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THE ROLE OF INOVATION POLICIES IN SOUTH ASIAN INDUSTRIALIZATION: THE CASE OF KOREA

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ABSTRACT

The main aim of this study is introducing historical, political and cultural dimensions of South Korean industrialization, without leaving aside the economic perspective as one of the explanatory factor. In the investigation of industrialization, the majority of the researches focused only on conducted economic policies as an explanatory factor of the rapid growth in South Korea. However Asian societies' communal tradition and institutions provided a suitable ground for strong developmental government to stay in power during the industrialization process in the South Korea. Consequently the ability to make especially long-term economic policy projections in turn allowed policy decision makers to form entire economy in accordance with the developmental goals in the South Korea.

Keywords: Strong Developmental Goevernment, Economic Perspective, Industrialization Policies.

ÖZET

Bu çalışmanın temel amacı açıklayıcı faktörlerden biri olarak ekonomik bakışı gözardı etmeden Güney Kore sanayileşmesinin tarihsel, politik ve kültürel boyutlarını ortaya koymaktır. Güney Kore'deki sanayileşmenin incelenmesi esnasında araştırmacıların çoğunluğu sadece uygulanan ekonomik politikalara odaklanmışlardır. Oysa ki Asya toplumlarının komünal gelenekleri ve kurumları sanayileşme süreçleri boyunca güçlü kalkınmacı hükümetlerin iktidarda kalması için uygun bir ortam sağlamıştır. Dolayısıyla özellikle uzun dönemli politikaları belirleme olanağına sahip olmaları, politika karar alıcılarının bütün bir ekonomiyi Güney Kore'nin kalkınmacı amaçları doğrultusunda biçimlendirmelerine izin vermiştir.

Anahtar kelimeler: Güçlü Kalkınmacı Hükümet, Ekonomik Bakışaçısı, Sanayileşme Politikaları.

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1.Introduction

Asian industrializtion and development miracle was one of the main research areas in the literature of economics in both theoretical and empirical sense until the financial crises has emerged in 1996. The majority of these researches were able to explain this industrialization and development success from only a narrow economic perspective. Whereas a complete investigation of this miracle shoul be made by considering the historical, political and cultural dimension additionally.

In this context the main distinguishing feature of Asian societies is communal tradition and institutions which in turn provide a suitable social environment for strong government and developmental state. A state of strong government in many Asian economies provided a ground to develop and conduct firm national goals and appropriate policy choices. The ability to make especially long-term economic policy projections on the ground of political independence from all economic actors, in turn allowed policy decision makers to form entire economy in accordance with the developmental goals in Asia.[2] In the South Korean case, developmental government conducted industrialization policies with a firm control of domestic and foreign capital and working class, for achieveing its final goal of rapid economic growth. In order to reach such goals, the authoritarian regimes between 1953 and 1987 are played crucial rol in the South Korea. In conducting industrial policies, export orientation, a bank based financial system and government inducement for big business groups was main cornerstones from the beginning of 1960s. A decede later South Korea has emerged as one of the fastes growing economy.

In this study in addition to narrow economical perspective we will try to put forth an historical, political and cultural dimension to the investigation of South Korean industrialization. In the first section we analyzed the the distinguishing features of Asian industrialization in the light of the South Korean experience, without excluding the historical, political and cultural dimansions. Then we analyzed respectively, the technology policy and education policy. Finally we expressed our initial argument that because of historical, political and cultural factors provided a suitable ground for strong developmental government.

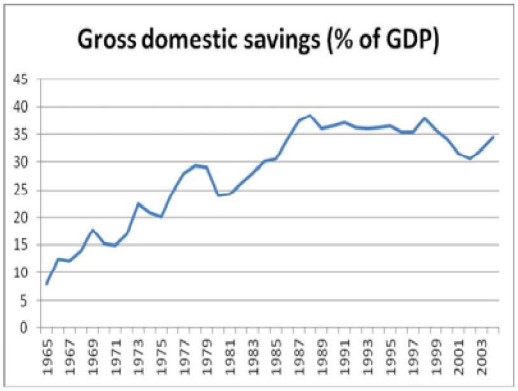
2. The Distinguishing Features of Asian Industrialization and South Korea

Almost all Asian economies implemented industrialization policies in different degrees and levels in order to increase industrial production. They determined the economic growth as one of the most important national goal. In first stage of development labor intensive sectors were dominant sectors and import substitution policy implemented. In second stage export oriented policies conducted and technology intensive sectors were dominant sectors. In first stage, economies grew up mainly within domestic market then in second stage they expanded their market all over the world with increases in the level of employment and fulfill high wage requests of the working class.

Specifically, industry and production oriented education system was an important part of the science and technology policies in south Asia. Technological capability increased through acquisition, assimilation and improvement policies and transformation of scientific discoveries into technology. This provided an opportunity for them to develop own technological capacity and capability.

A strong government intervention to the economic policy which realized by active economic policy and strategic planning in terms of several different ways, in order to regulate and improve capital accumulation in short and long run was the distinguishing feature of Asian development. Another common feature of Asian economies is very high levels of saving and investment expenditures.

Figure1. South Korean Gross Domestic Savings (% of GDP)



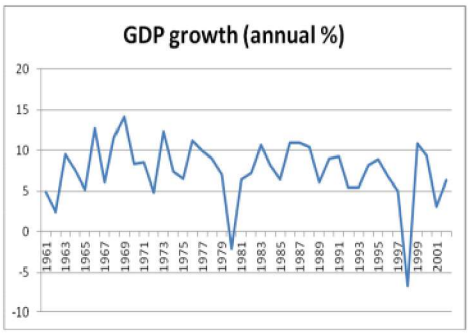
Source: World Development Indicators (WDI), World Bank, 2004.

[2] A distributive equality and the homogeneity of societies in East Asia helped create and sustain communal institutions, which in turn were able to provide local public goods and to enforce social rules and regulations and property rights. Effective communal institutions are then able to help maintain a high quality bureaucracy since these institutions do not allow interest groups to easily control local politics (Bardhan, 1996).

In addition, the authoritarian governments restricted civil rights and repressed opposition movements. Especially trade union rights were very limited in all Asian economies (Yılmaz, 1998). For example in the South Korea trade union rights were very limited until the success of the democratization movement in 1987.

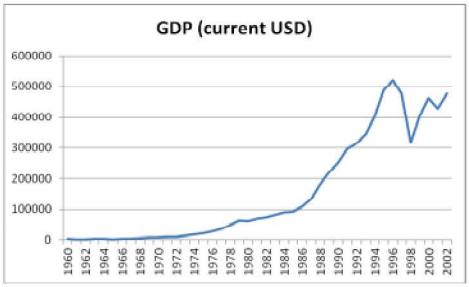
From the beginning in 1960, the Korean economy grew at an average annual growth rate of almost 8 % raising GDP per capita in constant prices (1995 USD) from 1.325 USD in 1960 to 14.280 USD in 2002. In the mid 1960s, South Korea's export goods were textiles, apparels, toys, wigs, plywood and other labour-intensive mature products. Ten years later, ships, steel, consumer electronics and construction services of South Korea began to challenge established suppliers from the industrially advanced countries.

Figure 2. Annual Gross Domestic Product Growth Rate.



Source: World Development Indicators (WDI), World Bank, 2004.

Figure 3. Gross Domestic Product in terms of current USD.

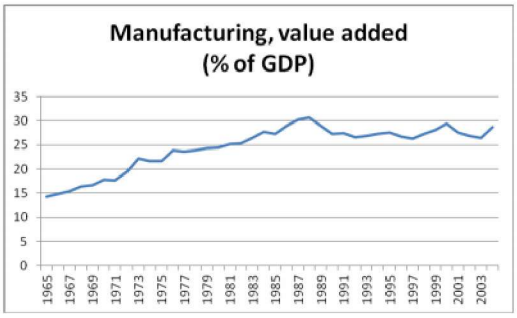


Source: World Development Indicators (WDI), World Bank, 2004.

While the level of export increasing from 33 million USD in 1960 to 367 billion USD in 2002 in current prices (1995 USD), the share of manufactured goods especially high-tech goods increased dramatically in exports.

By the mid 1980s, computers, semiconductor memory chips, video cassette recorders, electronic switching systems, automobiles, industrial plants and other technology intensive products were added to the list of South Korea's major export items. In the mid-1990s, South Korea was working on the next generation products, such as multimedia technology, high-density television, personal communication systems and a new type of nuclear breeder. By 1994, South Korea was second big supplier in the world in shipbuilding and consumer electronics, third big in semiconductor memory chips, fifth big in textiles, chemical fibers, petrochemicals and electronics, and sixth big in automobiles and iron and steel (Kim, 1998). Because of democratization of the government, wages and labor costs raised in electronics, automobiles and machinery. Then South Korean industries launched an overall restructuring of industry toward more technology intensive, higher value-added products (Hiwaki, 1998). As it is seen in the Figure 4, manufacturing value added increased during the industrialization stages.

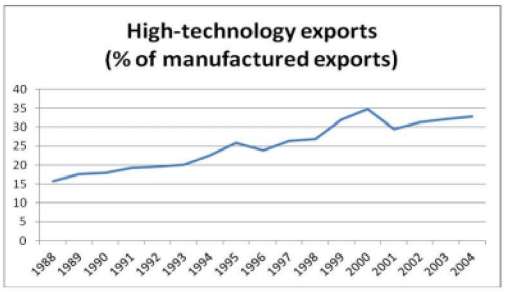
Figure 4. Manufacturing value added as percentage of GDP.



Source: World Development Indicators (WDI), World Bank, 2004.

South Korea's technology policy has shifted from the promotion of target industries to that of innovation related activities. South Korea, pursuing its drive toward the high-tech sector, has been achieving dynamic comparative advantage from technology acquisition, learning-by-doing and productivity growth (OECD, 1996). Therefore the share of high-tech products in manufactured exports increased fastly from 1988 to 2000.

Figure 5. Share of high-tech products in manufactured exports.



Source: World Development Indicators (WDI), World Bank, 2004.

3. Technology Policy

In the area of growth theory many studies have shown theoretically and empirically that technological improvement accelerates the economic growth by improving productivity, and leading to new products, processes or industries. However importing largely from high-knowledge countries is essential but not sufficient way of improving technological level for low-knowledge countries. In order to improve technological level, some additional policies should be implemented by both government and private sectors. In the South Korean case the reality shows us that, strong developmental state plays an important role to implement firm industrialization and technology policies which are complementary for improving technological level and achieveing the desired level of productivity growth.

Low-knowledge economies cannot rely only on combination of technology imports and investments, but have to increase their national technological activities as well. Especially during last stage of industrialization, South Korea developed its own national technological activities and reached extremely high level of technology in industrial area through acquisition, assimilation and improvement.

Increased competition from new entrants induced the technical efforts endogenously in the assimilation of foreign technologies in order to produce differentiated products. In South Korea 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) (Kim,1998).

South Korean public sectors investments on science and technology as a percentage of GDP was %0.5 in 1973, %2.0 in 1990. In 1980 private sectors' investment on the science and technology was 2/1 times biggerS than public sectors, but in 1990 this rate increased dramatically (Simon, 1993).

South Korea's technology is heavily derived from imported technology, both formal and informal. Formal transfer involves foreign direct investment (FDI) associated with technology transfer, technology licensing, and imports of capital goods. Informal transfer includes foreign training and studies, and reverse engineering from imported products. However, fully owned FDI or a Joint Venture as a means of technology transfer may lead to either foreign dependency or conflicts. These mechanisms definitely transfer production capability, but they do not necessarily transfer engineering capability or innovation capability.

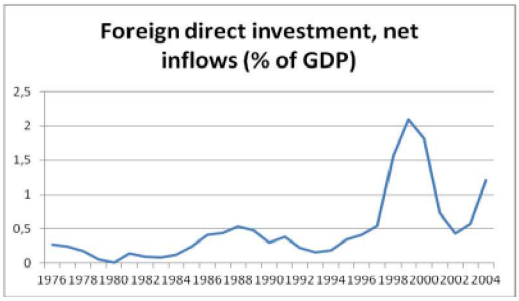
South Korea has developed its own way of using technology and capital goods including reverse engineering. Korea concentrated on wide-scale application of improvement engineering to imported technology, with emphasis on consumer goods for expanding exports. Along the line of the improvement engineering, these innovations have provided Korea bargaining options for cross licensing. It is Korea's strategy to become a partner country of the United States in the cross fertilization of the international technology market (Hiwaki, 1998).

South Korea has been enjoying high returns from imported technology because it had made strategic use of management, allocation of investment, and domestic R&D to capitalize on the use of that technology. The South Korean government had played a major role over importation of technology along with forming human capital, which contributed to the remarkable growth rate of its industrialization (Hiwaki, 1998). However by the 1980s labor intensive sectors were dominant economic activities and technology intensive sectors began to gain influence in the economy at the mid of the 1980s. For example until 1980s, in the electronic equipment and consumption goods production, South Kore had only montage industry. In addition, before the 1980s the concept of R&D was considered only as inverse engineering.

In the first stage, lack of resource and capital accumulation to support technological and scientific research and progress directed South Korea to rely on transferring foreign technology. In foreign technology transfer, induced foreign direct investments are not played a quite crucial role as it is seen in the Figure 6.

Because a fully owned FDI or a joint venture definitely transfer production capability, but it does not necessarily transfer engineering capability or innovation capability. So, Korea restricted FDI but promoted instead technology transfer through other means, such as capital goods imports in the early years. Capital was acquired in the form of foreign loans. Such a policy, designed to maintain Korea's management independence from foreign multinationals, was effective in forcing Korean firms to take initiative and a central role in learning (i.e. acquiring. assimilating and improving imported technologies) , rather than relying entirely on foreign sources (Kim, 1998).

Figure 6. Ratio of net foreign direct investment as percentage of GDP.

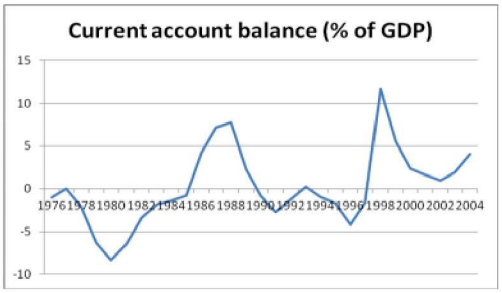


Source: World Development Indicators (WDI), World Bank, 2004.

In other words, South Korea supported technology transfer through the production of turnkey plants in the early years because technology was not a critical element those times (Nelson, Richard R., 1993). Technology transfer provided a suitable ground for developing of South Korea's own technological capability through reverse engineering. The reverse engineering applied successfully by well educated / trained engineers and this enabled the country to assimilate foreign technology. In the South Korean industrialization, technological progress can be summarized by the terms acquisition, assimilation and improvement.

Through out the past two decades of export oriented industrialization, the South Korean state has placed increasing emphasis on the role of big business (Johns and Sakong, 1980; Lim 1981). Large export firms have been provided with disproportionate amounts of domestic and foreign capital at greatly subsidized interest rates. In addition, the state has provided them with various kinds of technical and infrastructural support (Koo, Hagen., 1984). Through the technology policies and export oriented industrialization which conducted intensively after 1980 the current account balance improved gradually. Figure 7 clearly shows that while the current account balance deteriorated between 1977 and 1980, it improved dramatically from the beginning of 1980s in consequence of these policies.

Figure 7. South Korean current account balance (% of GDP)



Source: World Development Indicators (WDI), World Bank, 2004.

The Education Policy

In South Korea'n development, the education policy was one of the most distiguishing features. Strategically, strong government in South Korea gave a great importance to education for increasing the human capital in both quantitative and qualitative sense. In total government budget, the share of education increased from 2.5 % in 1951 to over 22% in the 1980s which provided capability for acquisition of technology. This indicates that the first and foremost implication for public policy is expanded investment in education even before launching an industrialization program. In adition to government's inducement, the high traditional value given to education, scholarship and less income inequality at least at the beginning, meant also increasing possibility for poorer families to heavily invest in the education of their children preparing, thereafter, a more homogenous society for the future generations. Therefore, even in 1965, scondary school enrolment rate was %29 compared to %17 in Mexico, %16 in Turkey and in 1978 same rate was %68, %37 and %34 (Amsden, 1989). South Korean education policy aimed not only generating a suitable human capital for improving the technological capability it also aimed with strict discipline, increasing the consciousness of loyalty to the country.

South Korea's policy was to utilize its existing resources and abundant labor supply for industrialization with imported technology. It is necessary to adopt a liberal policy on brain drain in the long run, allowing scarce scientists and engineers to migrate to advanced

countries. The government has sent a large number of students overseas for education, mostly to the United States, and these educated Koreans became elite engineers, scientists and managers who have increasingly moved to responsible positions, promoting Korea-US business linkages (Hiwaki, 1998). Korea's technology development has been continuously associated with the flow of Korean-American scientists and engineers resulting in mutual benefits to the two countries by cross-fertilizing science and technology (Kim,1993). Hence the most important diffusion mechanism has been the mobility of US trained-experienced managerial and technical personnel among Korean enterprises.

Brain drain was also a serious problem for Korea through the 1960s. As of 1967, 96,7% of Korean scientists and 87,7% of Korean engineers educated abroad remained abroad, mainly in the US, compared with the corresponding world comparisons of 35 and 30,2% for all countries (OECD, 1996). However over time good working conditions have been attracted them and they became important sources of an overseas technical network and a high calibre manpower pool for Korea's subsequent development. The majority of new enterprises and most venture firms are linked with American trained personnel and they acquired production and production design capability by luring experienced technical personnel from many Korean-American engineers and America-educated Koreans (Hiwaki, 1998). The recruitment of Korean scientists and engineers in the US, enabled Korean firms to build up necessary local capability to tackle new technologies. In other words, brain drain in earlier years provided an important high calibre human resource pool in America for Korean firms to draw competent manpower from (Kim, 1998).

3.1. Science and Technology (S&T) Policy

In South Korea, government has created a climate conductive to enhancing science and technology. The major feature of the Korean technological growth was the fostering of indigenous technology through research centers established in both the public and private sectors. South Korea has established its own R&D institutes, which have brought together scientists and engineers to work on common problems with efficient utilization of research equipment and facilities (Choi,1989). From the beginning of 1960s to the end of 1990s South Korea's investment on R&D as a proportion of GDP and the number of scientists and enginees as a fraction of labor force were approaching to the levels of some of the highly industrialized countries of Europe. The ratio of R&D expenditures to GDP increased from 0, 26 % in 1965 to 2,52 % in 1998, the quantity of researchers, (excluding research assistants and technicians) increased from 2.135 in 1965 to 129.767 in 1998 as it is demonstrated in Table 1 in the Apendix.

South Korea established also its ministry of science and technology (S&T) in 1967. The advantage of establishing a separate ministry of S&T to focus on S&T issues for the future, because action-oriented ministries are not at all interested in preparation for industrialization from a long-term perspective. It provided major contributions to establishing S&T infrastructure and promoting public R&D activities to pave the way for subsequent entry by the private sector.

Although S&T is not important for LDCs to acquire and assimilate mature foreign technologies, it is still important to invest in developing S&T infrastructure such as government research institutes (GRIs) in the early stage of industrialization. The South 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 GRIs, suffers 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 spun out of the S&T infrastructure and played a pivotal role in these private R&D centers.[3]

The Korean industry has been establishing R&D companies in Silicon Valley since 1984. Goldstar Electronics (LG) set up two R&D centers, one in South Korea and the other in California. It hired many Korean-American researchers away from US pharmaceutical companies. In 1986, Pohang Iron&Steel Corporation built its own university, the Pohang Institute of Science and Technology. The success of the venture became a shining example of which Korea is proud (Hiwaki,1998).

4.Conclusion

In industrialization process in order to improve its technological capability South Korea implemented acquisition, assimilation and improvement strategies. The South Korean case demonstrated that the industrial

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technology was not simply transfer from abroad. In addition these policies must be supported by indigenous education policies, national R&D and S&T policies. South Korea created its own engineering capability and innovation capability instead of relying on the imported technology in every stages of its industrailization process. South Korea's industrial policy has shifted from the promotion of targeted industries to that of innovation-related activities. In the last stage of industrialization it followed liberalization in trade, foreign investments and capital market, and privatized commercial banks and financial institutions to reach structural basic to push its economy toward globalized markets. Because of all these characteristic of South Korean industrialization, many planners in other developing countries show interest in imitation of the Korean experience.

However communal tradition and institutions in South Korea provided a suitable ground for strong developmental government. Due to the high credibility the government could develop especially long-term economic policy projections. This historical, political and cultural structure allowed policy decision makers to form entire economy in accordance with the developmental goals in the South Korea.

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