INFORMATION SOCIETY: NATIONAL SCIENCE AND TECHNOLOGY POLICIES IN TURKEY AND SOUTH KOREA

A THESIS SUBMITTED TO
THE GRADUATE SCHOOL OF SOCIAL SCIENCES
OF
MIDDLE EAST TECHNICAL UNIVERSITY

BY

SİNEM EMİROĞLU

IN PARTIAL FULLFILLMENT OF THE REQUIREMENTS
FOR
THE DEGREE OF MASTER OF SCIENCE
IN
THE DEPARTMENT OF SCIENCE AND TECHNOLOGY POLICY STUDIES

SEPTEMBER 2012

Approval of the Graduate School of Social Sciences

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ABSTRACT

INFORMATION SOCIETY: NATIONAL SCIENCE AND TECHNOLOGY POLICIES IN TURKEY AND SOUTH KOREA

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September 2012, 141 pages

This thesis emphasizes the role of being an information society in countries' development perspective; furthermore aims to study the economic, social and structural dimensions of information society related policies with the case studies of Turkey and South Korea. Although in 1950s Turkey and South Korea had similar characteristics in terms of basic economic and social indicators, Turkey has lagged behind in South Korea in terms of development perspective and information society parameters. In addition, information society levels of Turkey and South Korea are measured and compared by ICT development index. Information society policies of South Korea and Turkey are analyzed in the scope of national science and technology policies separately.

In theoretical perspective, transforming to information society is analyzed on the basis of “Deployment policies in the field of ICT” and “Two models of network policy formation”.

The findings of the study indicate that, although hegemonic ruler organizations determine science and technology and transforming to information society related policies, government should not apply these policies without considering their internal dynamics. These policies should be re-evaluated and modified in the scope of national advantages and priorities. In addition, this study aims to indicate the importance of the role of science and technology policies on being an information society for 21st century.

Keywords: Information Society, ICT and Development, Science and Technology Policies, Turkey, South Korea

ÖZ

ENFORMASYON TOPLUMU: TÜRKİYE VE GÜNEY KORE'NİN ULUSAL BİLİM VE TEKNOLOJİ POLİTİKALARI

Emiroğlu, Sinem

Yüksek Lisans, Bilim ve Teknoloji Politikası Çalışmaları Bölümü

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Eylül 2012, 141 sayfa

Bu çalışma enformasyon toplumu olmanın ülkelerin kalkınma perspektifindeki rolünü vurgulamanın yanı sıra Türkiye ve Güney Kore'nin ekonomik, sosyal ve yapısal boyutlarıyla enformasyon toplumu politikalarını çalışmayı amaçlamaktadır. 1950'li yıllarda Türkiye ve Güney Kore ekonomik ve sosyal göstergeler açısından benzer özelliklere sahip olmalarına rağmen, gelişme perspektifi ve enformasyon toplumu parametreleri açısından Türkiye, Güney Kore'nin gerisinde kalmıştır. Ek olarak bu çalışmada Türkiye ve Güney Kore'nin enformasyon toplumu seviyeleri BİT kalkınma göstergeleri tarafından ölçülüp, karşılaştırılmaktadır. Ayrıca Güney Kore ve Türkiye'nin enformasyon toplumu politikaları ulusal bilim ve teknoloji politikaları kapsamında analiz edilmektedir.

Teorik çerçeve olarak ise enformasyon toplumuna geçiş ”BIT alanında yayılma politikaları” ve ”Ağ politika oluşumunun iki modeli” temelinde analiz edilmektedir.

Sonuç olarak, hakim, kural koyucu organizasyonlar bilim ve teknoloji ve enformasyon toplumuna geçiş ile ilgili politikalar belirlemelerine rağmen, devletler kendi iç dinamiklerini dikkate almadan bu politikaları uygulamamaları gerektiği vurgulanmaktadır. Bu politikalar ulusal avantajlar ve öncelikler kapsamında yeniden değerlendirilmeli, üzerlerinde değişiklikler yapılmalıdır. Ek olarak, bu çalışma 21. Yüzyılda enformasyon toplumu olmada bilim ve teknoloji politikalarının rolünün önemini belirtmeyi amaçlamaktadır.

Anahtar Kelimeler: Enformasyon Toplumu, BİT ve Kalkınma, Bilim ve Teknoloji Politikaları, Türkiye, Güney Kore

To My Parents and Brother

Nursen, Selahattin and Ulaş Emiroğlu

ACKNOWLEDGMENTS

I wish to express my deepest gratitude to my co-supervisor Assoc. Prof. Dr. Funda Başaran Özdemir and supervisor Prof. Dr. Erkan Erdil for their advices, guidances and encouragements during the all phases of this study.

I am sincerely grateful to The Scientific and Technological Research Council of Turkey because this study was supported with 2210 Graduate Fellowship Program.

My family supported me in all phases of this study thus, I would like to express my deepest respect and love to them. Thank you very much to my dear brother Ulaş for his presence.

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CHAPTER 1

INTRODUCTION

The debates on the concept of information society are not and have never been completed. There is no agreement on the "what is an information society?" or "can it be said actually exist?". However there is detailed work on different kinds of information societies that existed long before a so called information age. Writers like James Beniger (1986) associate information with societies which need to collect and control information. Others like Headrick (2002) argues that the modern information revolution is the consequence of a cultural change beginning in Europe in about 1700.

Recently an information society is described one that information is used intensively, whether by individuals, institutions and industry. In addition this intense use, an information society is characterized by the convergence of three sectors, the information technology (IT) sector, the telecommunications sector, and the information and entertainment sector. In this type of society, beside tangible production factors, information is considered as a production factor. According to this view, information and communication technologies (ICT) are important factors for the transition of industrial societies to information societies.

During the 1990s the dramatic expansion of the Internet the rapid deployment of wireless networks are considered as the most visible consequence of this view. With this approach, developed countries have attached an importance to ICT assuming a socio-economic development. In addition to developed countries, hegemonic neoliberal ruler organizations (World Bank, IMF etc.) have advocated that ICT has great importance on economic productivity, health, education, poverty alleviation, democracy and sustainable development. Furthermore, these leading developed

countries and hegemonic organizations have suggested transition to information society for developing countries through applying policies and strategies which were already defined as a model.

While the importance of information society is commonly accepted by authorities but the suggested model is still a debated argument because these organizations' suggested model does not considered the internal dynamics (education, economic structure, history, social structure etc.) of developing countries. According to transition model some indicators were developed to measure whether a country is an information society or not. In this study the transition model is going to be analyzed by highlighting indicators in the case of Turkey and Korea, consciously omitting the debates on the information society.

In the literature part of thesis, foremost scholars who had significant contribution to information society literature will be studied chronologically. Then, by increasing importance of ICT infrastructure and its relation between development, policies and action plans emerged in global perspective. These policies will also be studied this part.

Theoretical approach of thesis bases on "two models of network policy formation". In the scope of theoretical framework, "Idealist Model" and "Strategic Model" will be analyzed on network policy formation as well as national science and technology policies. In addition, theory of thesis also utilize from "deployment policies in the field of ICT". In the scope of this model, "Public - Interest Model", "The Social –Darwinist Model", "The Protection of the Disadvantaged Model", "Techno-Economic Paradigm Diffusion Model", "The Strategic Deployment Model and Focused Scattering Model" will be studied.

In next chapter, information society policies in the scope of science and technology policies of South Korea and Turkey will be compared and also studied on the basis of these complementary models.

One of the foremost questions is that "why South Korea and Turkey are studied?" Although in 1950s these two countries were in the same stage in terms of socio-economic development for instance GDP per capita etc.,

especially after 1980s Turkey lagged behind South Korea. South Korea has attained to developed country group and become a high-technology exporter and has successfully transformed through information society. In fact, there are many socio-economic reasons for the development gap between South Korea and Turkey. However, these reasons will be discussed in the scope of information society perspective in this thesis.

In the scope of this thesis, answer of some questions will be tried to find. These research questions; Does government support have vital role during the transformation period to information society?, Is there any relationship between ICT infrastructure deployment and transforming to information society?, and final research question is; What is the relation between information society indicators and national development indicators? Furthermore, the hypothesis of this thesis is; the latecomer countries should not directly obey the suggestions of neoliberal hegemonic organizations during transformation to information society, instead, should re-assess and combine the technological requirements with their national dynamics and socio-economic specifications.

In sum, in Chapter-1 there will be introduction part and research questions and hypothesis of thesis will be determined. In Chapter-2 literature review of information society, policy, theories and the transforming to information society indicators and according to leader hegemonic organizations, the relation between "ICT and development" will be studied. In Chapter-3, information society polices in the scope of science and technology policies of Turkey will be analyzed. In Chapter-4, information society polices in the scope of science and technology policies of South Korea will be analyzed. In Chapter-5, Turkey and South Korea will be compared according to their information, science and technology policies and science and technology related indicators. In addition, South Korea and Turkey will be compared in the scope of information society indicators. Finally in Chapter-6, thesis will be concluded. In that part, related beneficial policies will be suggested to Turkey in the way of transforming to

information society in a comprehensive manner and research questions will be tried to answer.

CHAPTER 2

INFORMATION SOCIETY

In recent decades, information society concept has become quite popular. This concept expresses a new social structure which is shaped by developments of information and communication technologies (ICT) and related fields.

Today, theories are developed to explain the current period and new economic and social changes. These theories specifically focus on new age communication technologies. The new technologies have distinguishing features which make new technologies different from previous mass communication technologies. The features are increasing the capacity in access, storing, processing and distribution of the information. New age communication technologies have been seen as the driving force in social and economic changes, due to mentioned features and expectations of new communication technologies about creating the new economic activity fields or carrying out improvements in related fields (Preston,2001:187).

These new technologies triggered the new theories which were developed on the social, cultural and economic effects of the new communication technologies. For instance, information society approach claims entrance to the new social processes. In the scope of Post –Fordist approach, the development of new communication technologies were analyzed with the development of capitalism and its differences from the previous periods. In Post- modern society approach, post- modern society was defined as rapidly changing society (Timisi, 2003: 87-106).

Moreover, Senn (1995) emphasizes differences of the information society than other previous society forms and advocates that there are five basic features which differentiate information age from other periods.

1. Information age occurs by the rise of information based society.
2. Business environment based on information technologies in information age.
3. Business processes turn into the productivity growth in information age.
4. The success of information age is measured with the efficiency on the usage of information technologies.
5. In information age many products and services are intertwined around information technologies.

In brief, Geray (2003) advocates that information society approach have two periods; these are first generation and second generation approaches. All of these approaches which were mentioned in above are called as first generation approach. In addition, after the World War II, increasing the purchasing power of employees and the expectations of there would not be an economic crisis, supported these first generation approaches. Second generation approaches are related with policies more than theories.

2.1 The Emergence of the Concept of the Information Society

Many scholars have contributed to the "Information Society Theories". These contributions will be emphasized in the scope of this thesis and under "The Emergence of the Concept of the Information Society" title. Briefly, these theories will be summarized and will be presented in historical flow.

> It is stated that information society concept was put forward before 1950; it was the first time that communication age concept was used by Marshall McLuhan in 1962 and in the same year information society concept was used by Fritz Machlup (Geray, 1997: 37).

Bell and McLuhan are major supporters of information society approach. However, to understand the both contributions and studies of Bell and McLuhan, analyzing the Machlup's contribution is beneficial.

Fritz Machlup studied information based society. In 1960s, Machlup thought the role of computers, communication and knowledge in US service economy. Machlup saw computers as primarily machines of knowledge production and as accelerator for transforming to the new information based economy. Unlike other scholars who have studied information society, Machlup made some numeric analysis about information society. It was mentioned below, Machlup analyzed that transforming to information society is related with the share of information sector in GDP and in the labor force.

> The economy of USA in 1960s, in that period the share of information sector in the GDP was 29%, the share of information in the labor force was 31%. So that USA has become the information society rapidly (Machlup, 1962: 44).

Machlup emphasized the sectoral distribution of the labor force and analyzed statistically.

> In 1800s the ratio of agricultural workforce was 87.2%, industrial workforce was 1.4%, service workforce was 11.3% and information workforce was 0.2%. (Machlup, 1962:48)

On the other hand, McLuhan studied the information revolution and information society. McLuhan (2001) emphasizes that agricultural revolution depends on access to the arable lands; industry revolution depends on wealth in terms of raw material sources or depends on capturing them and information revolution depends on the increased efficiency of information and communication in the economy. McLuhan advocates that information revolution takes its power from information and information

revolution guides to developing countries concerned with development problem.

Daniel Bell (1974) also contributed to the information society studies. He enhanced the post-industrial society and information based post-industrial society terms and he used the term information society as a substitute expression for post-industrial society. Bell advocates that changing the nature of the information caused the transition from industrial society to post-industrial society (Bell, 1974: 188). In addition, Bell (1980) emphasizes that information has become the strategic source and the converter element of the post-industrial society and he advocates that this society would be described by a shift from manufacturing to a more service-oriented economy. Thus, according to him, heavy and mass production techniques which had been used in Fordism period, would be substituted by information related service industries. Additionally, computer driven knowledge technologies of post industrialism were creating the information society and information economy and the role of information workers were the core elements of post-industrial society. Moreover, Bell (1974) studied also the relation between economic growth and information.

> In the model of post-industrial society economic growth is related with dominance of the information (Bell, 1974: 20).

Moreover, Toffler (1981) studied about information society. He divides history of humanity into three periods and describes these periods as separate waves. First wave is agricultural and it started in B.C. 8000. In this term villages formed a new way of life. Then, in 1650s the second wave also industrialization period started. Ten or fifteen years after the Second World War, during the peak of industrialization period, third wave started. As a sign of the third wave, Toffler shows the density on the service sector in the sectoral division of the economy. Furthermore, Toffler (1981) believes that Third Wave would provide new opportunities to the poor society of developing countries. In terms of in developing countries, ICT

would become prerequisite for economic development. Toffler also defends that the gap between developed and developing countries would be reduced via ICT.

In addition, Toffler (1981) also studied information function in the production process apart from the other scholars. He claims that differentiation of information function and competence in the production process caused an increase in importance of human capital. Thus, in time intangible capital excesses the borders. In 1973, 65 percent of the US workforce was in the service sector, and nearly 48 per cent of the Western European workforce was similarly employed.

Furthermore, Masuda (1990) studied the information society and he defined the information society as a social transformation and considered it totally different structure from industrial society. He advocates that in industrial society fabrics are the modernization symbol and in information society computer and ICT would be modernization symbol.

In time, beside these information and information society related studies as mentioned above, some scholars criticizes the term of information and information society. Headrick is one of these scholars.

Headrick (2002) critizes the scholars who determined a certain beginning for the information age. According to him, information age has no beginning because the beginning of this age is the similar with existence of humanity. Although the concept of information society is new, recognition of the need for information is not a new phenomenon. The necessity of information is as old as the history of humanity. However, for the first time information has been so important and it has become a unit of development measurement. Previously, although unit of development measured with the amount of produced steel and energy for countries, now unit of development is measured by information which is obtained particularly by telecommunication and computer technologies. In addition, he emphasizes that throughout the history in some periods the amount of accessible information has been increased. The emergence of writing, alphabet, double register system, press, telegraph and computer greatly

made easier the accessibility to information in their periods and he advocates that during history there have been lots of information revolutions.

Furthermore, Webster is one of the scholars who study information society and he collects the definition of information society under five main titles. The first one is that technological conception.

> Technological conceptions center on an array of the innovations that have appeared since the late 1970s. New technologies are one of the most visible indicators of new times, and accordingly are frequently taken to signal the coming of an information society (Webster, 2006:9).

According to Webster, technological conception uses technological innovations while describing the information society. ICT leads the all parts of the social life about the processing, storing and distribution of the information. In general, especially with the ICT developments, conceptualization of the information society concentrated on ICT and technology based economic models more than social based economic models. The second title is economic conception of information society.

> The economic approach charts the growth in economic worth of informational activities. If one is able to plot an increase in the proportion of gross national product (GNP) accounted for by the information business, then logically there comes a point at which one may declare the achievement of an information economy (Webster, 2006:12).

Third title is occupational conception of the information society;

> We have achieved an information society when the preponderance of occupations is found in information work. The decline of manufacturing employment and the rise of service sector employment is interpreted as the loss of manual jobs and its replacement with white collar work. Since the raw

> material of non-manual labor is information (as opposed to the brown and dexterity plus machinery characteristics of manual labor), substantial increases in such informational work can be said to announce the arrival of an information society (Webster, 2006: 14).

Webster explained this approach as when the numbers of information related works increase, the stage of information society may be achieved. Fourth, spatial conception of the information society defines that:

> Here the major emphasis is on information networks which connect locations and in consequence can have profound effects on the organization of time and space. It has become an especially popular index of the information society in recent years as information networks have become prominent features of social organization (Webster, 2006: 17).

According to Webster, the final conception of the information society is cultural conception. People witness tremendous increase of information in their daily lives. This conception focus on that informatics systems have engaged in all parts of lives.

As indicated, the importance of ICT is certainly determined in above approaches. Specifically, from the beginning of the 1990s, economic development discourse was formed in the scope of new communication technologies and especially deployment of internet. These discourses were concreted with second generation information society approach. Geray (2003) advocates that "second generation approach" are interested in more policies. Moreover, new communication technologies were considered having potentials to change economic and social conditions on both national and global scale. The importance of national infrastructure investments was emphasized and action plans were prepared. In action plans, importance of communication networks and its positive contribution to economic, social life and global competition were emphasized (Geray, 2003: 122-124). In

brief, these expectations enter to the countries' agendas and ICT related policies have gained more importance in national and global perspectives.

2.2 Information Society Policies

Ken Ducatel's studies are in the scope of "second generation approach". Ken Ducatel et.al (2000), analyze the information society policies and historically separate these policies into two periods. The first part of the policies include policy documents which emerge immediately after coming up the information society theories, official documents, action plans, reports and strategies which are prepared by governments and generating initiatives in this regard.

During first period, it is specified that information society policies of US and England were market based policies. Although policy documents of European countries were based on public investment and public leadership, England under the leadership of Thatcher, emphasized that the market lead for transforming to information society. In addition the role of the state was to create the awareness of information society (Ducatel vd., 2000: 2; Schneider, 1997: 339). In this period, the year of 1982 was declared as "the year of the information technologies" in England (Preston, 2001: 26). Opening the competition and liberalization of the field of telecommunication services and privatizing the British Telecom were the most important policy agenda for England. Moreover in 1980s, the development of information society occurred under the leadership of market in US. Thus, although there was information society related discussions in US, there was no overall politic programme during the first period.

Furthermore, from the beginning of the 1990s, the concept of information society entered the political agendas of all developed, developing and underdeveloped countries. Moreover, national, international institutions, charitable organizations began creating the documents, policy suggestions in this period.

US Vice President Al Gore started the second period of the information society policies. Al Gore published "National Information Infrastructure (NII): Agenda for Action" Report. This report is based on market but it includes wider government support than first period's government support (Ducatel et. al. 2000: 3; Audenhove et. al. 2003: 4). According to this report NII, national information infrastructure is not only infrastructure; the report includes many factors such that deployment of the information applications and software, network standards etc. The developing the national information infrastructure creates important changes in social life. Moreover, it is expected that national information infrastructure creates important opportunities in the field of education, culture, science, art, health, employment, economy and state-citizen relations.

In addition, at the beginning, information society theories were not interested in developing and underdeveloped countries. The effective process which is emergence of the information society theories may be reason for this approach. One of the emergence dynamics of information society theories is pointing their future and requiring to show the direction progress to developed countries. Development theories subject the underdeveloped countries and information society theories subject developed countries. In this sense, information society theories constitutes a continuation of the focused of developed countries development of communication approach (Winseck, 1998).

As mentioned above, information society related policies have been prepared in the scope of second generation approaches. Second generation approach is interested in policies more than approaches. Creating important changes in communication sector, social and economic life was expected from new information and communication technologies. These expectations were concreted with second generation approach. And action plans were prepared towards establishing national information infrastructure via these new information and communication technologies. The benefits of communication networks were emphasized in these action plans. In

addition, the importance of effective usage of these networks in terms of global competition was also emphasized (Geray, 2003:122-3).

In brief, the policies which were prepared in the scope of second generation approach provided a basis for the explanation the relation between information and communication technologies and development.

2.3 ICT and Development

The relation between ICT and development was studied first in 1960s. A new stage of development which was about the production, diffusion and use of information and communication technologies throughout society, first studied in 1960s and in USA. (Bell,1973; Castells,1998; Castells and Hall,1996). Porat studied to find which countries had achieved the advance stage of development also information economy by counting the number of people who worked in information related jobs. In addition, decline of industrial sector, rise of the service sector and combination of ICT with service sector have generated new economy and knowledge based information society.

Specifically after 1990s, hegemonic organizations like International Telecommunication Union (ITU), World Bank have noticed the importance of ICT and information society thus; these topics begun to be studied on official reports. For instance, in 1999, the United Nations Development Programme dedicated its annual "Human Development Report" to ICT related issues, and the World Bank dedicated its annual "World Development Report" to ICT and development. In World Summit on the Information Society in December 2003, the linking of sustainable development to technology development and a knowledge society was also explored.

Moreover, although some scholars discusses that ICT causes to new problems as digital divide, on the other hand some scholars advocate that the spread of ICT is a global trend and countries cannot ignore this fact.

Especially important organizations emphasize the contributions of ICT to developing countries. Thus they advocate, for developing countries the critical point is that these countries might benefit from the advantages of ICT in order to achieve sustainable development, transforming through information society; in short become a developed country.

> Information and communication technology is one of the most potent forces in shaping the twenty- first century… . IT is fast becoming a vital engine of growth for the world economy… . Enormous opportunities are there to be seized and shared by us all (G8, 2000).

> According to one expert from the World Bank, the new information and communication technologies can help people fight poverty, reduce the isolation of rural areas, educate children, support lifelong learning, create efficient, accountable, and transparent governments, increase economic reforms, monitor and protect the environment, promote small and medium sized enterprises, and participate in global trade (Talero, 1997).

In addition, hegemonic organizations advocates that ICT has potential to accelerate growth, to create jobs, to reduce migration pressure from rural to urban areas, to increase agricultural and industrial productivity, to increase services and to access to them, to facilitate the diffusion of innovations, to increase the public administration efficiency and the effectiveness of economic reforms, to strengthen competitiveness in developing countries and finally to encourage greater public participation and democracy. (G8 2000; DOT Force 2001; UNDP 2001)

Moreover in "G8 Meeting 2000" the necessary conditions to benefits from the advantages of ICT and to be information society was emphasized. While transforming to information society, lack of physical infrastructure and qualified human capital were shown important problems.

In addition Wilson (2004) also emphasized the common points of developing countries. He advocates that these common points differentiate them from developed countries in development of information and communication technologies.

- Lack of trained ICT workers,
- Having weak and inexperienced institutions,
- Being ICT consumer also importers of hardware, software,
- Having less information about rules of global information society. (Wilson, 2004)

Moreover, scholars also advocate that ICT infrastructure and information society potentiality certainly effect the national economic development. How ICT affects economic development and how it affects poor people particularly in developing countries. What policies and programs facilitate its potential to enhance development? These questions may explain the linkages between ICT, economic growth and development of developing countries.

Hegemonic organizations (World Bank, IMF etc.) provide answers and explain these questions. According to them, in societies, ICT enables the access of information and transform this information into added values. Thus, sustainable development requires a strict ICT policy to support infrastructure investment of information and communication technologies, acquisition and also usage. For instance, many East and South Asian economies have been successful in innovation in ICT related fields. These countries do not only focus on production and exports of ICT, they have also focused on consumption and the use of related technologies in many sectors.

After industrialization period, especially developed countries comprehended the importance of ICT and begun to invest on ICT infrastructure. In general, firstly governments have supported these ICT infrastructure investments and then they have encouraged the private sector and institutions to invest on ICT infrastructure investments. The role of governments and institutions is emphasized in OECD reports.

> Much of the investment for public sector services and the necessary ICT infrastructure must come from governments. This must be complemented by an enabling environment of business growth and employment through market development, competition policy, intellectual property rights and appropriate equity based social policies. The role of government and other institutions cannot be overemphasized, especially in areas of regulatory reform (OECD 2005: 297 – 313).

Furthermore, some scholars advocate that sustainable development has come to be thought and measured not only economic terms but also in terms of social wellbeing. Impact of the internet could not be measured with in the sense of the number of connected individuals alone, but also in terms of contribution to social and economic progress (Uimonen, 1997). To measure the benefits of ICT in socio-economic progress Shirin Madon (2000) emphasizes that ICT is not only used in researches and studies, also it is beneficial in six main areas; economic productivity, health, education, poverty alleviation and empowerment, democracy and sustainable development.

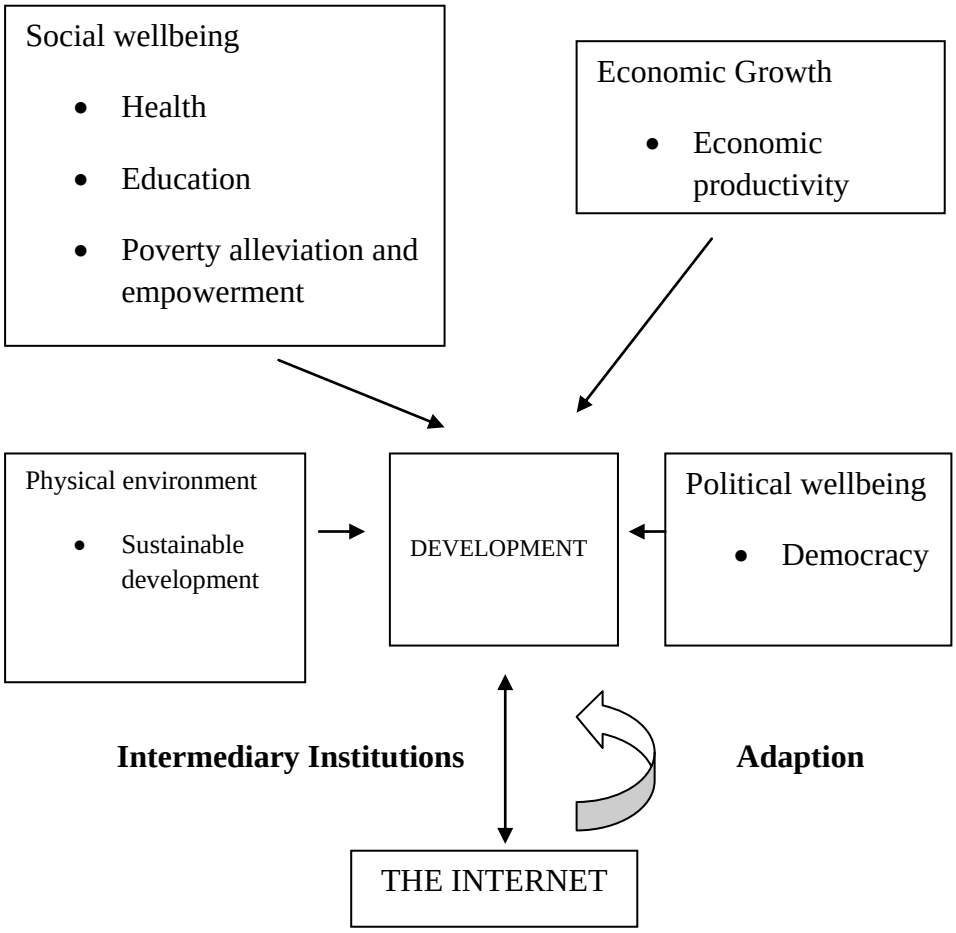
Moreover, Adam also studied the relation between ICT and economic development. In the scope of economic productivity, business networks are very important in the availability of better information and communication channels and these channels may provide significant benefits to local companies. Via internet, commercial connections has become faster, suppliers could measure demands easily and establish the closer relation with customers, competitors and market. Internet enables that local companies market their products in foreign markets and compete with global companies more easily. This competition increases the regional collaboration and competitiveness in world trade. (Adam,1996)

Panos (1995) studied the relation between ICT and social benefits. In the scope of health, the application of health care networks has also increased in developing countries. For instance, HealthNet is one of the health care networks. It links the healthcare workers who are from 16 African countries and four Asian countries, databases and statistics.

In the scope of education, in developing countries particularly networks are used on education. By communication technology, institutions mobilize resources and maintain the projects effectively between remote institutions. Also network is important in secondary and high school educations. Because, communication technology has great importance in attaining the information, collaboration between teachers and students in all over the world (Madon, 2000). In near future distance learning will become very popular and electronic networks could support this learning via providing the electronic libraries, computer conferencing (Hall, 1996, Panos, 1998).

Furthermore, according to Madon (2000) internet is used also for poverty alleviation. In developing countries because of the unemployment, the rate of migration which is from rural areas to urban is very high. Due to this reason, internet is used for creating new job opportunities in rural areas and these job opportunities could prevent the immigration to urban areas.

In the scope of democracy, democratic institutions are considered important factors for socio economic development. Although there are not many researches about the link between the openness of information and democracy, some scholar advocate that internet connectivity promotes the democracy (Goodman et al, 1994; Press, 1996; Mueller and Tan, 1997). It is believed that internet supports the democracy particularly people who are living under dictatorship. For instance, according to them, internet enabling people to share their ideas and opinions, thus, coordinate political activity within their countries. In this way, internet and improved telecommunications undermine the sustainability of the authoritarian governments (Madon, 2000).



Source: Madon,S.,(2000),"The Internet and socio-economic development: exploring the interaction"

Figure 2.1: The Internet and Socio-economic Development: Conceptualizing the Interaction

As mentioned in Figure 2.1, health, education, poverty alleviation, economic productivity and democracy play important role in countries' developments (Madon,2000).

Addition to benefits of internet, hegemonic organizations emphasize the importance of telecommunication for countries' sustainable development. For instance, public call offices in rural areas could ease communication by giving farmers chance in accessing to market information and in enabling to pass commission agent. In addition, people in

rural areas could reach governmental information easily without spending time.

For another example, in 1970s because of the Arab Countries petroleum embargo, petroleum prices increased in all world. Increased petroleum prices also increased the transportation costs. In that time, increasing investment in telecommunication sectors created the opportunity for reducing the transportation costs. Also telecommunication substituted transportation and the world has noticed the importance of telecommunication infrastructure once again. This example has shown one of the benefits of telecommunication by organizations.

Hegemonic organizations as World Bank, ITU (International Telecommunication Union) and OECD, developed indicators to measure the relation between ICT and development. These indicators will be studied in the scope of the following part.

2.4 Information Society Indicators

Beyond theoretical discussions of information society, in recent decades information society is inserted in a rigid form and is measured with determined indicators. Although indicators have not considered the internal dynamics (education, economic structure, history, social structure etc.) of societies, in time there have been many indicators emerged about transforming to information society. For instance, in 1968 Research Institute of Telecommunications & Economics issued a report. As mentioned in Table 2.1, basic criteria of post-industrial society divided into four main topics in this report (Dordick and Wang, 1993: 33-34).

Table 2.1: Basic Criteria of Post-Industrial Society

Information quantity	The annual amounts of each person's total telephone conversations, the number of newspapers, books per 100 people and the population density as a measure of interpersonal communication.
The distribution of communication media	The number of telephone receivers per 100 people, the number of radio receiver and television receiver per 100 households.
Effectiveness of the information attributes	The proportion of employees in the service sector and the proportion of university students in the population of college age students must exceed 50%.
The proportion of information	The budget of information must exceed 35% of the total budget. GDP per capita must exceed 4000$.

Source: 1968 Research Institute of Telecommunications & Economics

In addition, to measure the economic side of information society Dordick and Wang (1993) determined two different parts. These were the dimensions of workforce (information technologies oriented) and its contribution to GDP. To measure parts, they determined these indicators; infrastructure, economic and social indicators. (Table 2.2). (Dordick and Wang, 1993)

Table 2.2: Indicators

Infrastructure Indicators	The number of telephone lines per 100 people, the number of televisions and newspapers per 1000 people, the number of terminal with data processing function in public telephone and telex networks.
Economic Indicators	The percentage of informational workforce in national workforce, the contribution of information sector to GDP and the contribution of information sector to the productivity of other sectors.
Social Indicators	The literacy rate, the percentage of higher education in the national school age population.

Source: Dordick and Wang, 1993

Furthermore, for long years especially after 1980s, hegemonic organizations as World Bank, International Telecommunication Union emphasize the importance of information and communication technologies in the scope of countries' development periods. These organizations determine some indicators about transforming to the information society. In fact, these organizations group the indicators under the headings as ICT for Development Index (IDI) and indicators for the development of ICT.

> Comparable statistics on access, use, quality, and affordability of ICT are needed to formulate growth-enabling policies for the sector and to monitor and evaluate the sector's impact on development. Although basic access data are available for many countries, in most developing countries little is known about who uses ICT; what they are used for (school, work, business, research, government); and how they affect people and businesses. The global Partnership on Measuring ICT for Development is helping to set standards, harmonize information and communications technology statistics, and build statistical

capacity in developing countries (World Development Indicators,2012: 331).

World Bank determines the definitions of the computer users, internet users, fixed broadband subscriptions, international internet bandwidth, fixed broadband internet access tariff, secure internet servers to set the standards, to build statistical capacity during the transforming to information society (Table 2.3).

Table 2.3: Definitions of Information Society Indicators

Computer users	Computer users are individuals who have used a computer (in any location) in the last 12 months. Computers include desktop, portable, or handheld computers (such as personal digital assistant) and exclude equipment with some embedded computing abilities (such as mobile phones or television sets.)
Internet users	Internet users are individuals who have used the Internet (in any location) with a device such as a computer, Smartphone, or digital television in the last 12 months via fixed or mobile network. The internet provides access to the worldwide network.
Fixed broadband Internet subscriptions	Fixed broadband Internet subscriptions are the number of fixed broadband subscriptions with a digital subscriber line, cable modem, or other high-speed technology (excluding wireless).
International Internet bandwidth	International Internet bandwidth is the contracted capacity of international connections between countries for transmitting Internet traffic.

Source: World Development Indicators, 2012: 331

Table 2.3 (continued)

Fixed broadband Internet access tariff	Fixed broadband Internet access tariff is the lowest sampled cost per 100 kilobits a second per month and are calculated from low-and high-speed monthly service charges. Monthly charges do not include installation fees or modem rentals.
Secure Internet servers	Secure Internet servers are servers using encryption technology in Internet transactions.

Moreover, International Telecommunication Union (ITU) defines the single index "ICT Development Index (IDI)" to measure, monitor and compare developments in information and communication technology across countries.

> The ICT Development Index (IDI) is a composite index combining 11 indicators into one benchmark measure that serves to monitor and compare developments in information and communication technology (ICT) across countries. The IDI was developed by ITU in 2008. It was established in response to ITU Member States' request to develop a "single index" and publish it regularly (Measuring the Information Society ITU, 2011: 7).

Table 2.4: ICT Development Index

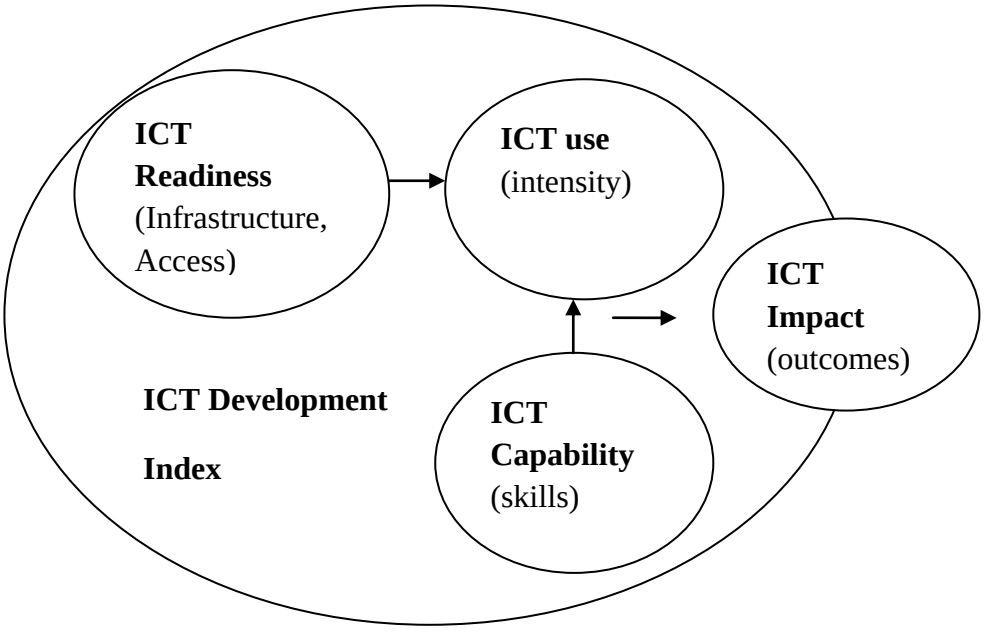
ICT access
1. Fixed - telephone lines per 100 inhabitants 2. Mobile cellular telephone subscriptions per 100 inhabitants 3. International internet bandwidth (bit/s) per internet user 4. Percentage of households with a computer 5. Percentage of households with internet access

Source: ITU" Measuring the Information Society", 2011: 10

Table 2.4 (continued)

ICT use 1. Percentage of individuals using the internet 2. Fixed (wired)-broadband Internet subscriptions per 100 inhabitants 3. Active mobile-broadband subscriptions per 100 inhabitants
ICT skills 1. Adult literacy rate 2. Secondary gross enrolment ratio 3. Tertiary gross enrolment ratio

As mentioned above ICT Development Index is divided into three main headings and these headings constitute from 11 indicators to compare ICT among countries. These indicators are emphasized in Table 2.4. Although World Bank and ITU use same indicators, differ from World Bank, ITU uses and gives importance ICT skills in ICT development Index



Source: ITU" Measuring the Information Society", 2011: 8

Figure 2.2: Three Stages in the evolution towards an Information Society

In addition, as emphasizes in Figure 2.2, ITU divides evolution towards an information society into three stages. These stages are ICT readiness which is about infrastructure and access, ICT use which is about intensity and final one is ICT capability which is about skills. Thus, ICT Development Index constitutes from these three stages.

As mentioned above to show the relation between ICT and development, organizations determine indicators. They emphasize the importance of ICT deployment especially for developing countries. Thus, "deployment policies in the field of ICT" have been emerged.

2.5 Deployment Policies in the field of ICT

Although there is no political tool kit determined as deployment policies in literature, when the ICT policies were investigated as a historical, some policies can be seen as deployment policies. These deployment policies were applied in different periods. These models were: (Başaran, 2005: 107)

1. Public - Interest Model
2. The Social –Darwinist Model
3. The Protection of the Disadvantaged Model
4. Techno-Economic Paradigm Diffusion Model
5. The Strategic Deployment Model
6. Focused Scattering Model

2.5.1 Public Interest Model

The public-interest model emphasizes the purpose of making information and communications services available to all people, nationwide at a reasonable charge or free. The most important characteristic

of this model is the deployment preventing social exclusion with the central planning (Başaran,2005: 107-108).

2.5.2 Social – Darwinist Model

The social-Darwinist model is a pro-market one. It is based on the assumption that only free market can guarantee optimal distribution in a perfectly competitive market. According to this model, by allowing market agencies, information and communications services will diffuse themselves in an uncertain period of time. In this process, the exclusion is normal (Başaran, 2005: 108).

2.5.3 The Protection of the Disadvantaged Model

The protection-of-the-disadvantaged model is also a pro-market one. But in this model, since free market cannot provide full competition and perfect distribution, information and communications services have to be provided for geographical or social segments which are not profitable in the market condition by state intervention or regulations. The purpose of this model is to decrease the impact of imperfect market conditions, and to prevent market failure, as the area of communications does not display many of the characteristics of providing a perfectly competitive market (Başaran, 2005: 108).

2.5.4 Techno - Economic Paradigm Diffusion Model

In the techno-economic paradigm diffusion model, the purpose is to construct institutional, legal and cultural structures which are the requirements of the diffusion of paradigm at a macro level or to expand some infrastructures according to the requirements of the new techno-economic paradigm or accumulation regime (Başaran, 2005: 108).

2.5.5 Strategic Deployment Model

The strategic-deployment model is based on the deployment of services according to some preferential national strategic targets. It has some strategic targets like establishing and strengthening the national communications industries, introducing and developing "national champion" firms and subsidizing the process of communications technology development (Başaran, 2005: 109).

2.5.6 Focused Scattering Model

The focused-scattering model is concerned with providing services for preferential segments of the society like rural areas or women by means of projects carried out with the support of NGOs, private firms and national and international funds in accordance with the sustainable development policy (Başaran, 2005: 109).

As emphasized in Table 2.5, all six models based on deployment policies and their based on principals, tools and examples were indicated.

Table 2.5: Models Based on the Deployment Policies

Name of Model	**Based on the Principle**	**Tools**	**Example**
Public Interest Model	Equality, encapsulating	State entrepreneurship; strong regulation; debitable service fees	Fixed telephone
Social–Darwinist Model	Competitive Market, idealist approach	Disconformity or weak regulation	Computer
The Protection of Disadvantaged Model	Correct the market stumbling	Strong regulation, universal service funds and institutions	Fixed telephone after liberalization

Source: Başaran, 2005: 112

Table 2.5 (continued)

Techno-Economic Paradigm Diffusion Model	Setting up the paradigm and actualizing	Setting up the legal, cultural, institutional infrastructure	E-trade, computers to schools, universal service funds, public places with internet access
Strategic Deployment Model	Various (Security, industry etc.)	Industry policy; arrangement; creating standard	During postal-industry alliance period telecommunication and mobile telephone
Focused - Scattering Model	Sustainable human development (strategic approach)	Development projects; international donations; special firm donations	1. Internet networks in rural areas (crafts, agricultural prices) 2.Women's solidarity networks

The change in deployment policies in the field of ICT could be explained by network models. In following part, these network models will be studied in the scope of this thesis.

2.6 Two Models of Network Policy Formation

Network policy trends are analyzed in two alternatives. These are The Idealist and The Strategic Model (Mansell, 1993:5).

2.6.1 The Idealist Model

The Idealist Model is based on competitive market theory. In which firms want to maximize their profits, people also consumers want to maximize their own utilities. These earned utilities are not affected by production or consumption of others. There are many buyers and sellers and among them the price is the only competition factor, none of individuals and

firms can affect the market prices. Finally consumers and producers are aware of all information related with market (Klees, Wells, 1980: 211). There is no barrier for entrance and exit of the market. Moreover, political suggestions of Idealist Model are withdrawing the state from communication area, privatizing the public networks, deregulation the service and equipment market and providing competition (Mansell, 1993: 5-7).

> In the Idealist model, competing communication network and service suppliers are assumed to meet all demand in the market. Any imperfections in the competitive market are assumed to be short-term distortions. In sofar as there is any role for government policy or regulation it is to ensure that there is a 'level playing field' upon which the forces of competition can flourish. In economic terms, the Idealist model suggests that communication network and service supply markets are, or soon will be, perfectly competitive (Mansell, 1993: 8).

2.6.2 Strategic Model

The Strategic Model is based on theories of imperfect markets, monopolistic competition, oligopolistic competition and monopoly.

> The Strategic Model takes into consideration strategic and tactical maneuvering of several agents, including transnational firms and the political and economic determinants of policy and regulatory regimes (Geray, 1999: 496).

> In the Strategic model, outcomes are the result of intense rivalry that only occasionally approximates the market conditions envisaged by the Idealist model. Outcomes in the market are shaped by the strategies of corporate actors and by policy or regulatory choices and these strategies need to be assessed in the light of their impact on producers and consumers. The economic foundation of the Strategic model is the theory of oligopolistic rivalry (a market with a few dominant players) (Mansell, 1993:8).

2.7 Summary

With development of ICT, information society concept has become quite popular. Although many scholars have studied information society concept, debates on the concept of information society have been not completed yet. For many years, scholars have been studied the concept of information society. For instance, Daniel Bell, McLuhan and Machlup are some of the scholars who contributed to the information society concept. These scholars analyzed in the scope of this chapter.

In time, these information society approaches have transformed to information society policies. These policies were the basis for the explanation the relation between ICT and countries' developments. Furthermore, hegemonic important organizations have determined the indicators to measure the relation between ICT and development. These organizations have emphasized the importance of ICT deployment thus, ICT related deployment policies have been emerged. These deployment policies in the field of ICT; "Public Interest Model", "The Social Darwinist Model", "The Protection of the Disadvantaged Model", Techno-Economic Paradigm Diffusion Model", The Strategic Deployment Model" and "Focused Scattering Model" analyzed in the scope of this chapter. In time, the change in deployment policies could be explained by network models; Idealist Model and Strategic Model. These Models analyzed in the scope of this chapter.

In sum, this chapter helped in analyzing the debates on concepts of information society and forming the information society. In addition, theoretical approach of this thesis studied in this chapter. "Deployment Policies in the field of ICT" and "Network Models" will be contributed in analyzing the transforming to information society of Turkey and South Korea in later chapters of thesis.

CHAPTER 3

ATTEMPT to INFORMATION SOCIETY in TURKEY

in the scope of
Development Plans and Science and Technology Policies
(since 1960s)

In this chapter, five year development plans of Turkey will be analyzed then the history of Supreme Council for Science and Technology will be studied. In addition to them, Turkey's attempt to being an information society in the scope of internet and telecommunication policies of Turkey will be studied.

Since the first five year development plan of Turkey, all development plans have included science and technology related policies. Although there were no specific science and technology related parts in initially prepared development plans, in following plans science and technology policies began to be studied as a separate title. Besides emphasizing science and technology related policies, after 1990s, the importance of transforming to information society, information and communication technologies were emphasized in development plans

3.1 Five Year Development Plans of Turkey

3.1.1 Turkey in 1960s and 1970s

3.1.1.1 First Five Year Development Plan (1963-1967)

In first five year development plan, there was no technology transfer and the development of R&D related policies. During this period Turkey participated in "Pilot Teams Project" and this project was carried out by OECD[1]. In the scope of "Pilot Teams Project", what should be the goals of Turkey in socio economic development were tried to explain. In addition, to achieve these goals "Science Policy" was defined (Göker, 2002: 2-5). But Science Policy did not include in first five year development plan.

In terms of science and technology, the most important result of this plan was establishing decision of TÜBİTAK. The aims of TÜBİTAK were explained such that; organizing basic and applied research in natural sciences, providing cooperation among them and encouraging the research (Göker and Dizdaroğlu, 1996: 102).

Although there was no science and technology related policies, there was a research title in this plan. This title included situation assessment of Turkey related to science and technology (SPO, 1963: 463). In addition, the importance of research is emphasized in this plan. Measures were determined for development of research studies and these measures were divided into four main topics under this plan.

- Creating the Necessary Environment For Research: The importance of research was not understood sufficiently. To solve this problem, some measures were provided.

- Organization of Research: Important goals of this topic were organization of research activities, ensuring cooperation among them and deciding the establishment of Scientific and Technique Research Committee.

[1] OECD (Organization for Economic Co-operation and Development) was established in 1961. The OECD provides a forum in which governments can work together to share experiences and seek solutions to common problems. (http://www.oecd.org)

- Training of Personnel: Under this topic the importance of personnel training was emphasized and making decision about sending the research personnel to abroad for training.

- Foundation and Equipment: Under this topic the establishments of libraries, the procurement of foreign publications were emphasized.

Furthermore, in the scope of this plan, the current status of research fields was determined.

Table 3.6: Research Staff in Public Sector (1961)

	Technical	**Agriculture**	**Natural and Medical Science**	**Social Sciences**	**Total (person)**
Highly-trained Research Staff	277	662	138	173	1250
Auxiliary Staff	332	200	30	102	664
Total	609	862	168	275	1914

Source: First Five Year Development Plan, The State Planning Organization,1963: 464

As mentioned in Table 3.6, in the scope of first five year development plan the total number of research staff was analyzed.

Table 3.7: Research Expenditures in Public Sector (1961)

Chapters	**Expenditures (Million TL)**
Social Sciences	27,1
Agriculture	33,3
Prosperity	11,8
Health	0,8
Mine and Electricity	46,0

Source: First Five Year Development Plan, The State Planning Organization,1963: 464, modified by Emiroglu,S.

Table 3.7 (continued)

Other	1,0
Total	120,0

As mentioned in Table-3.7, research expenditures were measured. In that period, mine and electricity researches expenditures were the biggest one.

Table 3.8: The Need for Research Staff (1963-1967) (Person)

	Highly Trained Research Staff	**Auxiliary Staff**	**Total**
Technical	442	70	512
Agriculture	162	2	164
Natural Science and Medicine	519	44	563
Social Sciences	252	100	352
Unspecified Occupational Groups	527	1212	1739
Total	1902	1428	3330

Source: First Five Year Development Plan, The State Planning Organization,1963: 465

As indicated above, after the determining the number of researchers, in the scope of this plan the need for research staff was determined in Table 3.8. As emphasized in Table-3.8, the required number of researcher staff in the field of technical and “natural science and medicine” were more than others.

Table 3.9: In Period of First Five Year Development Plan Total Public Expenditures

Research Divisions	**Expenditures (Million TL.)**

Source: First Five Year Development Plan, The State Planning Organization,1963: 466

Table 3.9 (continued)

Scientific and Technological Base Researches	170,0
Economic, Social, Administrative and Planning Researches	225,6
Research Expenditures which were Determined in Sector Programmes	746,4
Total	1 142,0

Under first five years development plan as mentioned Table 3.9, research divisions and expenditures of these research divisions were determined.

3.1.1.2 Second Five Year Development Plan (1968-1972)

Under the second five years development plan, science and research titles were studied in a general manner. However, there was no relation between these titles and technological development, industrialization and economic sectors. Moreover, during this plan period, MAM[2] was established.

Under this plan, it was emphasized that scientific and technological developments play important role in countries' development and in the rise of welfare level of society. Under "The Science and Research Topic" situation assessment was made and science and research related goals were determined. Moreover, policies which were related scientific researches were divided into two main parts; "Organization" and "Employment, Manpower, Education". In addition, under this plan it was noted and determined that TÜBİTAK provided the necessary measures which were related to the cooperation among universities and industry (SPO, 1967).

2 MAM (The Marmara Research Centre), one of TÜBİTAK's research and development units, was established in 1972. (http://www.tubitak.gov.tr)

Furthermore in the scope of this plan it was foreseen and was aimed that the share of R&D in GDP would be increased from 0,4% to 0,6%, shares to be allocated to research would be 3.215 million TL. and the number of researchers would be increased from 3500 to 5000 (SPO, 1967).

During this plan although the importance of scientific research was emphasized, targets failed. The share of R&D in GDP decreased 0.36% in 1969 to 0.35% in 1970.

3.1.1.3 Third Five Year Development Plan (1973-1977)

Under the scope of this plan different from the other two plans, the importance of technology transfer and patent rights were mentioned. Alone technology transfer may lead to some problems in economy of developing countries, for instance foreign trade. Thus, beside the technology transfer, the importance of technology assimilation was emphasized (SPO, 1973).

Like in other five year development plans, in third five year development plan, science and technology were determined as one of the main factors in socio economic development.

Table 3.10: Between 1964-1978 years R&D Expenditures and the Share of GNP

Year	R&D Expenditures (Million $)	GDP (Million $)	The Share of R&D Expenditures in GDP
1964	9,8	2,852	0,35
1969	17,4	4,996	0,35
1970	19,7	5,911	0,33
1971	22,2	7,704	0,29
1972	24,9	9,632	0,26
1977	258,7	34,561	0,75
1978	304,1	47,800	0,64

Source: Demir, 1997

As indicated in Table 3.10, from first five year development plan to third five year development plan also between 1964 and 1978 years, R&D expenditures increased from 9,8 million $ to 304,1 million $.

Furthermore, in the scope of third five year development plan, Science and Technology Department was built under the Ministry of Science and Technology. The aim of this department was implementing technology policies in accordance with objectives (SPO, 1979: 51).

3.1.1.4 Fourth Five Year Development Plan (1979-1983)

Preparing the "Turkish Science Policy 1983-2003" was quite important development during this period. This policy was prepared in a highly detailed for solving the problems which were determined in five years development plan. Furthermore, this policy was prepared in 1983 with the participation of the 300 scientists and experts. In the scope of this policy, it was the first time that capacity, manpower and expenditures of R&D were determined, in the scientific area long term goals were determined, "Supreme Council for Science and Technology" was established and priorities of science and technology areas were revealed (Göker, Dizdaroğlu, 1996: 103; Göker, 2002: 5). This council was established to help the government in science and technology policies and to determine of the plans of these policies. However, until 2005 council did not hold the meetings regularly.

Moreover, although lack of resources of R&D activities, the low rate of R&D in GNP and the uncertainty of national science and technology policy problems were emphasized, there were no plan and strategies to solve these problems under fourth five year development plan.

In addition to ensure the flow of information at the national level "Turkish Scientific and Technical Documentation Center" was established during this plan period.

3.1.2 Turkey in 1980s and 1990s

3.1.2.1 Fifth Five Year Development Plan (1985-1989)

During fifth development plan period it was determined that research and technological development were the driving force of socio-economic development. Preparing the long term science and technology policy was foreseen under this plan and "Turkish Science Policy 1983-2003" was accepted the starting point for this policy.

Moreover, in the scope of this plan to develop information technologies, the importance of training the sufficient labor force, building the networks among information banks and finally supporting the firms which serving in this area were emphasized. In addition, developing the telecommunication infrastructure in terms of quality and quantity was emphasized.

Furthermore, during this period in 1987, Expertise Commission of the Science Research Technology Main Plan was prepared within the body of State Planning Organization. This commission prepared reports related with the problems and solutions in the fields of science, research and technology of Turkey. Technology transfer was one of the important topics of this report. In terms of foreign technology, the dependency to abroad increased and to solve this dependency problem, solutions were proposed (SPO,1988: 27-28).

In addition, under this plan, tax exemption and tax postponing applied for R&D expenditures. If this period analyzed with numerical datas, the number of researchers 10.000 per person was only 6, the rate of R&D Expenditures to GDP was 0.2% during this period (SPO:1985).

3.1.2.2 Sixth Five Year Development Plan (1990-1994)

Under the sixth five year development plan transforming to information society, establishing the R&D infrastructure were determined as the goals. To achieve these goals, the target number of research personnel

would be doubled and the target number of research personnel per 10.000 people would be 15.

Furthermore, there was an information technology topic in sixth five year development plan. During the transforming to information society the importance of information technology was emphasized. In addition, the importance of software technology, training expert personnel about information technology and computer literacy were highlighted. At the beginning of the 1990s, as all over the world, Turkey noticed the importance of transforming to information society thus, information technology related policies were emphasized in development plans.

It was the first time that, supported R&D activities were determined in the scope of five year development plan. These determined fields were biotechnology, information technology, microelectronic, telecommunication, satellite technology, nuclear technology and new materials.

Moreover during this period, encouraging techno parks became important point to develop the cooperation between university and industry, in addition Technology Development Foundation of Turkey was established in 1991.

3.1.2.3 Seventh Five Year Development Plan (1996-2000)

Within the scope of this plan firstly, scientific and technological situation of Turkey was evaluated. Situation evaluation showed that science and technology policies were not determined compatible with other sectors policies and these science and technology policies could not be considered as the main axis of national strategies. (SPO, 1995: 60)

In addition, during this plan, "Turkish Science Policy 1983-2003" became the National Science and Technology Policy of Turkey.

During this plan science and technology related numerical datas of Turkey were analyzed and were compared with other countries. The share of R&D resources into GDP in EU countries was 2 %, in USA was 2.8%, in

Japan 3% and in Turkey was only 0.5%. (SPO,1996: 70) The number of R&D personnel per 10.000 person was 7.5 in Turkey, was 40 in EU countries, was 80 in USA and was 90 in Japan. In terms of the number of R&D personnel per 10.000 person and share of R&D resources into GDP, Turkey was the lowest rank among USA, EU Countries and Japan.

Under this seventh five year development plan, regarding the science and technology related analysis, goals and policies were determined. For instance, necessary technological infrastructure would be developed for increasing the level of scientific and technological research and the share of R&D resources into GDP would be raised to 1.5 %, the number of R&D personnel per 10.000 people would be raised to 15. Increasing the share of private sector in R&D expenditures would be encouraged. Science, technology, education and R&D fields would be primary fields during the allocation of financial resources.

Moreover, like in sixth five year development plan in seventh year development plan priority sectors were determined. These sectors were: design, product development, information-communication, nuclear field, new materials, techno parks, space and military technologies, medicine, environmental, robot, biotechnology, marine science technology and finally telematics services.

In addition, under seventh five year development plan various legal and institutional arrangements were made. These were: Patent Law, Venture Capital, Techno Park and Technology Development Zones Law, Information Network, Encouragement of Research Companies Law, Establishment of High Technology, Institute of Metrology Law, TUBITAK Law, Legislation of Research Personnel. (SPO, 1995)

Furthermore, in this period, TÜBİTAK prepared the emergency action plan related with Science and Technology Policy Agenda of Turkey. This plan included establishment of the National Innovation System and preparatory works related to this system. The main topics of this agenda were, the preparation of “National Information Infrastructure Main Plan”, establishing “the National Academic Network and Information Center”,

establishing common research centers of university-industry, building the national R&D projects (TÜBİTAK, 1997a: 10-11). In addition, during this period Information Network Project was put into practice for connecting universities with each other and in 1998 Turkish Academic Network and Information Center was established.

In addition, the preparatory works of National Information Infrastructure Main Plan was started. (TÜBİTAK, 1997a,42) E-trade workings and investment of a new spine internet access were started but necessary legislation could not be developed (SPO, 2001: 36).

3.1.3. Turkey and 2000s

3.1.3.1. Eighth Five Year Development Plan (2001-2005)

Under the eight five year development plan, the scientific and technological situation was evaluated. During seventh plan period, although the share of R&D resources in GDP would be targeted 1.5 % and the number of R&D personnel per 10.000 people would be targeted 15, these targets were not achieved. By the year 1997, the share of R&D resources into GDP was 0.49 %, the number of full time equivalent R&D personnel per 10.000 person was 8,2.

Moreover in the scope of this plan, the advanced study fields were determined. These were information and communication technologies, biotechnology, genetic engineering, new materials, nuclear technology.

Under this plan, information and communication technologies were examined in different topics. During this period government noticed the importance of ICT in socio economic development and ICT was determined one of the strategic sector and software was determined as a strategic area. Thus, during this period national academic network was established and the first longest science and technology related project of Turkey, "Vision 2023: Turkey's National Technology Foresight Program" was started forming. Moreover, e-government workings which were performed separately by the institutions, gathered under one project also and it was called "Turkey e-

Transformation Project". In addition in the scope of this plan, the importance of electronic trade and its legal, technical infrastructure were indicated. However, some problems emerged during the internet access for instance high costs and low fast. To solve these problem and provision of the internet services, these were planned that national policies would be developed and legal, technical arrangements would be regulated.

Table 3.11: Developments in the Capacity of Communication Services

	1995	**1999**	**2000 (1)**	**2005 (2)**
Number of telephone subscribers(One thousand)	13.227	18.054	19.510	26.000
The density of telephone subscriber(subscribers/100 people)	21,8	28,0	29,9	37,0
Number of internet users (number)	30.000	900.000	1.650.000	15.000.0000

(1) Estimated actualization, (2)Estimation
Source: SPO, Eighteenth Five Year Development Plan, Bilişim Teknolojileri ve Politikaları Özel İhtisas Komisyon Raporu",2001: 131,modified by Emiroglu,S.

As mentioned in Table 3.11, from 1995 to 2000 number of telephone subscribers, the density of telephone subscribers and number of internet users increased. Government estimated huge increase in the number of internet users in 2005 based on the previous years' increase.

3.1.3.2 Ninth Development Plan (2007-2013)

In the scope of this plan Turkey's scientific and technological situation was evaluated. In addition, transforming to information society was determined as vision and it was emphasized in the introduction part of

the plan. Beside them in the scope of this plan, the importance of innovation was highlighted.

Moreover, although since 2005 devoted public resources to science and technology were increased substantially, the share of R&D expenditures in GDP was still less than 1%. The number of full time equivalent researchers staff per 10.000 person was 13,6 in 2002 and this number was far below the OECD average which was 66,6 %. Beside them, while the 73.1 per cent researchers in Turkey worked in higher education institutions, 70 per cent of researchers in developed countries were employed in the private sector.

In addition, there was an ICT related topic under ninth development plan that "Deployment of Information and Communication Technologies". In this topic, importance of liberalization in the electronic communications sector, establishing the "Telecommunication Institution" and the importance of e-Transformation Turkey Project were emphasized.

> With the implementation of the e-Transformation Turkey Project, the use of information and communication technologies in the provision of public services has become widespread and important developments regarding the awareness of the citizens and businesses about these technologies and regarding their service demand have been experienced. These developments have significantly increased the demand for Internet access and, consequently, the broadband infrastructure investments and the number of broadband subscribers increased to 1.5 million as of the end of 2005 (SPO, Ninth Development Plan, 2007: 40).

In the scope of ninth development plan developing R&D and innovation, deployment the ICT related objectives were mentioned. In addition, the main objective of science and technology policy was determined as increasing the innovation capability of private sector. Furthermore, development of ICT infrastructure and also development broadband infrastructure was determined as one of objectives of this strategy.

Furthermore, in the scope of this plan, the importance of "Technology Development Zones" was emphasized and "Technology Transfer Centers" were planned to be established. The importance of these centers was emphasized in transforming the information which resulting from R&D activities, to industry and production.

Moreover, in the scope of this plan "Information Society Strategy 2006-2010" was emphasized and "Information Technologies Services" was determined as one of the topics of this plan. In addition, ninth plan emphasized developing local demand and making suitable environment for direct foreign investments to develop the information technologies. In addition, during this period government gave importance to e-government studies thus, "Deployment and Enabling of E-Government Applications" was one of the topics of this plan. These were planned and were aimed that public services would be presented benefit from information technologies at the highest level, usage of e signature would be expanded and legal arrangements would be legislated for ensuring the security information.

3.2 The Supreme Council for Science and Technology (SCST)

> The Supreme Council for Science and Technology (SCST) is the highest ranking STI policy-making body in Turkey chaired by the Prime Minister with the decision-making power for national S&T and innovation policy. SCST was established and granted the role of identifying, monitoring and coordinating policies in S&T areas in accordance with national goals for economic and social development and national security. Accountable directly to the Prime Minister, SCST upholds important functions, such as to assist the government in determining long-term S&T policies. SCST was established in 1983 (http://www.tubitak.gov.tr).

According to statutory decree 77, "The Supreme Council for Science and Technology" (SCST) was established to fulfill the functions determined as:

- To assist the government in the determination of long-term S&T policies,
- To identify R&D targets related to S&T areas,
- To identify the priority areas in R&D and prepare related plans and programs,
- In accordance with these plans and programs, to assign tasks to public organs as well as to cooperate with the business enterprise sector as necessary to identify regulations and promotion schemes related to business enterprise sector,
- To have bills and legislations prepared aiming to develop and increase the effectiveness of the S&T system,
- To identify the means for development and effective utilization of R&D human resources, and assure their implementation,
- To set the procedures for establishment of R&D centers of private institutions, and monitoring and evaluating their activities,
- To determine in which research fields and in what proportions the R&D investment is to be made,
- To provide coordination among sectors and institutions in programming and implementation stages.

First meeting of Supreme Council for Science and Technology was hold on 9 October in 1989. In the meeting, taken decisions were mainly about creating the scientific and technological infrastructure. Increasing the R&D related manpower, expenditures and establishing new research centers were some of the taken decisions. In the scope of these decisions, these were planned and were targeted that the share of R&D expenditures in GDP would increase to 2% and the R&D personnel per 10.000 people would increase to 30 people (SCST, 1989).

In the second meeting of Supreme Council for Science and Technology, "Turkish Science Policy 1983-2003" document was accepted (SCST,1993).

In the third meeting of Supreme Council for Science and Technology, it was the first time that "National Innovation System" concept was used. In this meeting the main aims of National Science and Technology Policy were defined such being reconciled with science and technology, establishing National Innovation System, being competence in production of science and technology (SCST,1997).

In 20 years period, (1983-2004) Supreme Council for Science and Technology was collected only 9 times. But in its 10th meeting the decision of "SCST Meeting Calendar 2005-2010" was taken (SCST, 2004). This decision included that Supreme Council for Science and Technology would be collected from 2004 to 2010 on a regular basis twice a year. Lastly 24th meeting of SCST was held on August 7, 2012 (SCST, 2011). In 24th meeting eight decisions were taken these are:

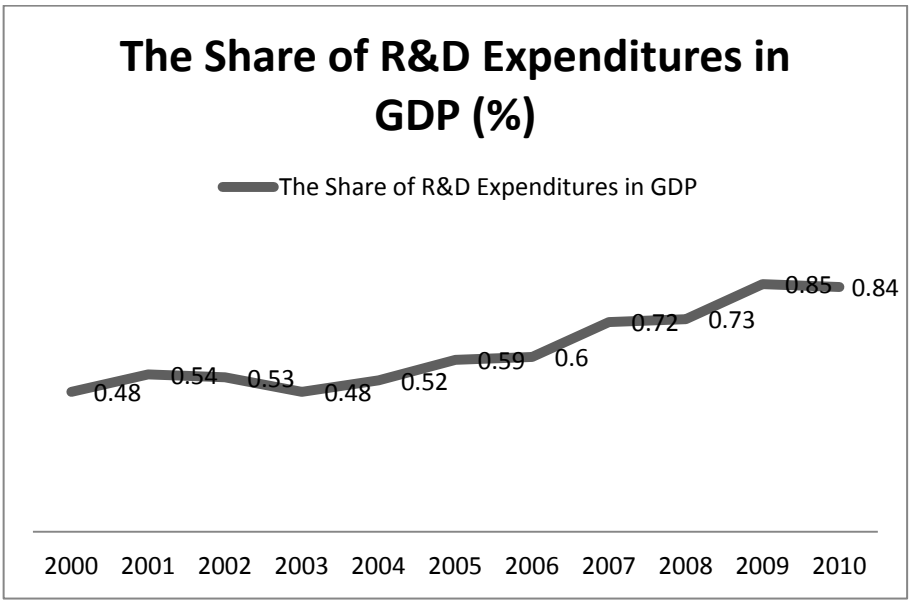
The following nine new decrees were adopted at the meeting. These are;

1. Situation determination will be held for increasing the quality of education.
2. Developing the suitable digital contents and providing the access them in the curricula of primary and secondary education.
3. Promoting and providing digital course contents for undergraduate and providing access to these contents.
4. To revise the education programmes and designing the education contents for giving the basic competencies to students efficiently.
5. Making research about the foreign language education system and developing the alternative teaching models in primary and secondary education.
6. Restructuring the scholarship programmes which provide support for abroad graduate education.
7. Preparing the science fairs for students of primary and secondary education.
8. Restructuring the university entrance system.
9. Conducting the participation for preparings of European Union "7th Framework Programme Horizon 2020".

To sum up, since 1960s science and technology related policies have been emphasized in development plans. In time, government noticed the relation between socio-economic development and technology. Thus, government determined visions, and long term goals. In addition, scientific indicators such as the rate of R&D expenditures in GDP, R&D human resources have increased over time.

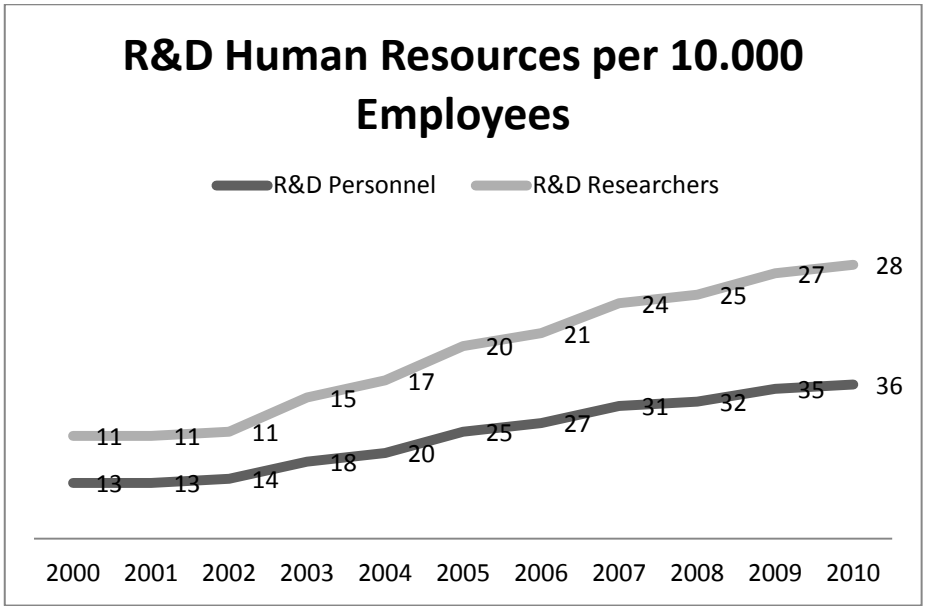
Moreover, in this part the science and technology focused indicators of Turkey will be analyzed. These three indicators are the rate of R&D expenditures in GDP of Turkey, R&D human resources per 10.000 employees and the annual distribution of patent applications. As indicated in

Figure 3.3, Figure 3.4 and Figure 3.5 although statistics of the share of R&D expenditures in GDP, R&D human resources per 10.000 employees and the annual distribution of patent applications declined in some years, especially from 2005 to 2010 they increased



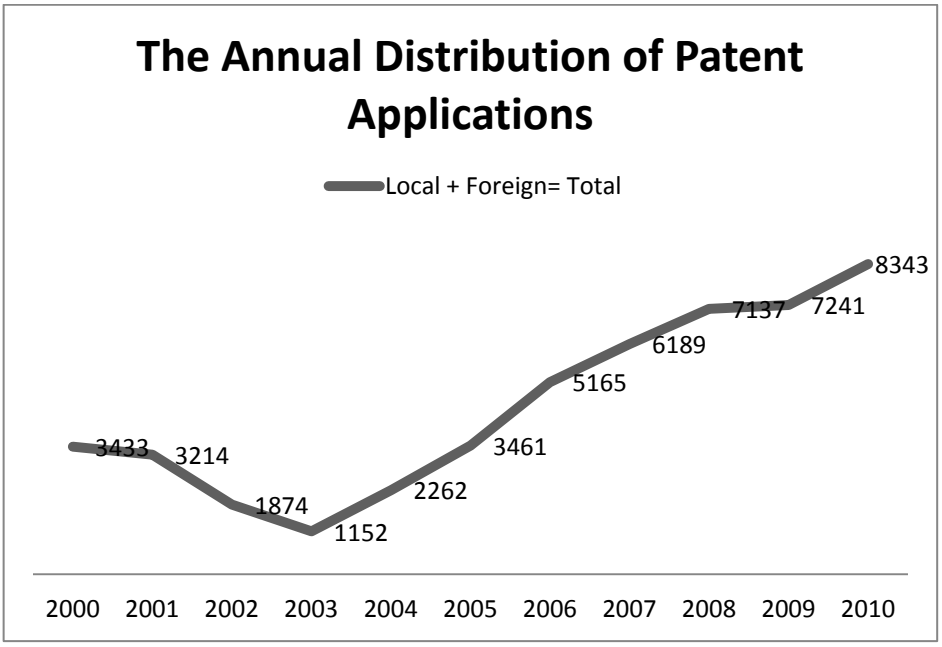
Source: TUIK,TUBITAK, (2012)

Figure 3.3: Share of R&D Expenditures in GDP of Turkey



Source: TUBITAK,(2012)

Figure 3.4: R&D Human Resources per 10.000 Employees



Source: TPE, (2012)

Figure 3.5: The Annual Distribution of Patent Applications

3.3 Turkey's Attempt to being an Information Society

Especially after 1980s, Turkey has begun to notice the importance of information and communication technologies in national development. Thus, in this chapter, information and communication technologies in the case of internet and telecommunication of Turkey will be studied in the scope of being an information society attempt.

3.3.1 Internet in Turkey

In 1980s, Turkey experienced a rapid development in the field of information and communication technologies. PTT (Post, Telegraph and Telephone) started preparing "1983-93 Communication Master Plan" and this plan presented to the relevant government departments. In the scope of this plan, being compulsory of digital technology in terms of local

communications requirements and the contribution of communication to national development were emphasized. According to analysis which were conducted after the presentation of the plan; while the number of telephone subscribers was 1.5 million in 1983, it became more than 12 million in 1993, the number of village which had no telephone decreased from 26000 to 0. The telephone density exceeded 16 % (Geray, 1994a).

Furthermore in Turkey, establishment of general-purpose computer networks started with the connection to EARN (European Academic and Research Network). In time, this network started being inadequate because of the technological advances. Thus, to develop this network TUBITAK and METU (Middle East Technical University) started new project and this project accepted the beginning of the internet in Turkey. They used internet for academic and scientific use.

From 1993 (this year first internet connection was providing) to 1995 (this year internet network was opened for commercial use) as well as university students and assistant professors nearly more than 500 institutions benefited from internet facilities. According to the estimates, the number of internet users was around at least 100.000 users in 1996 (Özgit, A., Çağıltay, K., 1996). Moreover, in time with effects of commercialization of the internet in US, internet was commercialized also in Turkey.

> Following the commercialization of the internet in the US, and its world-wide publicity, commercial users have embraced the network. A commercial Internet backbone was set up in 1995 and several Internet Service Providers (ISPs) emerged. A consortium made up of foreign and local companies in a revenue sharing agreement by Türk Telekom, formed the backbone of a state-owned monopoly telecoms operator. The internet system formerly operated by TÜBİTAK was transformed into an academic and research public network used by the universities and research institutes (Geray, H.,1999: 503).

In addition, Turkish government prepared “Project of Internet Access in Public Places” or the name of the “Project of Public

Communication Centers" in result report of TUENA related internet Access. In 1996, although internet access in public places conceptualized, this project was forgotten in time. Government preferred the diffusion of internet with market forces also preferred Social Darwinist Model. In addition, State Planning Organization (SPO) prepared IT Policy Questionnaire document for OECD. This report contained that in time with competition in diffusion of internet, access prices of internet will decrease and all people can access the internet easily. This document also SPO advocated Social Darwinist Model (DPT, 2003:19)

The applied policies show that about the internet Turkey applied Social Darwinist Model (Başaran, 2010: 198). Also this model was suggested by global policies. It is not surprising that in countries which transferred the ICT of developed countries, diffusion has different view because of socio-psychological reasons (Atabek, 2001: 24). In addition, National Innovation System is one of dynamics which created differences among the developed and developing countries in terms of in the diffusion of ICT (Başaran, 2010: 198).

Moreover, ICT has seen as opportunity window for developing countries but here national ICT related policies have great importance. Developing countries should determine and apply policies considering their socio – economic factors. While determining the policies, Turkey was under the effect of foreign countries and Turkey applied Idealist Model. Thus, during the implementation of policies Turkey met some problems and did not benefit from this opportunity window effectively.

To sum up, Turkey applied the hegemonic organizations policies also applied Idealist Model. Moreover, in diffusion of internet and in new technological areas applied Social-Darwinist Model.

3.3.2 Transforming to Information Society and Telecommunication in Turkey

> In Turkey, participation in policy formulation before restructuring in the field of telecommunication seemed to be limited with the State Planning Organization, the Ministry of Communication and the management of public institutions which were serving in telecommunication. National security was one of the important factors in forming the telecommunication policies thus, beside them military played role. In this process, national telecommunication industries, foreign partners of these industries and some other institutions became effective in time (Başaran,2010: 236).

Since end of the 1980s, international hegemonic organizations started playing more effective role in forming the telecommunication policies of Turkey. World Bank and International Monetary Fund were some of the prominent international organizations. In that period in the forming of information and communication network, Idealist Model gradually started to gain dominance with the effects of international organizations (Geray, 2002: 144).

Between 1960s and 1980s there had been significant developments in the field of telecommunication process of Turkey. In 1964 National Security Council meeting, establishing electronic industry in Turkey was emphasized. To the extent that in 1967 Northern Telecom (NT, Canada) and Turkish PTT came together and Netaş emerged as joint venture. The aim of this joint venture was increasing local production and technological capability of Turkey. Beside Netaş, Turkish Military established Aselsan to increase electronic industry in Turkey. In 1970s, because of the worldwide economic crisis, policy began not to work.

Furthermore, in time Turkish PTT was privatized. PTT research laboratory was established within PTT in 1965 and this laboratory was transformed into a joint stock company under the Teletaş in 1984. In addition, PTT was privatized with the pressure of World Bank and IMF in 1987. Finding resources to balance budget deficit was shown as reason for

privatization. Restructuring started in 1988 with market privatization of end devices in the field of telecommunication. Then in 1988 General Directorate of PTT privatized the telephone machines unit. (Yücel,1997: 175) After the privatization of PTT, postal services were divided into two parts; basic services and value added services. Then, at the beginning of 1990s, the services which are defined as value added services (data, mobile phone, pager, satellite, cable TV and internet services) were served by private sector. (Başaran, Özdemir, 1998)

Although Teletaş and Netaş were at the important level about development of technology production, they were taken in privatization extension. As mentioned above, imposed policies of hegemonic organizations applied great pressure to Turkey during privatization process. If Turkey did not under the influence of these hegemonic organizations, privatization of Teletaş and Netaş could not actualize. Maybe these privatization used as resource for budget deficit, but this is short term solution. Because government did not consider the development of technology production. As Geray discussed, increasing the dominance of international institutions and privatization of Teletaş and Netaş cases could be given as an example for Idealist Model.

After the privatization processes, in 1990s transforming information society oriented studies has increased in Turkey. In 1992, The World Bank prepared a country report on Turkey.

This report was published with "Turkey: Informatics and Economic Modernization" title in March 1993. This report included, computer usage, software market, human resource in knowledge economy, communication networks related topics. Moreover, report included some recommendations; elimination of monopoly in telecommunications, separation of telecoms from the post, corporatization of telecommunication entity, liberalizing value added services and improving the human capital formation (World Bank, 1993: 199-204).

The main aim of this report was forming the knowledge based economy. To achieve this main aim, some strategies were offered. These

strategies were, providing resources for information technologies, making provision to attach the foreign investors, encouraging private sector to provide development in new information and communication services, training the educated manpower for knowledge based economy, increasing informatics usage in public sector for increasing the effectiveness of public institutions, legislating the information society related regulations (World Bank,1993: 1-11). In addition, this report emphasized the separation of postal and telecommunication services, syndicating of telecommunication and suggested to open new telecommunication area to competition (World Bank, 1993: 141-150).

Experts who were from telecommunication and informatics equipment manufacturers, the state owned PTT and Technology Development Foundation of Turkey (TTGV), prepared a master plan because they were dissatisfy the recommendations of this report. However, World Bank rejected this master plan and did not give loan. Because this master plan did not support privatization. As mentioned above, hegemonic organizations did not support this master plan because it was outside the scope of Idealist Model.

Furthermore, in 1996 the idea of National Information Infrastructure Project Office (TUENA) was emerged. This project completely financed from domestic sources. In the scope of TUENA Project, the master plan initiative was prepared. It indicated, master plan should include transition to a knowledge society related policies and it should consider the public security, public interest, legal and socio-economic aspects (TUENA, 1997). In 1997 TUENA project office was established within TÜBİTAK under the responsibility of Transportation Ministry. The master plan was completed in the first half of 1999. Under this report, some specific policies were emphasized. For instance, determining social and economic policies which raised purchasing power of low income community, developing the national ICT and telecommunication industry of Turkey. In addition, to apply these policies the importance of the realization of the necessary institutional structures was emphasized. Although TUENA was governmental

documentation, it was never effectuated comprehensively. Because, political authority did not appreciate TUENA.

In 1999, "Turkish National Information Infrastructure Master Plan" was prepared by Ministry of Transport, Maritime Affairs and Communications and TUBITAK. This plan was prepared to determine the information policies of Turkey and it contained the usage and infrastructure of information technologies, general world trends, the current situation of Turkey in information technologies, finally it contained the target suggestions for future related this area (SPO, Information Society Department, 2012).

In addition, Telecommunication Institution was established in 2000. The main duties of this institution were giving license to telecommunication and communication related services, auditing the players in sector, taking measures to prevent infringement of the rules and protecting consumer rights. (TI,2000)

In brief, generally in 1990s telecommunication policies of Turkey was determined within the framework of the idealistic model approach by rather than the internal dynamics (education, economic structure, history, social structure etc.), also it was determined by external dynamics. (Başaran, 2010: 247) Political parties and finance bureaucrats showed tendency in acting Idealist Model. This tendency can be explained two reasons, these are; in unstable political system requirement of finding additional resources to close the budget deficit through privatization and the rhetoric of globalization that suggesting a cure all economic problems. (Geray, 1999: 506)

Preparing transforming to information society related plans and strategies have continued in 2000s. In 2001 "Attempt to e-Turkey" was started preparing to being competitive in information based economy and helping the transforming to information society. Draft action plan was prepared with the contribution of 13 working groups. However, because of political and economic instability this action plan could not be applied

(SPO, Information Society Department, 2012). These working groups and organizations which were responsible for coordination, as follows:

1. Education and Human Resource Working Group: Ministry of Education
2. Infrastructure Working Group: Ministry of Transport, Maritime Affairs and Communication
3. Legal Infrastructure Working Group: Republic of Turkey Ministry of Justice
4. Standards Working Groups: Turkish Standards Institution
5. Security Working Group: Turkish Armed Forces
6. E-Trade Working Group: Undersecretaries of Foreign Trade Affairs
7. Investments and Planning Working Groups: State Planning Organization
8. Archive and Digital Storage Working Group: General Directorate of Achieve
9. International Monitoring and e-Europe + Working Group: General Secretary of EU Affairs
10. Special Project Working Group: Informatics Foundation of Turkey
11. Determination of Current Situation Working Group: Technical Committee of KAMUNET
12. On National Basis Coordination and Monitoring Working Groups: Informatics Association of turkey
13. Environment- Health Working Group: Prime Ministry

In addition, coordination of "e-Transformation Turkey Project" was launched in 2003 to provide coordination among information and communication investments of public agencies and determining the strategic steps to be taken towards transforming an information society. The "e-Transformation Turkey Project" aims to carry out the process of transforming to an information society in a harmonious and integrated structure all over the society also with all citizens, enterprises and public segments. General coordination of the Project has been assigned to the State Planning Organization and the e-Transformation Turkey Executive Board with the participation of the State Minister and Deputy Prime Minister, Minister of Transportation, Ministry of Industry and Trade, top-level bureaucrats, non-governmental organizations (NGOs), and the Advisory Council with the participation of public and private sectors (SPO, Information Society Department, 2012). Moreover, in the same year,"

Information Society Department" was established within the State Planning Organization. As mentioned below, Information Society Department of SPO emphasized the importance of transforming to information society.

> In this process, "Turkey's Information Society Transformation Policy" which was prepared with the participation of all relevant parties, has been adopted by the e-Transformation Turkey Executive Board. The policy document states Turkey's vision of transformation into an information society as follows: "To be a country that has become a focal point in the production of science and technology, that uses information and technology as an effective tool, that produces more value with information-based decision-making processes and that is successful in global competition, with a high level of welfare" (SPO, Information Society Department, 2012).

Since the beginning of "e-Transformation Turkey Project" two action plans were launched. These plans covered 2003- 2004 and 2005 periods. In conjunction with the short-term targets of the action plans, an initiative for preparation of "Information Society Strategy covering 2006-2011" was also started in 2005. It contained enabling Turkey benefit from ICT effectively and identifying the middle and long term strategies, targets for the realization of transforming to information society. Moreover, Information Society Department of SPO emphasized that the main aims of information and communication projects were providing interoperability, efficiency and transparency in the meeting of integrated services which are presented in electronic area to citizens and business community (SPO, Information Society Department).

To sum up, especially after 1960s there have been conflict among Strategic and Idealist Model. Although establishment of Teletaş, Netaş were related with Strategic Model, especially after 1980s implemented policies showed that Idealist Model came forward. Because, Turkey was obliged to apply hegemonic organizations plans due to economic crisis.

> Despite all these investments, in the international level keeping up the speed of technological development did not achieve. Also the chronicle crises caused, investments came to a standstill from the end of the 1980s and again the investment of national communication infrastructure began to question (Başaran,2010: 175).

To sum up, especially after 1980s Turkey has noticed the importance of transforming to information society in socio-economic development. Thus, since 1980s some policies, strategies and plans have been prepared. Due from liberalization, important hegemonic organizations started having right in formation the transforming to information society related policies. In addition, these organizations affected Turkey to choose Idealist Model in the forming of information and communication network. Hegemonic organizations have ignored the countries' internal dynamics (education, economic structure, history, social structure etc.). The recent neo liberal policies (privatization, laissez faire policies, insufficient government intervention) which have been imposed from abroad, have effected Turkey negatively. As indicated below in Table 3.12 "Countries' readiness to information society", in Table 3.13 "Countries' readiness to information society" and in Table 3.14 "Turkey's Readiness to Information Society", Turkey is backward according to statistics.

Table 3.12: Countries' Readiness to Information Society (Networked Readiness)

Row	2007-2008 Country	Score
1	Denmark	5.78
4	USA	5.49
9	South Korea	5.43
55	Turkey	3.96

Source: World Economic Form, "Global Information Technology" Total: 127 Country

As mentioned in Table-3.12, for the criteria of countries' readiness to information society Turkey got behind the South Korea and among 127 countries Turkey was the 55th.

Table 3.13: Countries' Readiness to Information Society (Networked Readiness)

Row	2008 – 2009 Country	Score
1	Denmark	5.85
3	USA	5.68
9	Holland	5.48
61	Turkey	3.91

Source: World Economic Form, "Global Information Technology" Total: 134 Country

As emphasized in Table 3.13, among 134 countries Turkey was the 61st and its 2008-2009 score was lower than 2007-2008 score.

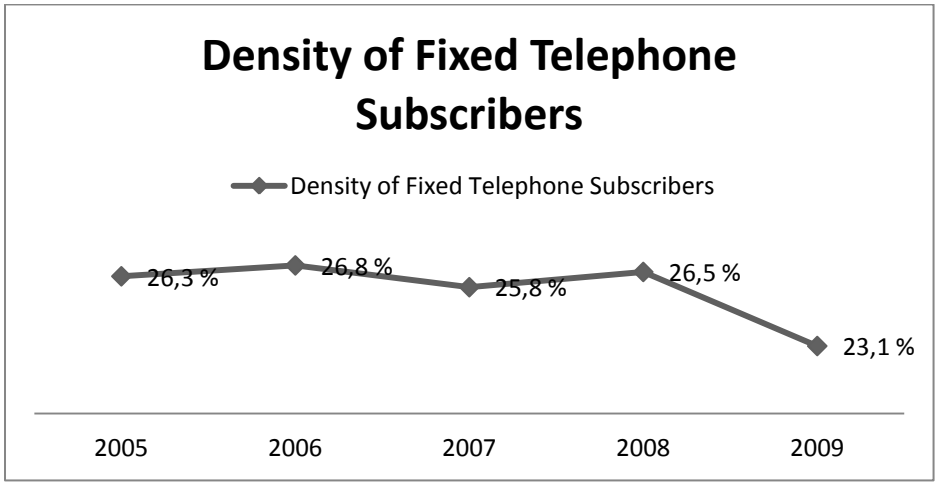
Table 3.14: Turkey's Readiness to Information Society (Networked Readiness)

	2003	2004	2005	2006	2007	2008	2009
Number of Evaluated Country	80	102	104	115	122	127	134
Row of e-Readiness (Turkey)	50	56	52	48	52	55	61

Source: World Economic Form, "Global Information Technology"

As indicated in Table-3.14, in time although the number of evaluated country increased, the rank of Turkey declined in order. From 2003 to 2009 Turkey declined from 50th to 61st in row of e-readiness order.

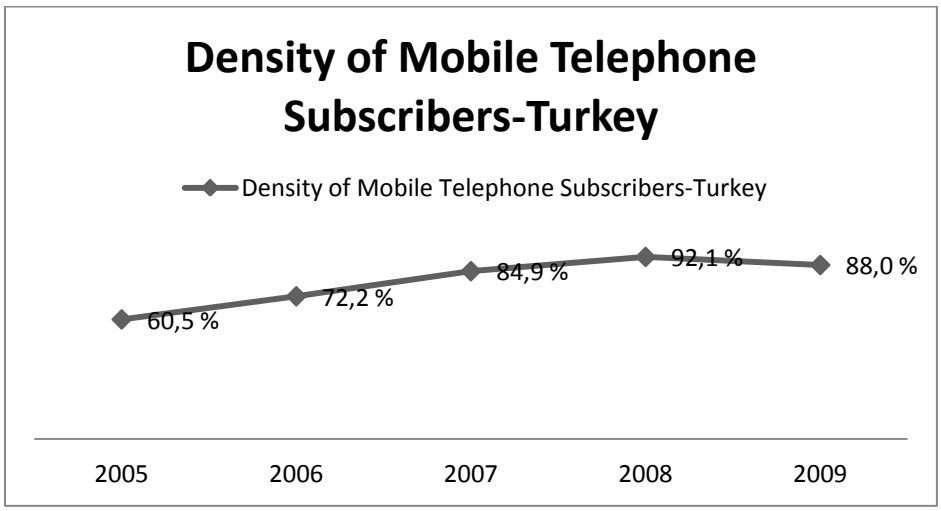
Moreover, Information Society Department of SPO emphasized and highlighted "density of fixed telephone, mobile telephone and broadband subscribers" and "ICT investment of government" related analysis.



Source: Eurostat, BTK and ITU, SPO Information Society Department, http://www.bilgitoplumu.gov.tr,modified by Emiroglu,S.

Figure 3.6: Density of Fixed Telephone Subscribers – Turkey

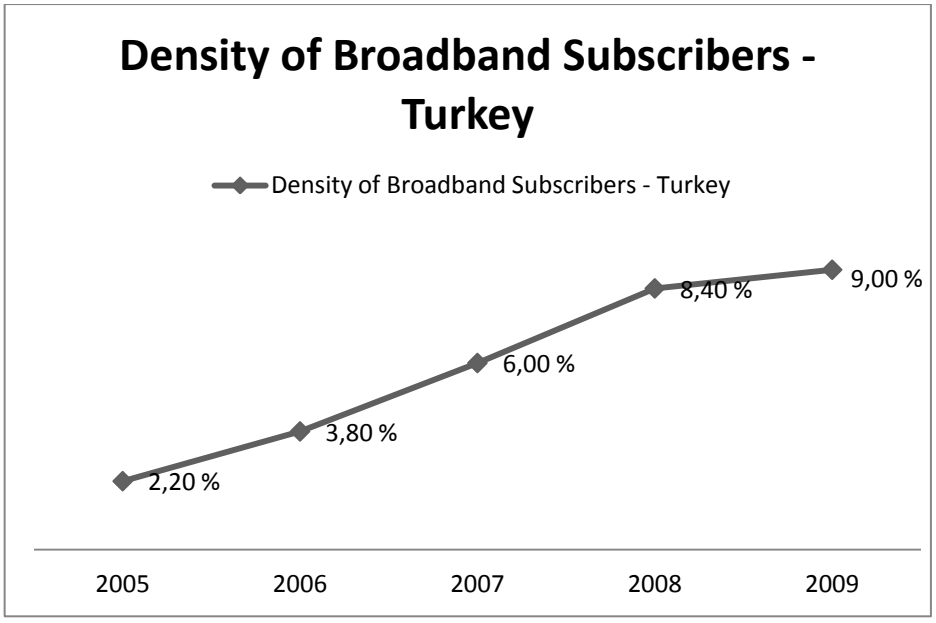
As mentioned in Figure 3.6, from 2005 to 2009 density of fixed telephone subscribers declined in Turkey. In this decline, increasing the mobile telephone usage has played important role. Because in time the fixed telephone market have become saturated.



Source: Eurostat, BTK and ITU, SPO,Information Society Department, http://www.bilgitoplumu.gov.tr,modified by Emiroglu,S.

Figure 3.7: Density of Mobile Telephone Subscribers - Turkey

As mentioned in Figure 3.7, from 2005 to 2009 density of mobile phone subscribers increased. In 2005 density of mobile telephone subscribers was 60.5 and was 88.0 in 2009.



Source: Source: Eurostat, BTK and ITU, SPO,Information Society Department, http://www.bilgitoplumu.gov.tr,modified by Emiroglu,S.

Figure 3.8: Density of Broadband Subscribers - Turkey

As mentioned in Figure 3.8, Turkey gave importance to broadband infrastructure and thus, from 2005 to 2009 density of broadband structure increased in Turkey.

Table 3.15: ICT Investments of Government

Years	Number of Projects	Subsidy Prices (Million TL)
2002	203	478
2003	204	536
2004	211	588
2005	200	815
2006	203	901
2007	237	928
2008	271	836

Source: Information Programs, http://www.bilgitoplumu.gov.tr,modified by Emiroglu,S

Table 3.15 (continued)

2009	244	890
2010	177	1.084

As indicated in Table 3.15, there was huge increase in ICT investments of Turkey. ICT investments nearly doubled from 2002 to 2010.

3.4 Summary

In this chapter, "Five Year Development Plans" of Turkey (from first to ninth development plans) were studied in the scope of science, technology and transforming to information society related topics. In addition, establishing "The Supreme Council for Science and Technology" (SCST) and its role in identifying, monitoring and coordinating policies in science and technology related national goals were studied.

Turkey's attempt towards being an information society was studied in the case of information and communication technologies. Plans and policies which were prepared in the scope of being an information society, were analyzed in this chapter. Furthermore, first internet connection of Turkey and cooperation among ODTÜ and TÜBİTAK analyzed, especially since 1960s telecommunication of Turkey studied. This thesis comparing the science, technology and information society related policies of South Korea and Turkey thus, this chapter contributed to thesis in terms of Turkey with analyzing information society policies in the scope of science and technology related policies of Turkey. Furthermore, "Deployment Policies in the field of ICT" and "Network Models" used in analyzing the transforming to information society period of Turkey.

CHAPTER 4

INFORMATION SOCIETY of SOUTH KOREA

in the scope of
Information Society & Science and Technology Policies
(since 1960s)

4.1 Explanation of the Korean Development via Ideologies

In recent decades, South Korea and its successful catch up attempt became popular topic for many scholars and their studies. These studies analyze this success from different perspectives; Such as market forces, dependency, étatisme, Confucianism, etc.

Development of South Korea case may be examined in economic, cultural and political aspects. Aidan Foster – Carter (2008) sum up the contributor factors of South Korea's development into four main categories. These are market forces, dependency, étatisme and Confucianism.

Among newly industrialized East Asian countries, South Korea has shown important growth. Although in all over the world capitalist economy is dominant and popular, there has been state intervention in growth of South Korea and government has played crucial role in development period. Besides government intervention, other three factors dependency, market forces and Confucianism have great importance in South Korean development.

i. Market forces

South Korea is called one of the newly industrialized countries in East Asia. Aidan Foster – Carter (2008) emphasizes that in South Korea economic policy, government is very interventionist in the fields of export promotion, industrialization, tariffs and in many fields.

Market forces affected Korea and due to the penchant of that period, like other developing countries, Korea first tried the import substituting industrialization. In time, Korea passed to export oriented industrialization.

ii. Dependency

According to Aidan Foster – Carter (2008), South Korea's development is fragile and is dependent on global economy. They indicate that although Korea seems independent country, Korean economy depens on global economy and hidden effects of America and Japan on South Korea.

iii. Etatisme

Etatisme refers the state intervention and it could be defined as one of the important factors in promoting the economic development. Aidan Foster – Carter (2008) emphasizes the importance of state intervention in South Korea's economic development.

> Korea was a highly regulated society with an authoritative and interventionist government. For much of the period under consideration, the government could be characterized as a military dictatorship (Leung-Chuen,2001: 152).

Particularly after 1960s, government direction and subsidies played important role in South Korea's development and industrialization.

iv. Confucianism

According Aidan Foster – Carter (2008), Confucianism has major effect on Korean development. For instance chaebols are very important organizational large businesses which are set up by Korean Government to accelerate the technological development. Confucianism is important factor in management of chaebols, because Confucianism makes stronger relations in those groups of people.

Moreover, South Korea chose import substitution industrialization then transformed to export oriented industrialization. South Korea produced highly quality manufactured products in wide variety of industries and exported them. According to the statistics of The Economist Group in 1986 South Korea became the world's twelfth biggest exporter and in 1987 South Korea became the fourth exporter in Asia. Andrew Tank (2008) emphasizes the importance of increasing international flows of capital, technology and internalizing this technology to satisfy customers in a global market.

As mentioned above, in literature, the South Korean Development has been analyzed by many scholars and Andrew Tank (2008) is one of them. In South Korea's achievement, some determined factors has played important role. According to Andrew Tank (2008), these determined factors can be divided into two parts; external and internal factors. Japan, United States, trade and threat are the external factors.

a. Trade

> The Koreans are not intrinsically traders, and very, very reluctantly accept the capitalist world trading system. As one senior Samsung executive put it, "By the mid-1990s we will be a responsible member of the world economic clubs (GATT, OECD) not because we want to, but because we have to (Tank, 2008: 272).

After the Korean War, South Korea had scarce resources and had not sufficient infrastructures for industrialization thus, domestic market of South

Korea was poor. In that time, export was seen the one way for expansion therefore Korea decided to transform from import substitution industrialization to export oriented industrialization.

b. Japan

Throughout the history in many fields for instance production techniques, engineering, technology transferred from Japan. South Korea imitated the Japan's engineering methods. Especially technology transfers from Japan, have played important role in South Korean's development. In addition, there has been important and strong relation between Korean business leaders and Japan leaders. Thus, Japanese companies have invested in South Korea and these investments have been helpful for the development of South Korea.

c. The United States

Especially in 1950s and 1960s The US helped the South Korea in rebuilding the national infrastructure.

> Direct aid between 1953 and 1970 amounted to 6$ billion in concessionary aid and $7 billion in military aid, and during the 1950s accounted for 75 per cent of gross investment. In short, the US gave Korea a brand new national infrastructure in the 1950s and US-trained technocrats masterminded the astute economic management of the next two decades (Tank, 2008: 275).

In addition to this direct assistance, South Korea exported many product to the US also the US became important market for Korea thus; US had major importance for Korea's export orientation view.

d. Threat;

Due to the danger of war, Korean Military forced the industry to work on aerospace, electronics fields. These forced research areas had major role in technological development of South Korea.

According to Andrew Tank (2008) beside external factors, internal factors for instance people, education, investment and technology acquisition had great importance in Korean's development.

e. People;

Generally the education level and literacy rate of Koreans are high and workers are inspirational in innovation and alteration of working methods. Some scholar correlated Confucianism to learning desires of people thus they think that Confucianism has great importance in development of South Korea.

f. Education;

In South Korea, government has given more importance to education and many educated people has transformed to the skilled workers for the necessary human resources especially in technological development.

> One of the manufacturing managers of Henry Ford's Detroit said that "In America or Europe we staff our car plants with the dregs – people who cannot find a job anywhere else. Here (in Korea) these guys really want to be here building cars (Tank,2008: 277).

g. Investment;

Although many countries could not benefit from Marshall resources and invested them into inefficient investments, Korea Government invested Marshall Resources into technological projects, technology factories and infrastructure. Especially between 1970s and 1980s, Korea invested on highly capital intensive steel-mills, shipyards, chemical factories. In 1980s

for fund, Korean Government turned out other countries and in 1985 external debt totaled nearly $50 billion (Tank, 2008: 278). But the return of investments were bigger than cost of investments thus, government has managed the fund and debt easily.

h. Technology acquisition;

Andrew Tank (2008) explained the importance of technology acquisition in Korea and he consolidates this importance with that sentence; "If you have not got it, go out in to the world and find it.'

For instance, as Andrew's (2008) said, in 1980s Samsung decided to enter the highly competitive semiconductor market and it obtained technology license from Micron Technology. In six months, Samsung built the fabrication plant and produced seven million wafers in the first year.

4.2 Development Periods of South Korea

4.2.1 South Korea in 1960s-1990s

> The outstanding growth performance of Korea in the three decades from early 1960s is, deservedly, labeled an economic miracle. As one observer put it: It is no exaggeration to say that the post-World-War II development of East Asia is the greatest success story of sustained economic growth in the history of humankind (Singh, 1995: 4).

To become an industrialized country, first South Korea used import substitution and then exports promotion strategies. Particularly in 1960s South Korea specialized on exported light manufacturing productions for instance textile, consumer electronics. In 1970s Korea specialized on heavy manufacturing production for instance steel, shipbuilding. For South Korea, all of these industries were infant industry thus, government used different

promotion strategies to develop them for instance export promotion, tax incentives, protection of market from foreign competition.

> Technological advancement of the Korean industry went through three phases: duplicative imitations in the 1960s and 1970s, creative imitations from 1980s and innovations since 1990. This evolution paralleled the three key sequences in the flow of technology from advanced industrialized economies to catching-up countries, namely, transfer of foreign technology, diffusion of imported technology, and indigenous R&D to improve foreign technology and to generate its own technology (Kim L., 1997: 23).

As mentioned above during the development process, technological advancement of the South Korean could be separated in some phases and these phases may be summarized into three main headings; duplicative imitations, creative imitations and finally innovations. In all these phases, South Korea Government had major role.

> The government played an active role in technology development from the very beginning. There was a Bureau of Technologies under the Economic Planning Board. In 1967 it was upgraded into a Ministry of Science and Technology (MOST), the first country to have a full-fledged Ministry of this kind (Leung-Chuen,2001: 142).

According to Freeman and Soete (1997), foreign technologies and their deployment in international area were important factors in industrialization of Europe, USA and Japanese. In addition, these factors are very important in development of newly industrialized Asian countries for instance South Korea, Taiwan and Singapore.

Moreover, foreign technology transfers and technological knowledge had great importance in Korean's technological development. Although in 1960s foreign licensing was very restrictive, after 1970s with changing

government policies foreign technology transfers increased. Japan and USA had major contribution in foreign technology transfers.

Table 4.16: Foreign Technology Transfer to Korea, 1962-93 (million dollars)

	1962-66	**1967-71**	**1977-81**	**1987-91**	**1992-93**
Foreign Licensing	0.8	16	451	4539	1797
Foreign Direct Investment	45	219	721	3.636	1.939
Capital-Goods Imp.	316	2.541	27.978	120.952	67.152

Source: Kim, L., 1997: 40-41

In 1960s Korea's foreign licenses policies were quite limited. As shown in Table 4.16 especially after 1977 Government stretched out the foreign licensing policies. In 1980s, there was substantial rise in all foreign technology transfers. But after 1990s because of the raised labor wages, foreign direct investments decreased. In addition, foreign licensing and foreign technology was imported through capital goods. For instance, in South Korea within the scope of heavy and chemical industrialization cement, steel, paper industries were set up in 1960s and in 1970s all these industries started importing plants and capital goods.

> Korea relied heavily on Japan and United States for technology. During the first two decades of industrialization, they accounted for 80 percent of FDI and 70 percent of FLs and capital imports. Japan took a strong lead in those years. In the 1990s, however, the U.S. share of technology transfer increased significantly (Leung-Chuen, 2001: 143).

Since 1960s, high growth rates of incomes, decreasing inflation rates, decreasing unemployment rate and export oriented industrialization had great importance in South Korean's rapid growth.

Table 4.17: Major Indicators of Korean Economic Growth

Year	GNP per capita (US $)	GNP Growth Rate (%)	Inflation Rate (%)	Exports (mn US $)	Rate of Unemployment
1960	80	1.1	10.5	33	11.7
1963	100	9.1	22.7	87	8.2
1970	243	7.6	13.5	882	4.5
1975	591	6.8	25.7	5003	4.1
1980	1,597	- 4.8	25.6	17,214	5.2
1985	2,242	5.4	4.1	26,442	4.0
1990	5,883	9.6	9.9	65,016	2.4
1995	10,076	9.3	4.6	123,242	2.0

Source: Economic Statistics Yearbook, various years, and National Accounts 1994, by National Statistical Office, Republic of Korea, Major Statistics of Korean Economy, various years modified by Emiroglu

As mentioned in Table 4.17 since 1960s, GNP per capita increased inflation rate and rate of unemployment decreased. Since 1960 GNP growth rate was positive every year, there was only one year economic growth rate was negative because the economic crisis and assassination of the President. After transforming to export oriented industrialization, GNP per capita showed substantial rises.

Table 4.18: The Structure of Production (% distribution in current prices)

Sector	1960	1970	1980	1990	1995
Agriculture	39.9	31.1	14.6	9.0	6.6
Industry	18.6	28.4	41.4	44.7	43.5
Mining	2.3	1.3	1.4	0.5	0.3
Manufacturing	12.1	19.1	29.6	28.9	26.9
Construction	3.5	6.4	8.2	13.2	14.1
Utilities	0.7	1.6	2.1	2.1	2.2
Services	41.5	40.5	44.0	46.3	49.9
Total (GDP)	100.0	100.0	100.0	100.0	100.0

Source: Economic Statistics Yearbook 1978, 1995, National Accounts 1994

As shown in Table 4.18, manufacturing sector has increased from 12.1 % to 26.9%. Especially after 1960s transforming to the export oriented industrialization affected the rise of manufacturing sector. Manufacturing sector increased from 12.1 % in 1960, to 26.9% in 1995 and industry sector

increased from 18.6% in 1960 to 43.5 % in 1995. Since 1960, Korean Government left the agricultural development policy thus, agriculture sector decreased from 39.9 % in 1960 to 6.6 % in 1995.

> South Korea (hereafter Korea) has developed very rapidly over the past 35 years economically and politically. A strategy of export-led development, mass production and mass exports was the main policy of the Korean government and Korean companies. The government pushed the firms to export, with many consequent benefits and disadvantages. As late as 1961, Korea suffered from all difficulties facing most poor countries today. However, the from all difficulties facing most poor countries today. However, the Korean economy grew at an average annual growth rate of 9 per cent, raising GNP per capita from 87$ in 1962 to $8000 in 1994. Exports increased from a mere $40 million in 1953 to 90$ billion in 1994. The share of manufactured goods in exports increased from 14.3 per cent to 95.0 per cent during the same period (Yun-Kwan,2008: 286).

Moreover, Korean Government always has been aware of importance of education also human capital. Thus, Korea has given more importance to education. In 1960s among developing countries, although South Korea had the low level of growth, Korea had high level of educational attainment. In addition, during Japan invasion, the education level of South Koreans was very low because Japans did not allow the education of Koreans especially after secondary school. Thus, South Korea was lack of talented labor force. (Song, 1990: 38-42)

To force the technical knowhow, professional and technical education was legalized. Thus, government aimed to provide more empirical training to especially high school students. For this purpose Korea Research Institute for Vocational Education and Training (KRIVET) was established in 1968. Teachers who would give professional and technical education were encouraged. (Kim, 1991: 1165) Briefly, South Korea has been shown as an example of rapid economic development country with a high quality educational system.

4.2.2 The South Korea in 1960s and 1970s

1960s and 1970s were the transformation periods and milestones of the South Korea. The development period of South Korea could be studied before 1960s and after 1960s. Since 1960 South Korea made a big effort to catch up developed countries and to have competitive power in the international markets. The First Five Years Development Plan which was put in practice in 1962 was the first step of science and technology studies of South Korea.

In time, South Korea left import substitution industrialization and followed export oriented industrialization policy. Government planned to develop export oriented, labor intensive light manufacturing industry. But in that time, South Korea was lack of necessary technological infrastructure. To solve this problem government decided to import foreign technology but educated, talented labor force was required to acquire and imitate this technology. Thus, in 1960s and 1970s South Korea focused on developing the technological infrastructure and educating talented labor force.

Especially after 1960s, government played major role in Korean development. The share of science and technology increased in the government budget of South Korea. For instance although, the share of science and technology in the GDP of South Korea was 0.18% in 1964, in 1970 the share of science and technology reached 0.3% (Lee, 2000: 273).

> … Within three decades, the economy was transformed from a backward poor agrarian economic backwater into an industrial economy; a process which often took industrialized economies a century to achieve. But this condensed growth did not just evolve under the invisible hand of market forces. Quite the contrary, it was orchestrated, throughout, by a strong and authoritative government with forceful policy (Leung-Chuen,2001: 124-125).

> From the beginning, the Korean government took an active and direct role in guiding and promoting economic growth, much more so than the governments of Japan and Taiwan (Leung-Chuen, 2001: 125).

As Leung-Chuen's said after 1960s, government took strong and radical decisions about the development of South Korea. One of these radical decisions was the transforming from agricultural economics to export oriented industrialized economics. Until 1960s South Korea had scarce source agrarian economy and after 1960s government changed its policy towards export oriented industrialization and applied policies for this export oriented purpose. South Korea showed great performance in economic development with this policy change. In a sense, output increased and economies of scale occurred. Between 1961-73 years, Korean Government supported the export oriented industrialization.

> The Korean strategy was clear-cut and simple: outward-, industry-and growth- oriented (or "OIG-oriented") (Song, 1995: 85).

In 1970s, especially labor intensive light manufacturing industries of East Asian Countries became very popular. Moreover, especially in 1970s, conjunction with transforming to export oriented industrialization the labor abundance and labor input became the most important source of growth in South Korea. Thus, like other East Asian countries, South Korea concentrated on labor intensive light manufacturing industries.

Moreover, Korean Government emphasized the importance of export in second five-year plan (1967-71). In that period President Park also emphasized the importance of export and his popular aphorism was "nation building through export". After 1962 President Park arranged monthly export promotion conferences. These conferences provided benefit to make connection between government and private sector.

> Exporters were supported with tax exemptions, allocation of credits at zero or negative interest rates, multiple exchange rates, direct cash payments permission to retain foreign exchange earnings for private use and the privilege to import restricted commodities (Leung-Chuen, 2001: 126).

In South Korea, these supports attained to successful performance and actual performance exceeded the target. As mentioned Table 4.19 between 1962-66 years although target of exports was 137.5, the performance of exports was 250.4. Increased exports reflected economic growth in a positive way and although target of economic growth rate was 7.1, performance was 7.8.

Table 4.19: Targets and Growth Performance of the First Five Year Plan (1962- 66)

Indicator	Targets	Performance
Economic Growth Rate (%)	7.1	7.8
Exports in 1966 (mn $)	137.5	250.4
Imports in 1966 (mn $)	492.3	679.9

Source: Economic Planning Board; Bank of Korea, National Accounts 1990 modified by Emiroğlu

As emphasized Table 4.20 between 1967-71 years although target of exports was 550, the performance of exports was 1132.3. Increased exports reflected economic growth in a positive way and although target of economic growth rate was 7.0, actual performance was 9.5. Like between 1962- 66 years, there was an economic growth between 1967-71 years.

Table 4.20: Targets and Growth Performance of the Second Five Year Plan (1967- 71)

Indicator	Targets	Performance
Economic Growth Rate (%)	7.0	9.5
Exports in 1971 (mn $)	550.0	1132.3
Imports in 1971 (mn $)	894.0	2178.2

Source: Economic Planning Board; Bank of Korea, National Accounts 1990 modified by Emiroğlu

As mentioned Table 4.19 and Table 4.20 since 1962 there was a positive economic growth in South Korea. As emphasizes in Table 4.21 between 1972-76 years although target of exports was 3510.0, the performance of exports was 7814.6. Increased exports reflected economic growth in a positive way and although target of economic growth rate was 8.6, performance was 9.1. Briefly, by the strategy of with transforming to export-oriented industrialization country, since 1960s exports increased and it affected the economic growth rate in a positive way. In 1962 The Korean Trade Promotion Corporation was established to lead the Korean companies in international marketing. Moreover to encourage the industrialization and also effecting the economic growth in a positive way government legislated The Industrial Machinery Promotion Act in 1967.

Table 4.21: Targets and Growth Performance of the Third Five Year Plan (1972-76)

Indicator	Targets	Performance
Economic Growth Rate (%)	8.6	9.1
Exports (mn $)	3510.0	7814.6
Imports (mn $)	3993.0	8405.1

Source: Economic Planning Board; Bank of Korea, National Accounts 1990 modified by Emiroğlu

Furthermore, beside export policies Korean Government gave importance to science and technology. Thus in 1966, The Korean Institute of Science and Technology was established to lead the country's technological development.

> The Korean Institute of Science and Technology (KIST) was set up to develop science and technology infrastructure in 1966. In 1967, the science and technology promotion law was enacted. To develop science and technology policies Ministry of Science and Technology (MOST) was set up. (Chung and Lay,1997,

678-679). By this way South Korea became the first developing country to have Ministry of Science and Technology (Lee,2000: 273).

In time, South Korea noticed decreasing its competitiveness in newly industrializing economies and to solve this problem started concentrating on heavy and chemical industries. Thus, from 1973 to 79, Korean Government determined specific industrial targets and supported the heavy and chemical industry. Then, South Korea divided its resources into upgrading their technology and development of technological products. Moreover, in the sense of science and technology, Korea Advanced Institute of Science was established in 1972 and two laws which encouraged the developing technology and engineering services were enacted.

In 1973, Korean Government determined its new policy and published transforming from light industrialization to heavy and chemical industrialization. This policy was explained by President Park and he determined the targeted six industries. These industries were industrial machinery, shipbuilding, electrical, steel, petrochemical and non-ferrous metals. In 1973, government set up "The Heavy and Chemical Industry Planning Council" to encourage these six sectors. First, government planned to make these sectors internationally competitive. Then government detailed the plan and arranged to coordinate the social overhead capital investments. Finally government financed these industries and forwarded to public resources to heavy and chemical industry via National Investment Fund. Korean Government played major role in sustaining the achievement of these sectors. As mentioned government transferred funds to support these industries.

Although in 1973 oil crises and stagflation effected all over the world, South Korea had 9.1 % percent growth rate as shown in Table-3.21. The policies which were determined by government, and also export led industrialization made contribution to this positive growth rate.

According to Park Yun-Kwan (2000), export led strategy affected the deployment of technological capability in three ways. The first one is economies of scale. Local companies were forced making mass production and thanks to economies of scale they forced to increase their technological capability. Second one is increasing rate of investment in technological efforts. Because of the international competition, local companies efforted learning by doing and reverse engineering to become competitive in price and quality. Third one is informal technical assistance. Foreign equipment manufacture buyers forced local companies to meet their technical specifications thus; Korean firms learnt informal technical assistance.
Moreover, Korean Government encouraged private sector and chaebols to benefit from economies of scale, technological capability and overcoming international competition, overcoming the 1970s energy crisis and international debt problems.

> A chaebol is a business group of varied corporate enterprises operating in diversified areas, and typically owned and managed by one or two related family groups (Leung-Chuen,2001: 162).

Korean Government built up and supported chaebols because of economies of scale and management of chaebols is easier than management of many small firms. In foreign export markets, chaebols were able to compete with foreign firms with scale of economies. Thus, chaebols were the growth engine of industrialization of Korea in terms of acquisition of technological capability from foreign firms. Promoting Chaebols made different South Korea from other developing countries. Korea rewarded, promoted chaebols in new, different foreign markets for instance Korean Government gave long term bank loans and unrestricted promotions to chaebols. Thus, at the end of 1970s thanks to chaebols and export led strategies; South Korea had the largest textile plant, plywood plant, shipyard, cement and heavy machinery plant in the world.

On the other hand energy crisis, the assassination of President Park and in October 1979 effected political, economic and social spheres of South Korea too.

4.2.3 The South Korea in 1980s and 1990s

> … In the case of Japan in the 1960s and 1970s, and South Korea in the 1980s, in their rapid industrialization where world 'best-practice' productivity levels were achieved over a very short time in steel, cars and electronics consumer goods, and in the most recent years computers, largely on the basis of initially imported technology (Freeman, Soete, 1997: 356).

As mentioned above during 1970s South Korea went towards to heavy and chemical industries. Government took into consideration the world's demands and targeted to promotion especially these six industries. As mentioned above these industries were, industrial machinery, shipbuilding, electronics, steel, petrochemical and non-ferrous metal.

In the way of science and technology, infrastructure of information and communication technologies began to be formed, research and development activities started to focus on information and communication related areas in 1980s. In addition, in South Korea, as all over the world, the government intervention decreased the movement of financial and trade liberalization increased in 1980s. Beside them, new government which set up after the assassination of President Park, encouraged the financial and trade liberalization.

Especially after 1980s, although South Korea encouraged the liberalization, government continued being one of the decision makers in economic, industrial and political areas. For instance, though Samsung intended to enter automobile market, Korean Government did not allow to Samsung to enter automobile market. As exemplified in Samsung's sample,

government always had the right to comment on economic, industrial and political areas.

Moreover, in 1982 to develop the technology ability of country National R&D Programme which was the first great programme, was implemented. This programme was carried out by Ministry of Science and Technology. The aim of this programme was providing the research and development activities, supporting the collaboration between universities, public and private sectors. In accordance with this programme; thanks to efforts of both private and public sector of South Korea had the capability to compete with developed countries in some technologies (Chang, Lay, 1997).

In 1982, The Small and Medium Industry Promotion Act was legislated. The main goals of this Promotion Act were creating fund to build industrial complexes, providing technical knowledge and skills for small and medium enterprises.

In this period "National Basic Information Systems Project was implemented. This project aimed to develop the infrastructure of information and communication technologies then enabled the exchange of information between private and public sector (MIC,2002: 5).

In addition these developments in this period, Daedeok Science Center was established and it enabled settlement both private and public research institutions sectors. There are many research and educational institutions.

In 1980s, beside liberalization, export promotion policy was encouraged again by government because to overcome the slow growth, high inflation and foreign debt.

Table 4.22: Targets and Performance of the Fourth Five-Year Plan (1977-81)

Indicator	Targets	Performance
Economic Growth Rate (%)	9	6

Source: Economic Planning Board; Bank of Korea, National Accounts 1990 modified by Emiroğlu.

As emphasized Table 4.22 between 1977- 81 performance of economic growth rate was lower than targets of economic growth rate.

Table 4.23: Targets and Performance of the Fifth Five-Year Plan (1982-86)

Indicator	Targets	Performance
Economic Growth Rate (%)	8	10
Exports (mn $)	37.8	32.5
Imports (mn $)	29.6	26.4

Source: Economic Planning Board; Bank of Korea, National Accounts 1990 modified by Emiroğlu

As mentioned in Table 4.23 between 1982-86 years, although export and import performances were lower than the targets, in general there was a positive economic growth and performance of economic growth was higher than target.

Table 4.24: Targets and Performance of the Sixth Five-Year Plan (1987-91)

Indicator	Targets	Performance
Economic Growth Rate (%)	7	10

Source: Economic Planning Board; Bank of Korea, National Accounts 1990 modified by Emiroğlu

As emphasized in Table 4.24 between 1987-91 years performance of economic growth rate was higher than targets of economic growth rate. There was a positive economic growth.

> Korea's rapid economic growth has been attributed to many economic, social and technical factors. The most important of all may be technological capability, which is the combined outcome of various socio-economic inputs. It is efficient and effective assimilation, adaptation, application and creation of advanced technologies in production, investment and innovation in mature industries (Yun-Kwan,2008: 286).

Table 4.25: Structural Change: Sectoral Share of GDP (%)

	Agriculture			**Industry**			**Services**		
	1970	**1983**	**1993**	**1970**	**1980**	**1993**	**1970**	**1980**	**1993**
Korea	29.8	14.2	6.4	23.8	37.8	46.1	46.4	48.1	47.6

Source: Asian Development Outlook 1994, DB, 236, modified by Emiroğlu.

After 1970s, as mentioned in Table 4.25, the share of agriculture decreased and industry and services increased the share in GDP. Governmental policies like transforming to export led industrialization development, played important role in the rising of share of industry sector in GDP.

Furthermore, 1997 oil crises, also affected global automobile industry, the demand of fuel economic and small cars increased. MNCs wanted to keep prices down as a new strategy. For that reason, they set up production facilities to the cheaper labor cost locations also newly industrialized countries for instance Mexico, South Korea to decrease the cost. With building these new production facilities South Korea found an opportunity to acquire new automobile production technology.

In the 1980s, Korean Government, public and non-profit technical system encouraged the technological diffusion especially among small and medium enterprises. The Korean Academy of Industrial Technology, other research and development institutes made collaboration to promote science

and technology researches. Korean Government supported R&D activities in directly and indirectly. Government supported R&D directly that promoting science and technology infrastructures and encouraged the universities and research institutions. R&D loans, tax reductions were indirectly government supports for R&D development. In the early 1980s, preferential R&D loans became the most important means for financing private R&D activities.

Table 4.26: Research and Development Expenditure, 1965-93 (in billions of won)

	1975	**1980**	**1985**	**1990**	**1994**
R&D Expenditures	43	283	1237	3350	7895
Government	30	180	307	651	1257
Private Sector	12	103	930	2699	6635
Government (% Total)	***71***	***64***	***25***	***19***	***16***
R&D/ GNP	0.32	0.77	1.58	1.95	2.61
Number of researchers (total)	10275	18434	41473	70503	117446
Government/Public Institution	3086	4598	7542	10434	15465
Universities	4534	8695	14935	21332	42700
Private Sector	2655	5141	18996	38737	59281
R%D expenditure/Researcher (x 1000)	4152	15325	27853	47514	67220
Researcher/10.000population	2.9	4.8	10.1	16.4	26.4
Number of corporate R&D centers	12	54	183	966	1980

Source: 1994 Report on the Survey of Research and Development in Science and Technology, Ministry of Science and Technology (Korea), December 1994, modified by Emiroğlu.

As mentioned in Table 4.26, since 1980s government played major role in R&D activities. In time, with government supports and international competitiveness the effects of private sector increased R&D activities. Private sector understood the importance of high technology development for instance in 1975 number of corporate R&D centers increased from 12 to

1980 in 1994 and in R&D expenditure role of private sector increased to 84 percent in 1994. Beside, there were important increase in R&D expenditures, number of researchers, government/public institutions and number of corporate R&D centers from 1975 to 1994.

> ...The number of Korean scientific publications cited by the Science Citation Index increased slowly from 27 in 1973 to 171 in 1980, but rapidly to 1227 in 1988 and 3910 in 1994, climbing from thirty-seventh in the world in 1988 to twenty-fourth in 1994. Korea achieved the highest annual growth rate (28.97%) in 1973-1994 (Leung-Chuen, 2001: 146).

> … The number of R&D scientists and engineers rose more than fivefold, from 18434 to 98764, between 1980 and 1993. The annual growth rate of 14 percent was again the highest in the world (Leung-Chuen, 2001: 147).

> … University enrollment also expanded rapidly, from 38400 in 1953 to 1.15 million in 1994. And the proportion of those majoring in science and engineering also went up from 35 percent in 1965 to 44 percent in 1994. The number of scientists and engineers per 10000 population reached 22 in 1993, the highest among developing countries… (Leung-Chuen, 2001: 147).

Moreover, in the early 1970s South Korea suffered from shortage of researchers who had doctoral or master's degrees. To solve this problem Korean Government built up Korea Advanced Institute of Science in 1971 to have high quality researchers, scientists and engineers. In addition, KAIS offered to researchers four times higher salary than other Korean universities to attract lots of researchers. KAIS was renamed KAIST in 1981.

> From 1975 to 1993, KAIST produced 7577 M.Sc and 1693 Ph.Ds. (Leung-Chuen,2001: 150).

In 1986 for undergraduate students who had scientific and technological talent, Korean Government built up Korea Institute of Technology (KIT). In 1990 these two institutions were merged and it was called Korea Advanced Institute of Science and Technology.

Moreover, at the beginning of the Korean Development, lots of Korean students preferred studying on particularly in Japan and USA. This generated the brain drain problem. After Korean Government determined strategies and built up the institutions, this brain drain problem started being disappeared. To solve this problem KIST called back Korean engineers and scientists who employed abroad and this strategy was called "reverse brain drain". (Leung-Chuen, 2001)

In addition, in 1990 MOST (Ministry of Science and Technology) set up "Science and Engineering Research Centers" to finance the researches in universities. To support research capacity based on the collaboration and to create the legal basis, Korean Government legislated "R&D Promotion Law" in 1993. Besides these supports, Ministry of Education funded universities to develop the R&D infrastructure and to employed more researchers. (Lee, 2000)

In 1990s, lots of ministry for instance Ministry of Health, Ministry of Environment began to conduct their own R&D programmes (Lee, 2000). In addition to technological developments of South Korea, at the beginning of the 1960s, Korean Government did not give more importance to intellectual property rights because they made encourage the duplicative imitation. In time, as mentioned above Korean Government, transformed to creative imitation and then in 1990s transformed to innovation. Thus, with developing technology; number of patent registrations, intellectual property rights showed huge increase because Korea developed its own technology and reverse engineering declined.

> …The Korean share of local patent registration also swelled from 11.4% in 1980 to 39.7% in 1993, indicating increasing R&D activities. Korea was fifth in the world in 1993 in the number of industrial property applications… (Leung-Chuen,2001: 146).

4.3 The Role of Foreign Investments

Developing countries find opportunity to access to the international market under favors of foreign direct investments (FDI). FDI brings them capital, know-how, technology transfer so on. Although many developing countries use FDI, South Korea is an exception among them. However, at the beginning of the 1960s in South Korea there was little restriction about foreign investments, there was little FDI. Because FDIs perceived South Korea as a very bureaucratic country and this made South Korea inconvenient for FDIs.

Due to the lack of technological capability, South Korea also had to rely on imports of foreign technology. Although many developing countries used foreign direct investment, South Korea preferred assimilation, adaption, application and creation of the advanced technologies thus, South Korea used reverse engineering. Korean Government made restrictions to prevent the entrance of foreign direct investments. Therefore in South Korea, the numbers of foreign direct investments are lower than other newly industrialized countries.

> During 1965-85, FDI amounted to much less than one percent of GNP, and below 5 percent of total capital inflow. While it depended heavily on foreign loans, Korea has entertained almost no foreign direct investment outside the labor-intensive sector" (Amsden, 1989: 9).

> As illustrated in Perez and Soete (1988) a central problem on the international diffusion of technology is the almost automatic interchange of the words 'use' in the narrow diffusion sense and 'entry' in the broader technology sense. Technological catching up implies in the end the effective 'use' of foreign technology with the aim of mastering and improving it. The emphasis is on the acquisition and the assimilation of technology. From an industrializing country or from any other lagging position this can be in the first instance only be done through the 'use' of foreign technology (Freeman, Soete, 1997: 356).

As mentioned above, Freeman and Soete (1997) advocates that catching up the technology may be enabling with not only use it but also enable with creating and developing the technological capacity. This means that in some determined phases countries may act as innovative and imitative. Thus, South Korean Government always wanted to protect economy from independent multinational corporations because they wanted to acquire, assimilate foreign technology through imported foreign goods.

4.4 The Role of Korean Government in Science and Technology Policies

> Competitive advantage is created and sustained through a highly localised process. Differences in national economic structures, values, cultures, institutions and histories contribute profoundly to competitive success. The role of the home nation seems to be as strong or stronger than ever. While globalisation of competition might appear to make the national less important, instead it seems to make it more so. With fewer impediments to trade to shelter uncompetitive domestic firms and industries, the home nation takes on growing significance because it is the source of the skills and technology that underpin competitive advantage (Porter, 1990: 19).

Chris Freeman and Luc Soete (1997) emphasize the importance of government expenditures on scientific and technological researches, basic sciences. Because private firms do not want to invest in uncertain, long period researches, they want to invest in short period researches. According to Richard Nelson (1959) and Kenneth Arrow (1962) when science, technology and basic science expenditures are paid by private firms, the expected result will be below the expected level in terms of economic and social.

Although Richard Nelson (1959) and Kenneth Arrow (1962a) advocated the government expenditures on scientific, technological researches and basic sciences, Kealey supports that all government expenditures on basic sciences should be stopped. Because he thinks that government's support may be ideological and may be subjective.

> Whereas in the 1950s and 1960s public subsidies for both military and civil R&D projects had been widely employed, the value of these subsidies was now increasingly questioned and economists generally argued that public expenditures in support of innovation should be mainly oriented into four areas:
>
> 1. Fundamental research, mainly universities.
> 2. Generic technologies and their diffusion, especially ICT.
> 3. Industries whose structure prevented the effective performance of research and development at firm level. Agriculture was the typical example but the case for technical consultancy and research services to support small and medium-sized firms (SME) in many industries was widely advocated and implemented.
> 4. Infrastructural investment in STS as, for example, in bibliometric services, data banks and other information services (Freeman, Soete, 1997: 372).

Despite, there have been lots of ideas about the government support of science and technology, Korean Government chose the supportive one in the field of science and technology, Korean Government encouraged many research institutions for instance, the Korea Institute for Industrial Economics and Technology (KIET), the Korea Research Institute for Human Settlement (KRIHS). In addition, to promote import and diffuse the industrial technology Korean Government built up research centers, institutions under the Industrial Advancement Administration. For instance to plan and implement heavy and chemical industrialization policies Heavy and Chemical Industry Planning Council was established in 1973.

Moreover, export-led manufacturing industry played major role in development of South Korea. During transforming from light manufacturing to heavy manufacturing industrialization, government decided what to

produce, how much and who will do, also government took entrepreneurs role in transforming to new industries.

Furthermore, Korean Government supported industrial development thus, shared big parts of government incentives to industrial development. For instance, targeted HCI industries were supported with tax incentives, tax holidays and special investments, these industries paid low interest rates and so on. Beside these supports, for land prices, water, electricity, transportation, communication costs and other services, government supported HCI industries.

In addition, in South Korea, all commercial banks were nationalized thus; government was able to control all credits of firms. Government applied tariffs and licensing to protect market from foreign competition. Successful firms were rewarded and unsuccessful ones were penalized.

4.5 South Korea's New Economic Strategy in 2000s

Koreans were late in industrialization thus; they did not want to repeat the same mistake in transforming to information society. Thus, Korean Government gave more importance to informatization. For instance in 1998, President Kim Dae-Jung made a speech in 1998 and promised to make Korea the most computer literate nation in the world. In order to make good on this promise Korean Government determined master plan as blueprint to transform from industrialization to knowledge based economy. In addition, after 2000s increasing importance of knowledge based industries had an effect on preparing master plan.

> Korea has been quick to recognize the importance of the global information and knowledge revolution, and in formulating a strategy to ensure that the country gains all possible benefits from the advances. Indeed, Korea has performed impressively in the information infrastructure sector in many areas – especially in mobile telecommunications and Internet access (Pai et. al., 2003: 219).

Moreover, in 1990s South Korea has experienced significant opportunity and left dependency on foreign technology policy. Both public and private sectors gave more importance to information and communication technologies (ICT) which formed the basis of new economy. In 1990s, ICT was seen as the opportunity window for developing countries. Because formation of ICT capital is cheaper and easier than formation of industrial machines. In ICT sector the cost of forming the talented, educated labor force is cheaper than industrial sector. In time, South Korea saw the positive contribution of ICT sector in economic growth. The contribution of ICT to real economic growth of South Korea increased from 5.9% in 1995 to 50% in 2000 (KISDI, 2004: 15). With increasing the contribution of ICT to real economic growth, Korean Government has invested more than previous years.

Table 4.27: Investment in Information Infrastructure

	Investment/GDP (%)		**Public Investment (% of total)**	
	Average 1991-95	**Average 1996- 99**	**Average 1991-95**	**Average 1996- 99**
Hong Kong	0.58	0.98	0	0
Japan	0.14	0.34	0	0
Korea	**0.80**	**1.85**	**48**	**25**
Singapore	0.35	0.57	38	4
UK	0.23	0.35	2	2
US	0.58	0.52	0	0

Source: OECD - World Bank Institute (2000:82) modified by Emiroğlu,S.

As shown in Table 4.27 since 1990s, when comparing with other countries, the rate of Investment/GDP of South Korea was higher than other countries. It shows that South Korea invested more in information infrastructure.

In December 2001, the number of mobile phone subscribers in Korea reached 29 million also 60 per cent of the population. At the end of 2001 there were nearly 24 million internet users in Korea. (MIC, 2002) The numbers shows that increasing investment showed its effect and with increasing investment on information infrastructure the number of internet users and mobile subscribers increased, new internet businesses and e-commerce increased, expanded their market. For instance, in 2001, almost 70 percent of stock transactions were carried out on on-line, and there were more than 1800 internet shopping malls (MOCIE, 2002a).

Furthermore, South Korea noticed the importance of education in transforming to information society. In terms of educated, talented human resource has great importance in creating; using and disseminating the information thus, government gave more importance in education. Total education expenditures increased from 8.8 per cent of GDP in 1966 to 13.3 per cent in 1998 (KEDI 1998). Beside increasing the education expenditures, Korean Government made some information society related educational reform. After Korean Government recognized the positive effect of the internet on the education and on the information based society, applied some programs. For instance, expanding high speed internet network, offering access to the computers. In addition to these programs, government offered some other programs to overcome the digital divide for instance teaching the internet to nearly half a million poor students (NEAC 2000).

Furthermore, applied programs of Korean Governments demonstrate that government used "Public- Interest Model" in diffusion the internet. To overcome the digital divide, Korean Government has provided internet access all segments of society.

Thanks to internet training programmes government wanted to eliminate the digital divide between socio-economic classes and regions. Government gave importance on creating internet friendly classrooms to the broadband internet service free of charge. In addition, government offered "Internet and Computer Literacy Programmes". These programmes aim 10

million Koreans; it included students, housewives even convicts in the prisons. These programs have created market for information society and have created enormous demand for ICT. In addition, creating internet friendly classrooms, internet and computer literacy programmes show that as mentioned above, Korean Government used "Public-Interest Model" in diffusion the internet. Owing to Public-Interest Model, Korean people could find opportunity to access the internet easily.

1997 crisis caused the changes in the management of Korean Government and Government made flexible its strict, interventionist policies and started encouraging the market more. The reasons of encouraging the market were promoting the competition and entrepreneurship.

4.5.1 Internet

> South Korea's unique combination of being one of the most wired countries in the world coupled with its relatively short history of democracy makes this developing country a very interesting case study (Kim et. al., 2004).

As Kelly, Gray& Minges's said, because of the highest rates of internet connectivity, South Korea started being named "Internet Republic." In addition as Kang, Dyson's said South Korea showed high adoption to mobile phones and other ICTs. As mentioned in previous part, applying Public-Interest Model has great importance in calling for the name of "Internet Republic".

> By its own admission, South Korea is an "Internet Republic." It has one of the highest rates of internet connectivity among OECD Nations. South Korea's broadband take up at the time of the election was nearly 55%, almost twice as high as the third nation, Canada (Kelly, Gray& Minges 2002). In some residential areas, fibre optic connection with 100 Mbps is becoming common place. It is also very high adoption of mobile phones and other ICTs (Kang, Dyson, 2007).

> Despite huge investments in infrastructure, in terms of ICT usage patterns, Korea did not belong to the top group of nations at the time of the election. While it has progressively improved over the years, it ranked only 17th in the year 2000, putting it into the middle group. However, the time people spent in front of a PC per week dramatically increased in the years leading up to 2000: it almost tripled compared to the year 1997. Also, many Koreans equate PC usage with Internet use – 40% of Koreans in 2000 were connected to the Internet, an increase of 5 times during the 1997-2000 period (Han, 2002).

The number of internet users in Korea is shown in Table-4.28. In addition, Table 4.28 indicates that over the age of 16 who use internet more than once a week is counted as the internet users. Thus, third of Korean population is internet users.

Table 4.28: The number of Internet users (KRNIC) The net value 2000

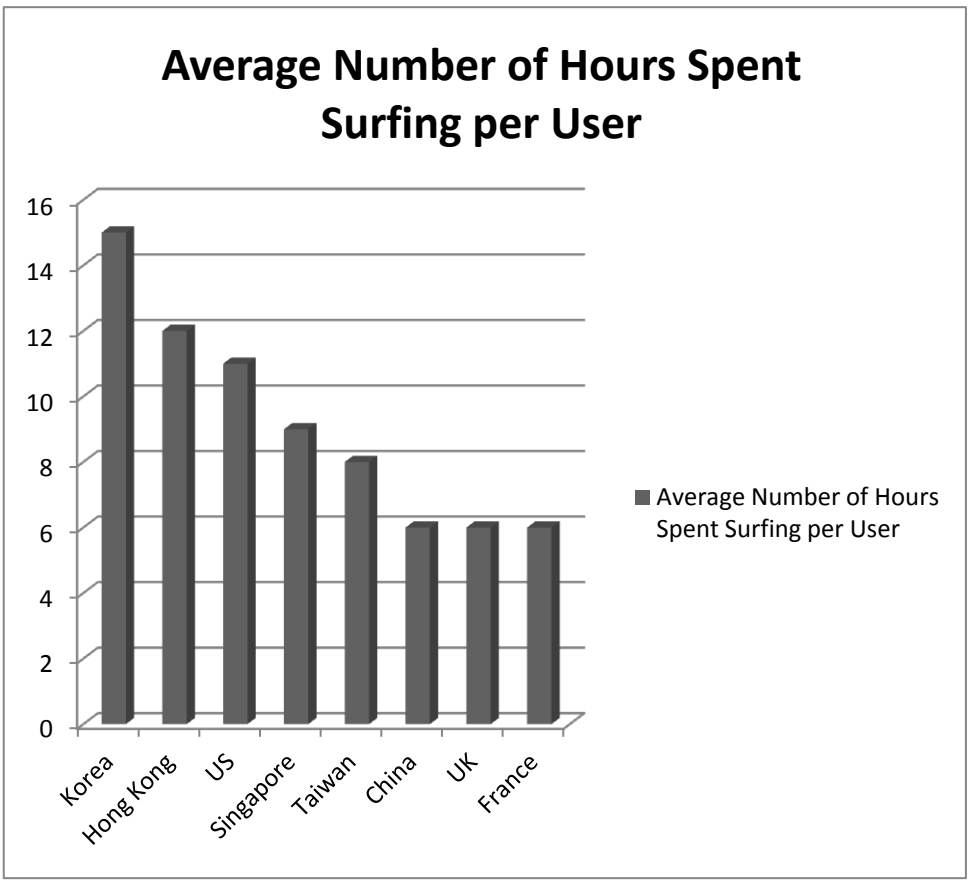
Internet Usage				**Number of Users (10,000)**		
Time / **Measure**	**2000.3**	**2000.8**	**Increase from March 2000**	**2000.3**	**2000.8**	**Increase from March 2000**
A	33.0%	38.5%	16.7%	1,393	1,640	247
B	30.3%	34.6%	14.2%	1,276	1,474	198
C	32.2%	35.4%	9.9%	1,168	1,299	131
D	29.8%	32.1%	7.7%	1,080	1,178	98

Measure A: Internet user over the age of 7, using more than once a month
Measure B: Internet user over the age of 7, using more than once a week
Measure C: Internet user over the age of 16, using more than once a month
Measure D: Internet user over the age of 16, using more than once a week

Source: Lee,O'Keefe,Yun, 2001 modified by Emiroglu,S.

Figure 4.9 shows that Koreans (along with Hong Kong) surf on the Web on average 12 days out of the month, with Singapore and the US 11 days. This is longer than France and the UK where the average user in both countries spends 9 days. In terms of the hours spent surfing per user per month, Koreans take the lead with 15 hours (Figure 1). This is longer than

Americans (11 hours) and double longer than British and French (6 hours each).



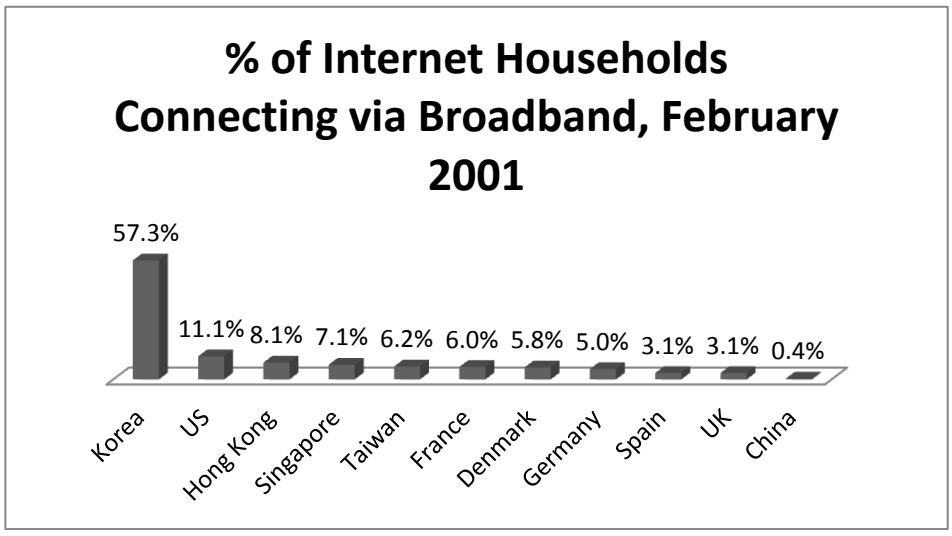
Source: Lee,O'Keefe,Yun 2001

Figure 4.9: The Numbers of Hours Surfing (September 2000, from NetValue)

4.5.2 Broadband

The deployment of broadband internet connections varies across different countries. OECD survey (2001) put South Korea is the first place out of 30 OECD member countries in the broadband penetration. The survey measures how many broadband connections are available per 100 inhabitants. South Koreans have nearly 10 connections per 100, Canadians have 3.9 connections and US have 2.25 connection.

NetValue – a Fench which is internet based measurement company, prepared a survey and revealed a similar result with OECD survey. It shows that 57.3% of Korean Internet home users have broadband connections and US is the second country in Figure 4.10, only 11.1 % Internet users was connected by broadband access (NetValue, 2001). As mentioned in Figure 4.10, South Korea is the most wired country in the Asia and is a world leader about broadband access. Furthermore, it has been widely reported that South Korea is already the most wired nation in Asia, and by some measures (such as online stock trading and broadband access) it is a world leader (Financial Times, 2000; Business Week, 2000; Time, 2000).



Source: Lee,O'Keefe,Yun 2001
3 month average: Dec/Jan/Feb

Figure 4.10: Internet Households Connecting via Broadband

In addition, in June 2009 there were 16 million fixed broadband subscribers in Korea, equating to a household penetration rate of 94 percent —one of the highest in the world. (OECD, 2009)

Moreover, Korean Government played important role in broadband standards and technologies via ETRI (Electronics and Telecommunications Research Institute) and KISDI (Korea Information Society Development Institute).

Korea‘s fixed broadband market has evolved in four stages:

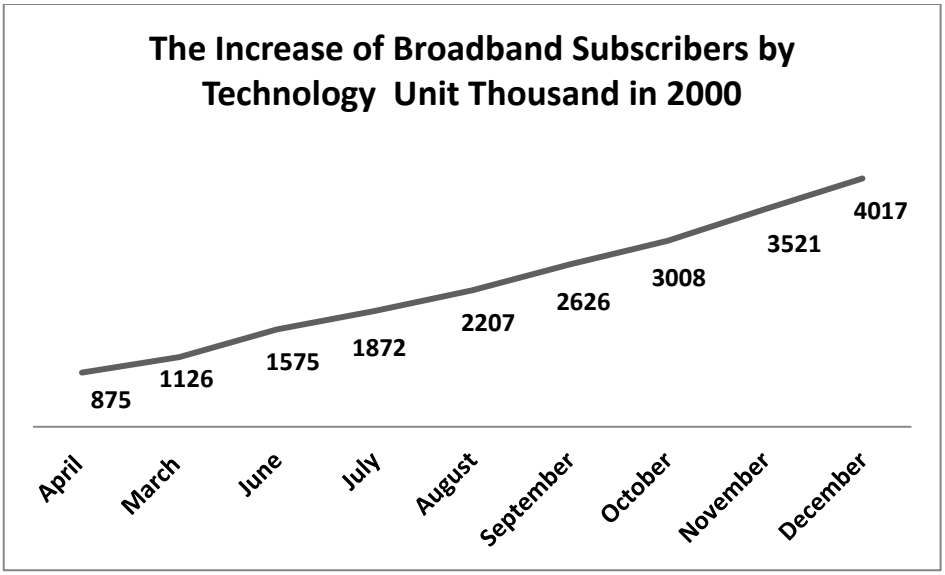
Early stage, 1998–99: broadband services were first commercialized.

Growth stage, 2000–02: number of subscribers and household penetration rate increased dramatically.

Market maturity, 2003–05: growth of broadband adoption slowed and signs of market saturation emerged.

Move to fiber (convergence), 2005 onward: broadband operators have been rolling out advanced next generation access networks. (Kim et. al. 2010)

Figure 4.11 indicates the increase of broadband Internet connections by each technology. At the end of 2000, there were more than 4 million broadband subscribers while there were 2 million in August 2000 and 0.87 million in April 2000. In addition, broadband internet connections mainly consist of ADSL, Cable TV, and LAN Internet. (Ministry of Information Communication)

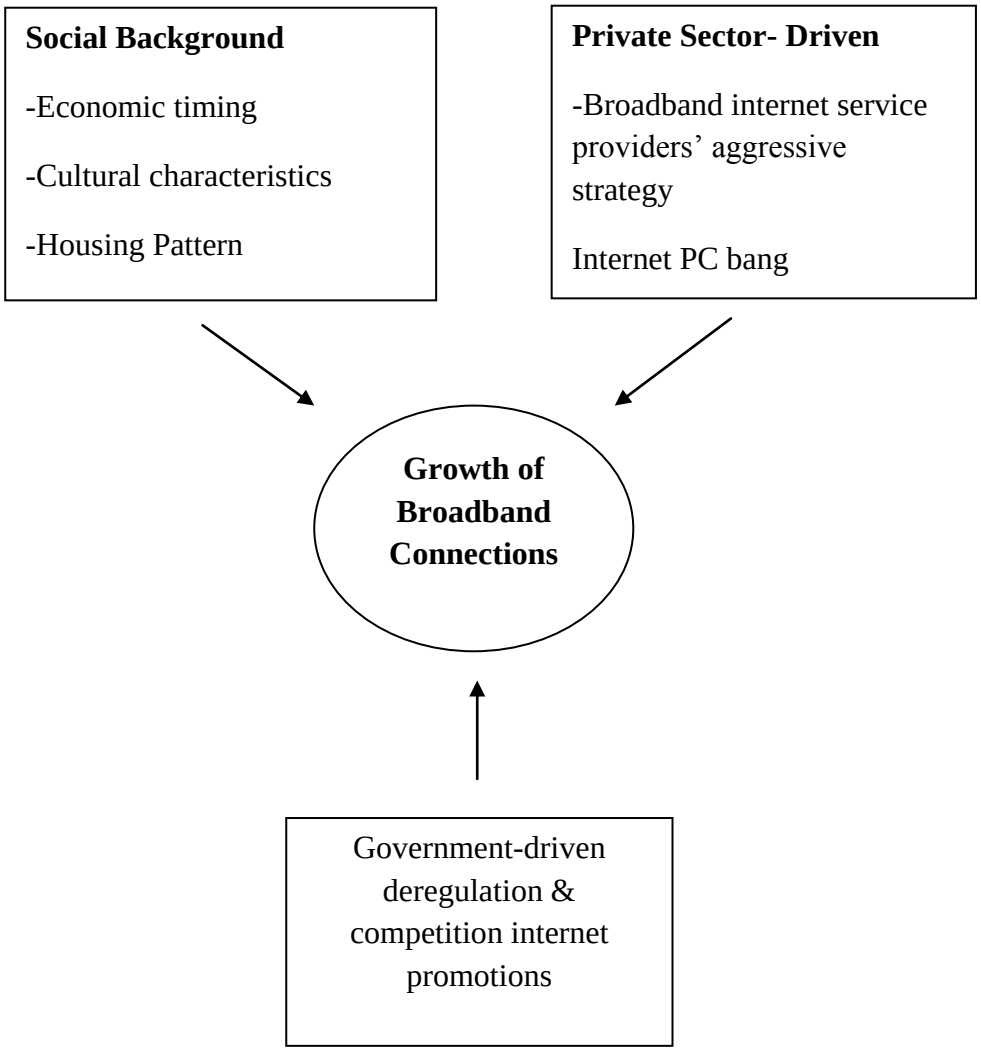


Source: Ministry of Information and Communication of South Korea modified by Emiroglu,S.

Figure 4.11: The Increase of Broadband Subscribers by Technology

Broadband access is perceived as one of life`s necessities among the Korean population (Lee et. al., 2001).

In addition, below Figure 4.12 indicates that social background, private sector driven strategies, government driven deregulation and competition internet promotions have played important role in growth of broadband connections in South Korea



Source: Lee et. al., 2001

Figure 4.12: Contributing Factors to the Internet Development in Korea

4.5.2.1 Government Role in Broadband Penetration

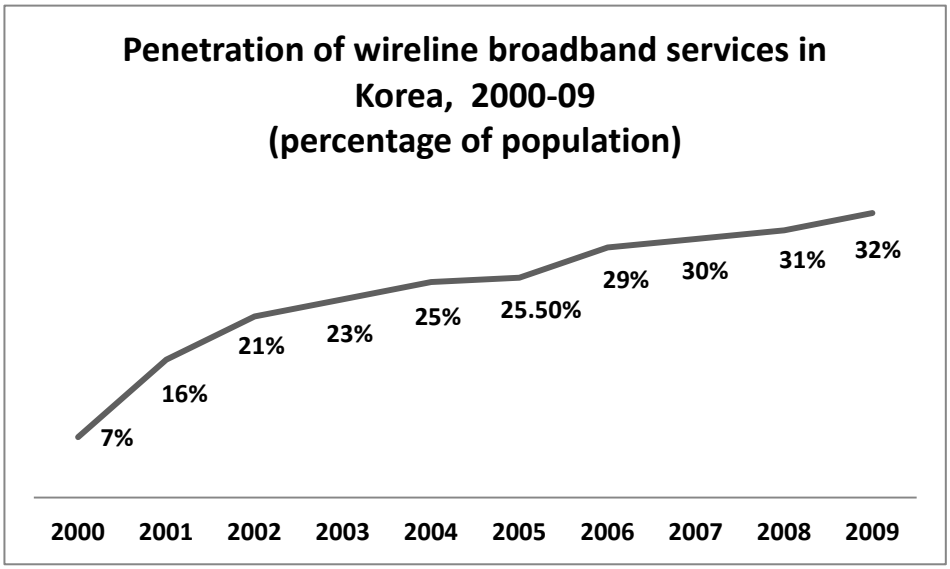
As mentioned in previous parts in the mid 1950s Korea struggled with poverty. But in 1970s and 1980s Korea had a booming economy which

was based on heavy industry and manufacturing. Until mid 1990s traditional manufacturing and automobile industries were the major drivers of the Korean economy. In recent history, because of Asian Crisis Korea had some problems about unprecedented rates of unemployment and bankruptcies. This crisis caused Korean Government find new way to overcome crisis and to recover. After 1997s economic crisis, Korea was forced to borrow from IMF. Thus, Korea was subjected to strict rules and financial control of IMF. Despite this strict financial control, Korean Government determined and applied strict information technology policies for a new information based economy and for making the broadband a universal service in all Korea like telephone service. To sum up, Korea gave more importance to information and communication technologies.

Government invested more than 0.25% of the GDP to build a high speed backbone and is also providing more than 0.2% of GDP in soft loans operators from 1999 to 2005. (Economist intelligence unit, EIU Country Data: South Korea, Japan, USA.2003). Briefly Korea was able to turn economic crisis into opportunity that is to say Korea used big amount of IMF supports to invest information infrastructure. Moreover, Korean Government gave importance to internet and ventures and also encouraged internet ventures with tax benefits and low rate loans.

Moreover, Korean Government has taken great interest and has played major role in developing broadband infrastructure and increasing the broadband penetration rate. Government has perceived that development of broadband in South Korea is not only the simply a network or communication service, Korean Government has seen development of broadband is strategic process about transforming to information society. Thus, Korean Government determined strategies and policies to promote broadband diffusion. First Korean Government prepared master plans and at the end of the master plans, these plans were evaluated in the scope of objectives and goals. Beside master plans, Korean Government determined rules and regulations to sustain long term development in broadband infrastructure, encouraged the private sector to invest in broadband

infrastructure to promote broadband diffusion. As indicated in Figure 4.13, penetration of wire line broadband increased from 7% to 32 % from 2000 to 2009.



Source: Kim et. al., 2010 modified by Emiroglu,S.

Figure 4.13: Penetration of Wire line Broadband Services in South Korea, 2000- 09 (percentage of population)

4.5.3 Plans and Policies in the scope of Information Society

South Korea completed its industrialization in a short period and showed rapid growth among developing countries. Consistent and stable policies of South Korea played important role in developing the ICT and transforming to information society. Government applied plans and projects which were about transforming to new economy. With these policies, Korean Government provided that South Korea has been first country among the developed countries in the field of ICT. (ITU,2003: 33-34)

> Korea has drawn international attention for its success in constructing a national information infrastructure. Policy researchers in various countries have begun to analyze Korean Policies on informatization, promoting the use of information technologies to enhance work efficiency and quality of life. These policies from part of Cyber Korea 21 which was put forward by the Korean government in 1999 as the blueprint for

> Korea's development of an information society in the 21st century (Yoon, Sonn, 2003: 231).

South Korea noticed the importance of transforming to information society in countries' socio-economic developments. Although economic crisis effected negatively, government did not give up determining and applying information society related policies. As mentioned above, although IMF forced to apply some strict financial rules, government did not apply them. Korean Government determined and applied its policies considering its own internal factors, socio economic dynamics. Briefly South Korea was not under the influence of hegemonic organizations and chose Strategic Model in transforming to information society related policies.

i. National Computerization Plan (1987-1996)

It was the first big project to spread the ICT systems and applications in national field. The aim of this project was enabling the exchange of information between ministries, private sectors, financial institutions and public in digital area. During this plan, Korean Government started privatizing of South Korea Telecom in 1989.

ii. KII Master Plan (High--Speed Information Infrastructure Plan) (1995)

This plan included the developing ICT applications, promotion of the research and development activities related ICT, pilot ICT related projects and the establishment of high speed internet network. In the scope of this plan government ensured the cooperation between public and private sector. Korean government encouraged the private sector investing in the long term ICT related investments and provided the forming the ICT

support fund to encourage the ICT related research studies. In addition, Korean Government provided the test fields to support the research activities of private firms and to decrease the risk of private firms. Furthermore, this plan included certificate programmes which were related developing broadband internet for buildings.

iii. A Blueprint for an Information Society (1996-2000) Informatization Promotion Committee

Under this plan, Korean Government prepared informatization related annual plans for many sectors for instance public sectors, universities. In addition, "Informatization Promotion Committee" was set up. This committee was the highest decision making body and president headed this committee. ICT related projects were evaluated by this committee.

iv. CYBER Korea 21 (1999-2002)

Cyber Korea 21 was prepared to remove the negative effects of 1997 Crisis, to skip the economic recession and to provide the steady growth of South Korea. In the scope of Cyber Korea 21, transforming to information society, steps to be followed to increase the effectiveness of ICT was analyzed. The increasing the quality of society, providing the computer processor to secondary and high schools, increasing the educated labor force in the field of ICT and increasing the competition in the domestic market via supporting e-trade were determined as aims of this plan.

v. Electronic Government Act (2001) Special Committee of e-Government

This plan includes providing public services and bureaucratic procedures through internet. The aim of this plan is making public services

and bureaucratic procedures more rapid and more transparent via internet. To apply this plan "Special Committee of e-Government" was set up. This committee consisted of experts from private and public sectors.

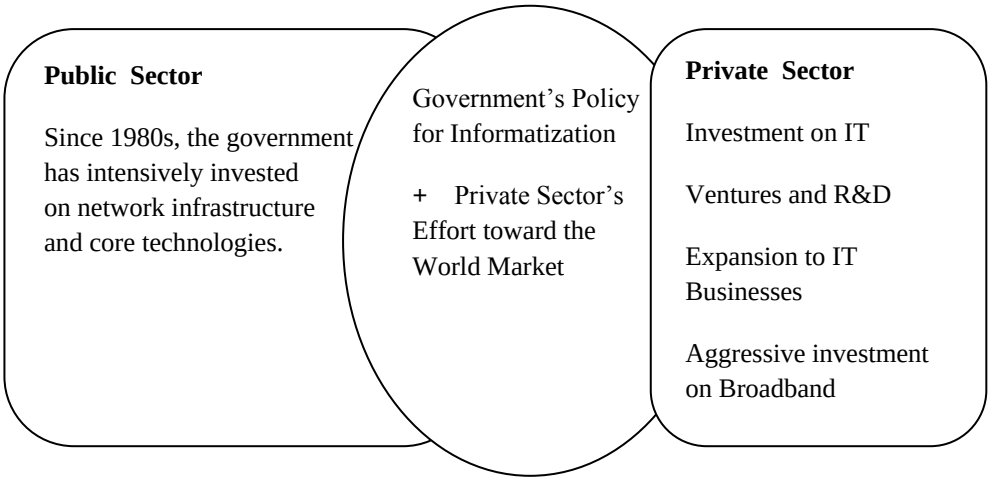
vi. e-Korea Vision 2006 (2002-2006)

This project firstly aimed enhancing the ICT infrastructure and decreasing the effects of the digital divide. Scope of this project, Korean Government planned to invest in ICT infrastructure more than 53 billion dollars. Enhancing the e-government studies, supporting schools to use the more complicated ICT applications, making the internet users more than 90 percent of the Koreans were some of important targets of this project. In addition, Korean Government believed and targeted that they would increase its competitiveness in international area and would be leader in the new economic area of the world via ICT investments and applications.

Especially after 1990s, necessity of educated labor force increased in the field of ICT. Thus, Ministry of Information and Communication (MIC) invested more than 1 trillion to support the education and to increase the basic research capacities in the field of ICT. (Hong Choi ve Kim, 2004) In addition them government supported the ICT research centers and developed ICT education related overseas scholarship programmes (Hong,Choi, Kim,2004). Briefly, as seen in the examples, South Korea used "Public-Interest Model" to enable accessing the ICT of all segments of society to prevent the digital divide.

Beside these plans, government established "Informatization Promotion Fund" in 1993 to finance projects which are about transforming information society. This fund is encouraged by the contributions from both private and public sector. "Informatization Promotion Fund" are used for ICT related R&D activities, diffusion of broadband infrastructure. Until the founding of the KCC the fund was managed by MIC (Ministry of Information and Communication) and IITA (Institute of Information Technology

Advancement) and now the fund was managed and administered by Ministry of Knowledge Economy.



Source: Korean government-driven ICT policy: IT 839 Strategy, (ETRI),2005

Figure 4.14: National Consensus on IT Development

As mentioned in Figure 4.14, there has been national consensus between private and public sector on IT development of South Korea. For instance "Informatization Promotion Fund" includes the contributions from both private and public sector. Furthermore, "Korea Information Infrastructure Project" started in 1995 and it included; construction of national high speed public broadband, development of ICT and R&D projects.

vii. IT 839 Strategy

IT 839 Strategy like "Korea Information Infrastructure Project" aimed to develop ICT services between 2004 and 2010. This strategy also aimed to create the Broadband Convergence Network (BcN) which allowed sending voice, text and video in the same transmission lines. The IT 839 program could cost the government and private industry $70 billion by 2010.

> Much of the funding for Korea‘s broadband infrastructure projects has come from the private sector rather than the public sector. Whilst the Government invested more than US$900 million in the KII project, this is a small proportion compared to the total investment in KII of US$33 billion overall and represents just 8 percent of the Government‘s total IT budget between 1998 and 2003. By comparison, public sector investment in e-Government development comprised 20 percent of the IT budget during this period. Similarly, the government‘s budget for the BcN was just $62 million—most of the foreseen investment was expected from the private sector” (Kim et. al., 2010: 23).

Moreover, Korean government has applied “the Cyber Building Certificate System” since 1999. The aim of this system is to apply high speed telecommunication capacity to all office and apartment buildings.
In the spread of internet and the computer usage beside the government grants, private sector subsidies provided great contribution.

4.5.4 South Korean Telecommunication

Until 1980s, telecommunication services of South Korea were conducted by Ministry of Post and Telecommunication. Providing the phone line to houses was the main responsibility of this ministry. As mentioned previous titles, with export led development and light manufacturing industry, life standards of Korean increased. Therefore, phone line demand increased among society. In time, Ministry of Post and Telecommunication could not meet increased phone lines demands. To meet the increased demand and to provide more speed internet to society, telecommunication services was divided from Ministry of Post and Telecommunication and the management of telecommunication services was given to South Korea Telecom.

In 1990s Korean Government opened telecommunication market to competition. In 1989 government started to privatize of South Korea

Telecom. Until 1989 South Korea Telecom was the monopoly in telecommunication services. In 2002, government completely pulled its hand from telecommunication market (ITU, 2003: 5).

Furthermore, mobile communication services started in 1984 with setting up South Korea Mobile Telecom. During the privatization of the South Korea Mobile Telecom, South Korea signed Base Telecommunication Agreement with World Trade Organization and opened its market to foreign firms. (Hong, Choi, and Kim,2004: 186)

As mentioned previous title, in 1995 South Korea legislated the "Basic Law on Informatization Promotion" and in 1996, established the Informatization Promotion Fund". In 1997, South Korea formed its first inter-ministerial Informatization Strategy Council. This council chaired by President. In 1999, South Korea implemented the "Cyber Korea 21 Initiative".

Since the mid 1990s to build information society, The Ministry of Information and Communications (MIC) determined and applied a policy which was about high speed telecommunication infrastructure. The Ministry of Information and Communications (MIC) gave a license to Hanaro Telecom Inc. to compete against Korea Telecom. For instance The Hanaro Telecom was licensed in 1997 for the local call carrier but it was too difficult for Hanaro Telecom to compete against Korea Telecom because Korea Telecom has high quality service, low cost thus The Hanaro Telecom decided to focus on high speed internet access. In times Korea Telecom noticed the competition in high speed internet access but because of the high initial investment and low demand Hanaro Telecom planned to launch its own ADSL Service later. After Hanaro's success the Korea Telecom strengthened its ADSL Service. Because of the competition Korea Telecom gave importance to high speed internet to catch the Hanaro Telecom.

In Korea government has applied entry regulation for voice telephone services however government has applied no entry regulation for internet services. If someone wants to enter Internet business, can enter easily

because there is simple procedures of registration. This open policy has caused to severe competition between broadband network providers of different technologies for instance ADSL, Cable modem, LAN internet. The Korean government gave low fee for broadband internet access.

4.6 Summary

Firstly, this chapter analyzed the explanation of the Korean Development via Ideologies. Scholars who studied the ideologies via factors analyzed. The development of South Korea was divided and studied into three periods; 1960s-1970s, 1980s-1990s and 2000s.

1960s - 70s were the major periods for South Korea. Because lacking of capital, South Korea focused on light manufacturing industry. Then, focused on heavy manufacturing industry and gave importance to export promotion strategies. Since 1960s, South Korea began having competitive power in international markets. Korean Government determined and targeted main industry fields to encourage especially in international markets.

Especially after 1980s, Korean Government noticed the relation between development and deployment of information and communication technologies thus, began to give importance and to prepare information and communication technologies related policies, strategies. Furthermore, Korean Government decided to invest in ICT related infrastructure investment, determined plans and policies to increase the usage of internet, deployment of ICT and to decrease digital divide.

This thesis comparing the science, technology and information society related policies of South Korea and Turkey thus, this chapter contributed to thesis in terms of South Korea with analyzing information society policies in the scope of science and technology related policies of South Korea. Furthermore, “Deployment Policies in the field of ICT” and “Network Models” used in analyzing the transforming to information society period of South Korea.

CHAPTER 5

COMPARISON

> We want to be able to use these events to help in assessing economic policies that may affect growth rates in other countries. But simply advising a society to "follow the Korean model" is a little like advising an aspiring basketball player to "follow the Michael Jordan model." To make use of someone else's successful performance at any task, one needs to be able to break this performance down into its component parts so that one can see what each part contributes to the whole, which aspects of this performance are imitable and, of these, which are worth imitating. One needs, in short, a theory (Lucas, 1992: 252).

As emphasized in the Lucas's quotation, this study does not aim to suggest the same policies with Korea for Turkey's transformation through being an information society. Instead, analyzing and taking as an example of Korea's successful science, technology and transforming to information society related policies and suggesting the effective new policies to Turkey. These suggested policies will be combined with the Korea's successful policies and Turkey's own socio-economic dynamics.

In 1950s, Turkey and South Korea had similar characteristics in terms of basic economic and social indicators. Such as, these two countries had almost the same population. In 1955, Turkey had nearly 24 million, South Korea had nearly 21 million population (http:// www.worldbank.org). Furthermore, both countries were in underdeveloped group, and also certain poor countries. In fact, South Korea was almost poorer country than Turkey. According to United Nations statistics, in this period there were only two countries which were poorer than South Korea in Asia; India and Burma (Krueger, 1987:13). Moreover, in 1955, Although GDP of Turkey was 50.528 million $ and GDP per capita was 2.093$, GDP of South Korea was

25.191 million $ and GDP per capita was 1,169 $ (http://nso.go.kr). As shown in above statistics, Turkey was quite richer country than South Korea in terms of GDP per capita. In addition, in 1950s, the economies of both countries were based on agriculture. In 1955, the share of agriculture in GDP was 44.9% in South Korea and the share of agriculture in GDP was 41.9% in Turkey (Kruger, 1987: 13).

Especially in recent decades, South Korea's sustainable economic development and successful transformation through being an information society is an important topic. How has Turkey become a latecomer in the comparison with South Korea? Why did not Turkey perform a similar success for science and technology and also establishing information society infrastructure? These questions could be explained around different factors which mainly include countries' socio-economic factors and dynamics.

As highlighted in the previous chapters, since 1960s, technological development of South Korea includes three phases; duplicative imitations in 1960s and 70s; creative imitations in 1980s and finally innovations since 1990s. Actually, during this technological development, South Korea achieved the importing, assimilating and generating its own technology. South Korea preferred assimilation, adaption, application and creation of the advanced technologies thus, used reverse engineering strategy.

In addition, in all these periods Korean government has played major role as a policy maker. For instance South Korea was the first developing country which founded Ministry of Science and Technology. It shows that Korean government was willing to control the science and technology related aspects under its own control.

Furthermore, in development of South Korea, external forces played a significant role. Because of the political conflict between South and North Korea, Japan and USA supported and helped the development of South Korea. Especially, during the industrialization period the percentage of FDI and FLs were very high in South Korea. Besides FDI, many engineers came from these two countries to Korea for training the Korean engineers and many Korean engineers were trained in abroad, specifically in Japan and

USA. Although there was a clear Japan and USA's assistance to South Korea in science and technology aspects, Turkey did not take such effective assistance from its strategic partners. Because the political and strategic environment strongly affect relations between nations.

In addition, importance for education investments also provided significant contribution to South Korea's development. Korean government has always emphasized the importance of education in country's development especially while assimilating and generating its own technology. Especially in 1960s, although South Korea had low growth rates, Korean government increased education spending. In time, long-term education policies created talented, qualified human resources for South Korea. Moreover, South Korea applied reverse brain drain programs to call back the scientists who lived in Japan and USA. Although South Korea applied brain drain program in 1980s, Turkey applied this brain drain program in 2012. "Delay problem" is one of the reasons in lagging behind of Turkey. As mentioned in thesis, Turkey has determined similar policies; however, Turkey has implemented related policies quite lately.

On the other hand, export has great importance in development of South Korea. Especially in industrialization process Korean government noticed the importance of export in countries' development. Hence, Korean government encouraged the export with tax exemptions, providing financial credits at zero or negative interest rates. By this export policies, although in 1960 the export was nearly 33 million $ and iron was the first in export list in South Korea, in 1990 export was nearly 65 billion$ and electronic materials were the first in export list in South Korea (http://www.bok.go.kr). As shown in numbers, export has great importance in industrialization of South Korea. In time, national export revenue increased, thus, government allocated more financial resources on science and technology related fields and information and communication infrastructure- specifically on telecommunication.

Furthermore, protection of intellectual property rights in late is another important factor in South Korea's development process. As in all

developing countries, in the beginning of the industrialization period, South Korea did not give importance to application of intellectual property rights because they used duplicative imitation strategy. However in time, after transforming to creative imitation and innovation process stages, the number of patent registrations increased. The intellectual property strategy was not applied in a similar way in Turkey. During Turkey's industrialization period, before innovation stages, strict intellectual property rights protection was applied by governments. These strict laws made negative impact on imitation and learning capability of local industries of Turkey.

At the beginning of the industrialization, Korean Government controlled the entrance of FDI in South Korea market. Korean Government applied strict rules to restrict the entrance of the FDIs into country. Thus; the number of FDIs was lower in South Korea than other developing countries. If government had allowed the uncontrolled entrance of more FDI, maybe they could not pass the innovation process and could not achieve this technological development.

Moreover, in 1980s, financial and trade liberalization became popular in the world. Thus, South Korea adapted to financial and trade liberalization policies in general. Although South Korea encouraged financial and trade liberalization, there was always government control and intervention. As mentioned in previous chapters, Samsung's desire to enter the automobile sector is a good example for this strategy. As South Korea, Turkey kept up with the liberalization fashion. However, in Turkey with liberalization, interventionist policies of government decreased in a certain manner. In the governance of Turkey, developed countries, hegemonic organizations and important political figures began to take the responsibility and rights especially in the forming the national policies.

Furthermore, in 1980s during transforming from industrial society to information society, South Korea noticed the importance of information and communication technologies and infrastructure and transforming through information society in socio-economic development. In addition, as all over the world, Korean government has started to concentrate on information and

communication technologies related fields. South Korea was late in transforming to industrialization period. Thus, to avoid this failure again, Korean government gave more significance to transforming to information society via information and communication technologies infrastructure. As highlighted in the previous chapters, especially after 1980s, government determined and applied many policies and plans related with transforming to information society. Korean government invested in infrastructure of information and communication technologies. Although in 1997 Korea was negatively affected from economic crisis, the government did not obey the financial pressure of IMF and continued to invest in infrastructure of information and communication technologies. This case shows that Korean government used *Strategic Model* in policy formation. Although South Korea used Strategic Model and prepared policies considering its socio-economic factors, Turkey preferred *Idealist Model* and did not take into consideration its own socio-economic dynamics generally, instead applied the suggested policies. As highlighted in previous chapters, Idealist Model began to prevail in policy formation in Turkey. Although Turkey was torn between Idealist and Strategic Model for a while, Turkey had to choose Idealist Model because of the effects of liberalization, globalization and the pressures of hegemonic organizations (World Bank, IMF etc.). Moreover, political parties also advocated this model, because the policy makers believed that budget deficit and economic problems could be solved by mass privatization policies without government intervention.

In addition, in South Korea to prevent the digital divide, government prepared several programs and projects. These projects aimed to teach the internet and its usefulness for nearly half a million of poor family students. Government expanded high speed internet network, provided access to the computers to overcome the digital divide. To make easier the transforming to information society, Korean government applied computer literacy programs and these programs included housewives, students, prisons, and also soldiers. Applied policies and programs have certainly influenced South Korea in a positive way. Because, as mentioned in previous chapters

among all countries South Korea's information society indicators has shown significant increase rates in recent years. As shown in examples, Korean government mainly used *Public Interest Model* in the deployment of the internet and telecommunication services. Because "Public-Interest Model" emphasizes the purpose of making information and communications services available to all people, nationwide at a reasonable charge or free. (Başaran, 2005: 107-8)

From Turkey's side, although in 1996 internet access in public places conceptualized, this project was not applied in Turkey. Then, Turkish government decided to abandon the diffusion of internet to market forces. In a word, government applied *Social Darwinist Model*. This model based on the assumption that only free market can guarantee optimal distribution in a perfectly competitive market (Başaran,2005: 108).

Turkey has determined and applied programs related with transformation to information society. For instance, Turkey applied programs to increase the computer and internet usage among students however in 2000s, not in 1980s as in South Korea. However, Turkey has lagged behind South Korea in information society indicators. "Time delay" is one of the reasons for this backwardness.

Furthermore, widespread information and communication infrastructure created a suitable environment for South Korean firms in order to export to foreign markets. In fact, there is a positive dynamic loop in this strategy. Government allocated the important amount of export revenues to ICT infrastructure and in time, with developing ICT infrastructure, Korean firms could integrate easily with globalized markets, thus, the export revenues increased with this strategy.

In all these cases, Korean government's foresight related to being aware of the contribution of information and communication infrastructure to socio economic development is the shared success point.

As mentioned above, successful foresight is significant factor in countries development. In Turkey, the importance of scientific and technological foresight studies was noticed later than other developed

countries. Especially after 1990s, the importance of transforming to information society and ICT has begun to gain importance in development plans of Turkey. Moreover, in first development plans, science and research related topics were examined without setting direct relations with industrialization and socio-economic factors. Countries' science and technology policies could not be examined without the socio-economic factors, thus this policy method had negative effect on development period of Turkey.

In addition, during the fourth development plan period, "Supreme Council for Science and Technology" was established to determine the science and technology policies of Turkey. However, this council did not hold on meeting in regular basis until 2005. In Turkey, policies have been determined related with science and technology, however, there have been problems in practice and these problems have affected negatively the socio-economic development of Turkey. Although Turkey noticed the importance of information society in policy dimension in similar years with South Korea, Turkey lagged behind of South Korea in information society indicators, because of its deficiencies in applications of plans and strategies related with transforming to information society.

Additionally, in Turkey, especially in 1980s, chronic political and economic crisis prevented the information and communication infrastructure investments. Although South Korea insisted on ICT investments despite 1997 economic crises of Asia, Turkey decreased its investment plans. Thus, transformation through information society was also affected negatively in longer term in Turkey.

To sum up, government policies and strategies and also their application methods and national priorities are strongly affect the nations' science and technology related investments and also national effort through being an information society.

Table 5.29: Comparison of South Korea and Turkey with Scientific and Technological Indicators

South Korea	**1989**	**1990**	**1995**	**2000**	**2005**	**2010**
High Technology Exports (current Billion US $)	10,2	10,93	29,78	54,33	83,91	-
Patent applications,resident	7,02	9,082	59,23	72,831	122,188	131,805
Researchers in R& (per million people)	-	-	-	2,357	3,822	-
Scientific and Technical Journal Articles	-	1,170	3,803	9,572	16,396	-
Turkey	**1989**	**1990**	**1995**	**2000**	**2005**	**2010**
High Technology Exports (current Billion US $)	0,13	0,11	0,19	1,07	0,89	1,35
Patent applications, resident	162	138	170	277	928	-
Researchers in R& (per million people)	-	-	-	363	574	-
Scientific and Technical Journal Articles	-	750	1,715	3,484	7,817	-

Source: World Bank,www.worldbank.org, 2012

As emphasized in above Table 5.29, there is clear gap between South Korea and Turkey since ends of 1980s; in terms of high technology exports, patent application (resident), researchers in R&amp and scientific and technological journal articles.

5.1 ICT and Development Indicators of South Korea and Turkey

As indicated in ”Measuring the Information Society” report of ITU, South Korea ranks first in ICT Development Index.

> Republic of Korea tops the IDI 2010, as it did in 2008. Republic of Korea has been a leader in terms of ICT diffusion and uptake for many years. The country has made ICTs an engine of economic growth and implemented policies allowing it to become an "IT powerhouse". By creating a competitive and dynamic regulatory environment, Republic of Korea has become an inclusive information society, and a number of government-driven initiatives- including "the Giga Internet Pilot Project", which includes the construction of 100 Mbit/ s broadband networks in rural areas – are helping it to meet future demands. It has the highest mobile- broadband penetration worldwide (91 per cent) and very high fixed-broadband penetration (36.6 per cent). It also excels when it comes to households with internet connections (almost 97 per cent of all households). In addition, it stands out on the skills sub-index, with very high performance on all three indicators (secondary and tertiary school enrolment and adult literacy) (ITU Measuring the Information Society, 2011: 12).

As mentioned in "ITU Measuring the Information Society" South Korea was a leader in terms of ICT diffusion. Government driven initiatives played important role in this success. In the scope of "Public Service Model", government gave importance to infrastructure in all areas of country.

Table 5.30: The Information Society

Personal Computers and the Internet				
Use		**Quality**	**Affordability**	**Application**
Computer Users per 100 people	**Internet Users per 100 people**	**Fixed Broadband Internet Subscriptions per 100 people**	**Fixed Broadband Internet Access tariff $ per month**	**Secure Internet Servers per million people**
2010	**2010**	**2010**	**2010**	**December 2011**
K 81.5	K 82.5	K 35.18	K 24	K 2,536
T 41.0	T 39.8	T 9.73	T 19	T 143

Source: 2012 World Development Indicators page 329-330 K:South Korea, T: Turkey

As mentioned in Table 5.30, World Bank first divides information society indicators into two main headings; personal computers and the internet then divided these main headings into four subheadings. These headings are use, quality, affordability and application. In computer users and internet users per 100 people, South Korea is almost twice as Turkey. South Korea has given more importance in broadband penetration thus, although fixed broadband internet access tariff per month of South Korea is more expensive than Turkey, in fixed broadband internet subscriptions per 100 people South Korea is almost four times as Turkey.

Table 5.31: ICT Development Index (IDI) 2010,2008

	Rank 2010	**IDI 2010**	**Rank 2008**	**IDI 2008**
South Korea	1	8,40	1	7,80
Turkey	59	4,42	60	3,81

Source: ITU" Measuring the Information Society",2011:13 modified by Emiroglu,S.
Among 152 countries

As emphasized in Table 5.31, among 152 countries South Korea was rank first in 2008 and 2009 in ICT Development Index (IDI). IDI of South Korea was almost twice as Turkey.

Table 5.32: Access Indicators 2010

Fixed – telephone lines per 100 inhabitants	**Mobile cellular telephone subscriptions per 100 inhabitants**	**International internet bandwidth (bit/s) per internet user**	**Percentage of households with a computer**	**Percentage of households with internet access**
K 59.2	K 105.4	K 11.878	K 81.8	K 96.8
T 22.3	T 84.9	T 19.087	T 44.2	T 41.6

Source: ITU World Telecommunication/ICT Indicators database modified by Emiroglu,S
K:South Korea, T: Turkey.

In all indicators of access part, Turkey lagged behind South Korea. As emphasized in Table 5.32, especially in percentage of households with a computer and percentage of households with internet access South Korea was almost twice as Turkey.

Table 5.33: Use Indicators 2010

	Percentage of individuals using the internet	**Fixed (wired)-broadband internet subscriptions per 100 inhabitants**	**Active mobile-broadband subscriptions per 100 inhabitants***
South Korea	*83.7*	36.6	91.0
Turkey	39.8	9.8	17.8

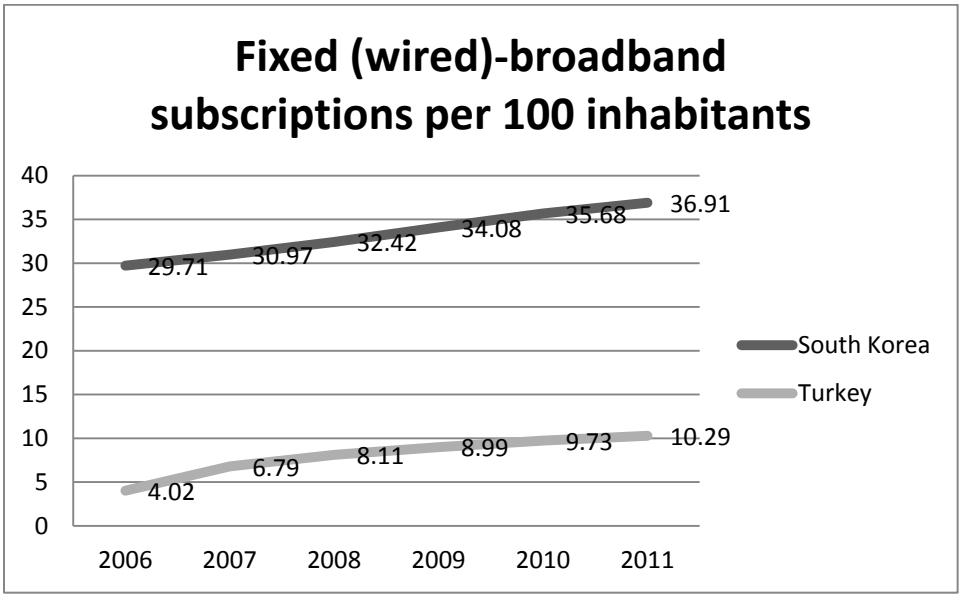
Source: ITU World Telecommunication/ICT Indicators database modified by Emiroglu,S.
Data in italics refer to ITU estimates.

In all also three indicators of use as indicated in Table 5.33, and two indicators of skill as mentioned in Table 5.34, Turkey is lag behind South Korea. South Korea is the leader country in broadband penetration thus, as mentioned in Figure 5.15, there is very important difference among South Korea and Turkey in the active mobile broadband subscriptions per 100 inhabitants.

Table 5.34: Skill Indicators, 2010

	Gross enrolment ratio		**Adult literacy rate**
	Secondary	**Tertiary**	
South Korea	*97.9*	*102.0*	*99.0*
Turkey	*81.8*	*44.0*	90.8

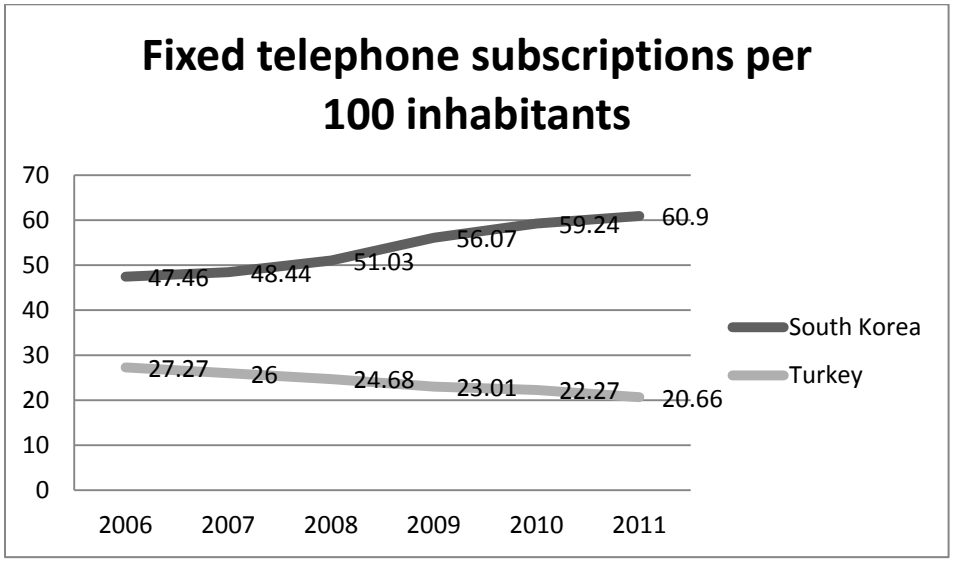
Source: UIS. Latest available data
Note: Data in italics refer to ITU estimates.



Source: ITU (International Telecommunication Union)

Figure 5.15: Fixed (wired)-broadband subscriptions per 100 inhabitants

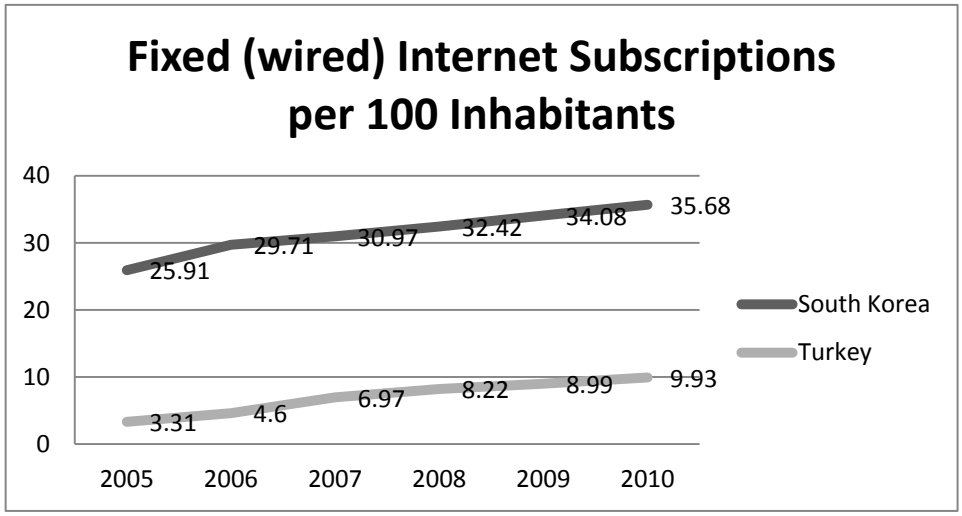
As mentioned in Figure 5.15, since 2006 although the number of fixed (wired)-broadband subscriptions per 100 inhabitants of Turkey has increased, Turkey could not make up the gap and got behind South Korea.



Source: ITU (International Telecommunication Union)

Figure 5.16: Fixed telephone subscriptions per 100 inhabitants

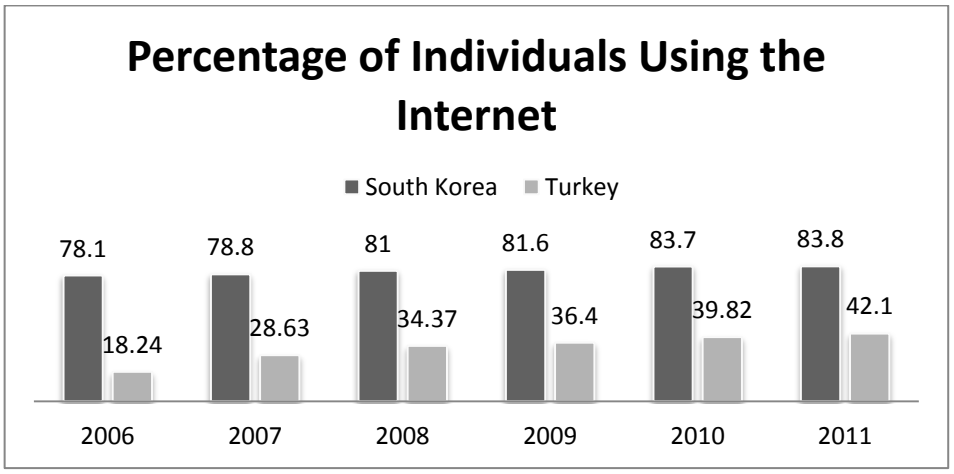
As indicated in Figure 5.16, since 2006, in terms of the fixed telephone subscriptions per 100 inhabitants, there is an increase in of South Korea, there is a decrease in Turkey. Thus, in time Turkey got behind South Korea and could not catch up South Korea.



Source: ITU (International Telecommunication Union)

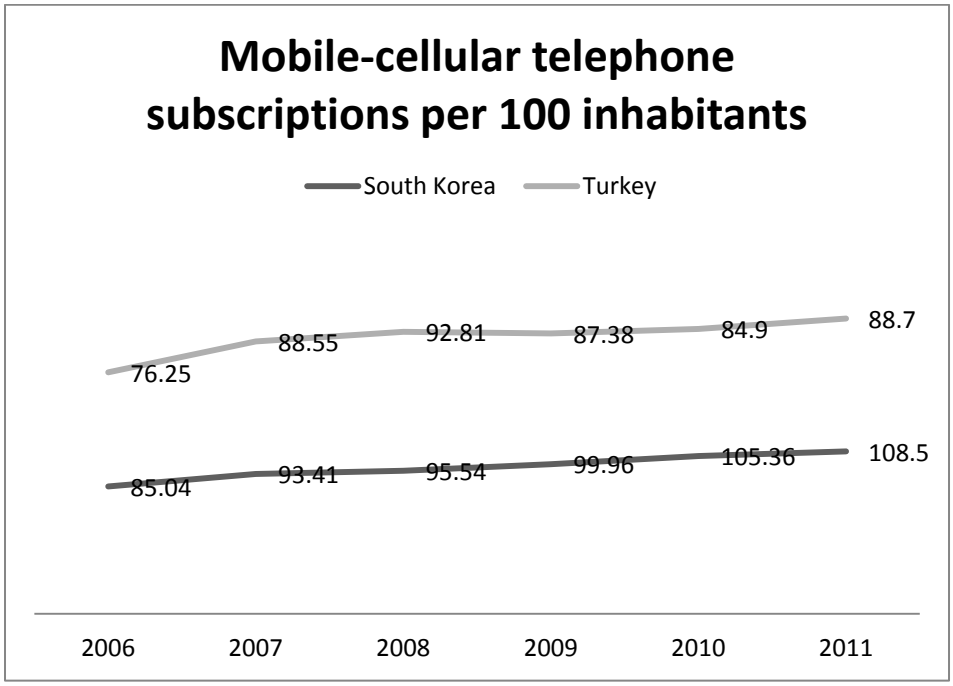
Figure 5.17: Fixed (wired) Internet Subscriptions per 100 Inhabitants

There is a huge difference among South Korea and Turkey in terms of fixed (wired) internet subscriptions per 100 inhabitants. As emphasized in Figure 5.17, although there was an increase in Turkey, the gap is still not closed in terms of internet subscriptions.



Source: ITU (International Telecommunication Union)

Figure 5.18: Percentage of Individuals Using the Internet



Source: ITU (International Telecommunication Union)

Figure 5.19: Mobile-cellular telephone subscriptions per 100 inhabitants

Despite, the percentage of individuals using the internet (Figure 5.18) and mobile-cellular telephone subscriptions per 100 inhabitants of Turkey (Figure 5.19) has shown increase since 2006, there is a huge gap between South Korea and Turkey and this gap is still not closed.

In sum, Turkey and South Korea are compared in terms of ICT and development indicators. As mentioned above, in all ICT and development indicators, Turkey lagged behind the South Korea.

Table 5.35: Deployment policies in the field of ICT and models of network policy formation of South Korea and Turkey since 1990s

	Deployment Policies in the field of ICT	**Models of Network Policy Formation**
South Korea	Public- Interest Model	Strategic Model
Turkey	Social- Darwinist Model	Idealist Model

"Deployment Policies in the field of ICT" and "Network Models" are analyzed in the cases of South Korea and Turkey. As mentioned in Table 5.35 and as emphasized detail in Chapter 3 and Chapter 4 South

Korea used Public-Interest Model and Turkey used Social-Darwinist Model in Deployment Policies in the field of ICT. In addition, South Korea used Strategic Model and Turkey used Idealist Model in Models of Network Policy Formation.

As indicated in the thesis, hegemonic ruler organizations have been more effective on Turkey's policies transforming to information society rather than South Korea. For instance, after 1997s economic crisis, Korea was forced to borrow from IMF. Thus, Korea was subjected to strict rules and financial control of IMF. Despite this strict financial control, Korean Government determined and applied strict information technology policies for a new information based economy and for making the broadband a universal service in all Korea like telephone service. On the other hand in Turkey, although Teletaş and Netaş were certainly important for Turkey's information and communication equipment infrastructure, they were taken in privatization extension. Imposed policies of hegemonic organizations applied great pressure to Turkey during privatization process.

In sum, these two countries gave different responses to hegemonic ruler organizations' policies during their transformation to information society.

CHAPTER 6

CONCLUSION

Since the existence of human being, societies have been in continuous transformation periods. In the fact, each period has its own features and dynamics. Societies which attain to significant improvements are named as developed societies and others developing and underdeveloped countries. Developed countries complete their development processes and pass to next period and also transform their societies according to period's conditions. Then, these developed countries are presented as a role model for developing and underdeveloped countries by hegemonic worldwide organizations.

Between 18th and 19th centuries, industrialization movement effected all over the world and countries' development processes. In that period, countries which completed industrialization were named as developed countries. Transforming to industrial society was shown as target for developing and underdeveloped countries.

In time, information has begun to increase its importance and the term of "industrialization" has not been used as a development criterion, yet. The societies which completed and achieved the industrialization stage, began to transform through information society. Furthermore, there were two previously accepted conditions for transforming to information society; having mature industry and qualified, well-educated labor force.

Especially since the beginning of the 1900s, the importance and the role of information has increased in the countries' socio-economic developments. The period, in which the importance of information has increased significantly, could be defined as transformation period to the

information society. Furthermore, in recent years, besides land, labor and capital, information has come into use as one of important production factors. Instead of manufacturing the commodity which was more important point in the period of industrial society, information and innovation has increased its importance and has taken a determinative role in the way of information society.

Information, particularly technological information, has begun to take strategic role in countries' development. Among developed countries, acquiring of this technological know-how has become significant purpose. To increase information accumulation, firstly countries access information, then use this accessed information and finally tries to get ability to produce their own technology via this information also technological know-how.

Furthermore, through transforming to information society especially after 1980s, worldwide hegemonic organizations as World Bank, International Telecommunication Union have emphasized the importance of information and communication technologies in the scope of countries' development periods. These organizations identify some indicators to determine the information society level of societies. In fact, these organizations and indicators as ICT for development index, emphasize the relation between ICT and development. Furthermore, as mentioned in previous chapters, South Korea and Turkey are analyzed in the scope of these ICT for development index. In terms of transforming to information society, the gap is among the South Korea and Turkey could be shown easily with these indicators. Tables and figures are mentioned in comparison chapter prove this gap with related statistics.

In this conclusion part, thesis makes suggestion to Turkey on behalf of closing the gap in the scope of information society and science, technology indicators. Turkey should realize the relation between being an information society and information and communication technologies in the scope of science, technology and socio economic development. Therefore, closing the gap between developed countries and increasing the international competitiveness forces could be achieved.

Today's developed countries have already realized the relation between technology and socio-economic development, thus invested in relevant fields in long-term perspective. For instance, South Korea is one of these developed countries, completed its industrialization from 1960s to 80s. Especially after the 1990s, ICT investments and transformation through information society effort has made the South Korea as one of the developed countries in the period of information age.

In this thesis, information society policies in the scope of science and technology policies of South Korea and Turkey are analyzed. Furthermore, in this study as mentioned in introduction chapter, answers of the some questions tried to be found. These research questions;

- Does government support have vital role during the transformation period to information society?

As shown in South Korea's case (chapter 4), government support have played major role in transforming to information society period. As emphasized in chapter 4, for instance, thanks to internet training programmes government aimed to eliminate the digital divide between socio-economic classes and regions. Thus, government gave importance on creating internet friendly classrooms to the broadband internet service free of charge. In addition, government offered "Internet and Computer Literacy Programmes". Creating internet friendly classrooms, internet and computer literacy programmes show that Korean Government used "Public-Interest Model" in diffusion the internet. Owing to Public-Interest Model, Korean people could find opportunity to access the internet easily.

- Is there any relationship between ICT infrastructure deployment and transforming to information society?

Especially after 1980s, Korean Government noticed the relation between development and deployment of information and communication technologies thus, began to give importance and to prepare information and communication technologies related policies, strategies. Furthermore, Korean Government decided to invest in ICT related infrastructure investment, determined plans and policies to increase the usage of internet,

deployment of ICT and to decrease digital divide. For instance, OECD survey (2001) put South Korea is the first place out of 30 OECD member countries in the broadband penetration. The survey measures how many broadband connections are available per 100 inhabitants. South Koreans have nearly 10 connections per 100, Canadians have 3.9 connections and US have 2.25 connection. ICT infrastructure deployment has positive effect in decreasing digital divide and transforming to information society.

- What is the relation between information society indicators and national development indicators?

As mentioned in "Three Stages in the Evolution towards an Information Society" figure 2.2, ICT Readiness (infrastructure and access) is one of the stages of ICT Development Index. While ITU is preparing the book of *Measuring the Information Society*, set up the relation between ICT and development and formed the ICT Development Index. As mentioned during South Korea chapter, South Korea's development period and transformation to information society has continued in parallel periods and support each other in a mutual relationship. In addition, today development is called with transforming to information society by ruler hegemonic organizations. Thus, these organizations advocate that there is a positive relation between information society indicators and national development indicators.

In a final word, this study advocates that all countries have their own internal dynamics (education, economic structure, history, social structure etc.) thus, successful model and policies of South Korea might be adapted to Turkey via considering the internal dynamics of Turkey. In brief, this thesis advocates *Strategic Model* during latecomers' catch-up and development processes, because developed countries and hegemonic organizations prepare policies for developing countries without considering these countries' own internal and socio-economic dynamics.

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YAZARIN

Soyadı : Emiroğlu

Adı : Sinem

Bölümü : Bilim ve Teknoloji Politikası Çalışmaları

TEZİN ADI (İngilizce) : Information Society: National Science and Technology Policies in Turkey and South Korea

TEZİN TÜRÜ : Yüksek Lisans [X] Doktora [ ]

1. Tezimin tamamı dünya çapında erişime açılsın ve kaynak gösterilmek şartıyla tezimin bir kısmı veya tamamının fotokopisi alınsın. [X]

2. Tezimin tamamı yalnızca Orta Doğu Teknik Üniversitesi kullancılarının erişimine açılsın. (Bu seçenekle tezinizin fotokopisi ya da elektronik kopyası Kütüphane aracılığı ile ODTÜ dışına dağıtılmayacaktır.) [ ]

3. Tezim bir (1) yıl süreyle erişime kapalı olsun. (Bu seçenekle tezinizin fotokopisi ya da elektronik kopyası Kütüphane aracılığı ile ODTÜ dışına dağıtılmayacaktır.) [ ]

Yazarın imzası Tarih

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