governmental support as a requirement in this endeavor. Brazil approach in the last decade, with some exceptions, is nearer to the “low road”, an economy based on natural resources and low wages, which requires competitive devaluations and continuus influx of foreign investment and where there is no clear political perception between the economy and Science and Technology.

Even with this drastic situation, the authors due to there always optimistic view, find that there are a number of interesting possibilities for cooperation in the area of IT between the two countries.

A classical area for cooperation is the exchange of professors, post-docs and graduate students. The Ministry of Science and Technology (MOST) of Korea has already proposed to provide scholarships for post-doc exchange between the two countries to the Brazilian CNPq (Brazilian Research Council), but up to now there were no takers.

This initiative did not work in the past probably because Korean universities were not seen as quality choices by Brazilian professionals, a distorted view, but also because only now universities such as KAIST and the newly formed ICU have plans to offer their courses in English. KAIST plans to have 20% of its faculty based on foreign professors and to offer 20% of its courses in English. ICU plans to grow from the present 30% to all of its courses offered in English. Given that most professors and graduate students in the area of IT in Brazil (most of them with Ph.D. degrees from renowned universities) speak English this establishes one of the basic pre-requisites for cooperation in the near future.

Another possibility that could be considered by the Korean-Brazilian Commission for the 21 Century is the “two-by-two” style of cooperation (such as in the Brazilian-German cooperation in IT). It consists of defining R&D projects in the IT area in which one academic group and one industry group is involved from each side.

Once, for instance, a contact is established between ETRI in one side and CPqD and Brazilian companies such as Tropico S.A., ASGA and Procomp on the other side, it will be possible to define several cooperative projects in R&D in the IT area. We have learned at MOST that this type of projects can be partially sponsored by the Korean government.

Another potential area for cooperation is the exchange of experiences between the Brazilian Research and Education Network (RNP) and the Korean Research
Network led by Prof. Kijnam Chon from KAIST.

On the business side it is our impression that a company with the profile of Samsung SDS could establish partnerships with Brazilian companies in a number of areas. The existence of highly qualified software companies in Brazil could help develop interesting partnerships with Korean companies to explore jointly other markets in the world.

On the government side we have noticed lots of similarities between the studies developed by KISDI and those developed by the working group that is currently planning the implementation of the Information Society project in Brazil under the Ministry of Science and Technology (to be institutionalized). We suggest that close consultations between the two groups should be developed maybe involving the development of joint studies in areas which are strategic to both countries.

Finally there is the question of putting together the two scientific and technological communities. A model that often works for that purpose is the promotion of two bi-lateral conferences (one in each country to also allow for visits). The conference could be called the Brazilian-Korean Conference on Information Technology.

12. Conclusions

As Brazil and Korea develop their plan to become active participants in the Information Society, innumerable opportunities are open to cooperation.

Korea has a much clearer perception and commitment as a Society to this challenge and opportunity. Its institutional framework and as a consequence resources allocated are much more focused then the ones of put in place in Brazil.

Brazil nevertheless has some very dynamic IT sectors that could provide a basis for mutual learning.

It is the authors hope that much could be learned from building joint efforts with Korea and that the Brazilian Society could learn and act in a more decisive way to build its own capacity through R&D and its own economic agents to support a richer and more productive society.
References and Sources

Ministry of Science and Technology. 1998. MOST: Its Roles and Activities. Seoul: Ministry of Science and Technology. (October)
LG-EDS. LG-EDS Systems: Total Solution Provider.
Samsung SDS. Information Network Center.
Samsung SDS. Lead Networking Society.
ETRI. Technology for the New Millennium.
ETRI. ATM Switching Systems.
KITECH. Korea Institute of Industrial Technology.
KISDI. Korea Information Society Development Institute.
APPENDICES
Appendix A

The Final Report of
the Korea-Brazil 21st Century Commission

The Korea-Brazil 21st Century Commission was created as a result of the meeting held by President Kim Young Sam and President Henrique Cardoso in Brasilia on September of 1996. The objective of the Commission was to stimulate cooperation between the two countries by way of a forum bringing together members of the private and public sectors. Since then, the Commission has met four times (July and November of 1997, May of 1998 and October of 1999), alternately in Brazil and Korea. In between these meetings, the two countries have exchanged preparatory missions in specific areas.

After four meetings, the members of the Korea-Brazil 21st Century Commission have concluded their work and, thus, present this document, to the President of the Republic of Korea Kim Dae-jung and to the President of the Federative Republic of Brazil Fernando Henrique Cardoso, containing a description of the Commissions activities and suggestions aimed at strengthening the bilateral relationship between the two countries.

There was a consensus on the desirability of the exchange of mutual Presidential visits in the near future to give impetus to the proposed bilateral cooperation programs.

I. Composition of the Commission

Below is the list of participants in the four meetings of the Korea-Brazil 21st Century Commission.

1. The Korean delegation comprised the following personalities:

a. As Full Members:
* Dr. Soonhoon Bae: Professor of the Graduate School of Technology Management at KAIST, former President and CEO of Daewoo Electronics Corp., and member of the Presidential Council for Science and Technology,
Head of the Korean Delegation
* Dr. Linsu Kim: Professor of Business Administration at Korea University, former President of the Science and Technology Policy Institute, Head of the Korean Delegation (3rd Meeting)
* Rep. Chong Moo Bae: Vice-President of the Korea-Brazil Parliamentary Group
* Rep. Il Yun Kim: Chairman of the Korea-Brazil Parliamentary Group
* Amb. Heung Soo Kim: Former Ambassador to Paraguay, former Consul General to Sao Paulo, Vice-Chairman of the Korean Council on Latin America and the Caribbean
* Prof. Woo Tack Kim: Vice-president of Hallym University, Professor of Economics at Hallym University, and Former Chairman of Latin American Studies Association of Korea.
* Mr. Pal-Am Park: Senior Counselor for Samsung Corporation
* Mr. Jae-Yoon Kim: Former member of the Monetary Board of the Bank of Korea
* Mr. Myung-Kwan Hyun: Vice-Chairman and CEO of Samsung Corporation

b. As ad hoc Members:
* Dr. Seungtaik Yang: President of the Information and Communications University
* Dr. Young Hoon Park: Director of Bioprocess Technology (KIRIBB)
* Mr. Seung-woong Lee: President and CEO of Samsung Group Latin America H/Q
* Mr. Dong-Sik Jeong: Director General, Investment Promotion Department, Korea Trade-Investment Promotion Agency (KOTRA)
* Dr. Hun-Young So: Director, Division of Chemistry and Radiation, Korea Research Institute of Standards and Science (KRISS)
* Dr. Young-Ha Park: Director, Korean Collection for Type Cultures (KCTC), Korea Research Institute for Biosci & Biotech (KIRIBB)
* Dr. Se-Jung Oh: Head, Beamline Department, Pohang Accelerator Laboratory (PLS)

c. As Coordinator:
* Dr. Won Ho Kim: Director of the Department for American Economies, Korea Institute for International Economic Policy
2. The Brazilian delegation comprised the following personalities.

a. As Full Members:
* Dr. Jose Mindlin: Director of the Technology Department of the FIESP - Federation of the Industries of the State of Sao Paulo, Head of the Brazilian Delegation (1st Meeting)
* Amb. Amaury Banhos Porto de Oliveira: Former Ambassador to Singapore and member of the Institute for Higher Studies of the University of Sao Paulo (UPS), Head of the Brazilian Delegation (2nd and 3rd Meetings)
* Rep. Antonio Ueno: Chairman of the Brazil - Korea Parliamentary Group
* Mr. Hugo Miguel Etchenique: President of Brasmotor S.A.
* Prof. Helio Barros: Special Adviser to the Minister of Science and Technology
* Mr. Mauro Motta Durante: President of the Executive Board of the Brazilian Service for Support to Micro and Small Companies (SEBRAE)
* Amb. Jorio Dauster: President of the Companhia Vale do Rio Doce, Head of Brazilian Delegation (4th Meeting)
* Rep. Augusto Franco: (PSDB/SE), Member of the Brazil-Korea Parliamentary Group
* Rep. Alberico Cordeiro: (PTB/AL), Member of the Brazil-Korea Parliamentary Group

b. As ad hoc Members:
* Dr. Lourival Monaco: Chairman of the Financing Institute for Studies and Projects (FINEP)
* Dr. Alkimar Ribeiro Moura: Professor at the Department of Economics of the School of Business Administration Getulio Vargas Sao Paulo
* Prof. Eduardo Moacyr Krieger: Chairman of the Brazilian Academy of Sciences
* Dr. Roberto Fatorelli: Consultant for the Fiscalization Department of the Central Bank of Brazil
* Prof. Nelson Maculan: Member of the Brazilian Academy of Sciences
* Dr. Paulo Gazzinelli: Consultant
* Dr. Jorge Avila: Director of the Financing Institute for Studies and Projects (FINEP)
* Prof. Gilmar Masiero: Professor at the University of Maringa
* Dr. Renato Neves: President, Rio Doce Asia Corporation
c. As Coordinator:

* Minister **Edmundo Fujita**: Director General of the Department for Asia and Oceania, Ministry of External Relations (DAO/MRE) since June 1999.

* Ambassador **Vera Machado**: Ambassador to India, Former Director General of the Department for Asia and Oceania, Ministry of External Relations (DAO/MRE) until May 1999.

II. Activities

Over the course of the four meetings, many areas of interest were broached, such as cooperation in the fields of education and culture, in the supervision and adjustment of the banking system, in the pharmaceutical sector, in the production of semi-conductors, in tourism and in industrial standardization, as well as cooperation between small and medium-sized firms of both countries.

During the first Meeting of the Korea-Brazil 21st Century Commission, held in Brasilia on July 22, 1997, the following areas of cooperation were highlighted: information technology; aerospace research and development; biotechnology; pharmaceuticals, including joint research and production of vaccines; sports, specifically during the 2002 World Cup; and culture, including student and artist exchange programs and the participation of Brazilian artists in cultural events held in Korea.

During the second meeting, held on November 12, 1997, in Seoul, attention was focused on the promotion and development of small and medium enterprises through investments, technology transfers, and the strengthening of a legal and institutional structure to facilitate procedures between Korea and Brazil. Among the other subjects that provoked interest, the following stood out: the possibility of establishing a mechanism of cooperation between the central banks of the two countries for the purpose of exchanging information on measures to cope with financial crises; collaboration in measuring, calibrating, and testing in various industrial sectors and scientific activities; a possible exchange program between Pohang synchrotron and LNLS (Brazilian synchrotron light source), including the exchange of scientific information, personnel, and research materials, as well as joint seminars or workshops and joint scientific research (especially in hard x-rays); expansion of cultural exchanges, including art exhibitions, musical performances, soccer games, and biennials; and, in the area of education, study fellowships, university sisterhood affiliations, and language courses, in order to increase academic exchanges between the two countries.

The 3rd meeting of the Korea-Brazil 21st Century Commission, held in Rio
de Janeiro on May 15, 1998, concentrated mainly on the promotion of cooperation in the area of technology. The following priority areas for cooperation in science and technology were indicated: biotechnology, information technology, data processing, microelectronics, telecommunications and oceanography. In this respect, Korea and Brazil exchanged missions, prior to the 4th meeting of the Commission, in the areas of science and technology policy, information technology and biotechnology (a Korean mission participated in the Bio-Latina meeting of 1998). Following up on the discussions held during the previous meeting, an agreement between the Brazilian Support Service for Micro and Small Business (SEBRAE) and the Korea Trade-Investment Promotion Agency (KOTRA) was proposed, in order to facilitate the exchange of information on business cooperation.

III. Action Plan

Notwithstanding the importance of the above-mentioned, there are several core areas, identified by the members of the Commission throughout the course of all the meetings, which evoked an especially strong degree of immediate mutual interest in developing mechanisms of cooperation, namely:

a) Information technology and telecommunications;
b) Electro-electronics;
c) Biotechnology applied to agriculture and health; and
d) Academic exchanges.

It is on these four areas that the Korea-Brazil 21st Century Commission shall center its recommendations.

Cooperation in these areas would profit from the association between Brazilian and Korean science and research institutes and academic entities, both private and public, with a view to developing common projects, contemplating the two following types of activities:

a) Pre-Projects:
- Travel activities, business missions, events and internships in firms and research institutes, and academic entities, all of which sharpen the identification of mutual interests and increase knowledge pertaining to the chosen areas of cooperation.

b) Projects:
- Substantiate research and development activities performed by both
countries, resulting in a product or process of interest to the firms and academic entities involved.

In order to finance these activities, the establishment of the Korean-Brazilian Cooperation Fund for Research and Development is strongly recommended, with the participation of public and private entities, and foundations supportive of science and technology, research and post-graduate studies. The Fund's resources could be managed by the Financing Institute for Studies and Projects (FINEP) of Brazil and by a relevant institution of Korea.

Based on the prediction of an initial sum amounting to US$ 2 million - which would increase over the years according to demand, our goal being to reach US$ 10 million in the course of the next five years - we suggest the following alternatives for the application of the fund resources:

a) Support for scientific entrepreneurial missions, with a view to increasing technological cooperation between Brazilian and Korean firms, focusing on the joint evaluation of technical problems and the definition of projects capable of solving them.

b) Support for events and activities leading towards scientific and technological cooperation between R&D institutes of both countries, and towards academic cooperation.

c) Systematization of efforts to publicize possibilities of cooperation, structural advancements in science and technology and Brazilian-Korean cooperation in general.

d) Support for the transfer of technology between firms and the development of joint R&D projects and ventures.

e) Creation of a "seed money" line to support the creation of small firms in one country based on the innovative technologies of the other.

f) Support for a policymaking experience-sharing program.

Finally, the Commission highly recommends that both countries make special efforts to improve cultural cooperation and to establish appropriate mechanisms for its promotion, composed by public and private funds.

Dr. Soonhoon Bae  
Head of Korean Delegation

Amb. Jorio Dauster  
Head of the Brazilian Delegation

October 27th, 1999  
Kyongju, Korea
Appendix B

The Minute of the First Meeting of the Commission

The First Meeting of the Korea-Brazil 21st-Century Commission was held at the Palácio Itamaraty on 22nd July 1997. The opening session was chaired by the Minister of External Relations of Brazil.

On the Brazilian side, the meeting was attended by the following authorities:

As full members:

Mr. José Mindlin, Director of the Technology Department of the FIESP - Federation of the Industries of the State of São Paulo - Head of the Brazilian Delegation; Ambassador Amaury Banhos Porto de Oliveira, former Ambassador to Singapore and member of the Institute for Higher Studies of the University of São Paulo - USP; Representative Antonio Ueno, Chairman of the Brazil - Korea Parliamentary Group; and Mr. Hugo Miguel Etchenique, President of the Brasmotor S.A.

In the capacity of observers:

Mr. Hélio Barros, Special Adviser to the Minister of Science and Technology; Mr. Isaias Raw, President of the Butantã Foundation; Mr. Silmar Pereira, of the Brazilian Service for Support to Micro and Small Companies - SEBRAE; Secretary Jairo Collier, of the Trade operations Division, Ministry of External Relations (DPR/MRE); and Secretary Ancelmo Gois, of the Science and Technology Division, Ministry of External Relations (DCT/MRE).

In the capacity of coordinators:

Minister Vera Barrouin Machado, Director General of the Department for Asia and Oceania, Ministry of External Relations (DAO/MRE); and Counsellor Gladys Ann Garry Facó, Head of the Division for Asia and Oceania-Ⅱ, Ministry of External Relations (DAO/MRE). On the Korean side, the meeting was attended by the following authorities:
As full members:

Dr. Soonhoon Bae, President and CEO of Daewoo Electronics Corp. and member of the Presidential Council for Science and Technology - Head of the Korean Delegation; Representative Il Yun Kim, Chairman of the Korea-Brazil Parliamentary Group; Ambassador Houn Soo Kim, former Ambassador to Paraguay, former Consul General to São Paulo, Vice-Chairman of the Korean Council on Latin America and the Caribbean; Dr. Linsu Kim, President of the Science and Technology Policy Institute; Professor Woo Tack Kim, Chairman of the Association for Latin American Studies of Korea, and Professor of Economics at Hallym University; Mr. Pal-Am Park, Senior Counselor for Samsung Corporation.

In the capacity of observer:

Mr. Duck Sang Yoo, Director of the Economic Cooperation Division, Ministry of Finance and Economy; Counsellor Jae Bum Kim, Embassy of the Republic of Korea, and Ms. Dong Won Park, Second Secretary, Embassy of the Republic of Korea.

In the capacity of coordinator:

Dr. Won-Ho Kim, Director of the Department for American Economies, Korea Institute for International Economic Policy.

The opening session was chaired by the Minister of External Relations of Brazil, Ambassador Luiz Felipe Lampreia, who welcomed the Korean Delegation, stressed the importance of the forum established in accordance with President Kim Young Sam's proposal during his visit to Brazil and the importance that the Commission comprised outstanding members of private and non-governmental sectors of Brazil.

The Korean Ambassador to Brazil, Mr. Sam Hoon Kim, thanked the Minister for his words and wished the Commission's success in its activities. He also added that it shall submit a set of recommendations for the strengthening of the relations between Korea and Brazil.

The Commission started to discuss the Agenda items.

Dr. Soonhoon Bae opened the working session by mentioning the importance given by the Korean Government to its relations with Brazil, as clearly stated by President Kim Young Sam's visit to Brazil in September of 1996, the first Korean Head of State to visit Brazil. Taking into account the fact that the members of the Korean Delegation belong to the private sector, he stated that it is important
that a permanent body be in charge of the coordination. From the Korean side, this body will be the Korea Institute for International Economic Policy (KIEP) and suggested that the Brazilian side reciprocate.

Mr. José Mindlin, upon welcoming the Korean Delegation, emphasized that the Commission is in itself a symbol of globalization, since it brings together two countries so far away from each other to explore means to strengthen their bonds. He briefly described the changes which have taken place in Brazil during the last decades and the process of industrialization and progress in science and technology. He added that the two countries have a lot to learn from each other. The task of the 1st meeting of the Commission, he pointed out, should be to identify specific topics of mutual interest, to be discussed in the next meeting.

Prof. Woo Tack Kim suggested that, in view of the extension of the proposed agenda, the topics of mutual interest should be immediately identified. He mentioned a World Bank report published in 1993 on East Asian Growth Experience, which could serve as the basis for the identification of topics of mutual interest in the area of information cooperation.

He mentioned education as a sector in which the exchange of experiences could be profitable, in view of the highly positive results of governmental investments in the training of skilled labor. Public expenditures on education in Korea amount to 4.2% of the GNP; in Brazil, that percentage is of 4.6% of the GDP. Another area of mutual interest could be the exchange of information on the banking reform. Adjustment in the banking sector has already taken place in Brazil, while Korea is defining adjustment policy that would not entail any negative impact on the country's economy. Mr. José Mindlin indicated the need to encourage the transfer of Korean technology to small- and medium-sized Brazilian companies, or the establishment of joint ventures for operation in third countries.

Mr. Pal-Am Park mentioned that thirty Korean companies are currently investing in Brazil, such as the Samsung Group and the several other companies (i.e., Samsung Electronics and Samsung Display Devices, in the process of being established in Manaus for the production of kinescopes). He also stated that Samsung Electronics had suffered huge losses as a result of difficulties regarding retail distribution and sales. Nevertheless, the Samsung Group plans on investing and overall amount of US$5 billion in Latin America in the 21st century, the majority of investments to be made in Brazil. The new sectors to benefit from such investments would be engineering construction and mineral exploitation. The company is also interested in exploring the opportunities to place, in the Brazilian market, the telephone technology (Band A), CDMA, developed in Korea.

Mr. Etchenique suggested that Korean investments in Brazil should aim,
essentially, at the sector of microwave components and audio and video products which are currently being imported on a large scale. By producing such components in Brazil, Korea would be giving its contribution to the Brazil trade balance, and to its industrial diversification.

Mr. Park and the Head of the Korean Delegation recommended, that the bilateral Agreement for the Promotion and Protection of Investments, signed in 1991, be put into effect. Once in place, the agreement would further encourage the Korean FDI. Dr. Bae also suggested to the Commission’s attention to the compatibility of the industrial standards in both countries which would be further discussed on item III of the agenda. A third topic pinpointed by the Korean Delegation was the need to facilitate the concession of visas, especially with regard to business people.

Upon welcoming especially his counterpart, Representative Il Yun Kim, Representative Antonio Ueno, informed that the constitutional reforms recently approved have substantially modified the 1988 Constitution. For example, foreign company and domestic company are now placed on equal footing for any purpose. The current agenda of the National Congress includes constitutional reforms in the administrative and fiscal areas. He also recommended further increase in the exchange of information and legislative missions.

Upon reiterating the large number of Korean companies which, in addition to Samsung, have been investing in Brazil in the area of components production, the Head of the Korean Delegation suggested that Brazilian companies, likewise, began to invest in Korea. Mr. Etchenique asked for indications on the areas most suitable for Brazilian investments. Dr. Bae will convey Mr. Etchenique’s request to the Federation of Korean Industries. In addition, he suggested considerations by the Commission regarding the prospects for joint investments in third countries. He also added to the agenda of the next meeting the following topics: cooperation between small- and medium-sized companies; aerospace industry and avionics for Embraer’s aircrafts; telecommunications technology; joint initiatives in the areas of tourism and science and technology.

After having explained the objectives and main characteristics of SEBRAE, Mr. Silmar Pereira, emphasized small and medium sized enterprises’ relevance in the creation of working places. He mentioned the work being developed by the SEBRAE with a view to expanding the participation of its associates in the international market. With this aim, the SEBRAE sponsors fairs, exhibitions and business rounds. He also noted that neither the SEBRAE nor the micro and small sized companies are technology sources; however the SEBRAE supports small business by means of hiring consultants and implementing partnership programs
which allow for the participation of its associates in production chains. The SEBRAE would appreciate an increase in the promotion of bilateral events.

Upon opening the discussions of item II of the agenda - Cooperation on Science and Technology -, Dr. Linsu Kim presented the strengthening of the Science and Technology in Korea as one of the key-elements of the strategy for the country’s development since the 1960’s. The priority, at that time, was the establishment of institutional mechanisms (the Ministry of Science and Technology and the Korean Institute for Science and Technology) and of a five-year plan. Currently, 84% of the resources in research and development come from the private sector. The document presented by Dr. Linsu Kim contains an assessment of the Science and Technology in Korea, its influence in the country’s economic development, among other relevant aspects.

Mr. Hélio Barros, upon request of Mr. Mindlin, briefly described the Brazilian Science and Technological system. A group of consultants hired by the Ministry of Science and Technology upon request of the National Science and Technology Council is assessing the system in order to redefine its basis, as to better match the requirements of a production. This assessment derives from the current Brazilian priority to integrate technology innovation to the production system. Mr. Barros indicated the Brazil has much to learn from the Korean counterpart and that cooperation should not be restricted to the aforementioned areas but should involve the process of application in research, development and engineering. Furthermore the areas of technology information, aerospace research, development and the pharmaceutical sector, should be explored. That scientific cooperation might have reflex upon other items of common interest, particularly, on technology not available in the market, due to international competitiveness. He agreed to the suggestion of joint work on technical standards. He also recommended that the use of vague concepts such as “technology transfer” be avoided without precise identification of niches and ways of cooperation.

Mr. Isaias Raw proposed the establishment of a specific team of experts to work in the area of research and production of vaccines. He remarked that, in Brazil, the sector is under the responsibility of the public sector, whereas in Korea it is in private hands. Dr. Bae indicated that Korea was having difficulties in getting acquainted with and in adjusting to Brazilian standards for vaccines. He agreed with the recommendation to create a working group on the matter.

Minister Machado conveyed information on the agreements which had been mentioned and on the remaining issues regarding the competence of both governments. The Agreement on Cooperation in the Fields of Science and Technology, Signed in 1991, provides for a joint committee. Its first meeting,
initially set for May of 1997, has been postponed ever since. In view of the great number of relevant topics which had emerged in the course of the meeting, it seemed urgent to recommend that a new date in the near future, to be arranged through diplomatic channels. She will submit the suggestion to the Director General of the Science and Technology Department and to the top level of the Ministry of External Relations. As for the remaining agreements, the one regarding the Promotion and Protection of Investments is under study at the National Congress; and the one on business visa is pending final approval by the Legislative. She also recommended that, with a view to the next meeting, the members of the delegations keep in touch on a regular basis and deepen considerations on issues which had not been included in this meeting's original agenda. She suggested, furthermore, the ad hoc participation of representatives of public or private organizations in the discussion of issues related to their respective areas of activity.

Ambassador Amaury B.P. de Oliveira recommended that the interest regarding the cooperation with the Unicamp's Synchrotron Light Laboratory were further explored, and handed out a document on the subject to the group. He also mentioned televisual technology and biotechnology as one of the niches for possible cooperation. He handed out lists of research undergoing in research institutions in the state of São Paulo likely to be of interest to Korea.

Upon opening the discussions of item IV of the agenda - Cultural and Diplomatic Cooperation - Ambassador Heung Soo Kim introduced the Korean Council on Latin America and the Caribbean, which is of nongovernmental nature. Within the Scope of governmental action, he recommended that Brazil and Korea continue to support each other in international fora including the issues regarding the stability of the Korean peninsula. He suggested that the group should recommend the Brazilian government to support the Korean plea for admission into the Inter-American Development Bank (IDB). With regard to the cultural area, he suggested the intensification of students and artists exchange programs. He added that the participation of Brazilian artists in cultural events being held in Korea should be encouraged, considering that, for example, the "Bienal" of São Paulo had counted on the participation of Korean artists. He suggested that the Commission recommend to both governments the implementation of action-oriented plans, and the extension of the Commission's activities beyond the two year term.

Ambassador Amaury B.P. de Oliveira referred to the rich and successful experience of small and medium sized countries of the Pacific Rim, the Republic of Korea among them, in the treatment of international issues. Brazil is interested in analysing this experience. He also mentioned that Brazil would like to participate
in some Pacific Economic Cooperation Council (PECC) working groups, and asked which kind of assistance Korea might offer in this regard.

Dr. Bae informed that he is a member of the Board of Directors of both Asia Pacific Economic Cooperation (APEC) and PECC. In this capacity he could raise the Brazilian interest in that forum. As a first and pragmatic step, has suggested that some type of Partnership between Korea and Brazil could be created in support of the above mentioned suggestion.

Representative Il Yun Kim suggested that the Commission take the necessary steps to involve society in deepening relations between the two countries. He agreed to the proposal of his colleague regarding mutual support in multilateral fora. In addition, he mentioned that the two nations could cooperate with each other to help make Brazil a permanent member of the United Nations Security Council. He also referred to Brazil's contribution towards the peaceful reunification of North and South Korea. He expressed interest in the Korea-Mercosur cooperation. With regard to international sports, he expects Brazil's cooperation during the 2002 World Cup Games, in reciprocity to Korea's support concerning the success of the Brazilian Delegations to the 2004 Olympics.

Getting back to items II, III and IV of the agenda, with a view to the next meeting, Dr. Bae informed that Korea has been developing medium-range aircraft in partnership with China, and added that Brazil could also take part in the project. Other interesting areas for partnership would be the manufacturing of semi-conductors and, especially, the telecommunications sector, considering that Korea believes that the demand for both regular and cell telephone sets in Brazil will increase substantially. Language barriers to be eventually faced by nationals of the two countries during their joint activities, could be overcome through specific courses, to be offered by the host party.

Mr. Isaias Raw expressed concern regarding the identification of sectors, companies and institutions with either favorable prospects or immediate interest in cooperating. According to him, the Commission should serve as the linking mechanism between the offer of and the demand for economic, commercial, scientific, technological and cultural projects.

Dr. Bae agreed with Professor Raw and suggested that the activities of the Commission should be broadly disseminated. Cooperation should be implemented at both the governmental and the private levels. In this regard, Dr. Won-Ho Kim summarized some administrative courses of action. The Commission's policy recommendations should be included in the official records from the next meeting on, so that actions agreed upon and deserving governmental approval would not have to wait for the end of the Commission's mandate. The task of serving as
permanent channels for every kind of cooperation projects and making all the arrangements for the next meeting should be assigned to the coordinators. The Commission would be officially called the Korea-Brazil/Brazil-Korea 21st-Century Commission. It was also agreed that just one version of the minutes would be drafted, as a result of the consolidation of notes taken by each one of the parties.
Appendix C

The Minute of the Second Meeting of the Commission

The Second Meeting of the Korea-Brazil XXI Century Commission was held at the Hotel Intercontinental, Seoul on November 12, 1997.

The Korean delegation consisted of the following persons:

As full members:
Dr. Soonhoon Bae, Chairman of the Korea-Brazil Economic Cooperation Committee (Head of the Korean Delegation); Representative Il Yun Kim, Chairman of the Korea-Brazil Parliamentary Group; Ambassador Heung Soo Kim, Vice-Chairman of the Korean Council on Latin America and the Caribbean; Dr. Linsu Kim, President of the Science and Technology Policy Institute; Professor Woo Tack Kim, Chairman of the Latin American Studies Association of Korea; Mr. Pal-Am Park, Senior Counsellor for Samsung Corporation.

As coordinator:
Dr. Won-Ho Kim, Director for the American Economies, Korea Institute for International Economic Policy (KIEP).

As observers:
Mr. Dong-Sik Jeong, Director General, Investment Promotion Department, Korea Trade-Investment Promotion Agency (KOTRA); Dr. Hun-Young So, Director, Division of Chemistry and Radiation, Korea Research Institute of Standards and Science (KRISS); Dr. Yong-Ha Park, Director, Korean Collection for Type Cultures (KCTC), Korea Research Institute for Biosci & Biotech (KRIIBB); Dr. Se-Jung Oh, Head, Beamline Department, Pohang Accelerator Laboratory (PLS); Mr. Yeon Gon Choo, Director of the South America Division, Ministry of Foreign Affairs (MOFA); Mr. Keun Ho Jang, Deputy Director of the South America Division, MOFA.

The Brazilian delegation consisted of the following persons:

As full members:
Ambassador Amaury Banhos Porto de Oliveira, Member of the Institute for
Higher Studies of the University of São Paulo (Head of the Brazilian Delegation); Representative Antonio Ueno, Chairman of the Brazil-Korea Parliamentary Group; Dr. Mauro Motta Durante, President of the Executive Board of the Brazilian Service for Support to Micro and Small Companies (SEBRAE); Dr. Helio Barros, Special Adviser to the Minister of Science and Technology.

As coordinator:
Minister Vera Barrouin Machado, Director General of the Department for Asia and Oceania, Ministry of Foreign Relations (DAO/MRE).

As ad hoc members:
Dr. Lourival Monaco, Chairman of the Financing Institute for Studies and Projects (FINEP); Dr. Alkimar Ribeiro Moura, Professor at the Department of Economics of the School of Business Administration Getulio Vargas-São Paulo; Professor Eduardo Moacyr Krieger, Chairman of the Brazilian Academy of Sciences.

As adviser:
Dr. Manuel Antonio Nunes de Oliveira, of SEBRAE.

As observers:
Ambassador Sergio Barbosa Serra, Ambassador of Brazil to Seoul; Mr. Carlos Jose Middeldorf, Counsellor of the Brazilian Embassy in Seoul.

The opening session was chaired by Deputy Prime Minister and Minister of Finance and Economy Kyong Shik Kang, who after welcoming the Brazilian Delegation, stressed the significance of Korea-Brazil 21st Century Commission as a channel for boosting cooperation between both nations. He also supported establishing a solid basis for the bilateral relations that may serve as the cornerstone for cooperation between Asia and Latin America in the approaching 21st century.

Brazilian Ambassador to Seoul Sergio Barbosa Serra, thanked DPM Kang for his words and wished success to the participants of the second meeting. He also added that the importance of the Commission lies in submitting new ideas for fostering close ties between the two countries.

The Brazilian delegation was chaired by Ambassador Oliveira who informed that the Chair of the Brazilian side rotates according to the alphabetical order of the surname, so that more members have the opportunity to serve in this prestigious position. Ambassador Oliveira then expressed his gratitude to the
Korean hosts and stressed the importance of the Commission in establishing practical (i.e., technological) exchange.

Dr. Bae, after welcoming the Brazilian delegation, noted that Korea’s recent stock and currency crises have accentuated the urgency for rapid globalization. Under this backdrop, Korea-Brazil relations will be instrumental in Korea’s successful recovery. The task of the Commission is still more important now than in the time of its creation. This two years Commission faces the task of recommending to the Presidents of both countries the ways and means to deepen and enlarge the bilateral cooperation between Korea and Brazil.

Prof. Woo Tack Kim referred to the contacts already established since the beginning of the Commission’s work, such as the one by Banco Nacional de Desenvolvimento Economico e Social (BNDES) on the possible impact of the Southeast Asia crisis to the Korean economy. He also mentioned the seminar held at the University of São Paulo, last October, which was attended by Korean scholars.

Both sides approved the report of the first Meeting of the Commission.

**Economy/Industry**

Prof. Woo Tack Kim made reference to some events that pointed to a large demand for economic information exchange since the creation of the Commission, such as the visit of an expert of the Banco Nacional de Desenvolvimento Economico e Social (BNDES), and the seminar hosted by the University of São Paulo, last October, attended by Korean scholars. He also proposed that both sides must systemize and organize some way to satisfy this demand.

Dr. Moura, taking up a subject referred to in the previous meeting, noted that there is room for Korea and Brazil to share experiences in the field of banking. He mentioned two areas of cooperation, based on the Brazilian experience in recent years: - the strengthening of supervisory powers of the central bank, especially in establishing rules and regulations to analyse the quality of assets, to prevent concentration of loans and to prevent favored lending practices, and - the restructuring of the banking system, that has already taken place in Brazil in the case of private banks and is under way among the banks of the public sector. The Brazilian experience has shown that sometimes it is more costly to restructure banks than let them close. He also mentioned that, in this process, the Korean fiscal surplus is an asset, because banking bailouts may not require money expansion.

In regard to financial cooperation, Rep. Ueno proposed a covenant between
the central banks of Brazil and Korea, that would make it possible for businessmen of the two nations to get access to cheaper financing.

Mr. Pal-Am Park, after contrasting Brazil's lack of investment into Korea and Korea's considerable investment into Brazil, highlighted Korea's attractive business climate factors. Not only does Korea plan to liberalize almost all business lines by the year 2000, but Korea hosts large demand for raw materials for its auto, machinery and electronics production. Korea also possesses highly secured production technology, stabilized labor-management, and advanced infrastructure. The Korean government offers favorable tax and financing benefits for seven high-tech industries: electronics, information and electronic technology; precision machinery and advanced process materials; new materials and biological industries; optical and medical equipment; aerospace and transportation; and environment, energy and construction. In addition, the Korean government grants usage of industrial parks at low rates and plans to allow usage of other factory sites.

Mr. Park then listed attractive sectors for long-term Brazilian investment, including direct investment (aerospace & aircrafts, pharmaceuticals, food & beverage, biochemical, and banking), joint investment (defense and overseas construction), and investment for triangular trade (wireless communications, electronic parts and components assembly/manufacturing, automobile assembly, logistics, coastal transportation, land transportation, and warehousing).

In terms of Korea's market attractiveness, Dr. Bae remarked that despite its relatively small size, Korea possesses large purchasing power, advanced infrastructure (i.e. optical cables), construction expertise, and room for mid-range products. Amb. Heung Soo Kim mentioned that Brazil can utilize Korea's warehouses and port facilities as a stepping stone to entering China and other Asian markets.

Concerning opportunities in Korea's telecommunications market, Dr. Bae predicted that Korea's service sector will outgrow terminal and system business and that wireless will outgrow wired telecommunication. He also noted that there are vast opportunities to expand PCS, CT2, TRS and other types of wireless telecommunication in Korea.

Dr. Barros, in light of the broad discussion material and limited meeting time, proposed creating an internet homepage for the Korea-Brazil 21st Century Commission. Critical dialogue could be continued privately via e-mail, while the general public could be informed of updates via a website. Dr. Barros also suggested meeting in subcommittees in the future to address specialized areas in detail.

In regard to cooperation between small and medium enterprises, Dr. Durante made two concrete proposals: an institutional agreement between SEBRAE and its
Korean counterpart that would serve as a basis for the exchange of information; and the access to SEBRE's data bank by Korean small and medium enterprises in search of new markets, new technology and potential partners. To date, Brazil has acquired information on 65,000 enterprises and plans to increase this number to one million by the year 2000.

Ambassador Oliveira reminded that globalization has enhanced the importance of regions having special aptitude for cross-cooperation with similar regions in other countries. An example of this is the synergy created between Korean firms and those in the Chinese province of Shandong. There is a great number of S & M companies in a region in the state of São Paulo having the city of Campinas as the geographical center with similar potential. These companies acquired a substantial innovation capability based on medium-advanced technologies (mid-tech), they have the support of skilled labor from the surrounding universities and may count on the services of the only synchrotron in the southern hemisphere. He recommended that the S & M business having this aptitude in both countries begin to cooperate even before the formal conclusion of the Commission's mandate. He proposed that mid-tech S & M enterprises of both countries be convened to identify concrete areas of joint work. He also conveyed the invitation of the "Laboratorio de Luz Sincrotron" to host the academic seminar to be held in parallel to the III Meeting of the Commission XXI.

Dr. Linsu Kim noted that many small and medium Korean firms with medium technologies are active in manufacturing and services in China, Southeast Asia, and Latin America. For this trend to continue, legal and institutional barriers need to be eliminated since small and medium firms lack substantial organizational, technical, and human resources. Dr. Kim also noted that the Korean government is currently promoting small high-tech firms, especially bio-tech firms, for which Brazil can offer vital resources and bio-technical expertise.

Mr. Dong-Sik Jeong described KOTRA's activities in promoting trade and investment for small and medium firms. In addition to maintaining a database of Korean companies interested in manufacturing or exporting abroad, KOTRA now has a regional headquarters stationed in São Paulo. KOTRA dispatches more than fifty trade missions and organizes more than 100 trade fairs around the world annually, a few of which take place in Brazil. KOTRA has organized plant symposiums and investment seminars for small and medium industries, and is currently planning Korea Techno Mart in November 1998 to attract foreign high-tech companies.
Science & Technology

Dr. Hun-Young So provided an outline of measurements & standards organizations and history in Korea. Noting that Korea now ranks around seventh in the world in terms of setting up standards in measurement science, Dr. So called for both nations to collaborate in measuring, calibrating, and testing in various industrial sectors and scientific activities.

Dr. Yong-Ha Park gave a brief on biotechnology, describing Korea’s “Biotech 2000” program to promote biomaterials, health care, agriculture & foods, environment, bio-safety & biodiversity, alternative energy, and basic life sciences. Dr. Park added that both nations can collaborate in the sectors that complement each other’s comparative advantages. Korea’s biotechnological strength lies in amino acids, rifamycin, hepatitis-B vaccine, bioinsecticides, recombinant human growth hormone technology, and functional oligosaccharides production. Brazil, meanwhile, is competitive in alcohol fermentation, agricultural products (sugar cane, coffee, oranges, and soybean), natural products, biodiversity and human resources. A sector with potential for cooperation, as Dr. Park pointed out, is in soybeans; the large amount of byproduct from Brazilian soybean crushing could be reprocessed and value-added using Korean technology.

Dr. Se-Jung Oh described Korea’s Pohang synchrotron, which has a 2-GeV electron linear accelerator and 2-GeV low-emittance storage ring (3rd generation ring), noting that project construction started in April 1988 and finished in December 1994. As for possible scientific exchange programs between PLS and LNLS (Brazilian synchrotron light source), he pointed to some programs such as exchange of scientific information, personnel, and research materials; joint seminars or workshops; joint scientific research (especially in hard x-rays).

Ambassador Oliveira added that the synchotron in Campinas is the only one in the southern hemisphere.

Dr. Helio Barros mentioned that, due to the number of issues under discussion, it would be advisable that the Brazilian coordinator would count on the support of another institution, such as FINEP.

Minister Machado welcomed the suggestion of Dr. Barros in view of the valuable contribution that FINEP would make to the achievement of the Commission’s goals.

Dr. Lourival do Carmo Monaco ensured that FINEP will provide the support that might be needed in the fulfillment of these goals.

Dr. Barros, in addition, will relay the suggestions concerning biotechnology in energy and agriculture to a group within the Ministry of Science & Technology,
which will review them and reply with comments. Dr. Barros also proposed to relay the Commission's suggestions for technology and industry, along with comments by Brazilian scientists and entrepreneurs, to Brazilian biotech and aerophysics firms, and convey the results to the Korean side through the Brazilian coordinator.

Within the technology information sector, Dr. Barros mentioned several sub-areas in which Brazil would be especially willing to cooperate: information technology in entertainment & education; multimedia & virtual reality; software production and commercialization (Brazil intends to capture one percent of the world's software market with Softex); consulting networking service, advanced training in networking; high performance computers; and parallel computers. Dr. Barros confirmed interest in cooperating in fields suggested by the Korean delegation, namely health, agriculture, and biotechnology. In addition, Brazil is interested in collaborating in education and science based technical programs, science and personnel exchange, fostering innovation, and multi-disciplinary projects.

Dr. Eduardo Krieger named the National Academy of Science and the Brazilian Society to Promote Science as Brazil's two major coordinating institutes, and stressed the need to exchange ideas with the equivalent institutes in Korea. In addition, the Financing Institute for Studies and Projects (FINEP) is placing special emphasis on higher education in technology and medicine. Dr. Krieger proposed convening a working group before April 1998 to address cooperation in these fields.

Dr. Lourival do Carmo Monaco encouraged the Commission to concentrate in a few projects that would demonstrate that the Commission was able to bring about a new vision of the cooperation between both countries and to disseminate information on these projects.

Dr. Linsu Kim encouraged both governments to push for a joint committee on science and technology cooperation originally agreed upon in 1991. Doing so will promote the catalyst function of the Commission, which will terminate after two years. Cooperation at the business level, the most practical and productive, could be carried out in the transfer of Korean hepatitis-B vaccine or magnetron technology. Korean businesses, meanwhile, are interested in establishing joint or wholly owned R&D facilities in Brazil to tap local technology. Dr. Kim also suggested selecting counterparts to cooperate at the institutional level.

Minister Machado noted that upon her return to Brazil, she would recommend that the joint committee on science and technology convene in order to deal with collaboration on metrology (involving Brazil's IMETRO and Korea's equivalent) as
well as on nuclear energy and other areas in the sphere of competence of the public sector.

Dr. So responded that cooperation on standards by metrology laboratories should be quite easy.

**Education/Culture**

Rep. Il Yun Kim recounted that fourteen Koreans in the Ph.D. course and four in the masters degree course have studied in Brazil over the past decade, and eighteen Brazilian scholars have conducted research in Korea. In addition to sister relations between colleges, the University of São Paulo offers Korean language instruction and the Korea Foundation offers fellowship opportunities. Rep. Kim stressed political ties, particularly at the congressional level, to put forth legislation that broadens exchange programs and addresses immigrant concerns.

Amb. Kim noted that both countries should continue to seek entrance to international organizations, such as the Pacific Economic Cooperation Committee (PECC) for Brazil and the Inter-American Development Bank (IDB) for Korea. As a foundation for economic and political cooperation, Korea and Brazil should expand cultural exchange, including art exhibitions, musical performances, soccer games, and bienales. Educationally, both countries should continue to provide study fellowships, university sisterhood affiliations, and language courses. Finally he proposed that a Korea-Brazil foundation or forum to be set up with government and private sector participation in order to materialize extensive educational and cultural exchanges.

Rep. Ueno also stressed the importance of education in the development of the country and suggested that members of Korea’s National Assembly and Brazil’s National Congress exchange information on education.

Prof. Woo Tack Kim added that the two countries should exchange educational policy making ideas. Dr. Bae also added that Korea has much to offer as one of the world’s most advanced country in vocational and professional schooling.

**Next Meeting**

As for future meetings, Minister Machado commented that the Brazilian delegation will have an internal meeting to decide the next venue, with special consideration for Campinas. The next meeting should also be scheduled to avoid conflict with the upcoming Summit of the Americas and other meetings related to the FTAA and the ASEM meeting. Participants tentatively set the next meeting
to be held in late April, 1998.

Dr. Bae suggested that the coordinators work out details concerning the Internet homepage, subcommittees and working groups, among other issues. Dr. Won-Ho Kim suggested that future working groups or special missions will have the format of a seminar and that specific topics be treated in simultaneous panels. As for administrative courses of action, both sides agreed to make decisions on above-mentioned issues before the next meeting. Dr. Bae added that the Commission, in light of termination after its two-year term, should produce a report on Korea-Brazil's bilateral cooperation vision for the 21st century.

The parties agreed that, according with previous understandings, the report of the II Meeting will be made by the Korean party. Dr. Bae closed by expressing great satisfaction in the Commission's discussions and eagerness to attend the third meeting in Brazil. Ms. Machado also expressed satisfaction as well as deep gratitude for the Korean delegation's hospitality.
Appendix D

The Minute of the Third Meeting of the Commission

The Third Meeting of the Brazil-Korea Commission for the 21st Century was held at the headquarters of the Federacao das Industrias do Rio de Janeiro (FIRJAN) on May 15th, 1998.

The Brazilian delegation was integrated by the following personalities:

a) As Full Members:
Ambassador Amaury Banhos Porto de Oliveira - of the Institute for Higher Studies of Sao Paulo University; Representative Antonio Ueno - President of the Brazil-Korea Parliamentary Group; Dr. Jose Mindlin - Director of the Technology Department of the Federation of Industries of the State of Sao Paulo (FIESP); Dr. Mauro Motta Durante - President of the Executive Board of the Brazilian Service for Support of Micro and Small Companies (SEBRAE); Dr. Helio Barros - Special Adviser to the Minister of Science and Technology.

b) As 'ad-hoc' Members:
Dr. Lourival Do Carmo Monaco - Chairman of the Financing Institute for Studies and Projects (FINEP); Dr. Roberto Fatorelli - Consultant for the Fiscalization Department of the Central Bank of Brazil; Dr. Nelson Maculan - of the Brazilian Academy of Sciences; Dr. Paulo Gazzinelli - Consultant.

c) As Coordinator and Assistant Coordinator:
Minister Vera Barrouin Machado - Director-General of the Asia and Oceania Department, Brazilian Ministry of Foreign Relations; Counselor Gladys Ann Faco - Head of the Asia and Oceania Division - II, Department of Asia and Oceania, Brazilian Ministry of Foreign Relations.

d) As Advisor:
Dr. Manuel Antonio Nunes De Oliveira - of SEBRAE.
e) As Observer:

Secretary Ancelmo Cesar Lins De Gois- of the Science and Technology Division, Science and Technology Department of the Brazilian Ministry of Foreign Relations.

The Korean delegation consisted of the following persons:

a) As Full Members:

Dr. Linsu Kim - President of the Government Reform Council, Professor of Management, College of Business Administration, Korea University; Representative Il Yun Kim - Chairman of the Korea-Brazil Parliamentary Group; Ambassador Heung Soo Kim - Former-Ambassador to Paraguay, Former-Consul General to Sao Paulo and Vice-President of the Korean Council on Latin America and the Caribbean; Dr. Woo Tack Kim - President of the Korean Association of Latin American Studies and Economics Professor of Hallyn University; Mr. Jae-Yoon Kim - Former Member of the Monetary Board of the Bank of Korea.

b) As ‘ad-hoc’ Members:

Dr. Seungtaik Yang - President of the Information and Communication University; Dr. Young Hoon Park - Director of Bioprocess Technology Research Division, Korea Research Institute for Bioscience and Biotechnology (KRIBB); Mr. Seung-Woong Lee - President and CEO of Samsung Group Latin America H/Q.

c) As Coordinator:

Dr. Won-Ho Kim - Director for the American Economies, Korea Institute for International Economic Policy (KIEP).

d) As Observers:

Mr. Ki-Su Kwon- Assistant Researcher of KIEP; Secretary Han-Gu Oh - Deputy Director of the South America Division, Ministry of Foreign Affairs and Trade; Mr. Jong-Deog Choi - Deputy Director of the Economic Cooperation Division, Ministry of Finance and Economy; Mr. J. H. Ryoo - Chairman of Samsung Corporation of Brazil.

The Vice Secretary-General of Integration and Economic Affairs and Foreign Trade of the Ministry of Foreign Relations, Ambassador Jose Alfredo Graca Lima, opened the meeting. After greeting the Korean and the Brazilian delegations, he stressed that the composition of the Brazil-Korea 21st Century Commission itself
is an indication that international relations are no longer built only by diplomats but by the constant interaction between government and society, scholars and businessmen. He emphasized that the discussions on bilateral cooperation would be more profitable if the Commission bears in mind the need for a comprehensive approach that would consider both production and technology research.

The Ambassador of the Republic of Korea to Brazil, Mr. Won Young Lee thanked Ambassador Graca Lima for his speech and wished success to the participants of the Third Meeting.

The Brazilian coordinator mentioned the changes in the Brazilian delegation and introduced Dr. Nelson Maculan, of the Brazilian Academy of Sciences, who substitutes Dr. Eduardo Krieger; Dr. Roberto Fatorelli, of Brazil Central Bank, who replaces Dr. Alkimar Moura and Dr. Paulo Gazinelli, all 'ad-hoc' members. She also informed that due to health reasons Dr. Eliezer Batista could not attend the meeting. Thus, Ambassador Amaury B.P. de Oliveira would keep the chair of the Brazilian delegation.

Ambassador Amaury B.P de Oliveira welcomed the Korean representatives.

On behalf of his delegation, the Korean coordinator thanked Brazil for the hospitality and the arrangements for the Third Meeting and the seminar "Brazil-Korea: Current Situation and Cooperation Perspectives", held in the previous day. He introduced the new 'ad-hoc' members of the Korean delegation: Dr. Seungtaik Yang - President of the Information and Communications University, and Dr. Young Hoon Park, Director of Bioprocess Technology Research Division, Korea Research Institute for Bioscience and Biotechnology (KRIBB), and Mr. Seung-Woong Lee - President and CEO of Samsung Group Latin America H/Q.

The records of the II Meeting and the agenda of the III Meeting were approved.

Dr. Woo Tack Kim noted that, as a visiting professor to the University of Sao Paulo (USP) he participated in a seminar organized by Fernand Braudel Institution on the financial crisis in Southeast Asia, and in a meeting with bankers organized by Dr. Edmar Bacha for a bankers audience on the same subject. In addition to his presentation on the Korean economy in the seminar of the previous day, he referred to the urgent need for drastic structural changes in Korea so that its economic activity can be resumed. The financial crisis, he said, has imposed the correction of economic imbalances. He also stressed that measures were adopted to reform the financial institutions aimed at finding a solution for the non-performing loans and at opening the capital market. Referring to the postponement of Korean investment projects in third countries and asked for the understanding of the Brazilian authorities regarding the difficulties that Asia
Motors is facing to start its plant in Camacari, Bahia.

Dr. Linsu Kim summarized his presentation in the seminar of previous day and stressed the role of science and technology in the Korean industrial development as well as the importance of education. He emphasized that Korea eradicated illiteracy in the 80's. He also highlighted the risk of brain drain in developing countries, and the importance the private sector be given incentives to develop research related to the improvement of its respective activities. He referred to the difficulties of Asia Motors in Bahia and also asked for the understanding by the Brazilian authorities. Furthermore, he mentioned the exchange of experts that has taken place since the second meeting of the Commission.

In this regard Dr. Helio Barros expressed his gratitude for the acceptance of Mr. Geraldo Nunes in KIST for research related to his Ph.D. dissertation.

Ambassador Amaury B.P. de Oliveira welcomed the participation of Dr. Woo Tack Kim in the seminar to be held at the Institute for Higher Studies in USP on the coming June 24th. He regretted that the III Commission meeting did not take place in Campinas, a city where a great number of midtech micro and small companies is located. He pointed out that since its inception, the Commission has made its best to create concrete cooperation links; that was the reason for his proposal. Had it been accepted, the Korean members could also have visited selected companies located in Campinas. He expressed his wish that these visits take place in the context of another event. He invited additional comments on the Korean economic crisis that had been analyzed in depth in Dr. Woo Tack Kim during the seminar of the previous day.

After expressing his satisfaction with having been nominated a member of the Commission, Mr. Jae-Yoon Kim explained that Korea is now pressing ahead with thoroughgoing reforms covering every aspect of its economy, on the basis of the letter of intent signed with the IMF. Restructuring has begun, he said, in the areas of the financial market, the corporate sector and the labor market. The IMF package contains conditionalities regarding the issues.

Meanwhile, Mr. Kim continued, the worst of the crisis now appears to be over and exchange rate stabilization has already been in progress. Macroeconomic projections indicate that late this year the trade balance will show a US$21-23 billion surplus, while inflation will stay below 10%. At the same time, GDP will decrease about 1-2%, and the small fiscal surplus of late last year will be turned into a small deficit(1.7% of GDP).

Deputy Antonio Ueno welcomed the Korean delegation, especially his counterpart. He informed that since the II Commission Meeting the Brazilian Congress approved the Constitutional reform on State administration; the reform
of the social welfare system is under way. This is a hard task in an election year, yet of great importance to curtail the public deficit (by 2001 the deficit in the social welfare system will be eliminated). Thanks to the Constitutional reforms approved by the Congress, the country is now open to foreign companies - consequently to Korean companies - that receive the same treatment granted to the domestic companies. The sectors of telecommunication, oil and coastal navigation are now deregulated. The restructuring of State banks is also in progress. He stressed the role of Congressmen in ensuring the full insertion of the country into the globalization era. He expressed his interest in exchanging ideas on parliamentary experiences with his Korean counterparts.

Dr. Roberto Fatorelli noted that the previous day's seminar presentation by Mr. Jae-Yoon Kim, and the discussions during the meeting, clearly demonstrated the concern with the restructuring of the financial system and the level of indebtedness of the private sector; thus, also with the prudential measures to be adopted. In the 80's, Brazilian financial authorities had to deal with an inflationary context and macroeconomic difficulties that no longer exist. Our goal now is to adhere to international credibility patterns, especially the 25 Basel principles, that will be fully adopted late this year. The financial authorities also have in mind the need for allowing the banks the necessary mobility so that they can quickly adapt to changes. In order to reach that goal it is necessary to improve the information system accordingly. Efforts are concentrated in the implementation of adjustment policies adapted to the Brazilian banking system needs; we are thus working out a culture of our own, even regarding prudential regulation on the risk limit/loan capacity ratio, on supervision of, inspection of and assistance to the banking activities, and also on auditing by magnetic means. He also mentioned the approval by the National Congress of the Law 9613/98 on money laundering by individuals and corporations.

Mr. Jae-Yoon Kim, making reference to the report of the 2nd meeting of the Commission, wished to know about the ways and means the Brazilian side has in mind for implementing cooperation between both countries in the subject. He added, for information, that the Bank of Korea has established cooperation in form of Repo agreements with Central Banks of seven countries. He added that due to new legislation in force, bank supervision is now under the sole authority of the newly created Financial Supervisory Commission. However, he expressed his intention to convey the interest of the Brazilian side to the competent authorities of the Bank of Korea.

In reply, Dr. Fatorelli stated that, according to his understanding, the Commission is a forum for exchanging ideas on any subject, including bank
supervision and adjustment. However, discussions on agreements on this matter should be the province of a governmental meeting. He said he would convey the interest of the Korean side in entering into an agreement, or in exchanging experience in a more formal way, to the competent authorities of the Brazilian Central Bank.

The Brazilian coordinator expressed her satisfaction for the willingness of both parties to deepen discussion in that area, and noted that the Commission's goal is to encourage exchange of ideas. In some cases, these should be conveyed to the governmental authorities for further action in their sphere of competence. The negotiation of agreements should be made in the context of meetings between representatives of both governments.

Dr. Linsu Kim agreed that the discussion on bank cooperation should take place in other forum and that the role of the Commission is also to lead to cooperation to be implemented by the governments.

Dr. Helio Barros pointed out that three important areas of cooperation come out throughout the work of the Commission: bank supervision, biotechnology and information technology. Now the Commission needs to identify concrete procedures for encouraging cooperation previous to the next meeting. A conference on biotechnology (BIOLATIN) with the participation of experts from Argentina and other South America countries is due to take place the coming October. This is an opportunity for the Korean party to get acquainted with the best of the available research lines and to identify concrete cooperation projects. Regarding information technology, a special meeting could be held in Brazil or in Korea followed by visits to institutions in order to identify specific proposals. That means that, from now till the fourth and last Commission meeting, we should work in specific subcommittees. Dr. Helio Barros also presented the project for the Commission's homepage which will be ready by the fourth meeting.

The Korean coordinator congratulated the Brazilian party for the project, an idea which was put forward in the last meeting. He thought of inserting a site on the Commission in KIEP's homepage. He inquired whether it would be more convenient to have one or two homepages - a Korean and a Brazilian one - which would interlink. This suggestion prevailed during the discussions. Dr. Helio Barros said it would be better keep the Brazilian homepage as a site in the homepage of the Ministry of Science and Technology (http://200.17.6.14/bracor) which has an access to homepages of other institutions. Both coordinators will keep in touch regarding to the implementation of this project.

Dr. Mauro Durante suggested that SEBRAE's homepage could be linked to the one of the Commission. He also elaborated on the number of small companies
associated to SEBRAE (4.5 million), the presence of the institution in all the units of the federation, the number of associated enterprises with computers. Micro and small enterprises are responsible for 60% of Brazil’s labor market, 42% of all salaries and over 20% of the Brazil’s GDP, he said. All over the world, the small enterprises face common difficulties in financing production, paying taxes and meeting the requirements of bureaucracy. However, they are instrumental for combatting the structural unemployment. The changes in the labor legislation to render working relations more flexible will increase micro and small enterprises capacity to create jobs. He said SEBRAE is making efforts to outreach its activities to the hinterland of the country so that the income of the population is increased, thus preventing rural exodus. Such efforts involve actions both in the educational and technologic field. The ultimate goal is to increase the productivity of micro and small enterprises and their participation in foreign trade. He referred to the creation of the Warrant Fund inspired on the Korean model, and to the cooperation of BNDES in rising the capitalization of the companies geared to foreign trade, a task assisted by APEX, a recently created institution. Finally he presented the copy of the agreement proposal between SEBRAE and KOTRA, already approved by the Council of SEBRAE. He expressed his willingness for the conclusion of said agreement in the next future.

After having expressed his satisfaction for the invitation to take part in the meeting, Dr. Paulo Gazzinelli referred to two aspects he considered relevant. First, the increase in the participation of micro and small entrepreneurs in the discussions on cooperation on science and technology in the framework of the Commission, thanks to the non-governmental nature of this forum. Reminding the words of the economist Michael Porter, he said that in the battle for international competitiveness the corporations, not the countries, are in the front line. Companies consider more important to possess modern and effective means of competition than overall strategies. The acquisition of these means via partnership with Korea should be the subject matter of discussions between potential business partners of both countries. Also, he noted that broad and conceptual issues of information science or biotechnology deserve less attention from entrepreneurs than practical issues such as the active principle of a certain vegetable, or suitable materials for coating wafers. Second, he pointed out that the members of the Commission have been making constant reference to ‘high-tech’ but have not considered that conventional technologies, in many cases, are bottlenecks in technology based industries, since they are essential for the development of high technologies. Next, he described "Brazil Techmart 97" - a joint enterprise of the Federation of Industries of the State of Minas Gerais - FIEMG and the United Nations Industrial
Development Organization - UNIDO covering the areas of biotechnology, metal-mechanics and agribusiness. The event consisted of a technology market where 70 companies from 10 countries were present, including Korea. The event was preceded by the selection of companies that were demanding new technologies and companies that were interested in supplying new technologies. The selection methodology took into account not only the interest of the companies in acquiring technologies but also their awareness of the impact of such technologies on their costs, manpower, services, marketing, distribution etc. The number of selected companies thus decreased from 3,000 located in the State of Minas Gerais to 70 companies. Five hundred meetings between entrepreneurs with complementing business profiles and market share expectations were scheduled, out of which three hundred took place. That procedure allowed for the conclusion of a considerable number of letters of intention on future commitments, corresponding to an estimated amount of US$ 100 million. Dr. Gazzinelli advanced that FIEMG intends to repeat the event in the following years. The participation of Korean companies in these events will be most welcome.

Dr. Linsu Kim expressed his satisfaction for the SEBRAE-KOTRA agreement proposal, which he considered to be a result of the Commission, and suggested that representatives of small enterprises be invited to the next Commission meeting to be held in Korea.

Mr. Seung-Woong Lee spoke about the investments of Samsung Corporation in Brazil (Manaus), in the electronic sector, totalling US$ 80 million for TV, VCR and computer monitor assembly. He informed that the company will start the production of color TV cathode ray tubes for export to Argentina and Africa and will further invest in areas where the corporation is also competitive. He explained that in Korea, small companies produce components assembled and sold to the foreign markets by large Korean companies. In the last week of May, representatives of small and medium companies will be in Sao Paulo, supported by Samsung, to look for potential partners for production of component.

Dr. Seungtaik Yang expressed his belief on the importance of technology associations between companies in the microelectronics sector of both countries; such associations could be carried out on the basis of the information acquired in seminars where not only technology but also financing and marketing were issues to be discussed. He admitted he was not acquainted with the Brazilian advances in the sector, the same way as Brazilians seemed not to be aware of what has been achieved in Korea. He suggested that seminars be scheduled and visits to Korea be promoted in order to fill this gap.

Dr. Helio Barros indicated four priority areas for cooperation in S&T:
biotechnology, information technology/data processing/microelectronics, oceanography and institutional cooperation. He reminded that the recommendations to be made to governments for improving Brazil-Korea relations must be action oriented. He reiterated the importance of Korea’s participation in BIOLATIN, in October, which will create an opportunity for the convening of a bilateral working group on biotechnology. He also suggested that a team of experts on data processing, microelectronics and information technology visit Korea the coming August.

Dr. Mindlin recommended that the working group be limited to five experts each side, including those engaged in the areas of education for research and training of teachers for remote teaching.

Dr. Young Hoon Park informed he needed more data on biotechnology in Brazil. He expressed his concern with the cost of the working group. He would to stimulate Korean experts to participate in BIOLATIN, provided he had a clearer idea on the expected results of the meeting.

Dr. Helio Barros suggested the participation of entrepreneurs and scholars to the meeting that will happen in parallel to BIOLATIN.

Dr. Seungtaik Yang said that regarding to data processing, microelectronics and information technology he would prefer that the working group be integrated only by potential business partners and post-doctorate degree students. Besides the meeting, visiting programs could be scheduled in order to allow that both parties acquire more reciprocal knowledge. Thus mutual strength and weakness could be detected in order to equate efforts to compensate the last.

Dr. Linsu Kim agreed with the creation of specific working groups and said that Biotechnology Association of Korea (BAK) will be requested to send experts to the BIOLATIN in October. He said that, in principle, August would be a good time to host the Brazilian experts on microelectronics. He also made reference to the perspectives of interinstitutional cooperation between research institutions and industries of both countries on science and technology.

Dr. Nelson Maculan spoke about the education agreements that give grounds for hosting foreign students in graduation courses on several specialities in Brazil. He mentioned, areas such as data processing, nuclear energy and others.

Dr. Seungtaik Yang expressed his willingness to know more on the syllabus of the graduation courses on telecommunications.

Dr. Mindlin pointed to the necessity that both Brazilians and Koreans know better the customs and traditions of one another, since cultural familiarity brings about a feeling of proximity. It would be advisable to establish a program for publishing translations of relevant titles of Brazilian and Korean literature, to increase the presentation of artistic activities and to introduce basic information
on each country in the syllabus of high schools.

Ambassador Heung Soo Kim agreed with the Dr. Mindlin’s proposal and noted that since the first meeting he has insisted that the Commission recommends ways and means for promoting more education and cultural interchange. He said it is necessary that both parties know each other for the sake of increasing economic cooperation. Therefore, it is important to think about the creation of working groups that can continue to meet even after the end of the Commission’s mandate. He also suggested that during the next Commission meeting, a permanent committee be created to work out an action plan on cooperation in identified areas, including cultural and educational ones. He proposed the creation of a Brazil-Korea Foundation financed by public and private funds, integrated by representatives of both governments, scholars and entrepreneurs; the Foundation would have a binational board of directors and an executive body. Finally, he reiterated the importance of convening the Joint Commission on Science and Technology in the near future.

Representative Il Yun Kim noted that Brazil is the bigger economic partner of Korea in Latin America (more than US$ 2 billion of bilateral trade a year and significant Korean investments). He recalled the interest of his Government in receiving Foreign Minister Lampreia and President Fernando Henrique Cardoso in an official visit to Korea in the near future. He reiterated Korea’s interest in becoming a member of IDB, that would enlarge the access of Korean construction companies in the American continent, and would appreciate Brazilian support. He mentioned the participation of the “Tapeju Support Lancers” group in the 98 World Culture Exposition in Kyongju. He suggested the establishment of Korean and Brazilian culture centers in Sao Paulo and in Seoul, and also regional culture centers: a Korean one directed to MERCOSUL and a Brazilian one to East Asia countries.

Deputy Antonio Ueno informed that due to the elections in Brazil the visit of a parliamentary mission to Korea will not be possible in the months ahead. However he thinks that the interaction with MPs of both countries is a fundamental factor for boosting bilateral relations. He would convey to the Chairman of the House his suggestion that a parliamentary mission visits Korea next year.

Minister Vera Machado informed that the visit of President Cardoso to Korea, in reciprocity to the State visit of President Kim Young Sam to Brazil in September 1996 is in the Presidents agenda since then, and will take place in the appropriate occasion. Moreover, when Ambassador Lee’s copies of credentials were presented, Minister Lampreia declared that his visit to Seoul would eventually be settled by the diplomatic channels. She also noted that the electoral calendar makes it difficult
for governmental missions in the second semester this year. She would convey Korea's interest in becoming a member of IDB to the competent authorities. She also said that due to the importance the Brazilian authorities attach to the Joint Commission on S&T, a date for that meeting would be soon proposed. She praised Ambassador Heung Soo Kim for his paper that consolidates cultural and educational activities of both sides presented during the last meeting. She noted that the number of Korean activities is bigger in Brazil than the Brazilian ones in Korea; however, the last ones tend to increase the more Brazilian entrepreneurs make use fiscal incentives for supporting art and culture introduced in our legislation a few years ago. It is also important that the members of the Commission stimulate both businessmen and cultural promoters from their country to create opportunities for cultural events in the other country. The use of Internet and the homepage can serve as an important instrument to disseminate news on cultural events in either country. As for the creation of cultural centers, stimulus should be given to initiatives of the civil society. However, those that will entail an increase in the government expenditure should not be taken into account - like a foundation, with its own bureaucracy. The creation of a permanent committee that would continue to work after the Commission mandate does not seem to match with the proposals that have been discussed on the establishment of working groups to deal with specific matters with high cooperation potential.

On her perspective, the goals of the Commission are being fulfilled, i.e. to stimulate reciprocal awareness of partnership opportunities so that the private sector of both countries can work together on projects of substantial and concrete interest, by their own.

Dr. Mindlin agreed that the idea of establishing a new forum or a new Foundation is not advisable once the consolidation of cooperation in the sectors of greater interest is a task for experts and entrepreneurs. He reiterated his interest in establishing a cultural exchange program, and his wish to start exchanging information and suggestions immediately.

The parties agreed that the coordinators get in touch to establish the date of the next and last meeting which will take place in Seoul. The Brazilian election calendar and the schedule of meetings in Asia and in the Americas must be taken into consideration.

Both parties expressed their satisfaction with the results of the meeting.
Appendix E

The Minute of the Fourth Meeting of the Commission

The Fourth Meeting of the Korea-Brazil XXI Century Commission was held at the Hilton Hotel in Kyongju on October 27th, 1999.

The Korean delegation consisted of the following persons:

As full members:
Dr. Soonhoon Bae, Professor, KAIST Graduate School of Management, Former Minister of Information and Communication - Head of the Korean Delegation; Ambassador Heung Soo Kim, Vice-Chairman of the Korean Council on Latin America and the Caribbean, Former Consul General to Sao Paulo; Dr. Linsu Kim, Chairman of the Administrative Reform Council, Professor of Management, Korea University; Professor Woo Tack Kim, Vice-President of Hallym University, Former Chairman of Latin American Studies Association of Korea; Mr. Jae-Yoon Kim, Special Adviser, the Boston Consulting Group, and Former Member of the Monetary Board of the Bank of Korea.

As ad hoc members:
Dr. Young Hoon Park, Director of Bioprocess Technology Research Division, Korea Research Institute for Bioscience and Biotechnology (KРИBB).

As coordinator:
Dr. Won-Ho Kim, Director for the American Economies, Korea Institute for International Economic Policy (KIEP).

As observers:
Mr. Bu Kyun Jeong, Director of the Development Cooperation Management Division, Ministry of Finance and Economy; Mr. Byung-Kil Han, Director of the South America Division, Ministry of Foreign Affairs and Trade; Mr. Jong-Heon Lee, Deputy Director of the South America Division, Ministry of Foreign Affairs and Trade; Ms. Sung-Hwa Na, Deputy Director of the Americas Division, Ministry

The Brazilian delegation consisted of the following persons:

As full members:
Ambassador Jório Dauster, President of the Companhia Vale do Rio Doce - Head of the Brazilian Delegation; Dr. Hélio Barros, Special Adviser to the Minister of Science and Technology; Representative Augusto Franco (PSDB/SE), Member of the Brazil-Korea Parliamentary Group; Representative Albérico Cordeiro (PTB/AL), Member of the Brazil-Korea Parliamentary Group; Dr. Jorge Ávila, Director of the Financing Institute for Studies and Projects (FINEP).

As ad hoc members:
Professor Gilmar Masiero, Professor at the University of Maringa; Dr. Renato Neves, President of Rio Doce Asia Corporation.

As coordinator:
Ambassador Sérgio Serra, Brazilian Ambassador to Korea; Secretary Pedro Cardoso, Division of Asia and Oceania - II, Ministry of Foreign Affairs.

Introduction

The head of the Korean delegation, Dr. Soonhoon Bae welcomed the Brazilian delegation to Kyongju for the Fourth Meeting of the Korea-Brazil 21st Century Commission, with the objective of discussing pending issues and preparing a final report of the Commission, to be presented to each respective president. Additionally, Dr. Bae expressed his wishes for the meeting to be productive and highly consultative.

Amb. Jório Dauster expressed his gratitude to the Korean delegation for the invitation to Kyongju, a city with deep historical meaning. As a newcomer to the Commission, Amb. Dauster applauded the efforts realized throughout the previous three meetings in identifying areas of cooperation between Brazil and Korea, and stressed that now was the time to finish the excellent work that has been done. Amb. Dauster recalled his meeting with President Fernando Henrique Cardoso about the progress of the Korea-Brazil 21st Century Commission, emphasizing President Cardoso's eagerness to know the results of the fourth meeting, as well as the high hopes he has placed on the work of the Commission. Amb. Dauster agreed with the Korean side on the desirability of drafting concrete recommenda-
tions which can be taken to both presidents.

Before starting the discussion on the main subjects of the meeting, the general agenda was drawn: first, the approval of the report of the 3rd meeting; second, the approval of the 4th meeting agenda and third, the meeting itself.

Dr. Soonhoon Bae opened the session with a discussion of unresolved topics, raised in previous meetings, some of which had been transferred to the relevant ministries and organizations, while others have still not been addressed conclusively.

**Unresolved Topics**

1. *Investment Promotion and Protection Treaty*

Two treaties signed in 1995 the Investment Promotion and Protection Treaty and the Extradition Treaty have still not been implemented, as they are still under examination by the Brazilian Congress. Secretary Jeong-Heon Lee, Deputy Director of the South America Division, Ministry of Foreign Affairs and Trade, solicited the cooperation of the Brazilian Representatives participating in the fourth meeting with a view to accelerating the process required for these treaties to come into force.

Amb. Jorio Dauster, head of the Brazilian delegation, pointed out that a number of Investment Promotion and Protection Treaties signed by Brazil have also been awaiting implementation for similarly long periods, emphasizing that the delay is not due to any form of unfairness towards Korea.

Rep. Augusto Franco - as a member of the Foreign Affairs Commission and of the Brazil-Korea Parliamentary Group - assured the Korean side of his support in this matter.

2. *Formation of a Bio-forum*

Dr. Young Hoon Park recalled his participation in the BioLatina 98 event, in October of 1998, with a view to identify cooperative means to promote biotechnology in Brazil and Korea. The event, he pointed out, afforded him and his mission the opportunity to meet many people from federal and state government, large and small biotechnology enterprises, as well as the academic sector. With this in mind, Dr. Park proposed the creation of a "Korea-Brazil Biotechnology Forum" to his Brazilian counterpart, Dr. Antonio Carvalho, President of BioRio Foundation, who agreed with the idea and promised to convey it to
his government. Dr. Park pointed out, however, that no progress has been made on the matter.

Dr. Helio Barros explained that Dr. Antonio Carvalho preferred to await the results of the 4th Meeting of the Commission before making a decision concerning Dr. Park's proposal. Dr. Barros added that the proposal of a Korean-Brazilian Cooperation Fund for Research and Development, pertaining to the agenda of the current meeting, might comprise the objectives of the proposed Biotechnology Forum.

3. Establishment of a Homepage

Dr. Won-Ho Kim recollected both countries' efforts in building the Korea-Brazil 21st Century Commission Homepage, a version of which was demonstrated in Rio de Janeiro. Dr. Kim informed that the KIEP homepage contains information on the Korea-Brazil 21st Century Commission. Formal documents of the Commission have been uploaded and KIEP plans to add other mutually interesting topics, as well as establishing links to major homepages in Korea such as government, private, economic and public institutions.

Dr. Hélio Barros was pleased to hear about these developments, adding that they will make bilateral cooperation even stronger. Amb. Dauster considered the idea of a homepage extremely positive, indicating that it will become an important mechanism for following step by step the actions of the Commission and a very efficient system of presenting the Commission's positions in the internet. Amb. Dauster suggested linking the Commission's homepage to the homepages of Brazil's Ministry of Foreign Affairs and Congress, in order to develop systematic interaction between Brazilian and Korean institutions and government agencies.

Dr. Bae noted that even though the Commission will be terminated physically, the mandates of the Commission can continue in the cyberspace.

4. Finance

Mr. Kim Jae Yoon observed that cooperation in central banking and banking system has been of major interest for both sides. Mr. Kim pointed out, however, that no concrete ideas on how to implement cooperation between the two countries in this field have been presented and that cooperation, thus far, has been limited to the exchange of economic reports between the Central Banks of each country. Mr. Kim stressed his hope that cooperation and exchange of information could be implemented in concrete terms in the future.
Amb. Dauster acknowledged the Bank of Korea’s efforts to establish communication with the Central Bank of Brazil. Since the Asian Crisis, he continued, developing countries have become greatly interested in coming together and developing ideas towards improving the capability of central banks to react to crises. For the matter to be developed adequately, however, he suggested that the Korean side present its objectives regarding banking cooperation in as clear and precise a manner as possible, concentrating on specific issues. Amb. Dauster highlighted, furthermore, that Korean and Brazilian delegates involved in discussions at the IMF and the World Bank concerning the establishment of a new international financial architecture should be encouraged to exchange views as much as possible.

Dr. Soonhoo Bae suggested that the sharing of experiences within the IMF between Korea and Brazil bears its importance as a means of bringing together specialists in the banking sector of both countries in the hope of expanding the scope of mutual benefits.

5. Educational and Cultural Exchange

Amb. Heung Soo Kim referred to the gradual change of focus of the Commission since the first meeting, towards technological and scientific exchanges, and away from educational and cultural initiatives. Amb. Kim remarked that the mutual understanding achieved between two nations through cultural exchange is crucial for the enhancement of cooperation in other areas. Amb. Kim reiterated his suggestion, made on previous occasions, of creating a foundation that could carry out the work of the Commission even after the termination of its two-year mandate, in order to fulfil the points of its action plan.

Amb. Dauster agreed with Amb. Kim’s observations about the existence of a technological bias with regard to the Commissions work, reflected in the composition of both delegations. He encouraged his colleagues to keep in mind the words of Amb. Kim concerning the importance of developing forms of cultural exchange.

Amb. Sergio Serra agreed, as well, on the importance of cultural exchange as a means of promoting mutual understanding, while recognizing the lack of institutional progress on the matter. He explained that during the period of the Commissions mandate, the preparations for the 5th centennial celebrations in Brazil have absorbed the greater part of the Ministry of Cultures budget. However, Amb. Serra continued, some independent and spontaneous contacts have occurred recently, such as the visits of a Brazilian delegation of state secretaries of education
and of Professor Cristovam Buarque, former governor of the federal district of Brasilia, both of which focused on the Korean educational experience. Also, in the field of culture, two Brazilian films participated in the 1998 Pusan Film Festival. Amb. Serra noted, as well, the participation of a dance group from Rio Grande do Sul in the World Cultural Festival held in Kyoungju in 1998. In the words of Amb. Serra, these independent and spontaneous events are seeds for future cooperation in this area.

Drafting of the Final Report

As a result of various exchanges, Dr. Won-Ho Kim presented the Brazilian side with the most updated version of the draft for the Final Report of the Commission. It included a series of changes proposed by the Korean delegation such as “cultural” cooperation, and “Korea-Brazil Cooperation Fund” vis-a-vis the earlier Brazilian proposal for a Korea-Brazil Fund for Research and Development. The name of the fund was to be changed with the objective of broadening the targets for the application of bilateral funds. Also, the Korean side suggested including the phrase “to express a consensus on the desirability of the exchange of mutual presidential visits in the near future.

After an intermission requested by the Brazilian delegation to discuss the proposed changes, the Brazilian side responded to the suggestions that had been made. The sentence referring to mutual presidential visits was accepted by the Brazilian delegation.

The Brazilian delegation did not accept the numerous mentions of the word “cultural” in the draft, because the proposed Korea-Brazil cooperation fund is to be administered, in the case of Brazil, by FINEP, which does not promote initiatives of a cultural nature. In order to stress the Commissions concern with cultural exchange, and at the same time keep the matter separate from the objectives of the proposed fund, Amb. Dauster suggested the incorporation of the following sentence to conclude the report: “Finally, the commission highly recommends that both countries should make a special effort to improve cultural cooperation and to establish proper mechanisms for its promotion, composed by private and public funds.”

In regard to changing the funds name, the word “cooperation” was agreed upon, but the Brazilian delegation requested that the terms “for Research and Development” be maintained. Finally, an additional target area for the fund (item f) was agreed upon by both sides: “support for a policymaking experience-sharing program.”
Korean-Brazilian Cooperation Fund for Research and Development

The Commission proceeded to discuss the establishment of the Korean-Brazilian Cooperation Fund for R&D, the correspondent guidelines, and the development of relevant ideas.

Dr. Soonhoo Bae, after indicating that details pertaining to the implementation of the Fund need not be included in the Commissions final report, solicited information from the Brazilian side regarding the character and objectives of the proposed fund.

Dr. Jorge Ávila explained that the proposed fund contemplates both projects and pre-projects. Dr. Ávila indicated that FINEP prefers to provide non-refundable funds only to institutions, since constitutional restrictions deter it from providing them to private companies. Funding for private firms, he suggested, could be channeled through loans and capital participation. To conciliate both objectives, Dr. Ávila recommended the establishment of two separate mechanisms within the Korea-Brazil Fund: one for providing grants and another to provide funds in a returnable manner through loans or capital participation to private initiatives. Dr. Ávila noted that items A, B, C & F in at the end of the Commissions report refer to institutional initiatives; and items D & E, to entrepreneurial ones.

While earlier talking to the Korean Advisory Council on Science and Technology, Dr. Ávila found that both countries face similar difficulties concerning the transfer of technology developed by academic research to the productive sector.

Dr. Hélio Barros indicated that, in discussions within the Ministry of Science and Technology, the possibility of the National Council for Scientific and Technological Research (CNPq) becoming involved in the proposed fund, by offering scholarships in various fields and levels of study, amounting to a total between 10 and 15 scholarships in the first year, was raised.

Dr. Soonhoo Bae observed that the Korean government does not provide grants to the private sector for the development of commercial technology. Private firms, he explained, acquire commercial loans which they have to repay later.

Dr. Linsu Kim added that, in Korea, a number of organizations specialize in a variety of different projects, in accordance with their scope and form of financing. This, he argued, makes it difficult to incorporate grants, loans, basic and industrial research, as well as technology transfer issues under one single organization, something which could be done only if the fund were to be limited to basic research. These factors, he pointed out, make it impossible to designate one specific Korean institution to act as FINEPs counterpart in the administration of the proposed fund.
Dr. Ávila responded that FINEP is willing to deal with two different institutions and form two different funds to match their characteristics.

Dr. Linsu Kim argued in favor of stating in the report that a relevant institution of Korea was to be a counterpart of FINEP, without specifically stating the form, the scope of research or the form of financing.

Amb. Dauster pointed out that the incumbent work of the Commission was to provide guidelines to be examined in the future. Secondly, he recommended that the coordinators of the Commission be maintained after the end of its mandate. And, thirdly, Amb. Dauster proposed that FINEP develop a detailed proposal for a fund with two different windows, encompassing grants and loans, which would preclude the necessity of creating two different funds.

Following, a discussion took place concerning the procedure for the presentation of the final report to the countries' respective presidents. Both Heads of delegations praised the positive and fruitful results of the Korea-Brazil 21st Century Commission and wished further success and cooperation in the future.
발간자료 목록 (1997~2000. 10)

■ 정책연구

97-01 미국 클린턴 제2기 정부의 외교·통상정책 / 원필
97-02 보건의 해외直接投資 : 現況과 成果 / 王允鈞 編著
97-03 外國人直接投資의 障礙要因과 促進方案 / 金東午
97-04 中國의 住宅市場 : 現況과 退去興味 / 崔秀雄
97-05 OECD 貿物防止協定에 따른 鋼管業之現況과 明確點 / 金鐘範
97-06 電子産業의 現況과 韓國의 對應 / 李鍾華・李昌鎬
97-07 韓・美 通商懸案의 推移와 對應方案 / / 王允鈞・羅秀準
97-08 中國的 水上舟과 韓國的 對應 / 李昌在・外
97-09 東亞一帶貿易・投資의 構造變化와 向後 課題 / 金成斗・外
97-10 北韓과 中國의 經濟關係 現況과 展望 / 趙明哲
97-11 韓・中韓 經濟交流의 現況과 政策課題 / 鄭容泉
97-12 美洲地域 經濟統合의 展望과 韓國의 對應課題 / 金元鎬・外
97-13 WTO 主要議論 動向과 對應課題 / 金成秀・外
97-14 中國內 外資企業의 勞務管理 實態와 改善方案 / 趙順坪
98-02 中國 金融改革의 現況과 과제 / 李章準・外
98-03 國內企業 構造調整에 集中 現況과 M&A의 影響 / 王允鈞・金瑞根
98-04 EU 정보네트워크 모형의 APEC 지역 적용에 間한 構成연구 / 標泰亭・外
98-05 1997년 APEC 개발실질적계획(IAPs)의 평가 / / 成克鳴
98-06 1999년 세계경제전망 / 王允鈞 編
98-07 부분별 조기무역자유화의 經濟적 效果 / 李在元・李弘求
98-08 러시아 금융위기의 원인과 影響 / 李昌在・外
98-09 外國人投資誘致政策 現況과 成功事例과 / / 崔秀雄
98-10 外國人投資誘致政策 現況과 成功事例과 / / 崔秀雄
98-11 統一對外 經済協力結果: 全面金融機構 活動貢獻 / 張亨晹・李昌在・朴映坤
98-12 臺灣企業의 統一 外貿策略 / / 崔秀雄
98-13 中國 韓國企業 改革의 現況과 問題과 對應策略 / 金錫準
98-14 Technology Cooperation in the APEC: Case of the APJJ/Byung-il Choi・Eun Mee Kim
98-15 IMF 급급지급지원체제에 대한 現況와 全面金融體制 改編展望에 따른 我們的 效果 / 張亨晹・元容杰
98-16 美国FTA政策의 전개와 展望 / 鄭仁效
98-17 近年 經済投資 紛爭事例의 研究 / 金鍾浩・李性美
98-18 通商懸案 電子産業의 課題과 展望 / 尹昌仁
98-19 中・東亞 및 CIS地域의 經濟統合 現況과 展望 / / 鄭錫泉・崔秉熙・韓倉澈
98-20 北韓的 外國投資저유지 정책과 傳統分析 / 趙明哲・洪翼仲
98-21 中國 發展市場의 現況과 國際화 전망 / 金載旭・崔義炫
99-01 1999~2000년 세계경제전망: 累積성출연구 / / 宋珍和 編
99-02 韓・日貿易 21世紀 匯元 競合과 課題 / 金元鎮 編

1990년~현재까지의 모든 발간자료 목록은 연구원 홈페이지 (http://www.kiep.go.kr)에 수록되어 있음.
Policy Papers

97-01 Impact of Trade Liberalization under Alternative Scenarios / Inkyo Cheong
97-02 Regional Integration and Liberalization in the Asia-Pacific / Honggwee Lee · Jai-Won Ryou
97-03 Northeast Asia's Transboundary Pollution Problems: A pragmatic Approach / Sang-Don Lee · Taek-Whan Han
98-01 Korea's Economic Reform Measures under the IMF Program / Chan-Hyun Sohn · Junsok Yang eds.
98-02 Adjustment Reforms in Korea since the Financial Crisis (December 1997 - June 1998) / Yunjong Wang · Hyoungsoo Zang

Discussion Papers

00-01 Review of APEC's IAPs: Competition Policy and Deregulation Focussing on Non-OECD Economies of APEC / Hyungho Ahn · Junsok Yang · Mikiyoung Yun

Working Papers/자료논문

97-01 Impact of Foreign Direct Investment Liberalization: The Case of Korea /June-Dong Kim
97-02 APEC's Eco-Tech: Prospects and Issues / Jaebong Ro · Hyungho Ahn
97-03 기업지배구조에 관한 OECD 논의와 우리경제에의 시사점 /王允鈞 · 李俊鳯
97-04 Economic Evaluation of Three-Stage Approach to APEC's Bogor Goal of Trade Liberalization / Inkyo Cheong
97-05 EU의 企業課稅와 韓國企業의 直接投資戰略 /李俊鳯
97-06 In Search of an Effective Role for ASEM: Combating International Corruption / Jong-Bum Kim
97-07 Economic Impact of Foreign Debt in Korea / Sang-In Hwang
97-08 Implications of APEC Trade Liberalization on the OECD Countries: An Empirical Analysis Based on a CGE Model / Seung-Hee Han · Inkyo Cheong
97-09 IMF 救濟金融案例 研究：墨西哥，泰國，印度尼西아의 事例를 중심으로 /金元錫 外
97-10 韓·EU 主要通商懸案과 對應方案 /李鍾雲
97-11 러시아 외국인투자 현황 및 제도의 특이 / 박영철
98-01 韓日主要通貨懸案과對應課題 / 程勳·李鴻培
98-02 Bankruptcy Procedure in Korea: A perspective / MiKyung Yun
98-03 美國의兩者間投資協定: 韓-美 投資協定의意義 와展望/ 金宣雄
98-04 The Role of Foreign Direct Investment in Korea's Economic Development: Productivity Effects and Implications for the Currency Crisis / June-Dong Kim · Sang-In Hwang
98-06 ASEM Investment Promotion Action Plan (IPAP) Revisited: Establishing the Groundwork for Regional Investment Initiative/Chong Wha LEE
98-07 외환위기 이후 한국해외자금변이의 구조조정실태 와 애로사항①: 영국/申東和
98-08 외환위기 이후 한국해외자금변이의 구조조정실태 와 애로사항②: 인도네시아/金完坤
98-09 외환위기 이후 한국해외자금변이의 구조조정실태 와 애로사항③: 美國/朴英鎬
98-10 외환위기 이후 한국해외자금변이의 구조조정실태 와 애로사항④: 中國/金肇根
98-11 외환위기 이후 한국해외자금변이의 구조조정실태 와 애로사항⑤: 泰國/權敬德
98-12 APEC'S Ecotech: Linking ODA and TIIL / Hyungdo Ahn · Hong-Yul Han
98-13 경제계 극복의 지름길: 외국인투자/金革新·外
98-14 最近 國際金融環境變化와 國際金融市場動向 / 王允鍾·外
98-15 Technology-Related FDI Climate in Korea / Yoo Soo Hong
98-16 構造調整과 國家競爭力/洪洪洙
98-17 WTO 무역원활화 논의현황과 정책과제- 통관절차 및 상품의 균형적응을 중심으로 /樸鎬鉉·任曉成
98-18 주요국의 투자관개념 관리사례/申東和
98-19 公企業 매각방식의 주요 유형: 해외매각을 중심으로 /尹英京·朴英鎬
99-01 改革推進 外國市場의 進出點/金元鎬·外
99-02 WTO 뉴라운드의 전망과 대책/ 蔡旭·徐暢培
99-03 Korea-U.S. FTA: Prospects and Analysis/Inkyo Cheong · Yunjong Wang
99-04 韓国のFTA Policy Consistent with APEC Goals / Inkyo Cheong
99-05 OECD연구시리즈③ OECD 부패방지협약과 후속 이행조치에 관한 논의와 평가/ 金康鎬
99-06 Restructuring and the Role of International Financial Institutions: A Korean View / Yunjong Wang
99-07 The Present and Future Prospects of the North Korean Economy/Myung-Chal Cho · Hyungsoo Zang
99-08 APEC After 10 years: is APEC Sustainable? / Hyungdo Ahn
99-09 Inward Foreign Direct Investment Regime and Some Evidences of Spillover Effects in Korea / June-Dong Kim
99-10 OECD연구시리즈①: 전자상거래 소비자보호에 관한 OECD의 논의와 정책적 시사점/ 姜聖嶪
99-11 Distressed Corporate Debts in Korea/Jae-Jang Kwon · Joo-Ha Nam
99-12 Capital Inflows and Monetary Policy in Asia before the Financial Crisis/Sung-Yeung Kwack
99-13 Korean Implementation of the OECD Bribery Convention: Implications for Global Efforts to Fight Corruption/Jong-Bum Kim
99-14 The Asian Financial Crisis and the Need for Regional Financial Cooperation/Yunjong Wang
99-15 Developing an ASEM Position toward the New WTO Round/Chong Wha LEE
99-16 OECD연구시리즈④ OECD/DAC의 공적개발원조 논의와 동향/樸鎬
99-17 WEF 국가경쟁력 보고서 분석/王允鍾·申東和·李衍根
99-19 An Assessment of the APEC's Progress toward the Bogor Goals: A Political Economy Approach to Tariff Reductions/Honggye Lee
99-20 The Relationship between the WTO and APEC: Trade Policy Options for APEC in the 21st Century/ Sung-Hoon Park
99-21 Competition Principles and Policy in the APEC: How to Proceed and Link with WTO
/Byung-il Choi

99-22 The Relations between Government R&D and Private R&D Expenditure in the APEC Economies: A Time Series Analysis
/Sun G. Kim · Wankeun Oh

99-23 Ecotech and FEEEP in APEC /Ki-Kwan Yoon

99-24 OECD 연구 시리즈: 무역과 경제정책에 관한 OECD 논의와 한국경제에 대한 시사점 /尹美京·金成根·羅榮淑

99-25 Economic Integration in Northeast Asia: Searching for a Feasible Approach /Inkyo Cheong

99-26 The Mekong River Basin Development: The Realities and Prospects of Korea's Participation /Jae-Wan Cheong

99-27 OECD 연구 시리즈: OECD 규제 개혁: 미국, 네덜란드, 일본, 영국, 프랑스 /権徹哲·金欽律

99-28 Assessment of Korea's Individual Action Plans of APEC /Hyungdo Ahn

99-29 민간외제항만 논의와 우리의 대응 /権徹哲 · 황대철

99-30 How to Sequence Capital Market Liberalization: Lessons from the Korean Experience /Insook Shin · Yunjong Wang

99-31 Searching for an Economic Agenda for the 3rd ASEM Summit: Two Scenarios /Chong Wha LEE


99-33 Exchange Rate Policies in Korea: Has Exchange Rate Volatility Increased After the Crisis? /Yung Chul Park · Chae-Shick Chung · Yunjong Wang

99-34 Total Factor Productivity Growth in Korean Industry and Its Relationship with Export Growth /Sang-yirl Nam

00-01 Issues in Korean Trade 1999: Trends, Disputes & Trade Policy /Junsok Yang · Hong-Youl Kim

00-02 Competition and Complementarity in Northeast Asian Trade: Korea's Perspective /Sang-yirl Nam

00-03 Currency Conversion in the Anti-dumping Agreement /Jong Bum Kim

00-04 East Asian-Latin American Economic Relations: A Korean Perspective after the International Financial Crisis /Won-Ho Kim

00-05 The Effects of NAFTA on Mexico's Economy and Politics /Won-Ho Kim

00-06 Corporate Leverage, Bankruptcy, and Output Adjustment in Post-Crisis East Asia /Se-Jik Kim · Mark R. Stone

00-07 Patent Protection and Strategic Trade Policy /Moonsung Kang

00-08 Appropriate Exchange Rate Regime in Developing Countries: Case of Korea /Chae-Shick Chung · Dooyong Yang
Korea and Brazil:
A Partnership for the New Millennium

발행인 李景台

對外經濟政策研究院
발행처 137-747 서울특별시 서초구 염곡동 300-4
전화: 3460-1178 FAX: 3460-1144

인쇄 오름시스템(주) 전화: 2273-7011 대표 이호열

등록 1990년 11월 7일 제16-375호

[本書 内容의 無斷 轉載・複製を 禁止]

ISBN 89-322-0011-4

값 12,000원

KOREA INSTITUTE FOR INTERNATIONAL ECONOMIC POLICY

ORDER FORM

- Fax number: 822-3460-1144
- Address:
  Publication Section, Department of Information & Library Services
  Korea Institute For International Economic Policy
  300-4 Yomgok-Dong, Seocho-Gu, Seoul 137-747
  Seoul, Korea
- E-mail: shbae@kiep.go.kr
- Please call: 822-3460-1080 if you have any questions.

ALL ORDERS MUST BE PREPAID

Date of Order: ________________________________

Name: Mr / Ms ________________________________

Department/Institution: __________________________

Street Address: __________________________ City: __________________________

State / Post Code: __________________________ Country: __________________________

Telephone: __________________________ Fax: __________________________
<table>
<thead>
<tr>
<th>Quantity</th>
<th>Title/Author/Series No.</th>
<th>ISBN</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Total Cost of book(s) is US$ __________________________.
- Cost of postage is US$ __________________________.

* Postage charge per copy is US$ 3 within Asia. For all other countries, the postage charge per copy is US$ 5.

All orders will be shipped by airmail.

**Payment**

- Check (payable to KIEP)
- Visa Card
- International Money Order
- Master Card

- Card Number __________________________
- Expiry date __________________________
- Signature __________________________

**Standing Order for Residents Outside Korea**

<table>
<thead>
<tr>
<th>Type of Membership (One-Year)</th>
<th>Annual Fee*</th>
</tr>
</thead>
<tbody>
<tr>
<td>All publications (60-70 titles, including periodicals, annually)</td>
<td></td>
</tr>
<tr>
<td>Institutions</td>
<td>US$ 500</td>
</tr>
<tr>
<td>Only English publications (10-15 titles annually)</td>
<td>US$ 300</td>
</tr>
</tbody>
</table>

* Airmail charges are included.

* Subject to change without prior notice.