INFORMATION TECHNOLOGIES, THEIR EFFECTS AND POSITION OF TÜRKİYE TOWARDS THESE TECHNOLOGIES AND THEIR EFFECTS

A Master's Thesis

Presented by

Okan Murat DEDE

to

the Graduate School of Natural and Applied Sciences of

Middle East Technical University

in Partial Fulfillment for the Degree of

MASTER OF SCIENCE

in

REGIONAL PLANNING

MIDDLE EAST TECHNICAL UNIVERSITY

ANKARA

September, 1994

Approval of the Graduate School of Natural and Applied Sciences.

Prof. Dr. İsmail Tosun

Director

I certify that this thesis satisfies all the requirements as a thesis for the degree of Master of Science.

Prof. Dr. Tansı Şenyapılı

Chairman of the Department

We certify that we have read this thesis and that in our opinion it is fully adeguate, in scope and quality, as a thesis for the degree of Master of Science in Regional Planning Department.

Prof. Dr. İlhan Tekeli

Supervisor

Examining Comitee in Charge

Prof. Dr. İlhan Tekeli

Prof. Dr. Ayda Eraydın

Assoc. Prof. Yusuf Ziya Özcan

Assist. Prof. Gülden Berkman

Assist. Prof. Murat Güvenç

ABSTRACT

INFORMATION TECHNOLOGIES, THEIR EFFECTS
AND POSITION OF TÜRKİYE TOWARDS
THESE TECHNOLOGIES AND THEIR EFFECTS

DEDE, Okan Murat
M.S. in Regional Planning
Supervisor: Prof. Dr. İlhan TEKELİ
September, 1994, 217 pages.

Until 1980's, it has been talked much about changing socio economic structures, changing economic, social, cultural relations in the world. These type of changes and transformations become the popular subject in academic environments. Which basic factors cause all these changes and transformations? With the help of other factors; existence of information technologies are the basic factor for existence of these changes, because effects of information technologies are accepted as so comprehensive and effective that, they have the potential to start up new information age. On the other hand there are various difficulties about determining certain effects of these technologies. Because firstly, the historical background of these technologies go back to only 15 years ago. Another reality is that, effects of information technologies differ in different social, economic and cultural environments.

The aim of this study is to explain characteristics and effects of these technologies depending on various studies and analysing these characteristics

(infrastructure, usage) and effects in Türkiye. For this reason thesis divided into 3 parts. In first part, general definition and characteristics of these technologies were given. In second parts, basic transformations that caused by these technologies and effects of these technologies were considered in general. After, these effects in the case of Türkiye will be analysed. As a result, I tried to determine the position of Türkiye towards the dynamics of information technologies, Türkiye's advantages and disadvantages towards coming information age. Also I gave all historical developments of information technologies in the world and Türkiye at appendices parts.

Keywords: Information technologies, telecommunication, computer, information age, structural changes and transformations, sectoral effects, spatial effects, Türkiye.

Science Code: 601.06.01

ÖZ

ENFORMASYON TEKNOLOJİLERİNİN ÖZELLİKLERİ, ETKİLERİ VE TÜRKİYE' DEKİ DURUM

DEDE, Okan Murat
Yüksek Lisans Tezi, Bölge Planlama Anabilim Dalı
Tez Yöneticisi: Prof Dr. İlhan TEKELİ
Eylül, 1994, 217 sayfa.

1980'li yılların başından bu yana, sürekli olarak dünyanın değişen sosyo- ekonomik yapısından, değişen ekonomik, sosyal, kültürel ilişkilerden bahsediliyor. Dünyadaki bu tür yapısal değişme ve dönüşümler son yıllarda tüm akademik çevrelerinde ilgilendiği bir konu haline geldi. Peki, nedir bu değişim ve dönüşümlere yol açan temel etmenler ? Birçok faktörün yanısıra, tüm bu değişim ve dönüşümler için gerekli olan ateşleyici enformasyon teknolojilerinin varlığıdır, çünkü enformasyon teknolojilerinin etkileri, yeni bir çağı yani enformasyon çağını bile başlatacak kadar etkili ve kapsamlı görülmekte. Öte yandan, bu etkilerin tam olarak teşhis edilmesindede büyük sıkıntılar mevcut. Öncelikle bu teknolojilerin varlığı ve yarattığı dinamiklerin mazisi en fazla 15 yıl öncesine kadar gidiyor. Bunun yanında, kabul edilen bir başka gerçek ise bu teknolojilerin etkilerinin değişik sosyo- ekonomik ve kültürel ortamlarda daha değişik yaşandığı.

Bu çalışmanın amacı öncelikle, bu teknolojilerin özelliklerini ve şimdiye kadar tartışılan etkilerini birçok kaynaktan derlemek, daha sonrada bu özellikleri (altyapı, kullanım vs.) ve etkileri Türkiye açısından incelemektir.

Bundan dolayı tez üç kısıma ayrıldı. Birinci kısımda teknolojilerin tanıtımı ve özellikleri yer aldı. İkinci kısımda enformasyon teknolojilerinin yarattığı değişim, dönüşümlerle beraber, bu teknolojilerin belli başlı etkilerini genel anlamda ve küresel düzeyde açıkladım. Daha sonra ikinci kısımda izlediğim yolu Türkiye'deki durumun incelenmesi konusundada uyguladım. Sonuçta Türkiye'nin bu teknolojilerin kullanımı, gelişmişliği ile ilgili olarak dünyadaki yerini saptamanın yanısıra, Türkiye'nin gelmekte olan enformasyon çağı karşısındaki potansiyelini, avantajlarını, dezavantajlarını ortaya koymaya çalıştım. Bu arada, dünya ve Türkiye'deki tüm enformasyon teknolojisi ile ilgili tarihsel gelişmelere ayrıca ek kısım olarak tezimde yer verdim.

Anahtar Kelimeler : Enformasyon teknolojileri, telekomünikasyon, bilgisayar, enformasyon çağı, yapısal değişim ve dönüşümler, sektörel etki, mekansal etki, Türkiye.

Bilim Dalı Sayısal Kodu: 601.06.01

ACKNOWLEDGEMENTS

First and foremost I owe graditude to my supervisor Prof. Dr. İlhan Tekeli. His constructive comments and and supervision, played important role on completion of this thesis.

Also I am grateful to Yusuf Ziya Özcan, Ayda Eraydın, Murat Güvenç and Gülden Berkman who accepted to attend to my thesis jury.

Special thanks go to Orhan Kuntay in Gazi Üniversitesi for giving me permission to study my thesis.

My gratitudes go to my parents Nazire Dede and Turgut Dede for their patience and support throughout the study.

Last, but not least special thanks go to my friends Hayber Hüseyin Gedar, Nurçin Çelik, Tülin Okumuş, Tahir Çalgüner, Melih İnce, Elvan Gülöksüz, and my relatives Fatma Soy, Şevki Soy and Arif Yenidikici for their moral support.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF NOMENCLATURE

ATM: Automated Teller Machine

ATM: Asychronous Transfer Mode

BT: British Telcom

CAD: Computer Aided Design

CAE: Computer Aided Education

CAM: Computer Aided Manufacturing

CEFOS: Central European Fibre Optic System

CIM: Computer Integrated Manufacturing

CNC: Computer Numeric Controlled

CSNET: Computer Scientists and Engineers Network

EARN: Auropean Academic Research Network

EFT: Electronic Funds Transfer

EMOS: East Medittrean Optic System

EPOS: Electronic Point of Sale

ETSI: European Telecommuncations Standarts Institute

EUTELSAT: European Telecommunication Satellite System

FMS: Flexible Manufacturing Systems

HDTV: High Definition Television

IBS: International Business Systems

ISDN: Integrated Services Digital Network

ISO: International Standarts Organization

ITU: International Telecommunications Union

JIT: Just in Time

LAN: Local Area Network

MAN: Metropolitan Area Network

M.E.: Ministry of Education

MIS: Management Information Systems

NSF: National science Foundation

NWICO: New World International Communication Order

OSI: Open Systems Interconnection

PCM: Pulse Code Modulation

POS: Point of Sale

PTT: Postal Telegraph and Telephone

R-D: Research and Development

SBS: Satellite Business Systems

S.I.S.: State Institute of Statistics

SITA: Internationale des Telecommunications Aeronatiques

S.P.O.: State Planning Organization

SWIFT: Society for Worldwide Financial Telecommunications

TDM: Transfer Domestic Mode

T.I.S.: Turkish Informatics Society

T.S.I: Turkish Standarts Institute

VLSI: Very Large Scale Integration

VSAT: Very Small Aperture Terminal

WAN: Wide Area Network

CHAPTER I
INTRODUCTION

There are two important subjects concerning information technologies. One is the theoretical base of these technologies and their effects. This theoretical base includes relation between technological change and socio- economic structures. Second important subject about the information technologies is the question of; whether or not these technologies really causes a revolution.

If we examine the first subject in detail, we can explain information technologies using technology- economy relationships. In general, neo classical economic theories take technological changes as an external condition, and it is accepted that the reasons of technological changes can not be known. Because of this condition, restructuring of economy and industrialisation problems are seen only as capital accumulation problems. According to one thought, it is not possible to understand restructuring of economy and its development dynamics with using only neo- classical economic theories. Also, Keynesian theories are not useful to understand all these changes. These theories are very far to understand new dynamics that all the world confront. (Freeman, 1989: 7)

In, Freeman and Perez's techno- economic paradigm studies; technology is taken as internal factor that plays a role on restructuring of economies. This theorem refuses capital accumulation as the most important source of productivity increase and rapid development. On the other hand, this theorem emphasises the importance of technological change for production of new materials and new technics for production of existing

products. The structural renewal of economy depends on innovation of new technologies, diffusion of existing technologies and development of national technological capacity. (Saner, 1993: 40)

If we compare effects of information- communication technologies with effects of other technological changes, we understand that, in 1990's, only information- communication technologies can be seen as techno-economic paradigm change. Information technologies become the key of all technologies. These technologies have several effects on all sectors and their effects are so universal that, these results can be interpreted as "the information technologies become the only techno- economic paradigm change." (Freeman, 1989: 10) This change creates a new wide activity area that includes new products and services.

According to one view, information technologies can be accepted as fifth Kondratiev cycle. (Inose, 1984) These technologies can be perceived as fifth Kondratiev cycle when we think about its potential to create new employment opportunities. On the other hand, there are fundamental differences between information technologies and other technologies that were the cause of 4 Kondratiev cycles. This difference stems from two situations. Firstly, these technologies do not succeed any other technology. Secondly, these technologies creates dynamics that can alter deeply all socio economic structures. Even, these technologies add another dimension to existing structure, called as Info- Socio- economic structure. (Toffler, 1991: 56) Another condition also shows us that, these technologies are not fifth Kondratiev cycle. We can group all Kondratiev cycles up to now, in one category, because all decision making processes were organised by human beings, but now it became partially organised by computers. May be in future, creation activity would be organised by computers. Besides these determinations, information technologies are developing more rapidly than technologies of other Kondratiev cycles. For example; in U.S.A., 50 % point of substituting of data transfer to voice transfer was calculated to happen in

2008, but this point was reached in 1990. This example is considered as discrediting Kondratiev interpretation. (Irvin, 1993: 12) No other technologies were developed more rapidly than information technologies. This is quite normal, because information as a basic material of information technologies is inexhaustible. (Toffler, 1991:75)

As a result of these theoretical explanations; information technologies can not be explained by classical economic theorems. With development of information technologies, new theorems may come into existence that explain the position of these technologies in socio- economic systems. Because the role of information technology on all systems becomes very important and crucial.

After we based information technologies on appropriate theoretical basis, we can start to discuss whether these technologies cause an information revolution like an industrial revolution or not.

In general, information technologies are the technologies which orders information and which are responsible from all functions of information. But why information is so important that it has the ability to change today, and will be the most important factor in future? Importance of information comes from the situation that "all resources depend on information and knowledge. In order to utilise any resource, an information on it has to be known at first. So information becomes an important factor that determines values of all resources. This interpretation attributes a social value to information behind its economic value, because all social activities are shaped according to existing information" (Avcı, 1990:91) The impact of information on value of all resources is not a new concept, but with the help of information technologies, the importance of information becomes seriously understood.

Besides, as a first step; information technologies are percepted as

technological means.(Communication technologies, informatics applications, computer technologies.) But debates are not occurring only on technological basis. Main debates are concerning whether these technologies cause new developments, new trends in the world.Point to be argued is that, are these technologies cause a new revolution like industrial revolution?

According to one approach, in order to compare a formation with industrial revolution, it has to be effective on all dimensions of society. Partial revisions on several jobs can not be compared to industrial revolution. (Rosenbrock, 1981 in Avcı, 1990:68) Also, according to this kind of thought, it is wrong to relate structural changes only with information technologies. Other developments like genetics are also effective on the changes in the world.(Ibid) But very near studies showed us that; information technologies are at the first stage concerning the economic significance of various technologies. The difference of information technologies from other kind of technologies can be followed in the table at below.

Table 1: Economic Importance of Several Technologies (Out of ten)

	Space	Nuclear	Biology	Material	INFORMATION
New products/services	2	2	4	4	9
Application capability to different sectors	2	2	4	4	10
Reforming existing system and products	2	1	3	4	9
Industrial relation	3	2	3	4	10
Social appropriation	6	3	5	6	9
Employment opportunities	1	1	2	9	10

Source: Durgut, 1992, pp:284

Even, these technologies will save their chief condition in the future. Another study which was done in 1984 can show this condition to us. (See Figure . 1)

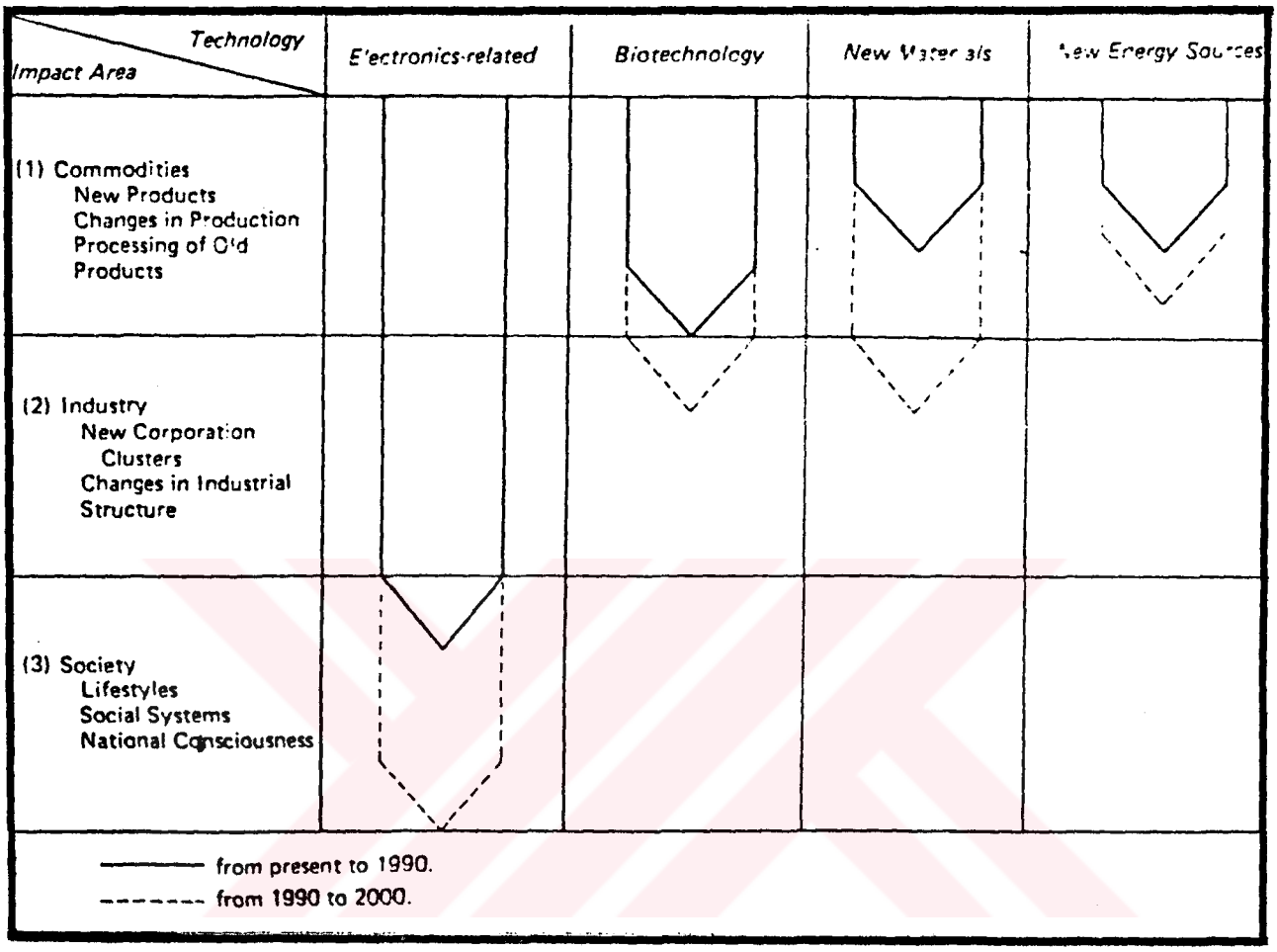

Figure 1. Impact of Advanced Technologies

Source: Yamamoto, 1986:69

From these examples, it can be easily understood that information technologies are the primary and the most important technology in the world. 'Ineffectiveness of information technologies on world systems and societies' is the thought that comes from U.K. (Conservative character of English people has to be considered) These kind of thoughts are so criticised by many authors and sociologists. According to them, information technologies as a chief variable, takes societies into a new era. This era is called as "informat-

ion era" and dynamics that cause this era is called as information revolution. It is sure that, information technologies are the chief factors in this information revolution. It is called as revolution because, there are fundamental changes in economic, social, political systems. These changes depend on situation that 'information' becomes the most important factor of power instead of classical production means. (Toffler, 1984:34) Besides, there are also some other fundamental changes. These are: production processes are changing, mass production type is changing, structure of industries are changing; flexibility becomes important, return to home in working life is actual, the structure of all type of organisations are changing; centralisation and decentralisation are both getting importance.

All these thoughts of change are always been criticised by different views. but the reality is; despite these technologies are developing very rapidly, their economic and social effects are not developing at the same rate. Reason is that; most effective information technology infrastructure and applications that have the potential for structural changes started to develop only for 10-15 years in the world. So it can be discussed that, whether the thoughts of 10 years ago about information technologies can show the real situations. Now, the situation in the world can be perceived as only using advanced technology. There are a lot of difficulties to measure effects of new technologies but after infrastructure and application of these technologies become worldwide and after their effects can be calculated accurately, we will able to understand that if we are in an information revolution in 10-20 years time.

Another reality is that, with development of information technologies, existing economic- political systems like Marxism and capitalism become criticised very much and some of their principles seems to be invalid. Toffler's opinions are very interesting about this subject. "Beyond the new type of capital, both Marxism and capitalism become invalid. Because, they based on principle of limited amount of capital. Land and capital can be used

by one person or firm, but information can be used by many user at the same time. If it is used properly, it generates more information. Most important peculiarity of information is its endless character" (Toffler, 1991:75) This reality makes 'value' perception of Marxism and capitalism invalid. However, these doctrines are not totally destroyed. Effects of information technology and networks on these social-economic-political systems are very clear. It is explained by some authors that, information technologies are the most important cause of restructuring of capitalism. Capital restructuring takes place as 1- The appropriation by capital of a significantly higher share of surplus from the production process.2- A substantial change in the pattern of state intervention , with the emphasis shifted from political legitimation and social redistribution to political domination and capital accumulation.3- Accelerated internationalisation of all economic processes , to increase profitability and to open up markets through the expansion of the system.(this an essential element of restructuring process) (Castells, 1991:127)

All these knowledge shows us that information technologies are so strong that even, they play a strong role on change of doctrines, so their potential to create a revolution is very strong.

Nevertheless, information technologies cause a revolution like industrial revolution or not, it is clear that ownership of these technologies has a lot of effect on social changes. International gap is increasing according to ownership of these technologies. Even, the concepts of development, less development are shaped by the condition of ownership of information and information technologies. Besides, ownership of information technologies also play important role on regional differentiation. Another reality is that, with the help of information technologies, transnational companies become very powerful and even they become more influential on global economic order than states.

Another way to measure the effects of information technologies on social life is to determine their role on democratisation and decentralisation. As there are no quantitative measurement techniques on these subject, a lot of debates are occurring. One view supports that information technologies reinforce centralisation of power, opposite view supports that information technologies cause decentralisation.

Like this debate, a lot of debates are taking place about information technologies. Ideas and explanations about information technologies are developing, parallel to the development of these technologies. There are some subjects about these technologies, and their dynamics and effects that authorities agree on them. These are; management size, system integration, education, working hours, interactive services, household economy. The subjects that authorities do not agree on are; organisational size, job polarisation, firm decentralisation, leisure times and regional differentiation. (Rush, Miles, 1989: 252) In coming parts, this knowledge will be very useful when effects of information technologies will be considered. We will able to know which effects are common, which effects are in doubt.

Another important point is that information revolution means much more than communication revolution. So what is information technology?, Which technologies involve in it?, What are its technological peculiarities. we can find answers in coming part.

CHAPTER 2
INFORMATION TECHNOLGY IN WORLD

2.1. Technological Features

In this part, we will examine the technological features of information technologies, in order to understand their dynamics and effects well.

In general, information technologies include production and processing and transfer of information technology objects like voice, data and vision. The integration of these activities strengthen the importance of information technologies. This condition is called as "economies of integration" 'Roland, Hueber, 1988:53) Microelectronic activities that organise and connect various production activities are also called as information technology applications. Our future criticisms will be on these two subjects. One is related to communication, other one is related to microelectronic applications.

Information technologies emerged as the result of development in 3 areas: microelectronics, digitalisation of telecommunication services, new transmission technologies. As a result of development in these areas; information technologies become responsible of these functions: Generation and process of information, preservation of information, transfer of information. (Birinci 1993:65)

Information technology concept can be taken only as hardware, but in order to understand the concept fully, we have to think all variables about information technologies. In this respect, we can divide information technology

concept into five parts. 1- Components of information technology: (telecommunication, computer science, microelectronics), 2- Information technology equipments (telecommunication equipment, computer hardware, software) 3- information technology applications (Electronic funds transfer, local area networks, computer aided design etc...) 4- information technology systems (data communication systems, multi media, flexible manufacturing) 5- information technology infrastructure (fibre, satellite systems) Depending on these explanations, if we handle information technology in a broadest sense, we can show the all components of information technologies in the table below. Necessary information about specific technologies are at appendix -D. For abbreviations, see page 194.

Table 2: Information Technology Components

Components :	Microelectronics-----Telecommunication-------- Computer using			
Devices :	Computer, microprocessors	Telephone, television paging device facsimile, telex Mobile telephone set	HDTV videotext teletext	computers
Applications :	CAD/CAM / CNC Robotics	Mobile telephone Paging Videoconference	WAN LAN EFT POS E-Mail	Database, Word processing Office automation
Systems :	FMS	SBS IBS	ISDN Multimedia MIS Data communication systems	
Infrastructure :				fibre networking satellite systems

If we widen up this table, we can derive some results such as; when we take functions about information technology like processing, preservation and transfer, we can give some activities according to these

functions: Information processing: data base management, distributed processing, array processing, text editing, composition and reproduction. Information Retrieval: data banking. Information Distribution: mass media, data transmission. Some of specific applications are: teleshopping, electronic journalism, teleconferencing, automatic translation etc. The tools that are used in these activities are; Processing: Computers, Retrieval: Data banks, videotext, teletext, Distribution: Television, telephone, facsimile etc. We can also determine application areas of these technologies according to information technology devices like this; Computers in industry , business world, daily life. Videotext, teletext, telephone, paging, facsimile, mobile telephone, e- mail in business world. TV, telephone, radio in daily life. (For detailed list of information applications in various sectors, see table no. 6, on pages between 43-46.)

As we see above, classical communication equipments like telephone and television are also accepted as information technology devices. Very rapid development of communication and computer technologies make these devices very functional. There is a fundamental difference between classical communication services and modern information services. This difference is come from this situation that, traditional telephone and telegraph services provide transmission but provide neither storage nor processing. Storage of data opens convenient access to large databases , and processing allows manipulation of data in various forms and orders. This definition excludes transborder data flows resulting from media products , such as news broadcasts, television programming and conventional telecommunication services. (Gillespie, 1987:233)

Most important peculiarity of information technologies comes from the integration of computer and telecommunication technologies. The integration process of these separate technologies is at the figure on the next page.

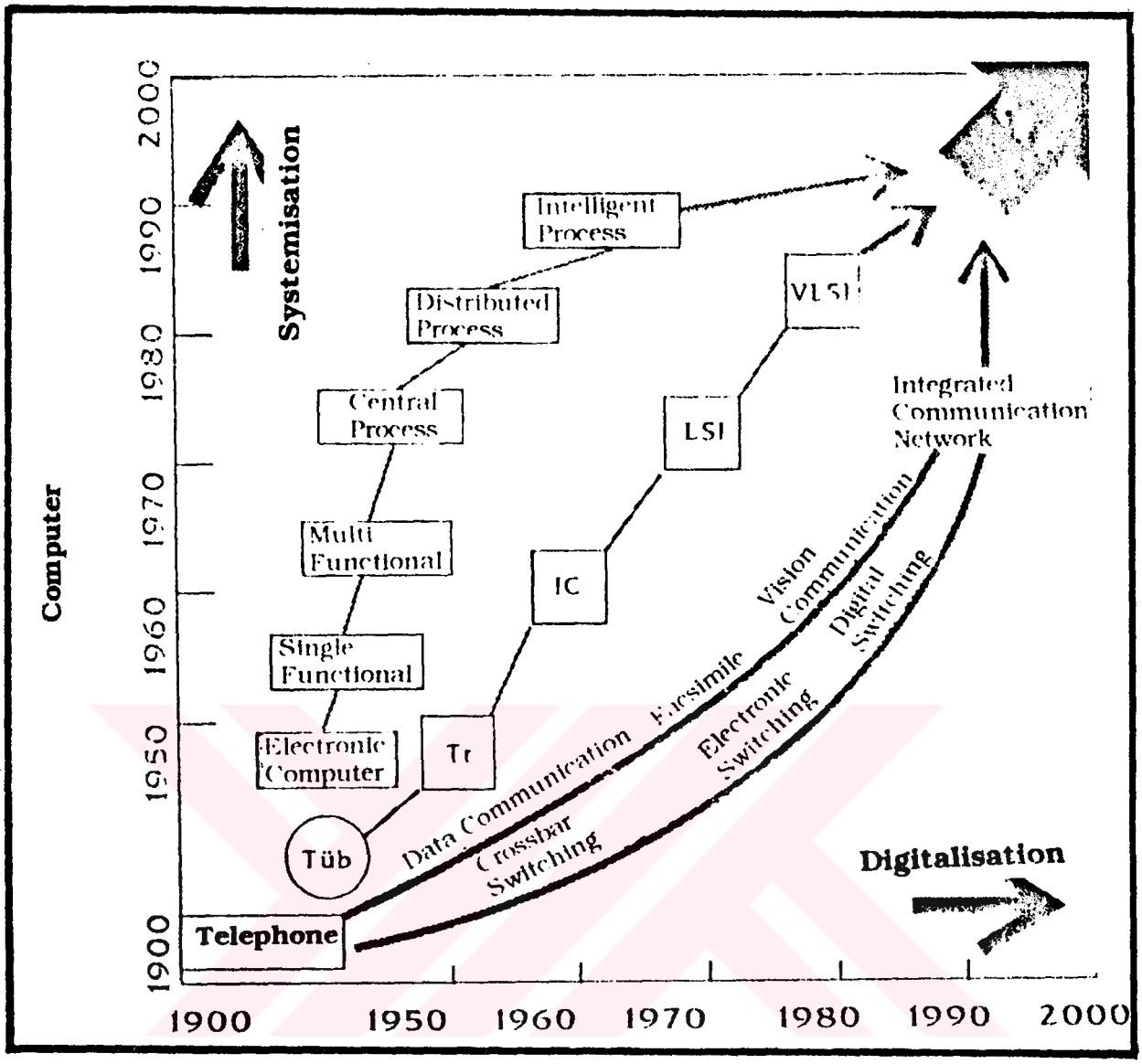

Figure 2. General Trends of Computer and Telecommunication Development

Source: PTT ARGE Dergisi, 1991, No.3:9

Beyond this integration, information technologies are developing at a very rapid rate. We can list the information technology developments of the last 15 years like that; special telecommunication networks, international and national satellite networks, broadcasting and cable TV networks, automation for factories and offices, image creation and display, CAD (Computer Aided Design), CAM (Computer Aided Manufacturing), FMS (Flexible Manufacturing

Systems) applications, robotics, human-computer interactions. (Rush- Miles, 1989, pp: 249-262) In addition to these applications and activities, we can give the development of IT devices in the figure below.

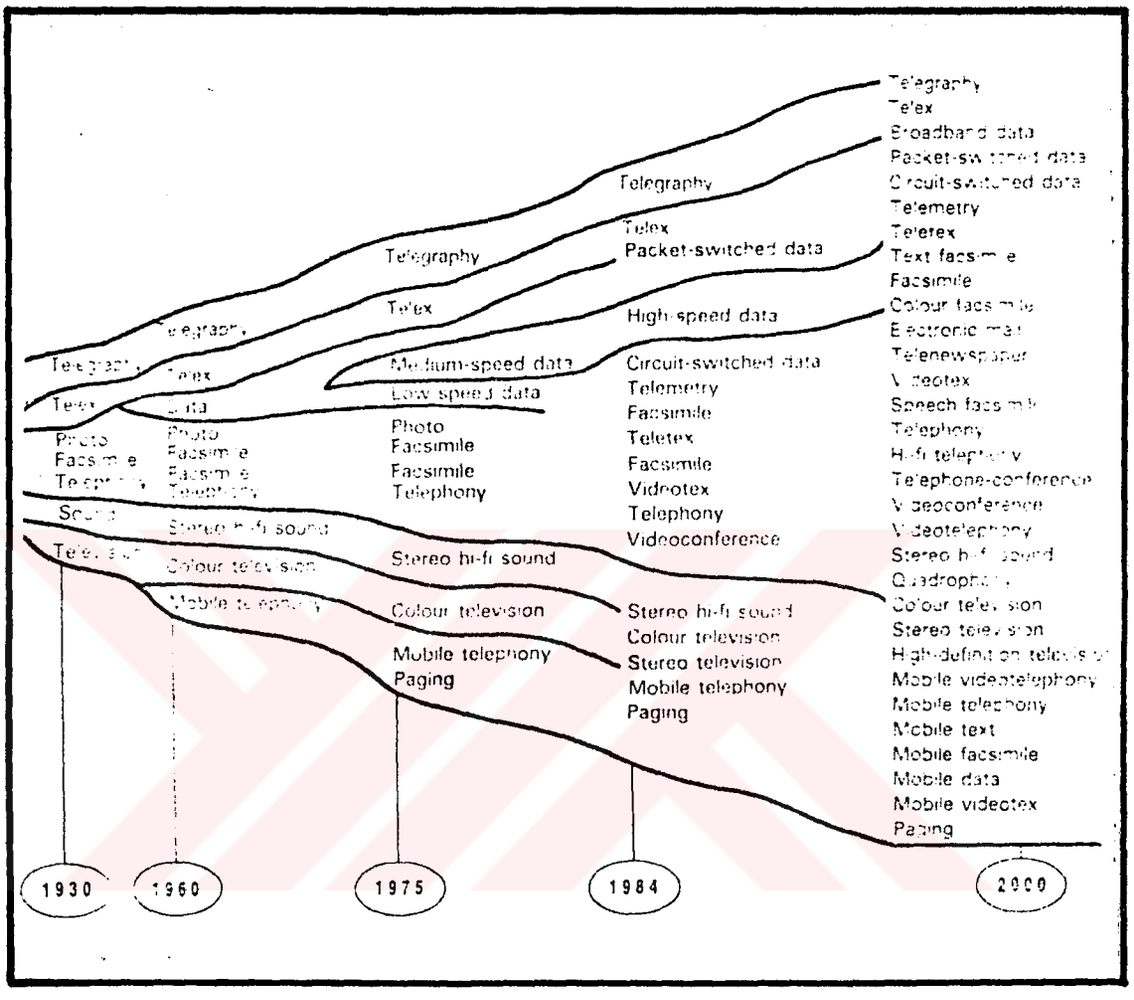

Figure 3. Development of IT Devices until 2000.

Source: Telecommunication Prospects, EEC, 1988:22

As it can be understood from these tables, the development of these technologies are surprisingly very fast. The most daily debate concerning IT is the integration of whole information technology components and information technology devices . In the future it would be possible to achieve this aim. Almost now, some devices like telephone and computer are integrated (See Appendix -A) This condition increases the importance of information technologies, as we explained before.

The integration of telecommunication and computer science is called as ISDN (Integrated Services Digital Network). After 1983, ISDN studies get importance very much. ISDN is the one of the most important innovations concerning information technologies. In general, ISDN means transmission of voice, text, data, and all type of vision from the same subscriber line. This flow is controlled by computers. (Oğuz, 1991:314) Some of ISDN offerings are given at the table below.

Table 3: Sample ISDN Offerings

	Narrowband	Wideband
Voice	Telephone, leased circuits, information retrieval	Music, hi-fi stereo, radio, television- audio
Data	Packet switched, circuit switched, leased circuits, telemetry, funds transfer, information retrieval, mail box, electronic mail, alarms.	High speed, computer to computer
Text	Telex, teletext, leased circuits, videotext, information retrieval, mail box, electronic mail.	Teletext, electronic publishing
Video	Videotext, facsimile, information retrieval, surveillance	Teletext, video conference, videophone, HDTV, cable distribution.

Source: Bolter, 1990:303.

There is a transformation from conventional telephone service to ISDN in the world. This transformation is given at figure 4 on page 15.

Integration of information technologies is also maintained by the situation that giving services from the same exchange. This condition shows us the level of these technologies. With the help of the figure 5 on page 16,we can get a visual information about information technology devices and infrastructure.

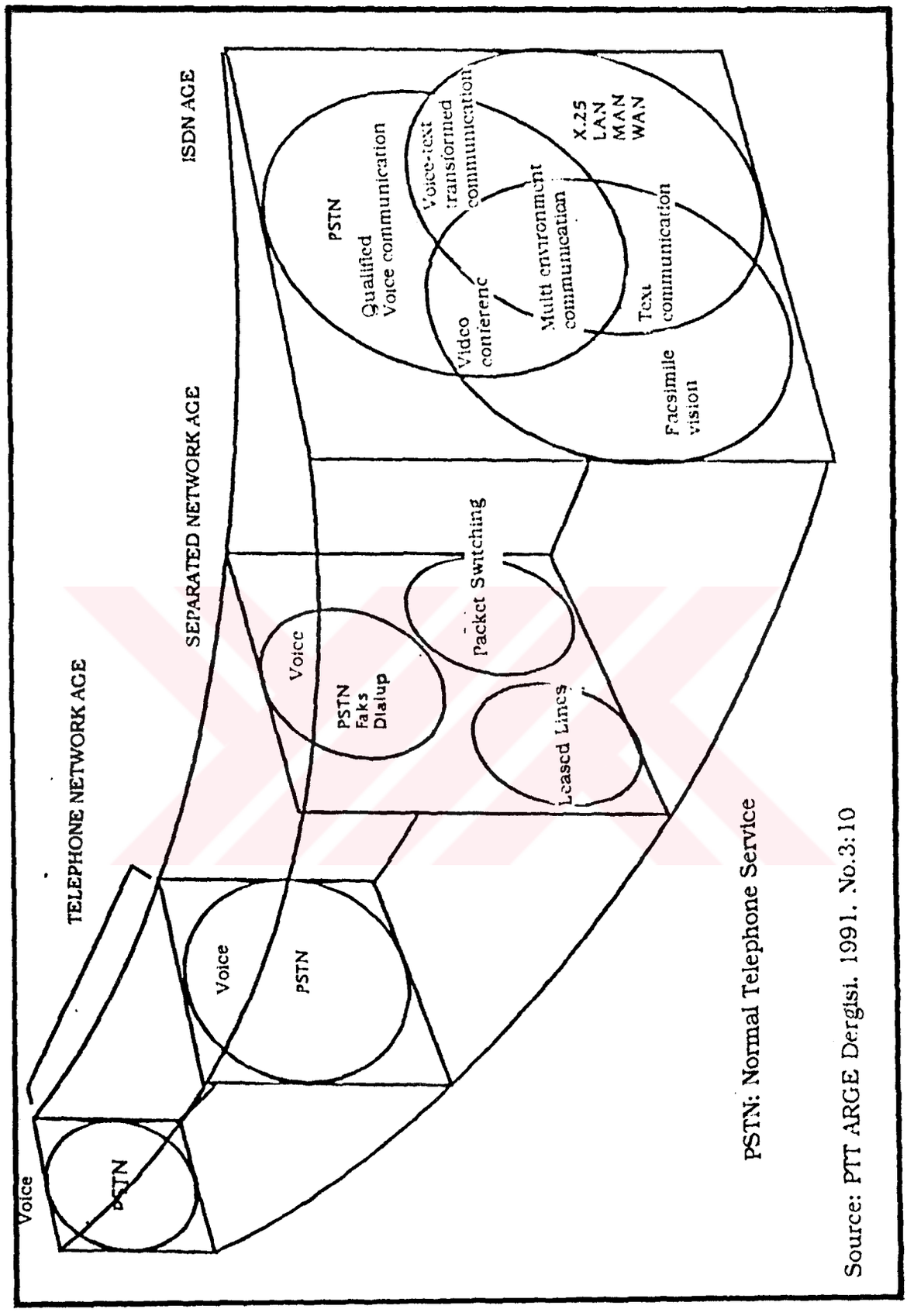

Figure 4: Transformation From Conventional Services to ISDN

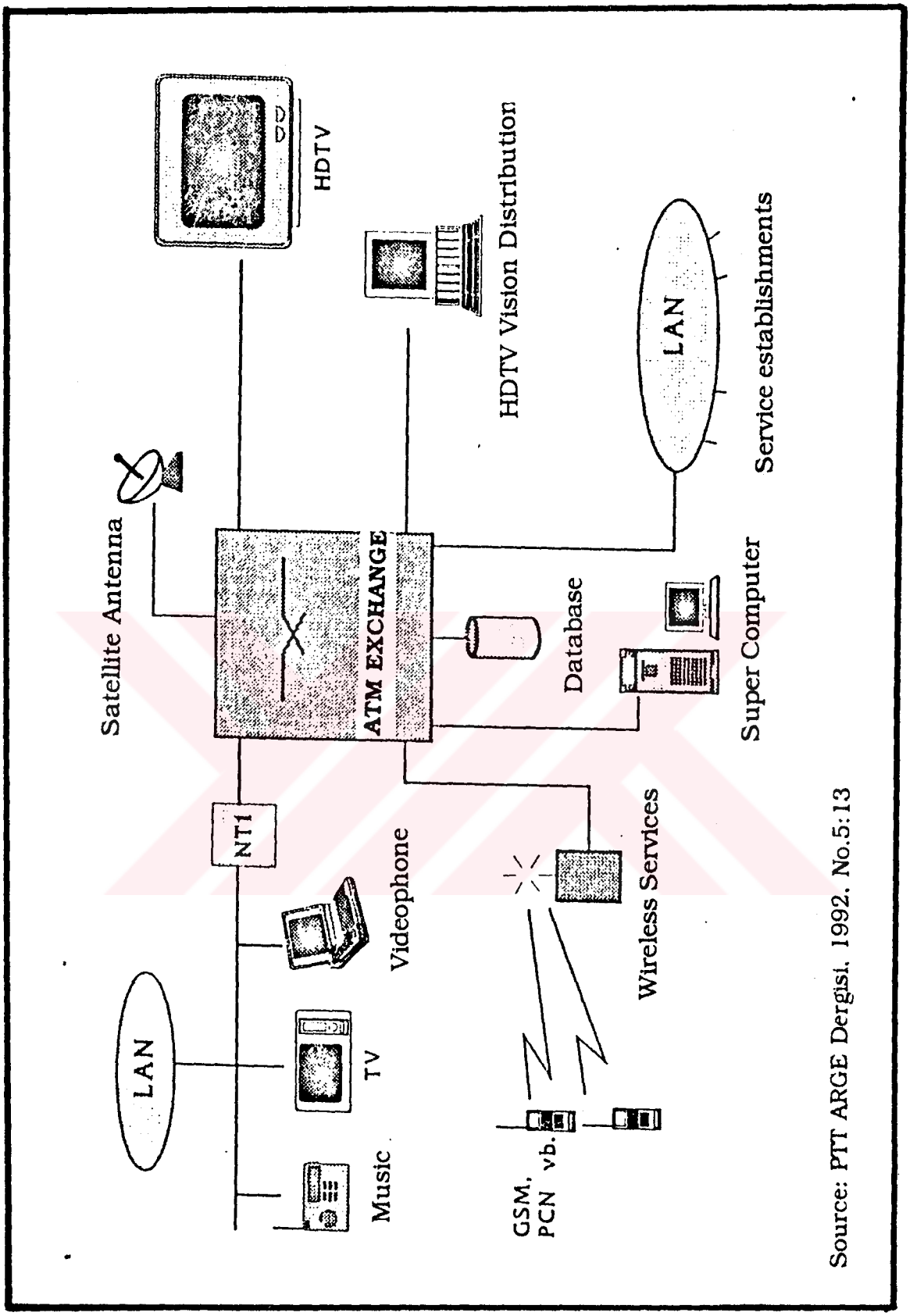

Figure 5: Integration of All Services Around ATM Exchange.

Another type of integration of several technologies can be seen in the field of multimedia. Multimedia is one of the most important development of information technologies in communication field. Multimedia means information environments which addresses two or more human senses. It is the integration of graphics, animation, musics and video. Most important peculiarities of multimedia are interactivity, non linear access and high communication possibility. 3th type of automation activities which are maintained with the help of multimedia are; reasoning power, high quality communication, probabilistic solutions, high level of visuality. (Bilgisayar, 1992, No. 133:36)

Upto now, we discussed about communication side of information technologies. Also, information technologies are widely used in industry. As the applications within FMS (CIM, CAD/CAM) are generally computer controlled activities and information within them is transferred by telecommunication devices, we will not explain them in detail. In general, Flexible Manufacturing Systems (FMS) can be defined as "the ability to move rapidly from one set of specifications to another in producing limited amounts of good. Coordination and management of this system is supported by advanced telecommunications and information systems" (Saner, 1993:65) Computer Aided Manufacturing (CIM), Computer Aided Manufacturing (CAM), Computer Aided Design (CAD) as the components of FMS are the software based information technologies which improves guidance of computer in production areas. Also, control systems that depends on microelectronic basis are also excepted as the part of information technologies, however these technologies themselves are not information technologies like Computer Numeric Controlled (CNC) machines. Various action areas of information technologies in industry are customer order handling, production, material and inventory control, automated production, automated material handling, automated testing. (Bessant, Cole, 1985:73)

Beyond the use of microelectronic based information technologies in industrial production, computer use becomes extensive in factory and firm

management. All planning and coordination activities started to have been done with computers. Computer controlled decision making and planning within production process is called as Management Information Systems (MIS). MIS is an important information technology system that effects production process and planning. MIS is used in various areas like mining, banking etc. It is said that, MIS is a revolution in decision making process, (Saner, 1993:65) because with the help of MIS, all information that was gathered and measured have been used for all decision making. All decisions depends on information that comes from this system.

All applications, that are talked upto now, require very high quality infrastructure. This infrastructure has to be composed of these factors: reliable and cheep communication network, reliable and wide area databases. (Kemp, 1987:195) The components of information technology are long distance systems (satellite or cable), regional or local distribution systems, intra building or complex systems (LAN; Local area Networks) (Moss, 1987:144)

Development of infrastructure is the one of the most important factor in development of information technology applications and diffusion of their effects. For example fourth generation networks (neural networks) will not only transfer messages, but they will give decision on timing the message transfer, according to flow of traffic. (Toffler, 1992:127) This means that, a new horizon is opening beyond decision making and planning systems.

Rapid increase in use of information technologies depend on effective development of infrastructure of these technologies. For example, fibre wire has 9600 channels while copper wire has 1800 channel capacity. With fibre systems speed and capacity are so improved. Like this, with development of fibre and satellite systems, information technology infrastructure developed very much since 1970's. By the development of satellite systems, information technology costs in telecommunication field

decreased and this is one of the factors for widespread use of these technologies. Also, with satellite systems, geographical obstacles can be passed over. Today, 2/3 of telephone callings are done via satellite systems. With VSAT satellite systems, all types of communication can be carried over intercontinental distances with the help of very small terminals. (Dağdeviren, 1990:14) All developments in world's information technology infrastructure can be observed in Appendix -A .

Upto now, existing conditions of information technology was introduced. To determine the probable future development of these technologies will be useful to guess the popularity of these technologies in future. We can list these probable information technology developments in future. Infrastructure: Photons will be used instead of electrons, Information networks will be widespread, competition between fibre and satellite systems will be ended. Services: mobile services will be put in use, computers will be used directly in decision making processes, databanks will be increased, visuality will get importance. Technological Devices: organic chips will be used, CD ROM's will be widespread, dimensions of computers will become smaller, pencil based computers will be used. Systems Development: ISDN will be developed very much, Speed of Gbit/sec will be achieved, multimedia will be developed very much and its use will be widespread, open systems will be developed.

With these probable developments in future, information technologies will save its popularity in future and their effects will be widespread parallel to development of these technologies.

2.2. Transformations and Changes in Various Systems Due to Use of Information Technologies.

Information technology concept should not be percepted only in

technological mean. To examine changing ideas, changing organisational structures, changing production processes, changing international relations with parallel to emerging information age is necessary to understand information technologies and their effects well. The new concepts that emerged after 1980's are good examples to understand strong effects of information technologies on various factors. Teleactivity (Fathy,1991), Network economy (Dordick,1981), Information Economy (Porat,1977),Online Economies (Fathy, 1991) are some examples for the new concepts.

Beyond these new concepts, we observe that a lot of facts, understandings are changing in the world. According to basic trends profile that was done in 1983, 670 experts from 48 countries decided that upto 2000 the most changing factors will be; application of information technologies, working times and types, industrial production types, drive from mass production and distribution. (Newton, Taylor, 1989:322) Also for OECD report in 1988, production structures of developed countries will be reorganised around electronic complexes according to use of information technologies. (Avcı, 1990:91)

Before explaining the changes and developments in production, economic relations, political systems, cultural systems, political relations according to the use of information technologies, there is something that needs to be explained. The effects Information technologies on various factors can not be separated from each other. All effects are interrelated. Of course we can not separate the several dimensions of society like economy, culture, policy etc.. Like this we can not able to separate effects of information technologies totally, because information age itself means the development of systematic conception.

2.2.1 Changes in Economic and Production Systems

To explain changes in economic sector will be useful, because

economy is the most responsive factor to technological renewal. In economic concept, one of the most important difference is the change of value 'concept'. It becomes very hard to obtain income in any sector of economy without high coordination and brainware and necessary information. (Toffler, 1991:19) Changing power relations has a big effect on change of value concept. Information is accepted as third power behind manpower and capital. (Toffler, 1991:23) Here, the important thing is not only information itself, information is mixed with all sectors. Not only existence of information is important, but also transfer of that information is a crucial factor. (Bilgisayar, 1987, No:73:111) For this reason, the power of information and high quality information is going to be the basis of economic relations. As a result; the high quality power is emerging with the use of information and knowledge. (Toffler, 1991:31) This condition causes very intensive R-D efforts in whole world.

From this point we can pass to second change that the world confront. With the direct or indirect helps of new technologies, industrial production structures are changing. New type of industries that depends on innovation activities emerged and became more important than conventional industries. Countries who do not produce new products, who cannot able to innovate and who can not consider R-D activities are not able to compete in world markets. For that reason, R-D expenses are always increasing. We can define R-D activities as the systematic processing of information. For the OECD report in 1988, the impact of information technologies on national economies will be wide ranging upto 2000, and innovation process will affect majority of labour force and industries. (Hepworth, 1990: 545)

Besides R-D activities, reliable and just in time information become one of the most important factor that determines the new production facilities. All countries and firms has to improve their information systems, organisational structures in order to compete. In 1983, according to OECD's survey on 200 firms, transborder data flows has emerged as a major element

in the implementation of multinational corporate strategies. (Gillespie, 1987:233) Also, Intelligent networks are taken as most essential factor for flexible production process by many firms as key to American economic revival. (Williams, 1991:11) For another example; in 1983, according to a survey on 380 firms from 85 countries, it was calculated that 94 % of these firms were using international computer networks and see it as a very crucial factor for competition. From all these examples, it is very clear that information technologies have an important role on international comparative advantage. This comes from a combination of factors such as, reduced labour input, improved product design and quality, reduced unit costs in production etc.. Since these changes diffused to the whole world, this will lead to structural change of production and distribution in whole world. (Bessant and Cole, 1985:124)

In this respect, changes according to application of information technologies in production can be observed. With development of information technologies, flexible production process became used in many manufacturing industry. Comparison between flexible production systems and conventional production systems can be observed in the table below using example of General Electric.

Table 4: Comparison of FMS with Conventional Production System (Example from General Electrics)

	Conventional	FMS
No. of machines	29	9
Total labour needed (Operator, manager, controller)	86	16
Average production period	16 day	16 hours
Increase in factor productivity		% 240 inc.

Source: Saner, 1993:72

The most important aim of flexible systems is to reduce imbalances

due to unstable condition of demand and achieve regular production flow. (Acar, 1990:10) In these type of flexible systems, information is started to use directly in production, even 'information' becomes a good itself. With these peculiarities, idea and organisational structure of the information age differs very much from other socio economic systems. For example, when some amount of capital is created or when consumer income is increased in neo classical economy; than new employment opportunities can be created. Today, the condition is different. Unemployment becomes a qualitative problem rather than a quantitative problem. (Toffler, 1991:87) It is not true to say that, new technologies create high rate of unemployment. There is an alternative way that does not cause unemployment. (Saner, 1993:46) According to this kind of thought, with capital intensive technologies, there is no need to decrease number of labour force, but there can be a decrease in working hours. As a result, both employees and production become more flexible. By this way, dependent countries had not obliged to use labour intensive technologies. All of these conditions are the products of information age, it is not a victory of Marxism to capitalism. (Saner, 1993:49) Dynamics of information age defeated many trues of Marxism as well as capitalism. Endless character of information as a mean of production is contrary to Marxist understanding of "all means of production are exhausted"

New information technologies advances local production systems, as well as they carry some kind of production to global levels, (Toffler, 1991:68) like "fason" work. The result is that, new technologies advances transnational capital. With strong information- communication infrastructure and with developments in microelectronics and FMS systems,; transnational capital becomes to dominate world economy. But this condition consists relations of complementary small and dynamic firms rather than relations of huge multinationals. All transnationals in the widespread to world and their centres became indistinct. (Saner, 1993:73) This is the "globalisation of production" (Daniels, 1991:157) Another concept that comes together with globalisation is internationalisation. Wide ranging of transnational companies is

an example for this situation. Rapid increasing of transnational data and information transfer is the most important determinant of internationalisation. (Daniels, 1991:157)

2.2.2 Changes in Organisational and Administrative Systems

One of the cause of change in production structure is the impact of information technologies and their dynamics on administrative and bureaucratic mechanisms. Because, administration discipline becomes very important in the environment which the importance of information and communication on economic structure is increasing. New models about administration is offered by academicians and managers. Business world is introduced with concepts of 'geengineering', 'return to origin' etc. Concepts of 'total quality management', 'simple administration style' are accepted. (Ekonomist Yıllığı, 1994:32-33) Instead of slow, bulky bureaucracies, more smaller units are taken place. These units are may be adhocratic teams or complex business alliances. In spite of these developments, it is not true that bureaucracies will be totally destructed; only the environmental conditions are changing that supports bureaucracies. For this reason, they can not function well. (Toffler, 1991:234) Of course, information technologies has the biggest impact on these changes.

With pressures of local factors, more flexible organisations are established, hierarchies are reduced, very strict hierarchies are clarified for the sake of necessity of rapid decision making. Instead of bureaucratic organisation of information, free flow information systems are started to use. (Forsstrom, 1991:101) This situation forces the administrative borders and new hierarchical structures according to the new functions that are emerging. (Forsstrom, 1991:101) Because of the changing role of information technologies on world markets and competition, organisations has to change their structures to adopt this situation. Instead of pyramidal structures, more

smooth organisation type is emerging. Network type structures become popular for organisations. In this respect, new technologies are not used only for automation but, they take more strategic functions. (Yurdakul, 1990:53) Within network structures; creativity, personal capabilities become important. This type of restructuring advances flexible systems. Besides these developments in organisational structures; also all economic, organisational and technological functions can be integrated under one organisation. In this respect, just in time production, process estimation, quality, productivity can be achieved without losing flexibility and assortment. This condition is called as "economies of scope" (Nijkamp and Salomon, 1988:93) The basic factor is the information technologies and their dynamics behind all these organisational changes.

Most important transformation that is open to debate is whether there is a shift from the centrality of organisational unit to the networks of information and decisions and whether flows rather than organisations become the units of work, decision and output accounting. (Castells, 1991:347) All economic and social structures have been restructuring under the hegemony of flows (Castells, 1991:348) , because "more organisations depend upon flows and networks and less influenced by social contexts associated with the places of their location. Access to network of flows is the basic condition for the performance of any organisation. Since, most organisations tend to connect and interact with other systems the key element for an organisation is increasingly to preserve those connections. The organisational flows are connected in a macro space of flows".(Castells, 1991:351) With this new understanding, all administrative, political and organisational structures face with radical changes and they try to adopt themselves to new information age.

Concerning organisational structure, to determine the changing role of state is important. Classical 'state' concept is broke down. States become no more effective on economies. "Globalisation or integration period of national

economies with world economy increases the importance of transnational capital centres. Global networks between these centres and Euro markets, off shore centers and transnational banks makes the efforts to control credit-money politics invalid. Impact of state on flow of capital becomes weak. (Yıldız, 1992:231) Determination of interest rates become free from state regulations. (Schiller, 1986:289) All of these cause the helplessness situation of governments in last money crisis. Rapid information flow and data transfer advances decision making at global scale, and this cause the developing crisis of nation states as they are losing authority. (Schiller, 1986:285) Concept of "welfare state" is changing. Another change is on duties of state. R-D and know-how services become the new responsibilities of the state.

2.2.3 Changes in Social Structure

Particularly, the most flexible factor is economic factor against the technological change. On the other hand, flexibility of social and political arenas are lower against technological changes.(Erkan, 1993:61) But essentially, technology takes its meaning from social sphere. It means, "technology does not determine social structure, it simply widens all kinds of possibilities, technology is embedded in a social support system, and each social structure has a choice as to how will it used." (Bell, 1983:38) According to this thought, social receptivity of technologies with their roles on economic and social relations supports them as a revolution. (Fathy, 1991:17)

Most important impact of information technologies and information age on social structure is the formation of new type of information society. According to one thought, the basis of information technology is technological imperatives (Weinberg, 1990:17) For one definition; information society is the society who employs big amount of labour force in information sector, and which information and organisations are the main sources of welfare. (Oğuz, 1991:314) Also, the use of information in the service sector is taken as a

major step on the way to information society, because large part of these services is concerned with processing of information such as banking, insurance, retail and distribution. (Kemp, 1987:206)

The characteristics of society in an information age can not be explained only by the economic indicators. Besides, there are different dimensions of information society. Horizontal institutional structuring, flexible education systems, importance of human rights etc. are some examples. (Salvaggio, 1983:6) But as the world is at the beginning of the information revolution, only concrete measurements of employment or value added can tell us something about information society. In this respect, it is observed that, number of information based employment and quantity of information based value added are increasing in Western countries. (For detailed information about these sectors see, Appendix- B) For example in U.S.A. between 1982 and 1995, the sectors are determined that have potential to develop as related to information technologies. These sectors are computer programming, electronic engineering, telecommunication works etc. (Castells, 1991:181) Also, according to a research that was done in 1985, it was calculated that 50 % of U.S.A. and Canada's income was depending on information based services. (Ansah, 1986:206)

If we generalise employment and value added variables, it is seen that not only information based services, but also all type of services are developing. For example, in U.S.A. between 1975-1987 the income of service sector grew at increasing rate of 50 % annual. It raised to 130 billion dollars from 3 billion dollars. Again in U.S.A. share of service employment in total employment raised to 70 % in 1990, from 45 % in 1960. (Mody, Dahlman, 1992:1707) Again in U.S.A. 20.000.000 service jobs were created between 1977 and 1987. (Forester, 1987:8) Also in future, it is estimated that information jobs will be wide ranging. For example, in the year 2000, it is estimated that 60.000.000 new jobs in OECD countries will depend on information technologies. (Elçi, 1992:117) According to a Delphi study that

was done in U.K., in the year 2000, it is estimated that 1/4 of total workforce will be teleworker in England. (Rush, Miles, 1989:257) The most important peculiarity of information technologies is that, information production and transfer becomes the most important factor in service sector. (Barras, 1986, 23) because technological progress is knowledge intensive. (Klaassen, 1986:254) This condition advances service economies. For Castells, information technologies are not only used in existing services, but also they play important role in creating new services. (Castells,1991)

Daniel Bell showed first signs of information society in 1973 (Bell, 1973) For an argument, information economy exists in world, but information society is not exist yet. (Sasaki, 1990) For another argument, all societies are information societies, but recognising this truth is a new thing, we recognise this truth with the help of rapid development of communication technologies. (Ploman, 1985:148) At last, for another argument, information society will not take place of industrial society, but changes will be in quantities. (Aytaç, 1992:67) From all these debates, it can be easily understood that, all experts of this subject have not allied on information societies' parameters and differences. (Avcı, 1990:100) But, we will able to define basic parameters of information society in the near future. On the other hand, according to Masuda's flexible historical hypothesis; development line of information society can be estimated by using historical development of industrial society. (Masuda, 1990) But this is not the truth, "it is only an analogy." (Avcı, 1990:75)

Another reality beyond information society debates is the changing role of information technologies on the decision making process in the society. The impacts of information technologies on decision making period are; high speed and reliability, flexibility, communication power. (Nijkamp, Salomon, 1988:93) With these impacts, also planning discipline is changing. Long range planning are been going to abandon due to development of complex information systems. Planning becomes depending on advanced information systems. With horizontal communication, dependency of communi-

cation structures to each other, complexity of duties of new technological systems, internationalisation of communication; conventional communication methods and central policy decisions may become insufficient. (Sankur, 1991:383) With new technologies, it can be expected that, decision making in local levels will be more powerful than central planning. But this does not mean that central planning will be totally forget. Information technologies advances central planning as well as local decision making and planning. For example MIS enlarges control area of center.

The development of computer integrated communication systems has the potential for influencing life at all levels of human organisation. Aside from international and national levels, their effect are seen on household and individual levels. (Janelle, 1991:49) The impact of information technologies can also be visible on individual level as well as social level. Electronic communication and media environments are considered as best mechanisms that reduce hierarchy between people. "Average people now have access to social information that once was not available for them. Average person now knows more about what special individuals know and also more about high status people as people." (Meyrowitz, 1985:324) This leads to democracy consciousness of all citizens.

Another effect of information technology is individualisation. This is inevitable, but in reality, different relationships are occurring between people. The most important cause for this condition is 'the changing role of family'. Family loses its classic regulatory role. With info-technology, family's regulatory role in social system is been restructuring. The hypotheses that are claimed according to changing role of family are: 1- There is a little change in family's role in developed countries, 2- With development of telematic family in developed countries, services and requirements are specialised and privatized. (Esin, 1989:186-187) In order to maintain the last condition, information technology services has to be diffused in all society. If

this condition is realised, differences between people will be reduced. On the other hand, it is expected that, social relations will be weaken. (Esin, 1989:188) Another important change for individual is removal of physical barriers to reach social information. (Fathy, 1991) As we will see, the social meaning of space is changing for individuals.

2.2.4 Cultural Changes

Less flexible dimension among technological renewal is cultural area. (Erkan, 1993:63) It is hard to get results of cultural changes, as there is no direct measurement for determining cause effect relationship between adoption period for information technologies and socio- cultural dimensions. (Blackler, Brown, 1987:27) On the other hand it is accepted that, information flows have important impacts on cultural changes. Technological changes are said to be the most important causes of cultural changes. (Gürlek, 1992:109) Also according to these thoughts, cultural change becomes one of the condition to obtain and continue technological changes.

Cultural change has two dimensions. One part is concerning local levels, other part takes place on global level and effects local levels. More important part is global cultural change. Especially, information flows have a significant impact on cultural change. The trend towards the internationalisation of media industries combined with efforts to liberalise trade in services, increase international pressures on cultural change, particularly in developing countries. Concept of national sovereignty is changing as a result of adoption of new telecommunication and information technologies. (Langdale, 1991:204) This type of changes supports ethnic movements.

At local levels, all customs about living and working have to be analysed within cultural change. In this respect, the most important change in

cultural area is spatial changes. This subject will be analysed in detail, but here, it is useful to explain some basic ideas about spatial changes. Nevertheless, it is not totally accepted and applicated, these technologies reduce and even eradicate "friction of distance". In a new "symbolic economy", the meaning of distance loses its importance. The time that spent to travel 1 kilometres become equal to time that spent to travel 1000 kilometres. (Toffler, 1991:175) Contrary to attractive logic, information technologies will actually reduce the need for physical proximity by enabling the close real time integration of production across geographically dispersed locations. (Gillespie, Williams, 1988:1319) Points that take place at important transport nodes, may lose their importance, as well as the points outside will not be at disadvantageous position in future. This means that, order and hierarchy of settlements are changing. With development of information technologies, we observe a new transnational urban hierarchy. Friedman's thesis of "world cities" depends on this basis. Also, center- periphery relations at national and international levels are being restructured. It is wrong to take this condition only in spatial means, it also creates a potential to change center- periphery relations at world economic system.

As it is explained, argument about the impacts of information technologies on cultural changes depend on different perceptions of people. When physical barriers are removed, also social meaning of various spaces are started to change. With growth of teleactivities like teleshopping, telebanking etc. and other network applications, we are witnessing the creation of new, highly flexible structures of production, consumption and social reproduction which extend beyond the traditional sites of economy like factory, office, home. (Hepworth, 1990:542) On the other hand, as these applications are mature and very new, their systematic impacts and functions are not totally defined.

2.2.5 General Evaluation

We can list all economic, administrative, social, cultural changes in the table below that shows industrial society and information society variables.

Table 5: Comparison of Industrial and Information Society Variables

INDUSTRIAL SOCIETY	INFORMATION SOCIETY
METHODOLOGY	
Empiricism, Experimentation	Modelling, simulation, system analysis
CAPITAL SOURCE	
Monetary capital	Information capital
PRODUCTION SYSTEM	
Mass production	Just in time production
Fabrication type production	Production based on re use
BASIC EMPLOYMENT	
Physical labour	Mental labour
Semi skilled labour, engineers	Professionals, technicians, scientists
AXIAL PRINCIPLE	
Economic growth, welfare	To satisfy social desires
TRANSFORMING RESOURCE	
Energy systems	Communication networks
MOST IMPORTANT FINAL PRODUCT	
Manufacturing industry products	Hardware, software
Commodities	Information
Hardware	
BASIC TECHNOLOGY	
Steam engine	Semiconductor
TECHNOLOGICAL FOCUS	
Mechanisation and standardisation	Processing
ECONOMIC STRUCTURE	
Substance economy	Information economy
Determinant is demand and supply	Synergic production

Table 5. Continued

PRODUCTION CENTERS	
Factories	Databanks and networks
ADMINISTRATION STRUCTURE	
Public democracies	Participatory democracies
POLITICAL PROCESS	
Ideology is dominant	Common aims and participation of several groups
SOCIAL STRUCTURE	
Society with classes	Functional society
Individual freedom thoughts	Auto control and globalisation spirit
World of hierarchies	World of flexibility
ORGANISATIONAL STRUCTURE	
Hierarchical	Horizontal social groups
From top to bottom hierarchy	Horizontal organisation structuring
BASIC SOCIAL PRINCIPLE	
Basic human rights	Self discipline, social participation
POLICY PRIORITIES	
National borders are important	Global standarts are dominant
Law, policy, are determined by capital owners	Global workshop is dominant
OWNERSHIP STRUCTURE	
Private ownership	Share principle (some services, networks)
EDUCATIONAL STRUCTURE	
Mass education	Individualisation of education
BASIC PROBLEMS	
Unemployment, fascism, wars	Future shocks,Terrorism, Elimination of individual privacy
MAIN INTERACTION SOURCE	
Transportation networks	Information- communication networks

Sources: Bell 1983:40, Fathy 1991, Erkan 1993:72-75, Erkan 1993:73 (from Masuda 1990), Avcı 1990: 78, Toffler 1991:102,215, Toffler 1984:24,89.

Despite all these changes, even the structures in developed countries are not totally appropriate to information society or information economy. Whole world is in a transition period. All kinds of developments at the table are taking place very rapidly. All these changes are not occurring one way performance, there are always feedback effects from all dimensions (economic, political, social, cultural) to each other. (Erkan, 1993:61)

All these type of changes show us rising of new civilisation period. (Toffler, 1991:41) But world is at the beginning of this new era. In coming part, we will see, whether information technologies are so strong to be the cause ofthis new era or not? In this respect, dynamics and basic peculiarities of information technologies that cause all changes will be analysed.

2.3. Information Technology Dynamics That Cause All Changes

It was dedicated that, the reason for all economic, social, political, cultural changes in world is not only the technologies, but other factors behind them play important role on all changes. In this part, basic characteristics of these technologies, historical backgrounds, their basic uses and their dynamics that cause structural changes will be explained with concrete examples. The technologies that we will entertain includes all of the information technologies that was explained in part 2.1.

Analysing basic characteristics of information technologies, we can explain dynamics behind all structural changes that explained in part 2.2. First of all with information technologies a similar type of life is created mechanically. Industrial robots, use of videoconference are some examples. With use of computers in industry; control mechanism of design and production stages shifts from human to computer. Also, with information technologies, modelling possibilities increased. With developing computer and film techniques, a simulation and image world is created beyond the real

world. By this way, all economic and human relations are changing as never occurred in the past.

Another important peculiarity of these technologies is an incredible increase in capability of creating, storing, processing, transferring of information. (Ploman, 1985:148) For example, now hundreds of books can be stored into one computer compact disc. For another example, speed of data transfer in 1990 was 100 times more than speed of data transfer in 1980, while speed in 1980 was only 10 times more than speed of data transfer in 1960. (Roland, Hueber, 1988:52) As observed in example, rapid transfer of information is one of the basic advantage that comes with using of information technologies. With very rapid data, voice, image transfer; some kind of business relations and spatial relations are changing. (We Will see in part 2.4.2) Because, rapid information transfer has impact on decision making periods as it is the most important item in effective using of capital and labour. It increases necessity of quick decision making. With using information technologies, information can get from all developments in the world at the same moment and by this way financial and other precautions can be taken without delay. With rapid transfer of information flow, information reaches everywhere at the same time. By this condition, decisions at remote distances can be taken at the same time. (For impact of information technologies on space, see part 2.4.2)

In this type of relations, besides 'speed' character of information technologies, there are other important characteristics of information technologies such as a-)Interactivity: This characteristics make all communication sides more effective and sensible. (Fathy, 1991:36) Also, it maintains equality to both sides in communication. For example person who use interactive television can choose his programmes freely. With this example we can pass to another characteristic. b-) Information technologies are far from mass use, they are due to satisfying of individual. (Fathy, 1991:36) With this characteristics, information technology differs from classical communica-

tion and media types. Especially after 1980, mass communication devices like television and radio programmes are deregulated and privatized and become addresses to all groups in democracies. This condition reflects needs of post mass production economy. Mass communication systems played important role on regulating masses of people. On the other hand, information systems transfer different images to different groups, thoughts (Toffler, 1984:88) c-) Information technologies are asycrohonous; it means without distance differences it becomes possible for many actors to interact with each other at the same time. Videoconference is an example for this. With the help of this situation, it becomes easy to take common decisions. d-) Information technologies can serve various service to various groups: One of the most important cause of the development of transnational companies after 1970's is that they started to own their information networks. For Williams, the intelligent network will facilitate the development of flexible production processes, seen by many as key to American economic revival. (Williams, 1991:32) In order to compete in technological markets, one has to own its network.

Besides these basic characteristics, the rapid development of information technologies for 10-15 years plays important role on their changing impacts on economic, social, cultural areas. For example, In 1970's, there were mainframes, between 1980-1985 dominant systems were decentralised minicomputers that was linked to mainframes, by the end of 1980's a distributive structure emerged that every type of computer were linked to various computer networks. (Cane, 1992:175) When computers were linked to various networks, they get rid of local works and created an advanced communication possibility at global level. Also, with developments in computer technology, long distance communication costs are decreased, the production and distribution of goods and services become very easy. (Bilgisayar, 1986, No. 69:67) This condition was primary source of globalisation effects.

The relationship between computer technology development and change of bureaucracies is another good example that shows how technological developments effects structural changes. First computers in 1970's were supporting existing bureaucracies in business world and governments. Their data systems were so hierarchical. In this respect, first computers resembled bureaucracies. Micro computers changed this condition. Micro computers distributed databases and processing power, but they were not able to effect existing bureaucracies so much. Next step came with hypermedia. Hypermedia gives user an endless flexibility with combining databases and programmes. Now, it is far from achieving its basic aims, but it ensures gathering, processing and supplying of information in numerous ways. This condition has the potential to change bureaucracies.

Besides technological peculiarities, characteristics and number of user groups of information technologies changed very much. In 1970's only professionals were dealing with computer works. All computer works were complex and hard. Than, computers were widespread with advanced hardware and software opportunities. Instead of very hard, expert computer programmes, easy packet programmes were started to be used. In this respect, especially from the mid 1980's computers started to be used widely in business, industry, education and many other areas. (Bilgisayar, 1993, No. 143) Computing work becomes no more the work of professionals, it diffused to whole society. Common databases were started to be used. At first it was only possible to communicate between resembling environments, but with development of common communication protocols, it becomes possible to communicate between all types of systems.

Another reason for wide use of information technologies is the noticeable decrease of processing and communication costs. This characteristic also makes information flows more efficient. Reduction in costs is one of the important cause that raise information technology effects to global level. In 1970's, only rich firms and countries were using information

technologies, but with development of these technologies and because of the decrease in costs, information technologies started to diffuse to developing countries at international level and to small firms and public at national levels. For example, once in France, videotext service had been only used by big institutions. By 1991, French families use 65 % of total 7 million videotext in the country. (Dündar, 1991:33)

Decreased costs of technology played an important role in this situation. We can give many examples for decreasing costs that are related to information technologies' and their applications. For example, E-mail service that was started in 1985 decreased costs in data communication as the rate of 80 %. (Yasin, Green, 1991) For another example, the cost of 1 meters of fibre cable was 17300 Tl. (1993 prices) in 1978, but it decreased to 1060 Tl. (1993 prices) in 1990.(Katz, 1990:21) The decrease in computer hardware costs is also noticeable. The cost of one average personal computer was about 54.3 million Tl. (1993 prices) in 1985, but it reduced to 9 million Tl. (1993 prices) in 1994. Also in 1985, local area network cost per each user was 60 million Tl. (1993 prices) but, it decreased to 15 million Tl. (1993 prices) in 1989. (Bolter and Cannaughey, 1990:320)

Besides the changing characteristics of these technologies, and reduction of costs; rapid development of infrastructures and growing diversification in using of these technologies are the factors that prepare revolutionary impacts of these technologies. Way of using these technologies is changing. There are some examples that can be given on this subject. In the beginning of 1980's CAD and CAM were simple design systems and simple production tools, with developments in technology , their creative character comes into existence, also these systems were started to be used in decision making process. Technological innovations played important role in this type of developments. For example, in 1987, it was very hard to link CAD terminals to CAM terminals, (Forester, 1987:120) but in mid 1990's it became very easy with software. Another important example is the development of

telephone. In the beginning of 1980's , telephone was a simple communication device and it had not developed much since 1920's. With the help of c omputer integration, and digitalisation, telephone became a multi functional telecommunication device forthe last 10 years. Again Hospital information systems that are being used in many countries was only a dream in 1970's. (Bilgisayar, 1992, No. 138:57) We can give some other examples as; the power of ordinary desktop computer is equal to the power of main workstation of 1980. (Bilişim, 1993, No.37:70) Fibre optic cable infrastructure between continents was criticised as a dream in 1978, but it was realised only 5 years after, in 1983. (Bilgisayar, 1984, No. 34:68) These are all the examples of how technology and its use developed and had a potential to change all world.

With all these structural and cost related developments, also concepts, ideas concerning information technologies developed and changed very much. As to give an example in detail, in 1983 CAD CAM applications were seen as automatic planning tools, but now they have been using as competing and strategic tools. (Bilgisayar, 1992, No. 136:73) Like this example, in 1983 it was thought that, use and application of information technologies give certain results. (Pelton, 1983:54) But in recent years it was understood that, there can be alternatives of these results. In 1960's telecommunication was seen as an instrument for social and political reforms but in 1980's it was seen as an instrument for development of international trade and economic growth. (Dutton, Blumler, Kreamer, 1987:21) In 1950's, it was expected that computer technologies will lead to decentralisation in decision making process, but in 1984, Child argued just the opposite, (Blackler, Brown, 1987:34) but also this was not the condition. In the beginning of 1990's it is accepted that impacts of information technology on decision making process differ according to the environmental conditions As a result, we can say that all these comprehensive changes about information technologies are the factors that creates their revolutionary character.

In order to understand dynamics of new technologies that creates all structural changes; it will be useful to explain its use and benefits in various fields. As an example, effective communication is a strictly necessary condition for the sustained operation of all types of markets over time. Information is implicit in all production and management activities within firms and other organisations.(Monk, 1993, 14-21) The most important benefit of information technologies on production is to decrease unit costs of operations. Also, the ability to communicate instantaneously can facilitate the development process in 3 ways; by improving efficiency,the ratio of output to cost effectiveness or quality of products and services such as education and health care and equity or the distribution of benefits throughout the society. (Hudson, 1990) Benefits of information technologies are mostly observed in business relations. The most important benefits of these technologies in business world can be listed as; to connect databases, to take all news at the moment, to reach all academic information, teleshopping etc. If we take academic activity, to reach a source using computer network, will be cheaper and more easy than search and find that source.

When the communication benefits analysed closely, these results can be gathered in terms of economic development: Use of telecommunications to order supplies can reduce downtime of plants and machinery. Also, coordination of logistics using telcom can eliminate wasted trips and missed deliveries. (Hudson, 1990:187) In this respect other benefits of telecommunication can be listed as, Indirect benefits: necessary information about prices, decrease in inventory, just in time supply, decrease in transportation cost, increasing locational flexibility, support on decision making process. (Hudson, 1990:245) Value added benefits: potential to create new products and services, increasing competing power of firms, to maintain a dynamism among unexpected changes, decrease cost of operations. (Williams, 1991:88)

If we generalise the benefits of telecommunications above, we can

give some benefits of information technologies on competition. These general benefits can be listed as; efficient financial management, development of products especially with CAD CAM systems, market research for identifying a strategy and growing customer services due to direct connection with consumers.(Bilgisayar, 1986, No. 61:47) Some other benefits of information technologies that are not able to priced are: rapid distribution, more qualified products, response to changing consumer needs. (Mody, Dahlman, 1992:1708)

Studies to determine benefits of information technologies are not so much, but some of the concrete examples of economic benefits of information technologies were listed at below. These examples are agreed by many authorities:

- With using information processing and information networks, inventory of General Electrics became processed 12 times faster than past. Also there is 5 % saving of paper. (Toffler, 1991)
- With using flexible manufacturing systems, it is observed that there is 20 % decrease in inventory, 20% decrease in unused parts, 20 % decrease in transportation costs, 10 % increase in indirect production performance. (Smith, 1988)
- It is calculated that, with using CAD CAM applications, there is 6 to 10 times of "time" saving. (Bilgisayar, 1992, No. 140:24)
- With using CAD CAM applications, to supply a good of 5 years average life, without 6 months of delay, rises profits at the rate of 33 % in the market which grows 20% annually and which prices decreases % 20 annually. (Atli, 1992:9)
- With CIM applications there is observed 25- 35 % of cost reductions according to classical production techniques. (Bilgisayar, 1986, No. 68:81)
- With neighbourhood offices in Kawasaki, annual saving became 19.4 million Tl. (1993 prices) per each worker. (Newstead, 1989:268)
- In 1988 according to a study that was done in U.S.A., it was calculated that

75 million gallon of oil can be saved for a year with reduction of transportation due to teleworking activity. (Günalçın, 1989:127)
- The saving of videoconference between 300 kilometres is 44.2 million Tl. (1993 prices) at the unit of 360 hours/ person. (Bengt, 1989:253)

The impacts of information technologies are not limited with economic factors. In the next parts the effects of information technologies on various variables will be analysed in detail.

2.4. Several Effects of Information Technology

We showed that most effected factors that effected from information technologies are economic relations, social relations and culture. In this chapter, firstly, sectoral effects of these technologies will be analysed than, their effects on spatial changes will be analysed. Space is the one of the factor that effected much from information technologies. It becomes important to determine effects of these technologies on space, because information technologies may cancel many theoretical studies that is done on space.

2.4.1 Sectoral Effects

Information technology has the potential to effect almost all economic sectors. Effects of information technologies on various sectors are mostly related to employment, output and process. These effects differs from sector to sector, but they are important on general structure of economy. A table that is prepared from 4 different sources will give the effects of information technologies on employment, output and processing variables of all economic sectors. (See Table. 6 at pages between 43-46)

Table 6. Use and Effects of Information Technologies on Various Economic Sectors.

	MAIN APPLICATION	AFFECTION RATE OF TOTAL SECTOR	IMPACT ON EMPLOYMENT	RATE
AGRICULTURE	- Farm management information systems - Reliable instrumentation - Automation to manage large farms	LOW	- Substitution for scarce skills - Skill level rises to meet need for multivalent skills - Small improvement in labour productivity	MINIMAL
MINING	- Improved monitoring - Improved control mechanism - Management Information Systems	MEDIUM	- Skill shift - Some losses on surface workers - Labour productivity increases about 100 % at surface	MINOR
INDUSTRY: PETROLEUM-PETRO CHEMICAL	- Improved monitoring and control - CIM. - Automated production control - Use of microprocessors in production	LOW	- Increasing need for maintenance - Trend towards high skill levels - Decreasing need for supervision - Minimal change in productivity	MINOR
FOOD-DRINK	- Packaging automation - Improved monitoring - Automated control systems - Automated testing - Use of microprocessors in production	MEDIUM	- Skill shift towards specialisation - Some losses in finishing areas - Labour productivity in finishing areas raised between 300 %- 500 %. - Labour saving is high as 80 %.	MEDIUM
TEXTILE-CLOTHING	- Computer aided design (CAD) - Computer numeric controlled machines (CNC) - Automated testing - Automated sewing	MEDIUM	- Operator displacement - Shift towards higher skills - Deskilling of semi skilled jobs - Bulk of movement in finishing and handling areas - Significant improvement in labour productivity(400%) - Large labour savings (50%) in some areas.	MEDIUM / HIGH
CAPITAL GOODS	- Flexible manufacturing Systems (FMS) - Automation of integrated functions - Improved scheduling	MEDIUM	- Significant job losses - Reduced labour needs - Skill requirement is likely to be rise - Major improvement in finishing rather than production - Labour productivity improvement is low	MEDIUM
MASS PRODUCTION (Vehicles, Durables)	-Inventory control - Computer Integrated Manufacturing(CIM) - Computer Aided Design (CAD) - Computer Aided Manufacturing (CAM) - Automated warehousing -Substitution of electromechanical components with integrated circuits.	MEDIUM	- Changes in job character - Shift in job skills - Job losses during earlier phases of mechanisation -Substitution for low skills and repetitive tasks - Labour saving differs between 20- 90 % - In some areas over 20 % improvement in labour productivity - In warehousing 400 % improvement in labour productivity	MEDIUM / HIGH

Table 6. Continued

	MAIN APPLICATION	AFFECTION RATE OF TOTAL SECTOR	IMPACT ON EMPLOYMENT	RATE
SERVICES: BANKING-FINANCE	- Automated Teller Machines (ATM) - Local Area Networks (LAN's) - Wide Area Networks (WAN's) - Point of Sale (POS) technology - Electronic Funds Transfer (EFT)	HIGH	- Shift towards higher skills - New skills required in management of financial networks - Labour productivity rises about 150-300 % - Little change in number of workers	MEDIUM / HIGH
RETAILING AND DISTRIBUTION	- Point of sale (POS) Technology - EFT/ POS networks - Wide Area Networks (WAN's) - EPOS technology - Customer order handling - Automated warehousing - Barcod readers	MED/ HIGH	- Reduction in part time employment - Main losses in warehousing and stock control - Demand for sophisticated planning staff rises - Shift from labour intensive stock operations - Labour productivity in particular warehousing is about 200 %.(Average)	MEDIUM
PUBLIC SERVICES	- Networking - Use of integrated systems - Computerisation of office work - Computer Aided Education (CAE) in education sector - Local Area Networks (LAN's) - Hospital Automation Systems in health sector. - Telehealth - Medical database	MEDIUM	- Shift in management skills - Demand for high skill arises - Change in character of teachers in education - Change in character of health personnel (Rise in computer and networking knowledge)	MEDIUM
OFFICE WORK (In private and public sectors)	- Networking - Use of data and word processing - Local Area Networks - Wide Area Networks - Use of integrated systems - E-Mail - Decision support systems - Management information systems	HIGH	- Change in character of jobs - Demand for service engineers emerged - Growth in the field of pool working - Growing trend for home working - Significant losses in potential exists - improvement in labour productivity as 150-300 %	MEDIUM / HIGH
TRANSPORTATION	- Automated scheduling - Automated ticketing - Computerised control	MEDIUM	- Maintenance jobs gets importance - Rise in level of skills required - Growth in planning and scheduling areas	MINOR
CONSTRUCTION	- Computer Aided Design	MINOR	- Little change, computer technicians needed	MINIMAL

Table 6. Continued

	IMPACT ON PRODUCT	EFFECT RATE	IMPACT ON PROCESS	EFFECT RATE
AGRICULTURE	- Quality improvement	MINOR	- Safety, reliability, efficiency improvement - Improved management and control	MINOR
MINING	- Quality improvement	MINOR	- Improvement in controllability - Access to difficult zones maintained - Maintain more safety - Elimination of hostile environment	MINOR
INDUSTRY: PETROLEUM- PETRO CHEMICAL	- Improvement on quality differentiation - More sophisticated product control	MINOR	- Optimise performance, mainly on energy saving - Centralisation of production control and and management systems - Highly integrated systems achieved - Improved controllability	MINOR
FOOD-DRINK	- Cost reductions through ; reduced manufacture, reduced distribution costs - More quality and differentiation gained	MINOR	- Process improvements - Distributed control and management systems - Improved finishing operations (packaging, storage, handling) - Improved materials saving - Improvement in quality	MAJOR
TEXTILE-CLOTHING	- Improvement in quality - Improvement in range - Quality differentiation - Cost reductions through efficient manufacture	MINOR	- Dedicated control of individual machines gained - Stock level order processing gained - Information system monitoring gained - Total production control maintained	MAJOR
CAPITAL GOODS (Metals man., equipment)	- Improvements in quality differentiation - Programmability achieved - Alteration in product	MINOR	- Automated assembly line achieved - Increased accuracy and reliability achieved - Substitution of integrated circuits	MINOR
MASS PRODUCT- ION (Vehicles, Durable Goods)	- Sophistication of goods - Cheaper and simpler design achieved - Safety and pollution control gathered	MEDIUM	- Quality and range improvement - More flexibility achieved - Production control achieved	MEDIUM

Table 6. Continued

	IMPACT ON PRODUCT	EFFECT RATE	IMPACT ON PROCESS	EFFECT RATE
SERVICES				
BANKING-FINANCE	- Quality improvement in given services - Long term quality improvement with EFT	MEDIUM	- Microprocessor installation in process - Flexibility and speed gained - Location independent operation occurred - Trend occurs toward automation - Growth on networking - High level of integration of information systems gained	MAJOR
RETAILING and DISTRIBUTION	- Improvement in service of goods - Improvement in quality of goods	MEDIUM	- Improvement in ; stock handling, planning scheduling systems - Distributed control systems maintained	MEDIUM
PUBLIC SERVICES	- Improvement in productivity - Improvement in type of services	MINOR	- Automated services achieved - More integration through networks gained - Computerisation of education - Flexibility and speed gained	MEDIUM
OFFICE WORKS	- Same as above	MAJOR	- More speed gained - Integration of facilities gained - Video links makes process easier - Word processing makes process easier and flexible	MAJOR
TRANSPORTATION	- Improvement in; service of goods, safety, availability.	MINOR	- Signalling improvement - Scheduling improvement - Improvement in reservations, ticketing	MINOR
CONSTRUCTION	- Improvement in tendering materials management	MINOR	- Little impact on production control and administrative data processing.	MINOR

Sources: Bessant, 1989:3-96, Bessant, 1985:109-135, Kemp, 1987:203, Blackler and Brown, 1987:33.

From the table, the following results can be derived:

- The most effected sectors from information technologies are service sectors; especially commercial and financial sectors. Also, some industrial sectors are effected from information technologies at increasing rates. Less effected sector from these technologies is the agricultural sector.

-In industrial sectors, mostly CAD CAM and FMS are using as information technology systems. In service sectors telecommunication services and communication networks are widely used.

- The effect of information technologies are on processes rather than products.

- Information technologies have an impact on changing work skills as well as they have an impact on number of employment. High skills become important in all sectors. Also information technologies has an important role on increasing productivities.

- Most important effects of information technologies on employment can be observed in office work and labour intensive industries.

- The effects of information technology on processes are mostly observed in banking, office work and labour intensive industries.

- In processes, we see application of automation and informatics applications.

- In industrial and service sectors, the rising quality of output is observed as an effect of information technology on outputs.

Besides the results that derived from the table;information technologies also has these kind of benefits on value added chain: business decentralisation, market expansion, improved decision making, efficient transport scheduling, cutting inventory costs, increase scope of management, improved opportunities for training. (Williams, 1991:27-28)

All the effects of information technologies on various sectors are only some generalisations. Their effects differ according to development levels, cultural values, technological development level etc. For effects of information technologies on societies that has different level of developments;

look at Table. 7 on pages between 65- 67. In this table it can be clearly seen that effects of information technologies differ according to development levels of different countries.

2.4.2 General Spatial Effects

One of the important impact of information technology can be seen on spatial patterns in the world. The effects of these technologies on spatial behaviours are so much. Effects of information technologies on space is a new subject that debates on it began since the beginning of 1980's. There is no agreement on certain effects on space, but all authorities and academicians agreed that information technologies are playing the most important role on changing spatial patterns, but also, it is not true to take information technologies as only factors that effect spatial changes. Studies on these subjects are continuing. Once, use of technology is diffused to all societies and all groups in different societies, their certain effects on spatial changes can be identified.

The role of information technologies on spatial changes and spatial choices becomes very important. According to a survey that was done in 1990, telecommunication systems was declared as second important factor for locational attraction by 506 firms in Europe. (Cornford, Gillespie, 1992:245) The important role of information technologies on spatial changes increased as a result of these developments: Rapid diffusion of information technology devices after 1970's, computerisation, growing use of robotics and computer supporter equipment, development and diffusion of network systems. (Johanson, 1987:57)Besides all these type of information technology developments, some appropriate variables of these technologies that effect spatial patterns are; a-)scale effect; a certain effect at metropolitan level need not to be repeated in other spatial scales., b-) the prior distribution of activities and resources, c-) the demand for information,

d-) the organisational structure; multiplant corporations are more likely to adopt telecommunication in order to accommodate locational dispersion. e-) logistics. (Nijkamp, Salomon, 1988:97)

Effects of information technology on spatial patterns can be analysed in three groups as global level, regional level, urban level. All these levels are not taken as separately. They are all interconnected because, base of the problem is to analyse the effects of information technologies on locational preferences of firms and industries, despite these effects are analysing at three different levels.

Before explaining the effects of information technologies on various levels, it will be useful to explain some of general spatial effects of these technologies that was argued by many academicians. In this respect, we will prepare a base in order to explain effects on global, regional, urban levels. Also, to analyse the role of information technologies on location models will be useful to understand the subject well. But it has not to be forget that, all debates and findings on effects of information technologies on spatial changes are new and, they should be taken as theoretical, therefore their truth has to be questioned for different cultures and different policies.

As a result of all debates on spatial effects of information technologies , we can list the important ideas about the subject, whether they are empirically proved or not.

- Improved communication and reduced transport costs releasing forces which have led to increased geographical concentration and largeness of scale (Tornqvist, 1987, pp:12)
- Improved information technologies favour center at the expense of periphery. No of levels in hierarchies tends to diminish with increasing mobility. (Tornqvist, 1987, 13)
- New technologies increase degree of freedom of locational choice (Funck, Kowalski, 1988, 127)

- Information technologies may have concentrating or deconcentrating impacts with respect to physical distribution of activities in space. (Funck, Kowalski, 1988, 127)
- IT can potentially render industry and people more footloose by emphasising the movement of information. (Mandaville, 1983)
- Most known spatial effects of new technologies is decentralisation of society. This decentralisation concerns both non metropolitan development and dispersion of population and activities within metropolitan areas. (Calhoun, 1987, pp:338)
- Despite the technical possibility for decentralisation of firms, we still observe a strong centrality or multinodality tendency; at the levels of management and decision making. (Nijkamp, Salomon, 1988 pp:102)

With increasing debates about spatial effects of information technologies, famous location theories are now being questioned. Information technologies advance more flexible locational decisions, because information technologies change "friction of distance" concept that accepted as the basis of locational theories. It is argued that friction of distance is decreasing by developed telecommunication technologies. (Tornqvist, 1987:11) Also, location theorems are argued from different aspects. For example, the points of market and resource supply in Weberian model are to be changed to the points of knowledge accumulation such as institutes and universities, R-D investment centers as well as international nodal points as airports. (Orishimo, 1988:253) For another thought, nodal points of new communication networks become the points of minimum risk. (Giaoutzi, Nijkamp, 1988:10) Another example is given on Lowry model. The older spatial models like Lowry model assume that, entrepreneur choose a location in respect of accessibility and raw materials. Under such conditions, certain activities and groups of population are settled at clearly defined locations. New activities due to IT no longer fits to situation. They have indeed become footloose in respect of supply and dispatch of some goods and services that are independent of

characteristics of the location. Also, new locational factors becomes important such as innovating activities. (Klaassen, 1987:254) In this respect, the workplace decentralisation in Europe after 1983 can be evaluated as the result of using information technologies.

Information technologies also effect basic theorems of urban planning as well as Weber, Lowry models. For example, according to Central Place Theory, there are hierarchical and symmetric relations between cities of different hierarchies, but with telecommunication technologies and globalisation these hierarchical structures lose their importance at some degree, (Forsstrom, Lorentzon, 1991:103) because distance is losing its importance. According to one thought; "there is no reason to believe that changes in IT will upset the fundamental structure of spatial economy. Any changes will be changes of degree. In particular, the spatial organisation of the economy as a Central Place system will continue even tough the distribution of economic activities within such a Central Place System will change. These changes may even go so far as to eliminate lower layer in a central place hierarchy. So far these effects have been most prominent in the rural areas of the U.S.A. and Canada. Whether there is a world wide tendency in this direction remains an open question." (Beckman, 1988, 157)

After, determining the relations between information technology and location models, it can be useful to determine effects of information technologies on production- industrial spaces. In general, "the impact of IT on new spatial pattern of the industry is two fold. Telcom technology increases the spatial mobility of the industry and lowers the cost of transmission between companies' units On line information processing allows geographical separation of activities without losing accessibility to the customers." (Castells, 1991) If we take the role of information technologies on production we can observe historical developments like; according to ideas in beginning of 1980's dispersal of work is encouraged by information technology, whether it

is to individual homes, branch offices, or plants in neighbourhood communities. (Inose, Pierce, 1984:127) As time passed, these type of ideas lost their character of certainity. With development of technology, its effects on storing became clear. Electronic networks accelerated business relations, and this situation increases pressures on just in time delivery. With increasing computer use, flexibility in production and production for demand concepts became popular. When all these developments combined with advanced telecommunication services, decrease in number of big amounts of dispatches observed, commodity endorsements accelerated. These type of trends decreased active character of of wide area industries. (Toffler, 1991) As an important point, it was claimed that, information technologies supports spatial concentration as well as dispersion in flexible type of productions. Especially, production and storage places located in a dispersed pattern, on the other hand, decision and administration units of firms concentrated in metropolitan centers in order to utilise information technologies well. (Nijkamp, Salomon, 1988:99) Also flexible systems bring assembly units and component producers close together despite flexible systems lead to reduction in inventory. (Kaplinsky, 12989: 14) Here the important point is that, decentralisation of production functions not only depends on information technologies, but on other factors such as output level, quality of manpower, wage rates, commuting costs etc. (Sasaki, 1990: 8)

Information technologies may have concentrating or deconcentrating impacts with respect to physical distribution of activities in space,with deconcentration tendency prevailing in all probability. Their effects on future will depend on distribution in space of new communications infrastructure.(Funck, Kowalski,1988, 137) As the infrastructure becomes widely accessible, substantial areas of production can transfer from centralised and specialised buildings back into home; routine typing and record keeping are obvious candidates creating back office phenomenon in residential areas. Teleworking centers are designed to reduce the costs of business location, transportation and time. Each involves a remote work

center close to workers' homes.(Fathy, 1991)

The last point is to analyse information technology- transportation relations in order to understand spatial effects of these technologies well. There are two type of relations between transportation and communication. They can be even substitute or complement of each other. (Salomon, 1988:94) Complementary principle is seem as more real for today. Theoretically, substitution is possible but number of applications in practice are very few. Teleconference is the most important application of this transportation communication substitution, but when considering physiological factors, it is not possible to use teleconference application totally instead of face to face relations in these conditions. Also, the idea that information technologies offer economy from transportation cost is not totally true, because it is observed that transportation flows increased with increasing information flow (Salomon, 1988:95)

Despite all these ideas, as the environmental deterioration and energy crisis remain as the big problems of world; it can be expected that in future, information flows will have the potential to substitute for transportation because, these technologies are the most sensible technologies for the whole environment. Also information technologies ensure big amounts of energy savings. According to an example, an automobile spends 1600 kwh energy for 400 kilometres of distance, on the other hand a viewphone spends about 40 kwh of energy for the same distance. (Harkness, 1982:230)

Most important point is that, cost of teleactivities is decreasing, whereas the cost of infrastructure and application for commuting to work is always increasing. There is two lines that intersects each other.(Toffler, 1991)

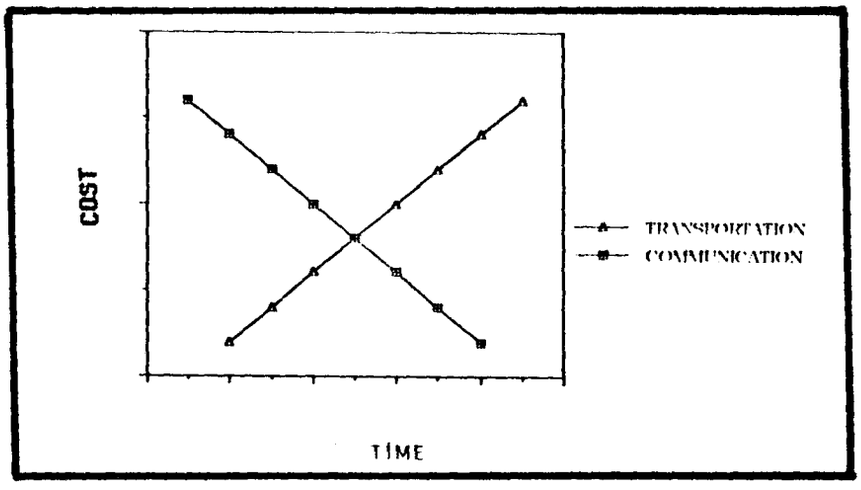

Figure 6. Trade Off Between Transportation and Communication Technologies

Some impacts of information technologies on traffic flow are: Slight decrease of flows as a consequence of telework, decrease of flows of commuter traffic as a result of local concentration tendencies, a decrease of flows as a result of consumer use of information technologies, increased flows in consequence of increasing leisure time activities. (Funck, Kowalski,1988:130)

The result of communication technology- transportation relations is that, communication technologies are effective on space as transport technologies. Competitive power that exists as a result of transportation networks, is carried to a new plane with the help of information networks. (Bilgen, 1991:383) Very remote places can be connected to a network with the help of information technologies.

2.4.3 Global Spatial Effects

Global spatial effects of information technologies is closely related with their role on production processes. For detailed information see part 2.2

Although, we can take spatial effects of information technologies on global level, it is more true to take these effects as scale effect on global levels. But some conclusions can be given on spatial effects of information technologies.

New technologies lead to internationalisation of capital. Number of transnational firms increased especially after 1970 and they started to activate in many countries. New information technologies used for acquiring necessary information just in time. This condition played an important role on globalisation and integration of world markets. (Pressmann, 1988:192) " More organisations started to depend upon flows and networks and less influenced by social contexts associated with the places of their location. access to networks become the basic condition for performance and success of organisations" (Castells, 1991: 30)

Impacts of information technologies on production spaces can be taken as global issue as well as a local issue. For example, according to Just in Time logic, producers tend to choose location at the place which ultimate assembly is taking place, and with using labour saving automation applications, cheap labour points for production tend to lose their importance. (Kaplinsky, 1989:13) This condition changes the academic thought that claims the shift of manufacturing industry to less developed countries, in the beginning of 1980's.

Another important spatial effect of information technologies on global level is that, these technologies play very important role on changing concepts of 'region' and 'nation'. With globalisation efforts, regions are not taken as locations only inside countries, even, 'region' is called as systems of countries in world. In coming part, spatial effects of information technologies on regional level will be analysed. I will use the concept of 'region' in its classical meaning.

2.4.4 Regional Effects

Concerning spatial impacts of information technologies on regions, one of the important subject is to determine the role of these technologies on regional development and regional balances. As a matter of fact, geographers have usually focus more on the role of telecommunications on regional development rather than its role on national international levels. (Stöhr, 1993) In this part, the role of information technologies on regions will be analysed.

The most accepted argument about the subject is that, information technology investments do not lead to regional economic development themselves. Mostly, these technologies have the facilitative role, because direct results of these technologies can not be calculated. Only presence of information technologies enhance opportunities for pay off in other investments (such as business development) Moreover, these technologies raise life standarts and make distribution of public facilities more efficient. Overall generalisation is "information technologies (especially communication technologies) are necessary , but not sufficient condition for economic development" (Gillespie, 1987, Williams, 1991) We can use this generalisation also for regional development, (Gillespie, 1987:794) as information dimension of all industries and services plays important role on changing socio economic activities. In this respect, most effected factor becomes regions which produce all industries and services, but, " new information technologies are unlikely to have a direct steering effect on regional development. On the contrary, it will give us greater freedom of choice and wider geographical scope for action . Information technologies open up new opportunities which did not exist in the past. (Tornqvist, 1987:14) Information technologies are mostly effective; to utilise information stock of region efficiently, to strengthen relations with world and support exporting, to increase of competitive advantage with new production technologies, to maintain economic integrity between center and periphery.

It is clear that, besides effects of information technologies and their dynamics on development of regions, also they play important role on changing dimensions on regional differentiation. A new criteria of "regional information environments" was introduced. (Gillespie, 1987:232) The firms of regions which have sufficient information technology infrastructure and applications can able to get competitive advantage, because these regions offer a big potential for develop. On the other hand, only to own these technologies and technological infrastructure is not sufficient condition. Also, socio economic conditions and orientation play important role on efficient and productive use of these technologies.

The integrated factors that determine regional information environment quality are; manpower quality and information stock of regions as a product of education systems, case of information technology systems and use of them in order to convert information stock to an advantage, variety of information networks that connects regions with other parts of world. (Gillespie, 1987:797) Beyond these, another important factor is the role of regions in innovation period, that is to say, the new technology production capability of region is one of the determinant of regional information environment.

The regions who have weak information environments do not complete their developments without external support. According to one thought, employment and capital may become sufficient to get competitive advantage, but in order to maintain internal dynamics for development, a region must have a rich information environment. (Gillespie, 1987) Now all regions are affected from new information technologies but it does not reflect the reality to expect that information technologies give the same benefits to all regions. The degree of benefit is related to socio economic potentials of region. The difference is so obvious between developed and underdeveloped countries. Effects of information technology are more clear in organised and systematic societies. Even there are big differences between innovating

regions and regions which has not able to produce these technologies.

Also other political factors plays important role on identifying differentiation of regional effects of information technologies on various regions. For example, to maintain regional equality and integration with using technologies is not easy in the countries which telecommunication services are privatized. Essentially, even in Europe it is accepted that without a strong government intervention, the most advanced information technology systems will not become available in peripheral regions at first. (Masser, Swiden, Wegener, 1992:172) This interesting phrase explain something to us. "Guaranteeing regional integrity in the face of telecommunication competition is like trying to make water run uphill" (Abler, 1991:38)

One important benefit of information, especially communication technologies is that peripheral regions can be directly linked to information systems using telecommunication networks. When direct communication is maintained between these areas, the importance of these regions increases and development accelerates. (Nijkamp, Salomon, 1988:93) But this is not the condition for all societies, even there are strong ideal differences between developed countries. German scientists claim that, information technologies do not have potential for development of peripheral regions, and the gap between central and peripheral regions will get wider. (Funck, Koblo, Kowalski, 1988) According to these scientists; "new technology effects locational behaviour. They increase the degree of freedom of locational choice, at the same time they may widen the gap between core and periphery. Those who will remain at the outside of the network will be poor. As a result of an increase in the degree of complexity of operation may lead to a stronger reliance on locations within the large agglomerations." (Funck, Kowalski, 1988) These scientists concluded these results after their studies in Germany. For them, these technologies are used to integrate developed regions, so peripheral regions had no chance to utilise information networks. (Funck, Kowalski, 1988:133)

Three results can be derived from all debates about regional development effects of information technologies ; Firstly, adaptation capability of regions to new technologies is one of the most important factor that will determine future development potential of that region. (Orishimo, Nijkamp, 1988:5) Second result is that, regional effects of information technologies are the reality for whole societies in the world. Here, an important point is that, how are these technologies used and how are they supported? Third result is that, despite all economic social and cultural differences, information technologies, their dynamics and production of these technologies play important role on regional development process.

Besides the role of information technologies on regional development and differentiation, these technologies contribute much to development of rural areas. With new information technologies, rural areas are directly linked to information networks. With the role of information technologies on spatial rearrangement (see part 2.4.2) also rural areas have new chances in new order.

Time and transport savings are obtained and increase in productivity is observed due to use of information technologies. Studies shows that benefit to cost ratios ranging from 1:5 to 1:100, because of improved efficiency in managing rural enterprise, time savings and travel cost and time. (Hudson, 1989:8) New opportunities are emerging for rural areas with elimination of middle man, elimination of distance problems, and with direct linkage to new networks. To maintain these conditions strong information infrastructure and efficient applications should exist in rural areas. Naturally, besides technological infrastructure and application, a suitable organisational structure is needed to use information technologies efficiently. In this respect, good organised local decentralised organisations are suggested. (Hudson, 1989:9) When these conditions are maintained, the positive results on rural areas can be obtained by using new information technologies.

Some of concrete examples about use and benefits of information technologies on rural activities are listed below.

- control systems for conservation
- elimination of middle man
-market research information
-remote management of decentralised facilities.
- Full knowledge on prices
-Weather forecasting
- Grower processor, market transaction systems.
- automatic monitoring for natural resources
- operation for telemarketing
- improved opportunities for village administration
- less isolation for remote rural residents
- better emergency services
- increased ability of small towns to cooperate with one another.
- improved scheduling of transportation.
- more chance to promote and coordinate tourism
- more opportunity of small town revitalisation
- more alternatives for home information

(Williams, 1991)

All these effects and activities are the results of theoretical studies upto now. Also some results of practical studies from developed countries were explained. It has to be kept in mind that, all these effects differ according to different socio economic structures. Number of rural applications of information technologies in developing countries are very few. Besides; in less developed countries rural applications of information technologies are not much developed as in developed countries. Also less developed countries do not give importance to the role of information technologies on rural development. (Williams, 1991, Hudson, 1989)

2.4.5 Urban Effects

One common idea about information technologies is that, information technologies and their dynamics are metropolitan based facts. (Moss, 1987, Nijkamp, Salomon, 1988, Colombo, 1991) Economic activities are reliable and daily information systems and one can interact with these systems at nodes of network. (Nijkamp, Salomon, 1988) The cities are the key elements of these networks. Regular distribution of information becomes the one of the important function of cities. Urban areas are called as information intensive social entities, cities become a sort of communication center, a locus for transfer and transformation activities. (Strover, 1988:127) Also, emergence of new transnational urban hierarchies and information capitals with the help of information technologies (Daniels, 1991:151) show us that information technologies are urban- metropolitan based facts. It is obviously clear that, such facilities like Teleport are feasible and necessary only in the largest, most information intensive metropolitan locations. (Abler, 1991:43)

Despite the belief that the, origin of information technologies is urban areas, there are those who beleive that, modern urban centre's role as nodes in networks in national or international relations may be declining however as, direct communication among peripheral areas become easier. (Calhoun, 1986:340) According to studies held in Germany; distribution of innovation activities which, are as a rule connected with information based new technologies seems to favour the economically stronger highly developed areas of large cities and their hinterlands as opposed to the lagging peripheral regions and old areas. (Funck, Koblo,Kowalski, 1988:137) In spite of these type of debates, an accepted reality is that; information based activities are dominating today's metropols. (Hepworth, 1987:162) Metropolitan areas become key nodes in international telecommunication networks and therefore, they become foci for globalisation strategies for industrial and producer service organisations. (Daniels, 1991:154) Advanced telecommunication systems enabled cities to be increasingly competitive in global markets,

through information technologies cities become more independent of local and regional economies. (Williams, 1991:164)

With development of information technologies, new urban development phases introduced. Castells' s (1991) "informational city", Lipman (1988) and Fathy's (1991) "telecity", Hepworth's (1987) "wired city" concepts are some examples. Friedmann's (1986) "wired city" concept is percepted as central points of international flows.

From urban systems perspective, information cities can be treated as higher order nodes on a global computer network. (Hepworth, 1987:257) Cityscapes are rapidly changing, to be the node of a network becomes important in order to integrate to the global system. Networked cities are emerging, networking structures become important as the new technical infrastructure of urban systems. These networks become integrated systems of electronic production and control systems. (Hepworth, 1987:258) Important point is that, assumptions of linear commodity and human flows, scarcity of production locations, and domination of political power over production and market, are all faced with a changing situation. (Lake 1983, in Fathy, 1991:82) New information technologies do not take place instead of linear flows in cities, but they raise some spatial relations to non linear network dimension. Urban places take their places in the new non hierarchical system that is called as "virtual network". (Fathy, 1991:82)

Beyond developments in urban systems, information technologies have a big potential to determine future's metropolitan structure. In this respect there are two kind of trends. One is dispersed city structure, other is more concentrated city structure. Information technologies advance two of them. At below, the information technology forces that support both locational tendencies are given. (Pressman, 1989:357-359)

IT Forces Working Toward Dispersal Urban Pattern are;

- global manufacturing/international economic dependency,

- specialised job skills needed with multiple skilled inhabitants emerging;
- influential human resources moving to high amenity areas areas on the urban fringe,with jobs following these essential managerial groups,
-high technology based on corporations moving to suburban regions and medium sized towns (telcom allows a lot of facilities now)
- electronic communication reduces need for spatial displacement.
and IT Forces Working toward Concentrated Urban Structure are;
- continuing need for personal face to face interaction despite the revolution in electronic communication.
- electronic hardware will not be accessible to all economic classes.
- anti technology attitude
- reduction of urban sprawl and its resulting costs.

Urban effects of information technologies are not only concerning urban systems or changing urban structures. If it is thought on local level, image of cities are effected from new technologies. If basic physical elements of cities are taken as paths, edges, nodes, districts, we see that these images are not changing, but some details about them are emerging like satellite dishes. Also intelligent buildings that are the determinants of information technologies included to these images. Like intelligent buildings, also Teleport that are regulating information flows was established in some big metropolitan areas of developed countries. (See Appendix -A)

The source of the alteration in urban physical structure is changing functions of city. (Fathy, 1991:76) The effect of information technologies on accessibility and urban land uses are the source of the effects of information technologies on city image. Information technologies have the potential for removing locational dependency for workplaces, increase accessibility on existing transport networks and they lead to diffusion of city borders. Related to all these effects, basic collective image of cities are on the way to change. This change is considered as weakness between urban activities and spaces. (Fathy, 1991:80)

All above debates are theoretical issues. Academic studies about urban effects of information technologies are held for only 10-15 years. The reason is that, advanced information technology infrastructure and applications did not diffused to masses of people yet. Also connection of various information systems is a very new effort in world. After diffusion of information technologies to all public and after determination of common standarts, the effects of information technologies on urban systems and urban spaces can be measured accurately. It is important to remind that, only technologies, themselves are not the only cause of changing patterns of urban systems and spaces. Supporting policies, supporting organisational structure for new type of relations are important factors as technologies.

Are all effects of information technologies on various factors same in all societies or not? In the next part, we will examine international differences concerning all issues of information technologies.

2.5. Information Technology For Whom ?

One important consideration about information technologies is that, are infrastructure, application and effects of information technologies a worldwide issue or are they under the dominance of few developed countries. In this part, countries will be compared according to production of technology, transfer, use of technology and differentiation of their basic effects. We will try to clarify information technology issues according to different development level of countries.

All studies about this subject showed that, the basic producer and extensive user of information technologies are developed countries (All bibliography) At the table No. 7 at the pages 65-67, there are some basic findings on different applications of information technologies on different sectors in different countries. Countries in the table is categorised as indust-

Table 7. Differentiation of Use and Effects of Information Technologies for Different Development Levels

	ADVANCED- INDUSTRIALISED COUNTRIES	
	Intensity of use	Way of use
AGRICULTURE	-Widespread	-Farming aid - Management and operational automation
MINING	-Widespread	- Higher level of automation - Use of integrated systems to improve productivity and controllability
FOOD-DRINK	-Widespread	- Microelectronics applications
PETROLEUM-PETRO CHEMICAL	-Very widespread	- High level of automation
TEXTILE-CLOTHING	-Widespread	- CAD/ CAM - High automation
CAPITAL GOODS	-Widespread	- Flexible Manufacturing Systems
MASS PRODN. Vehicles, Durables)	-Widespread	- Computer Integrated Manufacturing - CAD / CAM Applications - Monitoring
BANKING-FINANCE	-Widespread -Long term shifts to homework stations	- ATM - LAN - EFT/ POS - WAN - MAN
RETAILING AND DISTRIBUTION	- Widespread in Stockrooms, Ware-Housing	- EPOS - POS - WAN
OFFICE SECTOR	- Widespread - Long term shifts to homework stations	- LAN - WAN - Data Processing

Table 7. Continued

NEWLY INDUSTRIALISING COUNTRIES

	Intensity of Use	Way of Use	Adoption Problems
AGRICULTURE	-Limited in short run - Widespread in long run.	- Adopt as general part of mechanisation	- Lack of skill - Lack of availability of cheap labour
MINING	- Medium	- Use of automation	- Shortage of support skills - Lack of capital
FOOD-DRINK	- Medium	- Microelectronics Application	- Problems of skilled labour - Problems of capital availability
PETROLEUM-PETRO CHEMICAL	- Medium - Growing use	- High degree automation	- Problems of skill and capital availability
TEXTILE-CLOTHING	- Medium	- CAD - CNC	- Lack of R-D facilities - Lack of software
CAPITAL GOODS	- Growing use	- High degree of automation	- Low degree of skill problems - R-D limitation
MASS PRODUCTION (Vehicles, Durables)	- Widespread	-CAD - Monitoring	
BANKING AND FINANCE	- Medium - Growing use (Growth depends on infra)	- ATM - LAN - POS	- Skill problems in short run - Lack of design and management skills
RETAILING AND DISTRIBUTION	- Low - Widespread in long term (Depend on development of consumption based society)	- POS - WAN - EPOS	
OFFICE SECTOR	- Spreaded growing use	- LAN - Data processing - Office automation	

Table 7. Continued

DEVELOPING COUNTRIES			
	Intensity of use	Way of use	Adoption problems
AGRICULTURE	- Not exist in short run - Low		- Lack of skill - Lack of capital
MINING	- Low	-Automation confined to incremental improvements	- Skill shortage - Existing of monopolies
FOOD-DRINK	- Low	- Microelectronics application	- Problems of skilled labour - Problem of capital availability - Emphasis on labour intensive techniques
PETROLEUM-PETRO CHEMICAL	- Low	- Automation	- Problems of skill and capital availability
TEXTILE-CLOTHING	- Low/Medium	- CAD - CNC	- Lack of skilled personnel - Lack of R-D activities - Lack of capital - High dependence in labour intensive techniques
CAPITAL GOODS	- Low	- High automation	- Sophistication of technology - Limitations on capital and skill availability - R-D limitation
MASS PRODUCTION (Vehicles Durables)	- Low - Growing use	- CAD	- Skill and R-D limitation
BANKING-FINANCE	- Growing use - Growing depends on infra	- ATM - LAN - POS	- Cost problems - Skill problems - Lack of telcom infra
RETAILING AND DISTRIBUTION	- Low - Depend on retailing infra - Depend on development of consumption based society	- POS	- Lack of retailing infrastructure - Lack of telcom infrastructure - Small size of firms - Lack of capital available
OFFICE SECTOR	- Growing use - Depend on infrastructure	- Limited LAN - Data processing - Office automation	- Lack of telcom infrastructure - Lack of capital available

Sources: Bessant, 1989: 48-51, Bessant, 1985:126-135, EMO, 1992, No:368:84-94, Saner, 1993:44,76.

rialised countries such as Japan, U.K., U.S.A., Sweden, France, Germany, newly industrialising countries such as South Korea, Taiwan, Singapore, and developing countries such as Türkiye, India, Argentina, Brazil.

As it is easily observed from table that, developed countries own the most advanced information technology infrastructure and applications. The diversified use of of information technologies is not much developed in developing countries because of some adoption problems. If we examine, information technology diary in appendix A one can clearly observe that, information technologies and their applications are all originated from advanced countries such as Japan, U.S.A., France. These type of countries are the leaders in production of information technologies, and they have an advanced information infrastructure and also more advanced information technology applications have been using in these developed countries. For example, R-D activities are important indicator that show superior role of developed countries concerning information technologies. (See Table No.8)

Table 8: World R-D Distribution: (133 Countries)

	Researcher (%)	Expenditure(%)
Europa	23.8	30.68
America	20.43	36.13
Asia		
Africa	0.9	0.5
Developed (34)	93.9	97.4
Dependent (99)	6.10	2.6

Source: Saner, 1993: 78

It can be observed from table that developed countries play important role on innovation periods. So high technology production takes place in these countries as they are innovating countries.

Second example that shows big gap between developed world and others concerning information technologies and information activities is the

distribution of databases all over the world. According to a study that was done in 1991, the distribution of 6261 databases in whole world was like this; America 71 %, Europa: 24 %, Asia: 1 %, Far East: 3 %, and others: 1 %. (Bilgisayar, 1993, No.145:69) If we take the diffusion and intensity of use of these technologies, naturally we observe dominance of developed countries. We can give some other examples about this subject; by 1989, 75 % of all telephone lines exist in 9 richest countries. According to another example, 1000 people own the average of 650 radio and 447 TV in developed countries, however in less developed countries these averages become 142 radio and 36 TV per 1000 person. (Hamelink, 1990:260)

According to these examples, it can be suspected that, use and effects of information technologies belong only to developed countries, but this is not the case. For 10-15 years these technologies developed so much that, all countries and societies of the world met with at least simple applications of these technologies, and their all socio economic structures affected more or less from these technologies. Developing countries import and accept these technologies as they have no capability to produce these technologies. There is no convincing argument or model that places development of information technology in order of priorities in developmental needs. There is a tendency to generalise the problems and situations of countries according to their diversity. (Mowlana, 1986:14) In coming parts I will use this type of generalisations because use and effects of information technologies differ in each country. Generally, countries differ from each other by these factors; a-) political administrative traditions, b-) institutional arrangements and public policies, c-) environmental resources and constraints relevant to communication industries, d-) communications culture, elite and public beliefs, attitudes, values and habits concerning communications, e-) the lessons learned through past developments and experiments in communications. (Dutton, Blumler, Kreamer, 1987:474) Because of these type of differences, we can not take all societies one by one, so generalisations will give basic idea about differentiation of countries.

In order to analyse differentiation of information technology issues in various countries, it can be true to classify countries as technology producers and technology non-producers.Technology producers are developed and newly industrialising countries and technology non producers are classified as developing and less developed countries.

If we take technology producers or advanced countries, basic organisational, spatial, social effects of information technologies are seen widely in these type of countries. The most important characteristics of technology producer countries are the high innovation and R-D capacity, as we talked about before. Government's role is very important in technology production. Government shares in R-D expenditures are very high in these countries. For example in Japan 50 % , in U.S.A. 21 %, in European Community, 40 % of R-D expenditures are paid by governments. (Işık, 1990:44)

Besides the production of these technologies; these countries recognise the importance of these technologies in the new information era. In Europa, the emphasis of government policies has shifted towards supporting the introduction and efficient use of information technology applications. (Gassman, 1991:1024) Policy makers give very much importance to dynamics of information technologies. In most of developed countries Telecommunication and information infrastructures are seen as basic investments for the information society of future and they are designed in order to serve most remote regions. This shows importance of information technology concept in developed world.

Also in developed countries, the studies about effects of information technologies on society, space, economy etc.. had been increasing since the beginning of 1980's. Debates about information technologies and their effects become the most popular subject in academic life. Institutions of United Nations have various research programmes on this subject, many

information technology foundations were established. All these efforts show the growing importance of this subject.

With grasp the importance of these technologies, an important manner is to determine legal arrangements and laws about information technology use and application issues. For example data preservation laws have been applicated since 1980 in developed countries like France, U.K. Other activity area about this subject is standardisation. The need for standardisation increases as networks and automation systems spread in these countries. Standardisation efforts are so important for development and diffusion of information technology and information activities. When network quality increases with standardisation in developed countries, also economic value of information increases (Toffler, 1991:32) In this respect, these countries can be the members of information era.

Despite the developments in various aspects of information technologies, there are also some important problems in technology producer countries. Transformation period into information age leads to many problems in developed countries. The new created jobs (See appendix. B) do not totally complete their developments and do not start to serve for whole societies. Besides, the mentality of information era is not understood by all parts of societies. Also, all effects do not diffused to the whole parts of societies. Because of these reasons, there are some problems about information technology in developed countries. Unemployment problems, increasing gap between people and different parts of society, racism are some important problems that these countries confront in transformation to information age.

If we examine technology non producer or developing countries, we see that information technology devices, especially computers, satellites are seen as tools for accelerating development of these countries. This situation is a recent phenemenon of about 8- 10 years. Developing countries

import and use these technologies either consciously or not. Exploiting these technologies by technology non producer developing countries causes both advantages and disadvantages. (Kaplan, 1991:5)

Various activities can be integrated by the help of these technologies. Multinationals play important role on this integration as they become to invest in developing countries as the power mechanisms of capital. On the other hand, there is a danger of revolving national sovereignty concept into the hands of transnationals. Also, if organisational frame is not organised well, there is a danger of mass unemployment in developing countries. (Perez, 1985:452) With good organisational design, it is possible to achieve high productivity levels on the basis of a small market for one product or combination of them. In this respect, insufficient size of markets problem can be solved in developing countries. (Perez, 1985:456) Also, if chosen well, industrial application of information technologies accelerate development efforts in these countries. (Inose, Pierce, 1984) On the other hand, saving in labour due to automation decreases the advantage of countries who use labour intensive technologies in production. (Weinberg, 1990:14) This situation leads to increased gap between technology producer developed countries and technology non producer developing countries.

If we take, less developed countries, we see that, only big urban centres meet with information technologies. If these countries can not able to guarantee the diffusion of these technologies all over the country, it is accepted that balanced population growth and economic development will be impossible to maintain and economic, political, social conditions will be worse. (Patwardhan, 1985:275)

First of all, there is information scarcity problem in less developed countries. They can not be able to produce information, because it necessitates big amounts of capital that these countries can not afford. (Ansah, 1986: 208) Besides, there are a lot of obstacles for information

technology applications. Some of these obstacles are lack of infrastructure, lack of software services, weak management systems, wrong understandings about technology etc.. (Mody, Dahlman, 1992:1717) There are also some local problems and priority problems caused by using flexibility of technologies in established and traditional patterns of economic activity in less developed countries. Skill shortage, energy/raw materials conservation are some examples. (Bessant, Cole, 1985:66)

As a result; despite information technology use and effects are intensive in developed countries, these technologies and their dynamics are for the whole world. With information technology use and applications, the gap between developed and less developed countries always increasing. This information gap between societies and even between individuals; is accepted as one of the basic differentiation variable of humankind. (Janelle, 1991:79) Rate of process differs in various countries. even there are some less developed societies that not effected from technologies and structural changes. This leads to increasing global imbalances and globalisation concept becomes only true for developed countries. With true policies in developing countries, it is possible to catch up information age but there are some adaptation and organisational problems about information age. (Erkan, 1993:74)

"The success or failure of information technology in societies depends on attitudes of people who design it, work with it, live with it and consume it. These technologies can not be evaluated without the social context which it takes part in. We need to know the specific type of technology we are dealing with and the social system that surrounds it." (Kemp, 1987:207)

What is the position of Türkiye concerning all these developments. We will try to give an answer to this question in the next chapter.

CHAPTER III

INFORMATION TECHNOLOGY CONCEPT AND TÜRKİYE

After evaluating several effects of information technology on various factors, general trends and evolutions; we can start to interpret the position and characteristics of information technologies in Türkiye. Before we talk about various effects of information technology in Türkiye; we have to determine the degree of complexity and intensity of use of these technologies in Türkiye. Complexity includes both information technology infrastructure, organisational use and legal issues. Another important point is to determine the production of information technology and innovation, R-D activities that supports information technologies in Türkiye. After determination of all these issues; we can able to clarify Türkiye's position towards information technologies and its dynamics.

I gave all evolutions about information technology issues in Türkiye at appendix C. In this historical outline, all evolutions are given with necessary explanations. All evolutions take part in its related sub title. Subtitles in the Appendix .C is like;

- Information Technology and Networking Infrastructure
  - National
  - International
- Systems Development
  - Broadcasting
  - Telecommunication Systems
  - Data Communication Systems
- Database Activities
- Networking Activities
  - National
  - International
- Information Technology Applications
  - Retailing Wholesaling Applications
  - Industrial Applications
  - Education and Health Sector Appl.
  - Media Applications
  - Banking and Finance Sector Appl.

- Automation Applications
- Construction-Transportation Appl.
- Information System Applications
- Other Service Applications

- Production Issues
- Institutional Issues - Important Project Agreements
  - Legal Issues
  - New Institutions, Establishments
- Education and R-D Issues

In the light of these developments, there are 4 main subjects about information technologies that has to be explained in Türkiye. First subject is the development of information technology infrastructure and information technology applications. Second subject is to analyse production of these technologies and to determine the level of R-D activities in Türkiye. Thirdly we will explain institutional and legal dimensions of information technology use and informatics in Türkiye. The last subject is to determine the mentality in Türkiye and position of existing bureaucracy and society towards information technologies and information age. This last point will be given in conclusion point. The explanations on mentality and opinions towards information technologies can not be driven directly from this part, but different dimensions of information technologies and evolution of these technologies in Türkiye can give us some clues about this subject.

3.1. Development of Information Technology Infrastructure and Applications in Türkiye.

As parallel to developments in whole world, all issues concerning information technologies developed very much in Türkiye in the last 10-12 years. Especially, the development of information technology infrastructure is so attractive. These infrastructural developments include communication technology and computerisation. As we see in part 2.1., information technologies consist of developments in these two fields. If we take develop-

ments in communication technologies since 1983, we see that approximately, 0.86 % of national GNP was spent on telecommunication infrastructure at every year. Even, in 1987, 1.3 % of GNP was spent to telecommunication infrastructure and this value is accepted as a world record. (PTT Faaliyet Raporu- 1987) Besides the high amount of investments in telecommunications field, the increase in computer use is also important. With the beginning of personal computer era in the world, computer use increased in Türkiye as parallel to the world. Number of computers (game-type computers excluded) in 1993 is 100 times more than number of computers that was used in 1984. (Bilgisayar, 1993, No.147:88) By the beginning of 1994, approximately 600000 computers are in use and there are about 3.5- 4 million computer users. Increase in number of computers is given in Figure.7

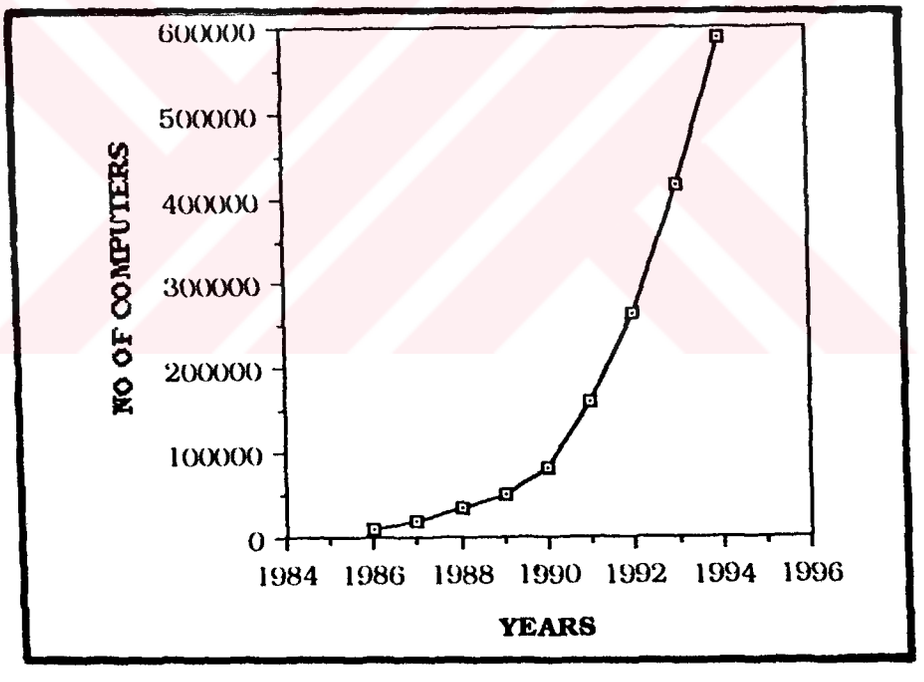

Figure 7. Development in Number of Computers in Türkiye.

No social or economic indicator increased like the increases observed in computer usage in Türkiye in this period. The value of computer hardware was about 17 trillion Tl. (1993 prices) by 1990, and value of

computer software was about 4.6 trillion Tl. (1993 prices) in the same year. If we define that total value of computer hardware and software was only about 3.6 trillion Tl. (1993 prices) in 1985, we can understand the level of development in computer field. Nevertheless with the last economic crisis, the most affected sector is said to be as computer sector but it is hoped that this crisis in computer sector is temporary.

The last 10 years was the period that information- communication infrastructure developed very much and information networks diffused to all over country. The national information infrastructure is strengthened with newest cable technologies, satellite systems and digital radio-link networks. A lot of new information technology systems and newest infrastructural developments took place in our country, as parallel to the developed countries. For example digitalisation efforts that started in 1980 in Europe was started 4 years after in Türkiye. Newest packet switching data communication systems started in 1987 in Europe and in 1989 in Türkiye. Digital mobile telephone system was put in service in 1993 in world and it was put in service in 1994 in Türkiye. Wide band ISDN system in Türkiye is planned to be put in use at the same time or 1-2 years later than developed countries. Despite these examples, the use and application of some technologies were delayed in Türkiye according to other countries. For example, first ATM was used in 1979 in U.K. but it was used in Türkiye in 1988. VSAT (Very Small Aperture Terminal) satellite network systems was first used in 1983 in Japan, but it is planned to use this system in 1994 in Türkiye. Also SBS (Satellite Business Systems) application was first held in U.S.A. in 1980, but it is planned to use this systems in 1994. The reason of these delays are mostly due to the lack of organisational design as well as technological insufficiencies. But this time lag is not so disadvantageous because at any time there are new innovations. Also the certain effects of these technologies will be understood in a few years time, so this time- lag concerning some technological infrastructure and applications do not create disadvantageous position for Türkiye.

We can give some striking examples for rapid development of information technology infrastructure in Türkiye. In 1984, a fibre network was started to be laid down in Türkiye and in 10 years time, approximately 21000 kilometres of fibre optic network is established. Fibre optic development can be observed in Figure.8.

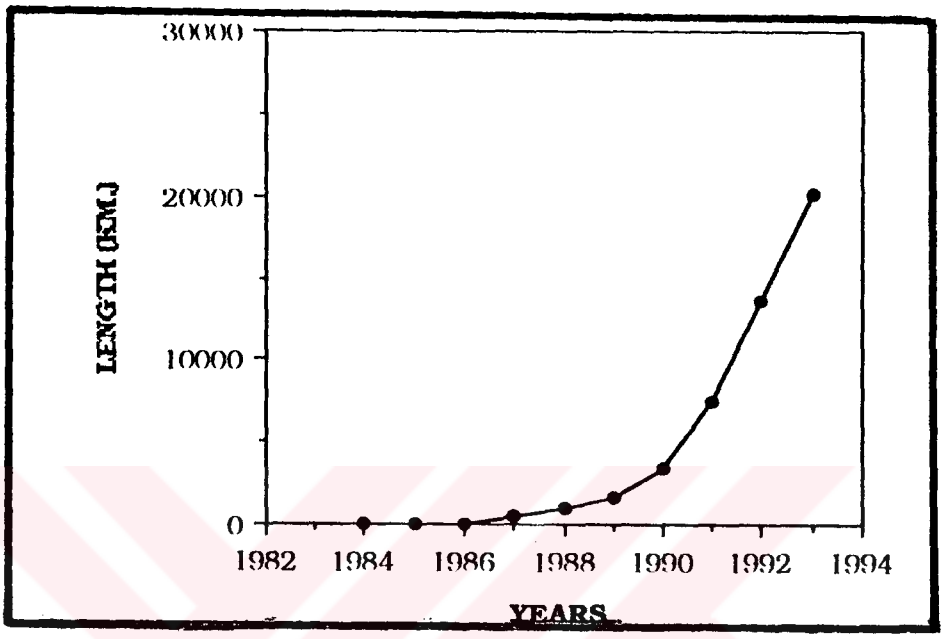

Figure 8. Fibre Optic Cable Development in Türkiye.

By the beginning of 1994, all exchange connections in metropolitan areas is fibre optic. The studies to establish the digital radio-link system was started at the same period with fibre optic efforts. By the beginning of 1994, there is 40000 kilometres of radio-link network in Türkiye. After the efforts that started in 1983, now 40 % of this network is digital. The radio link system development can be observed in Figure.9 in the next page

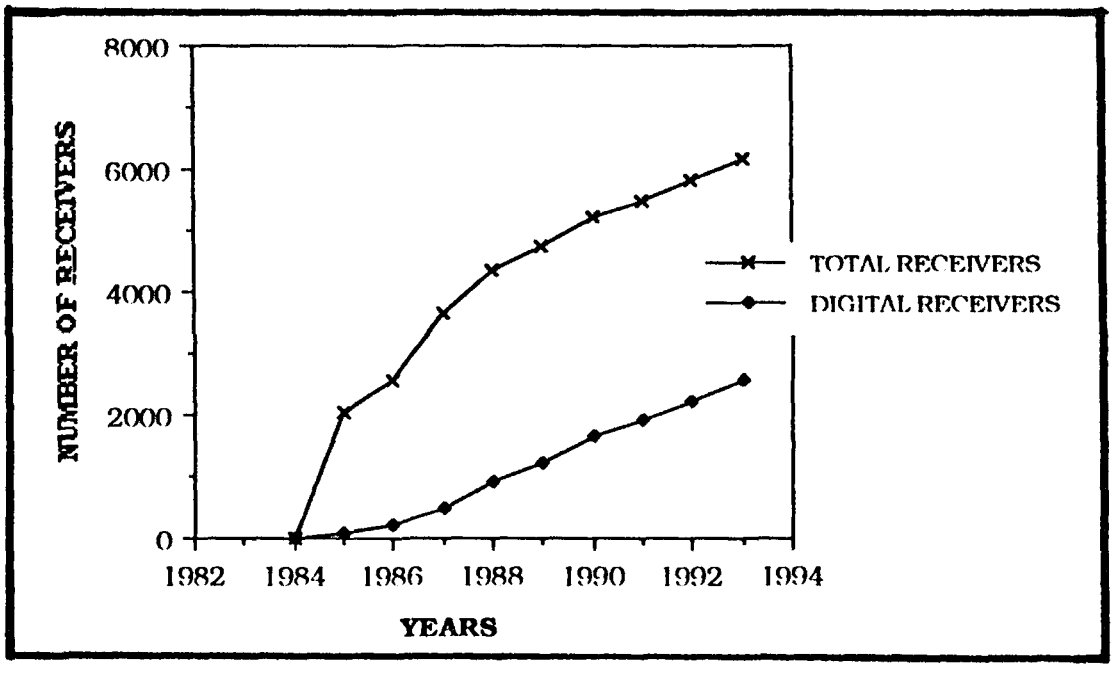

Figure 9. Radio Link Development in Türkiye

The map of the fibre and radio- link network of Türkiye is given in the next page (See Fig.10) As parallel to infrastructural works, digitalisation efforts started at 1984 and by the beginning of 1994, 55 % of total telephone lines becomes digital. At present the project of transformation of all telephone lines to fibre optic is still continuing. (Gözüm, 1990:3) With developments in infrastructure, Turkish transmission network was so much strengthened. By the beginning of 1994, the capacity of Turkish transmission network is about 3.5 million channels. At the same moment 3.5 million conversations can be made through Turkish telephone system. The ratio of this number to total lines is about 28 %. This number is above the accepted standard of the ratio of 20 %. This condition is so important that shows us the attractive development of information technology infrastructure in Türkiye for 10 years.

As parallel to developments in infrastructure, development of information technology systems and services are also noticeable. The development of information technology infrastructure supported the information technology systems and information technology use. By the

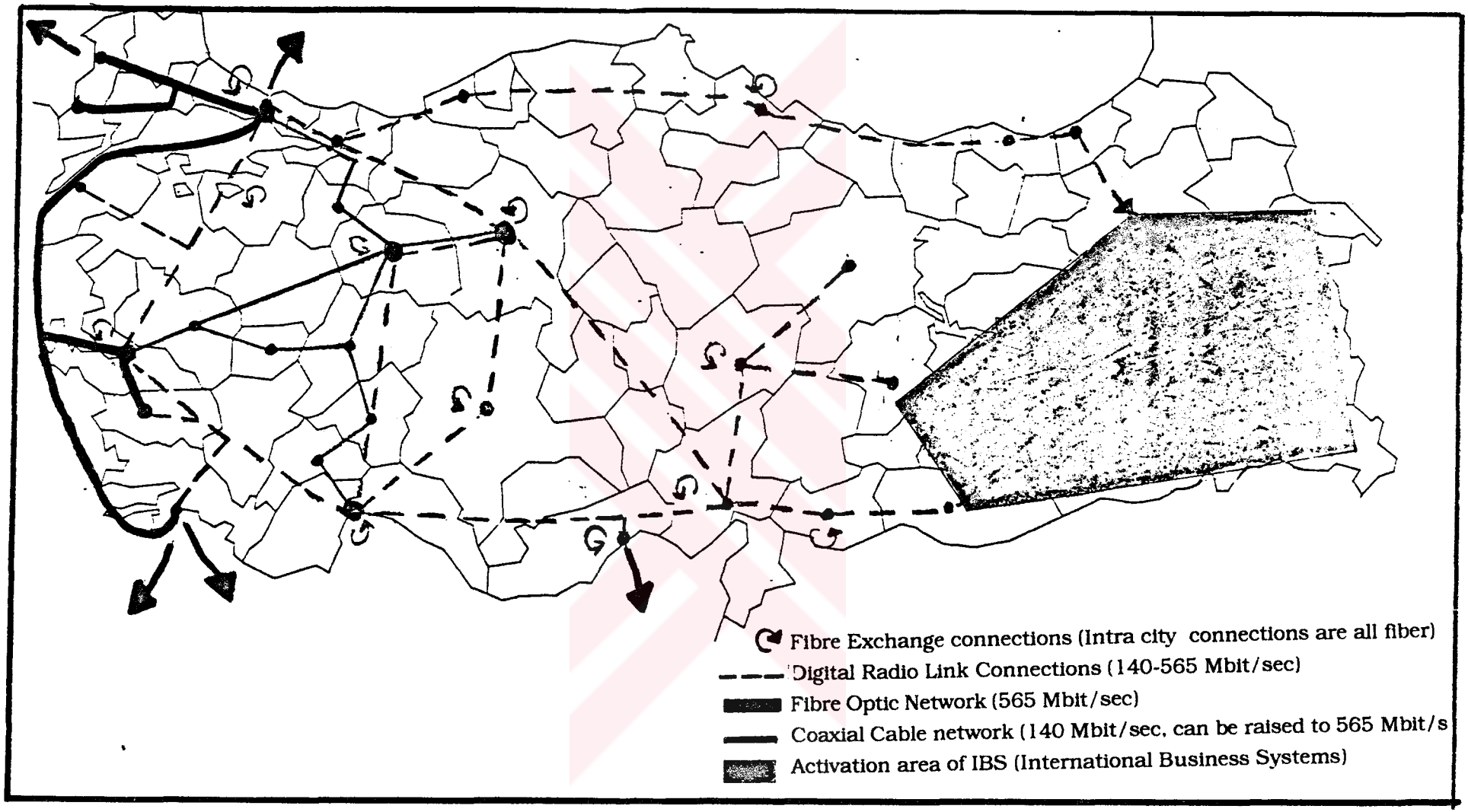

Figure 10. Information Technology Infrastructure in Türkiye

beginning of 1993, there was 25 telecommunication services such as paging, mobile telephone, videoconference, Telebilgi in Türkiye. If it is compared with Europe, the number of these services can be found as very insignificant, but when it is compared with 8 years ago, we can observe the significant development in Türkiye. For example although the paging and analog mobile telephone services started at 1986, by the beginning of 1994, paging service is given in 40 province center and in 65 county center. Also analog mobile telephone service is given in 45 % of the whole country. Graphs about evolution of paging and mobile telephone systems are given at Figure.11-12.

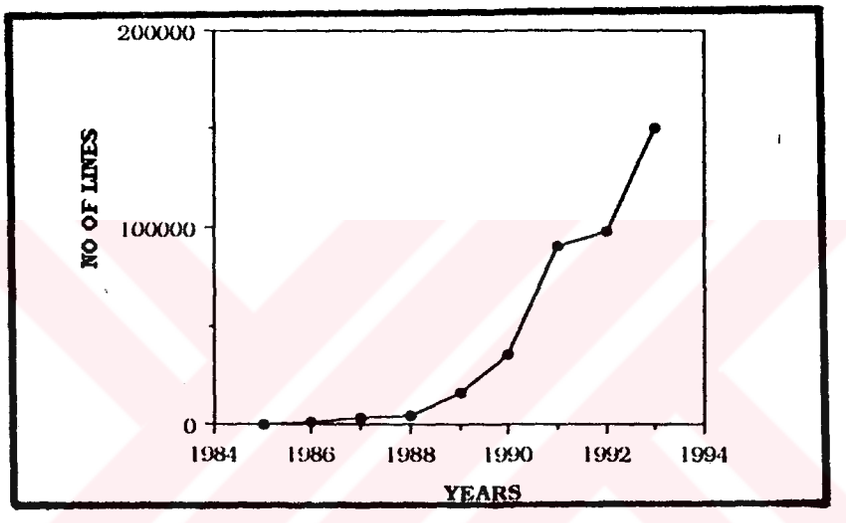

Figure 11. Paging Line Development in Türkiye

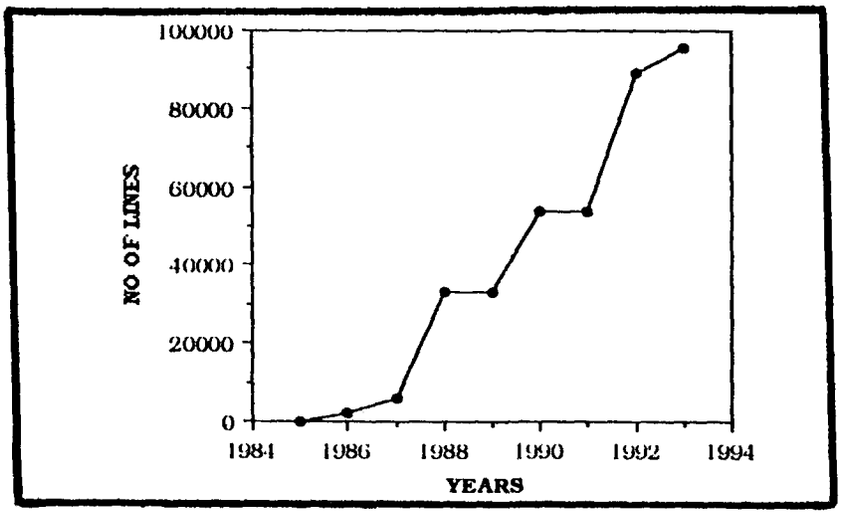

Figure 12. Analogue Mobile Telephone Line Development in Türkiye

Besides the development in telecommunications field; also data communication services developed very much in Türkiye. For example, the packet switching service of 65500 byte/second was put in service in Türkiye at the same time with the world. By the beginning of 1994, there is about 22170 direct data communication lines in Türkiye. Evolution of data communication lines is given in Figure. 13.

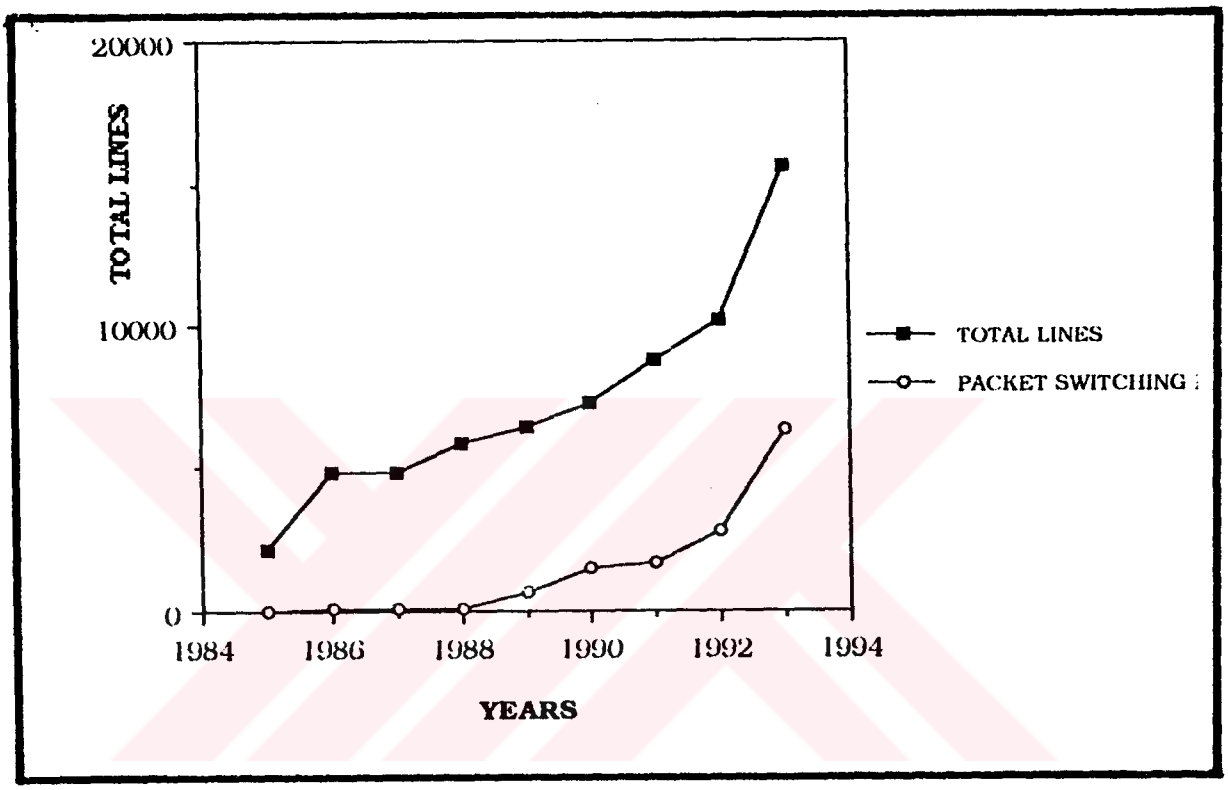

Figure 13. Development of Data Communication Lines in Türkiye

Especially, developments in data communication play important role on integration of Türkiye with the world. In addition to telecommunication and data communication facilities, there are also developments in broadcasting. In the year of 1986 there was one television channel in Türkiye, but by the beginning of 1994, there are 13 countrywide and 45 local television channels. By 1994, TRT programmes reach to 95 % of all population.

Progress in information technology in Türkiye is not only taking place

in communication field. Also, the various applications of information technologies can be observed. Most known applications are CAD/CAM applications in industry, informatics services in health sector, computer aided education in education sector. In order to know detailed historical developments of these applications see Appendix C, on pages 197-205. We can give some values in order to determine the ultimate condition of these applications in Türkiye. If we consider industrial application, we see that the market of CAD/CAM is worth about 575 billion Tl. (1993 prices) by 1994. This value was about 12.3 billion Tl. (1993 prices) in 1985. This example can show us the attractive development in CAD/CAM applications. Now, it is known that all telecommunication industry use CAD/CAM applications. Also, CAD/CAM applications are using in automotive sector, electronic industry, glass industry and in construction and architecture fields. Also nearly 35 % of big textile producers use CAD/CAM applications. (Boratav, 1991:128)

Beyond industrial applications, also there are important developments in financial and other applications of information technologies. First ATM (Automated Teller Machine) was put in service in 1986, and there is about 3800 ATM all over the country, also by 1993 number of ATM cards were reached to 100 million. It is estimated that newest applications of Electronics funds transfer (EFT), Point of sale terminals will be put in service by the end of 1994. In education sector, we see that, by 1994, computer aided education (CAE) is applied in 385 schools with 20000 computers. This values are very small when compared with developed countries like U.S.A. and U.K. as they applied CAE in 80 % of their primary and secondary schools by 1990. On the other hand Türkiye is in advanced position than other developing countries concerning CAE. (Akarsu, 1989:84) In any case, various information technology applications in Türkiye are not much developed as in advanced countries. Also there are no applications like telehealth, information city, advanced distance learning exist in Türkiye as U.S.A. or Japan. There are a lot of of problems in front of advanced information technology applications in Türkiye. It is expected that, with national satellite system,

some advanced information technology systems like International Business services (IBS), Satellite Business Systems (SBS) will be able to operate in Türkiye.

All these infrastructural and systems development cause development in national networking activities and database production. We can easily say that database and networking activities as advanced information technology applications played very important role for starting information age in the last 10 years. Network activities developed in 7 or 8 years and database activities developed only in 3 or 4 years in Türkiye very much, but these activities in Türkiye are not developed as much as they developed in advanced countries. In Türkiye there are about 15 wide databases that belong to SSI, SPO, Yargıtay, Banta, Borta, YÖK, Bilkent, METU, National library, TSI etc. For detailed information see Appendix C on pages 189-197. With parallel to infrastructural developments, networking studies was started in 1985 and continued upto now. By 1994, There are various communication networks that links different parts of public or private institutions. On the other hand, there is no national comprehensive network that links different institutions and firms to each other like in developed countries. But studies on this subject are continuing. With Turkish national satellite system, and with the help of standardisation efforts, it is estimated that in 2 or 3 years time a national comprehensive network will be established.(Bilişim, 1993) (For detailed information about national networking activities, see Appendix. C, on pages 191-194.

Development of information technology infrastructures and systems cause increase in use of these technologies. At first only user of new services in telecommunications, and computers were business world and academic environments but information technology use started to diffuse to all parts of society in Türkiye for especially 5 years. The graphs that show the increase of telephone density, cable TV subscribers, facsimile device subscribers, paging subscribers, mobile telephone subscribers can help us to understand that situation.

some advanced information technology systems like International Business services (IBS), Satellite Business Systems (SBS) will be able to operate in Türkiye.

All these infrastructural and systems development cause development in national networking activities and database production. We can easily say that database and networking activities as advanced information technology applications played very important role for starting information age in the last 10 years. Network activities developed in 7 or 8 years and database activities developed only in 3 or 4 years in Türkiye very much, but these activities in Türkiye are not developed as much as they developed in advanced countries. In Türkiye there are about 15 wide databases that belong to SSI, SPO, Yargıtay, Banta, Borta, YÖK, Bilkent, METU, National library, TSI etc. For detailed information see Appendix C on pages 189-197. With parallel to infrastructural developments, networking studies was started in 1985 and continued upto now. By 1994, There are various communication networks that links different parts of public or private institutions. On the other hand, there is no national comprehensive network that links different institutions and firms to each other like in developed countries. But studies on this subject are continuing. With Turkish national satellite system, and with the help of standardisation efforts, it is estimated that in 2 or 3 years time a national comprehensive network will be established.(Bilişim, 1993) (For detailed information about national networking activities, see Appendix. C, on pages 191-194.

Development of information technology infrastructures and systems cause increase in use of these technologies. At first only user of new services in telecommunications, and computers were business world and academic environments but information technology use started to diffuse to all parts of society in Türkiye for especially 5 years. The graphs that show the increase of telephone density, cable TV subscribers, facsimile device subscribers, paging subscribers, mobile telephone subscribers can help us to understand that situation.

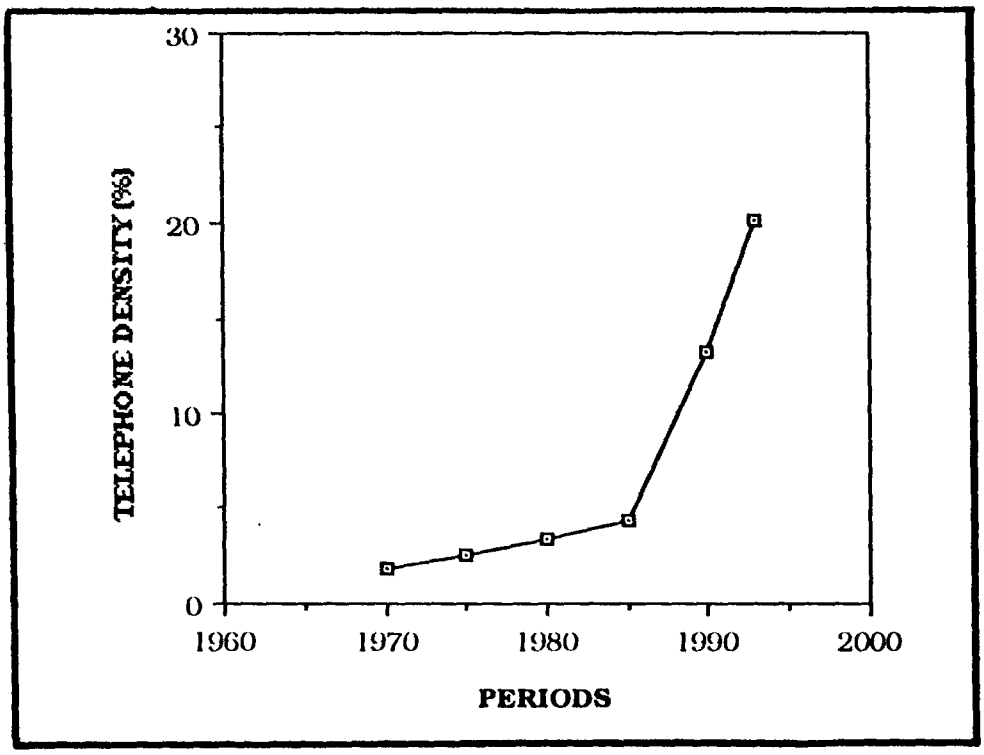

Figure 14. Telephone Density Development in Türkiye

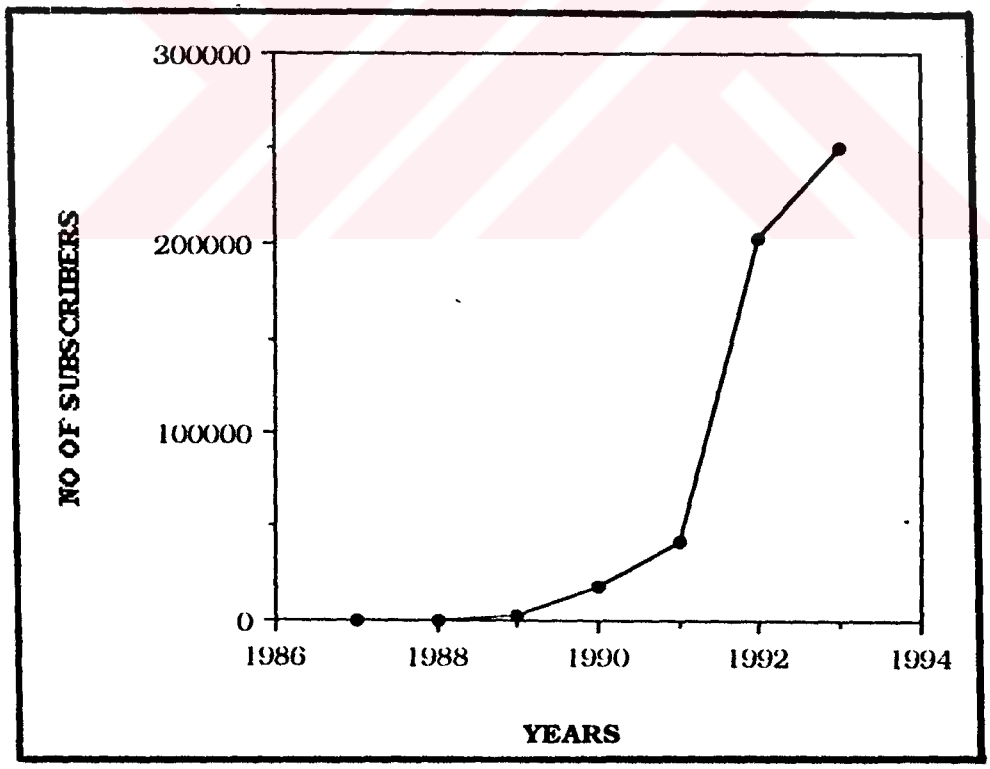

Figure 15. Cable TV Subscriber Development in Türkiye

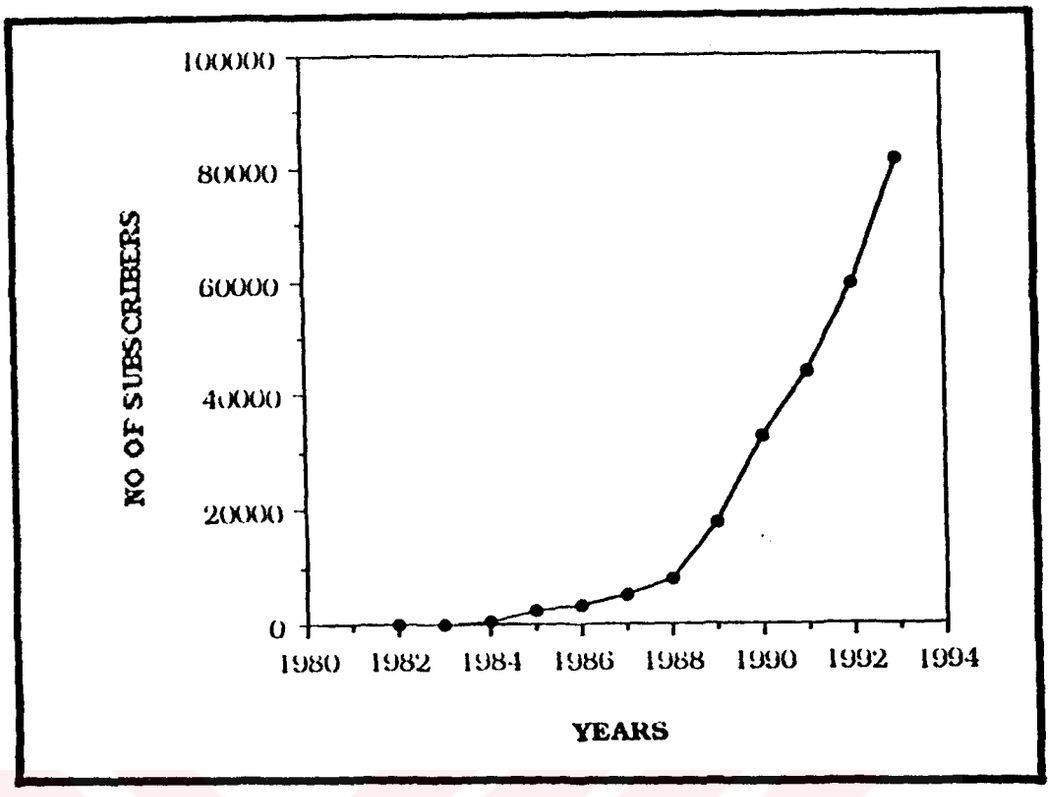

Figure 16. Facsimile Subscribers Development in Türkiye

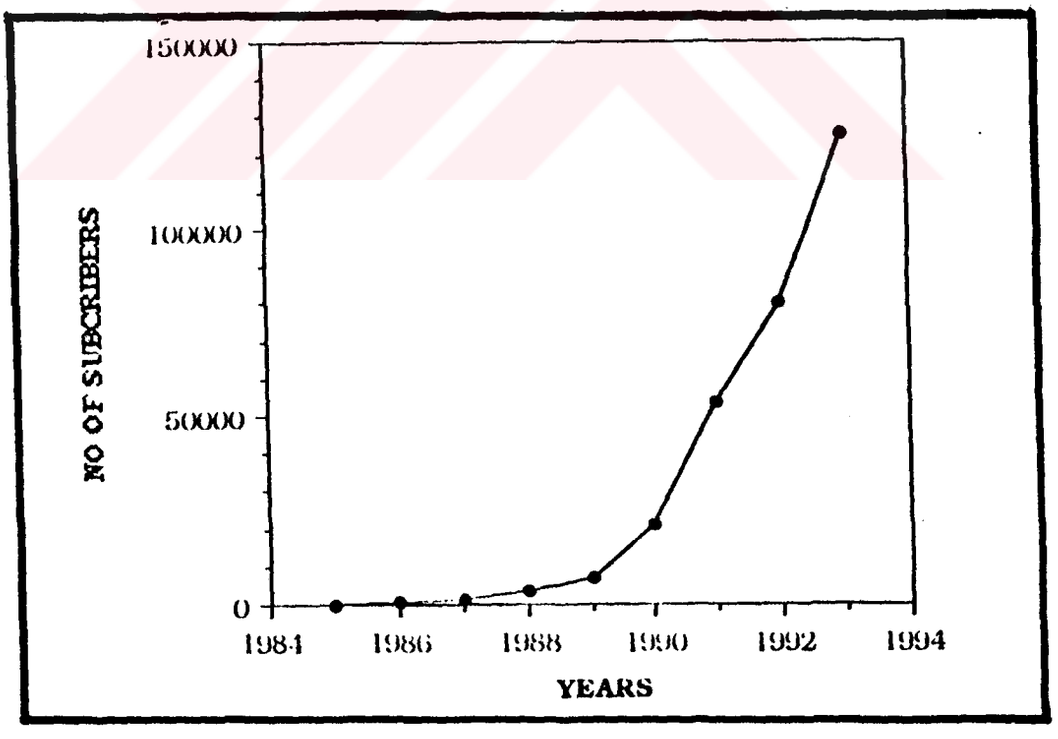

Figure 17. Paging Subscriber Development in Türkiye

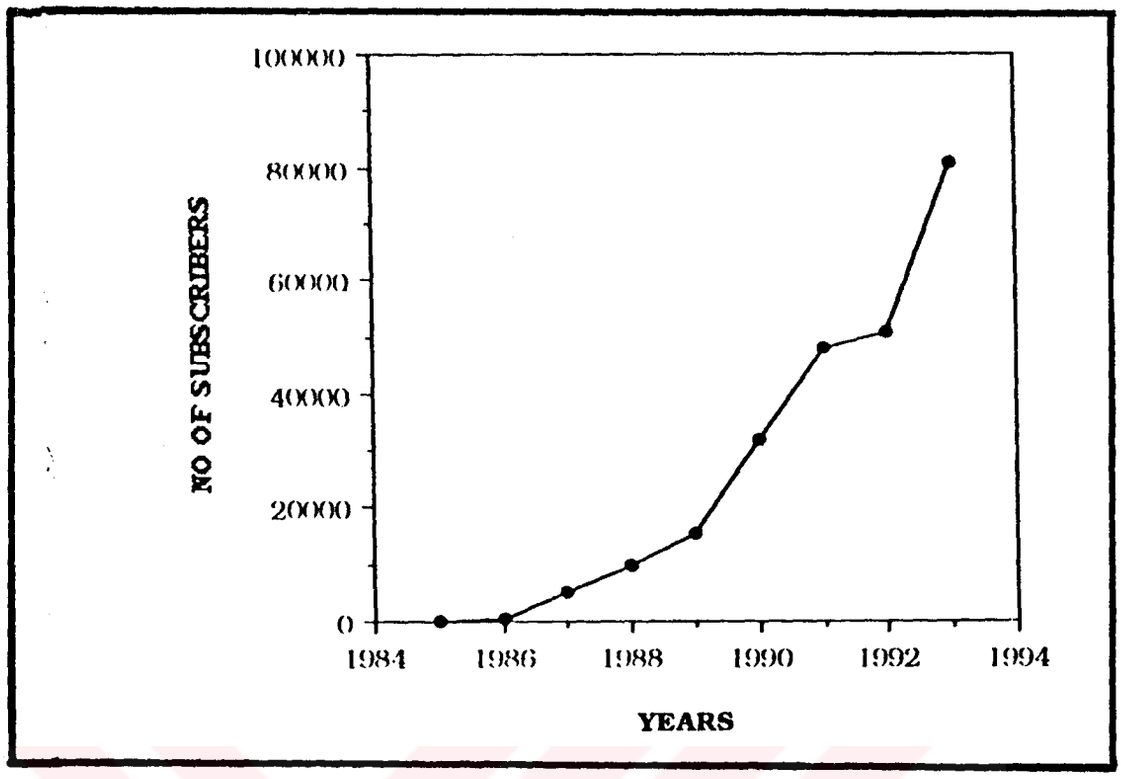

Figure 18. Analogue Mobile Telephone Subscribers Development in Türkiye

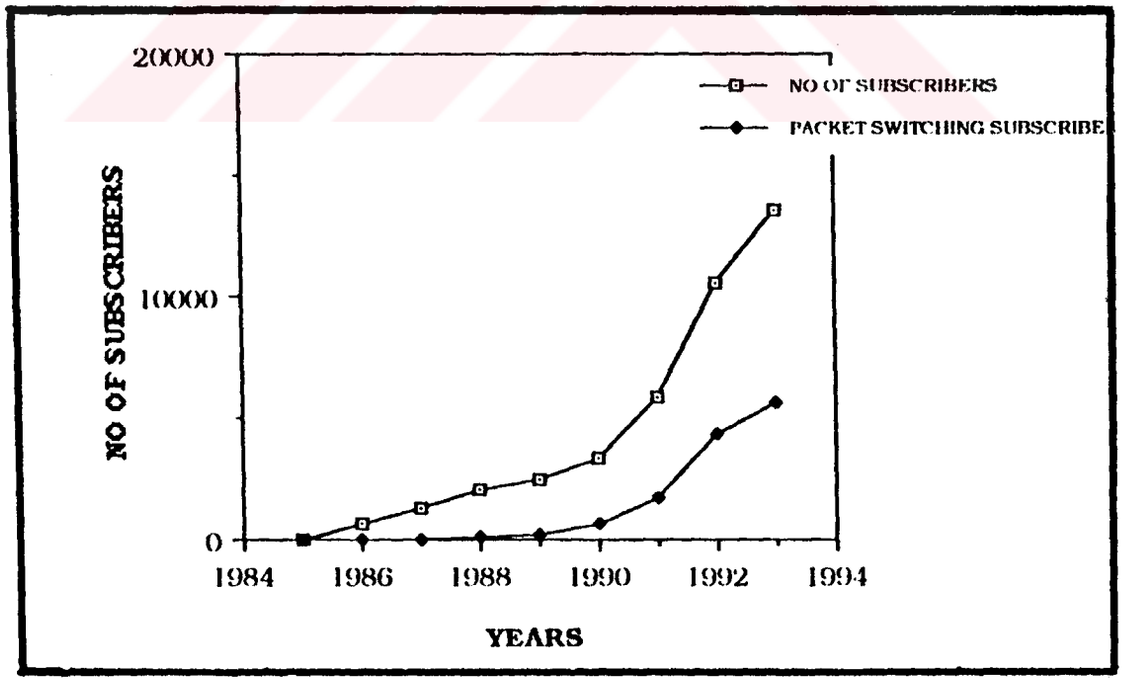

Figure 19. Data Subscribers Development in Türkiye

In order to determine the condition of information technology use in business world, we can use PTT's survey in 1991. (PTT ARGE, No. 3:42-45) This survey includes 43 % of firms, banks, social institutions in 19 provinces which has the greatest contribution to Gross Domestic Product. (GDP) If we generalise this survey, we can find these results;

- We estimate that 22.2 % of 10747 firms are using computer communication. This rate increases to 34 % considering big firms.
- A Local Area Network (LAN) exists in 42 % of all firms, this rate increases to 60 % considering big firms.
- There is office automation application in 31 % of all firms and institutions.
- Nearly all banks, financial institutions, and security organisations use computer communication and LAN facilities.
- There is facsimile device in 83 % of all firms and institutions.
- There is mobile telephone in 40 % of all firms and institutions.
- 54 % of all firms and institutions want to operate ISDN systems.

Besides development in use of telecommunication services, also there is a great increase in computer use. In 1983, the number of computer users varied between 5000-10000 and they were all professionals or semiprofessionals, but with development of personal computers, computer use diffused to all areas and all parts of society. As we mentioned before, by 1994, it is estimated that there is about 3.5-4 million of computer users in Türkiye. Also using rate of mass media is increasing. By 1994 it is estimated that 85-90 % of all households have a television set at their homes. (Cereci, 1992:85) There is increase in other applications of information technology such that, number of credit cards in use are about 975400. From all these values, we can derive that, the use of information technologies are on the way of diffusion to all parts of society. These are all the consequences of efforts for information technology infrastructure The diffusion of some application of information technologies is the important point for adopting the information age.

Besides the several information technology developments in national

field, also Türkiye developed its international information relations very much. Türkiye connected to a various global communication networks. Even Türkiye became the terminal point of some of these networks. Also Türkiye became the shareholder of many networks that do not pass through our country. With connection to various international networks, efficient use of international information systems is achieved and it becomes possible to reach and use international databanks. (For detailed international networking activities, see Appendix C, pages 182-184, 194-197.) The fibre optic systems that pass through Türkiye and the fibre optic systems that Türkiye is the shareholder can be observed in Figure.20 and Figure.21 on pages 90 and 91.

Türkiye also developed its satellite systems besides fibre networks. Türkiye is the shareholder of Intelsat and Eutelsat satellite systems and still utilises them. Türkiye will launch its own satellite Türksat I-B in August 1994. In this respect Türkiye will own its domestic satellite system and able to develop national and international information technology facilities. The activation area of Türksat I-B can be seen in Figure.22.

With the help of all these fibre and satellite facilities, Türkiye have the potential to be a communication centre and by this way, Türkiye will use all advantages that comes from its strategic geopolitic location.

Parallel to all these developments, Türkiye increased its international communication capacity very much. By the beginning of 1994, Türkiye has automatic telex communication with 202 countries, automatic telephone communication with 184 countries. Also, there is newest packet switching data communication with 74 countries. Also by 1994, all city and town centers are open for direct international subscriber dialling.

With development of international information technology infrastructure, Türkiye was linked to various international academic and financial networks between 1986 and 1993. The most famous networks

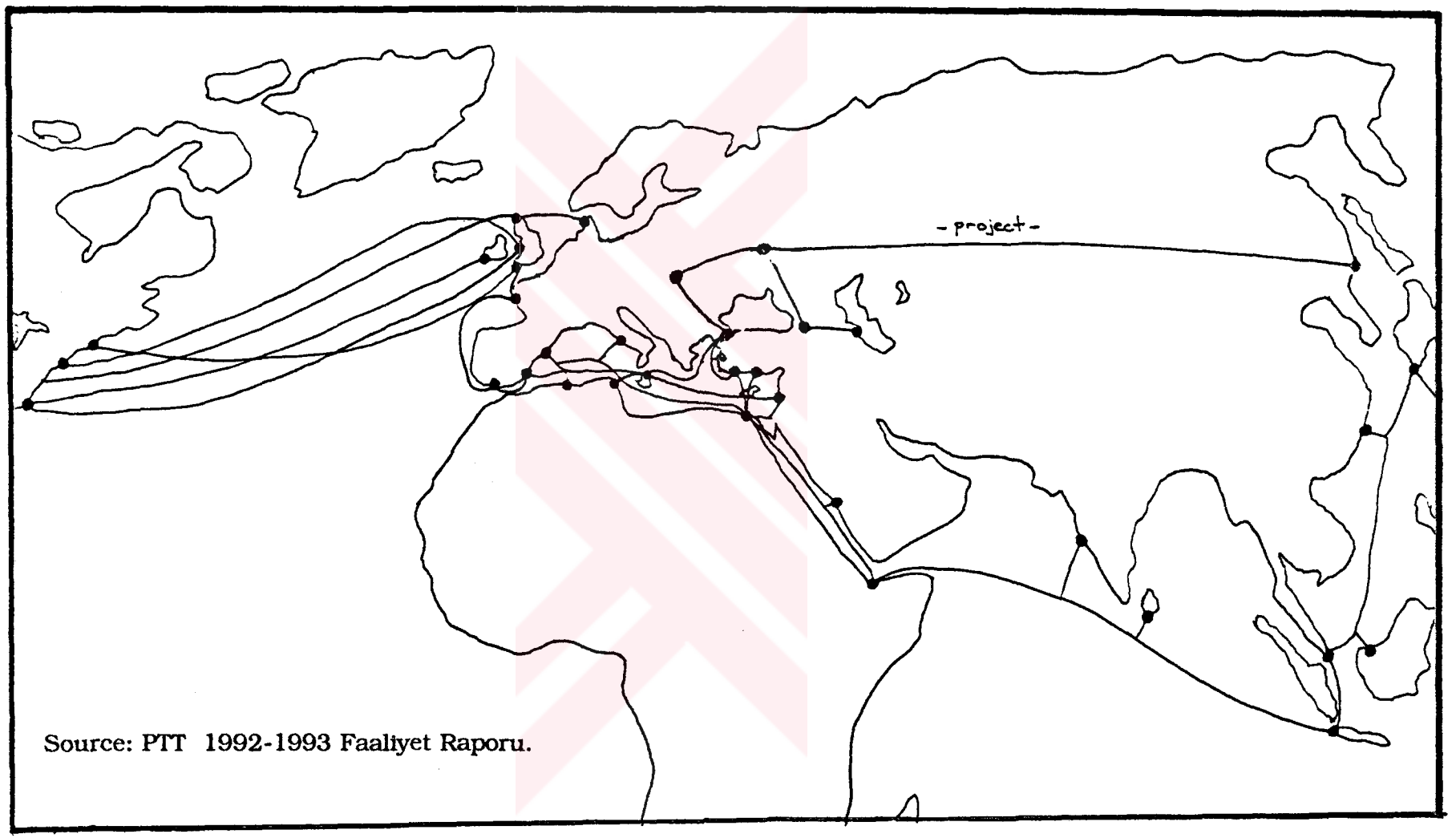

Figure 20. International Fibre Optic Cable Networks that Türkiye is the Shareholder-1993.

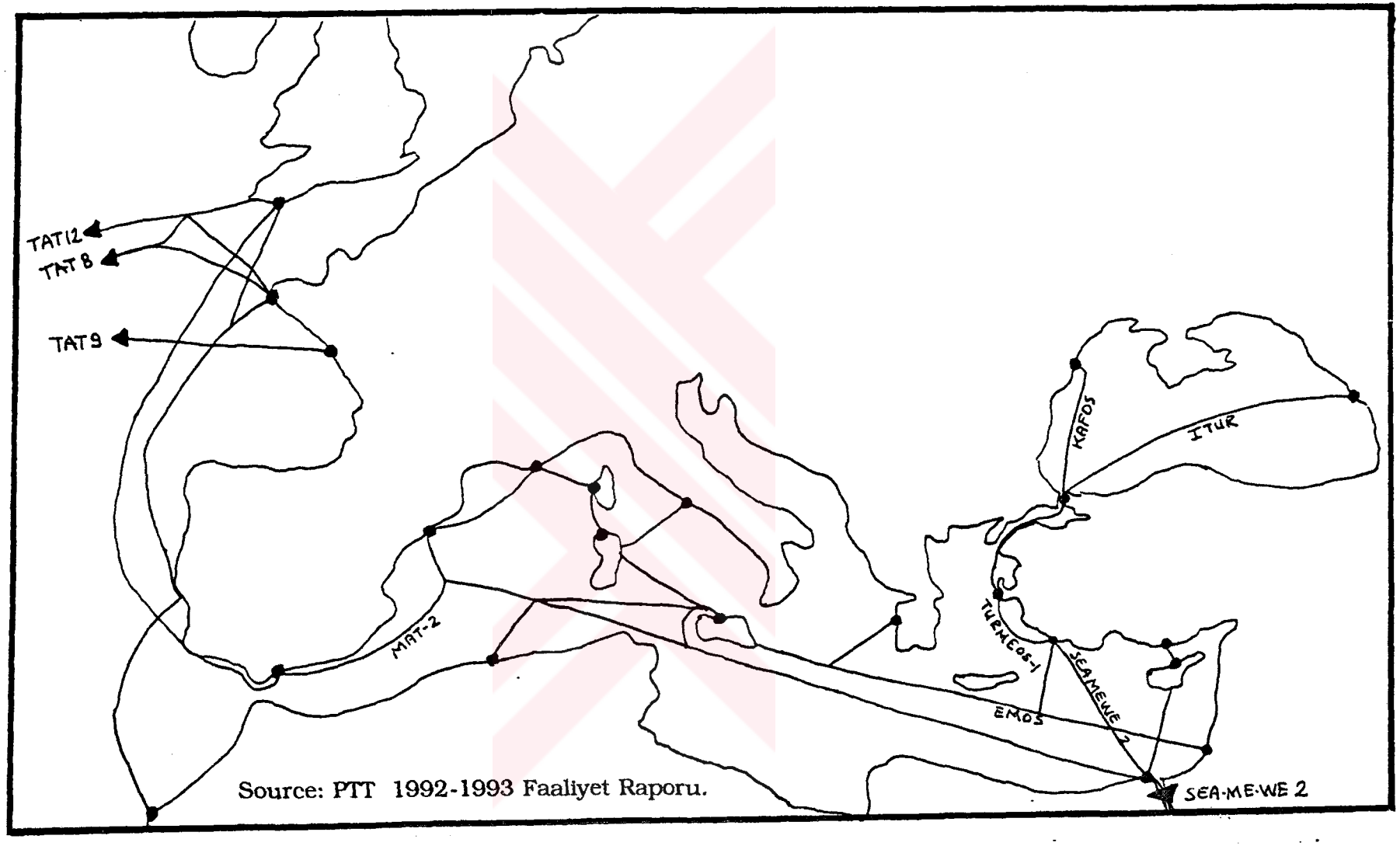

Figure 21. European Fibre Optic Cable Networks that Türkiye is the Shareholder-1993.

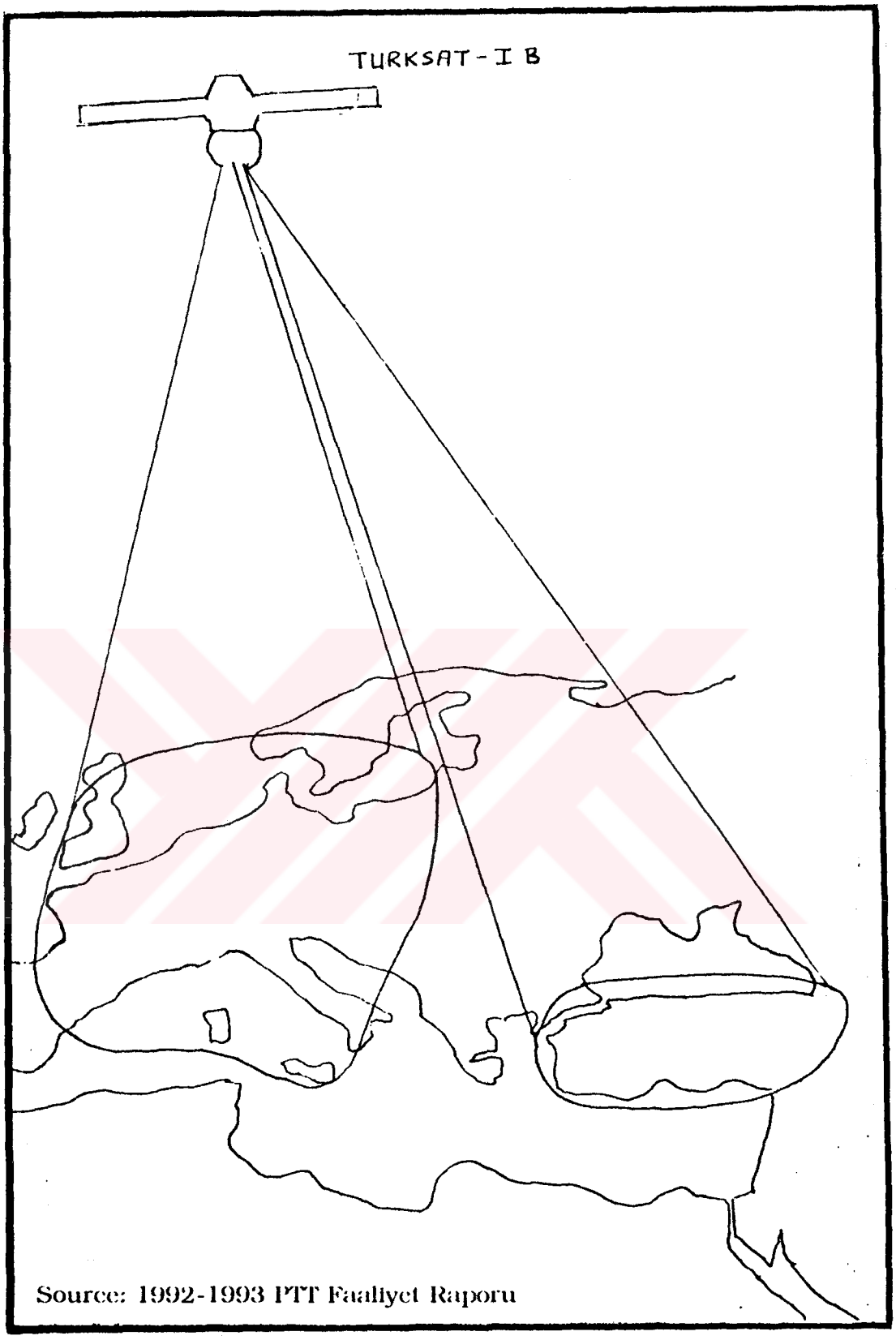

Figure 22. Activation Area of Turksat- 1994.

are BITNET (North American Academic Network) and EARN (European Academic Research network) that Türkiye was linked in 1986 and 1987. Türkiye linked to INTERNET (International Network) in 1992. (For detailed information, see appendix C, pages 195-197.) The distribution of nodes of EARN in Europe and Türkiye, and distribution of nodes of INTERNET in Türkiye can be observed at Figures. 23,24,25.

For efficient exploitation of information technologies production capability is important factor as well as infrastructure and application of these technologies. In coming part, we will analyse the production issues of information technology in Türkiye.

3.2. Information Technology Production in Türkiye

The reason for explaining production issue in Türkiye comes from the importance of this subject. It's importance arises due to two situation. One is, self sufficiency in technological field is very important in information era. It is accepted by many authorities that, countries who do not produce its own technology will be disadvantageous according to technology producer countries. Second important point is that, these industries take the place of classical manufacturing industrial production in whole world. In other words, the production of information technologies becomes the new dynamics of industry that supports economic system. Because of these reasons, it becomes compulsory to explain production process of information technologies in Türkiye in order to understand the position of these technologies in Türkiye.

The production of information technologies in Türkiye is the combination of electronics industry and computer assembly industry. Electronics industry consists of telecommunication equipments production, component production and consumer electronics production. Consumer

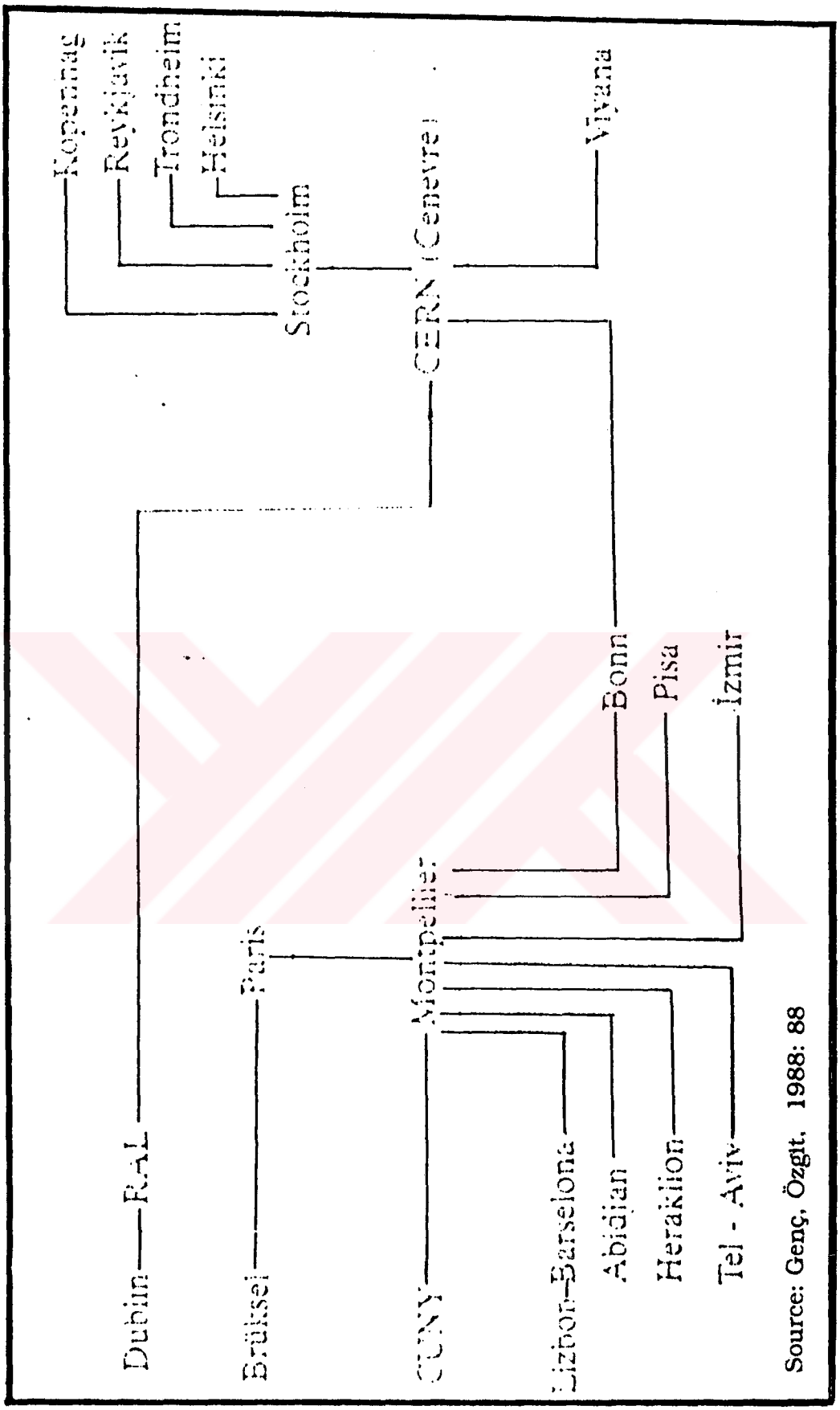

Figure 23. Topology of EARN in Europea-1990

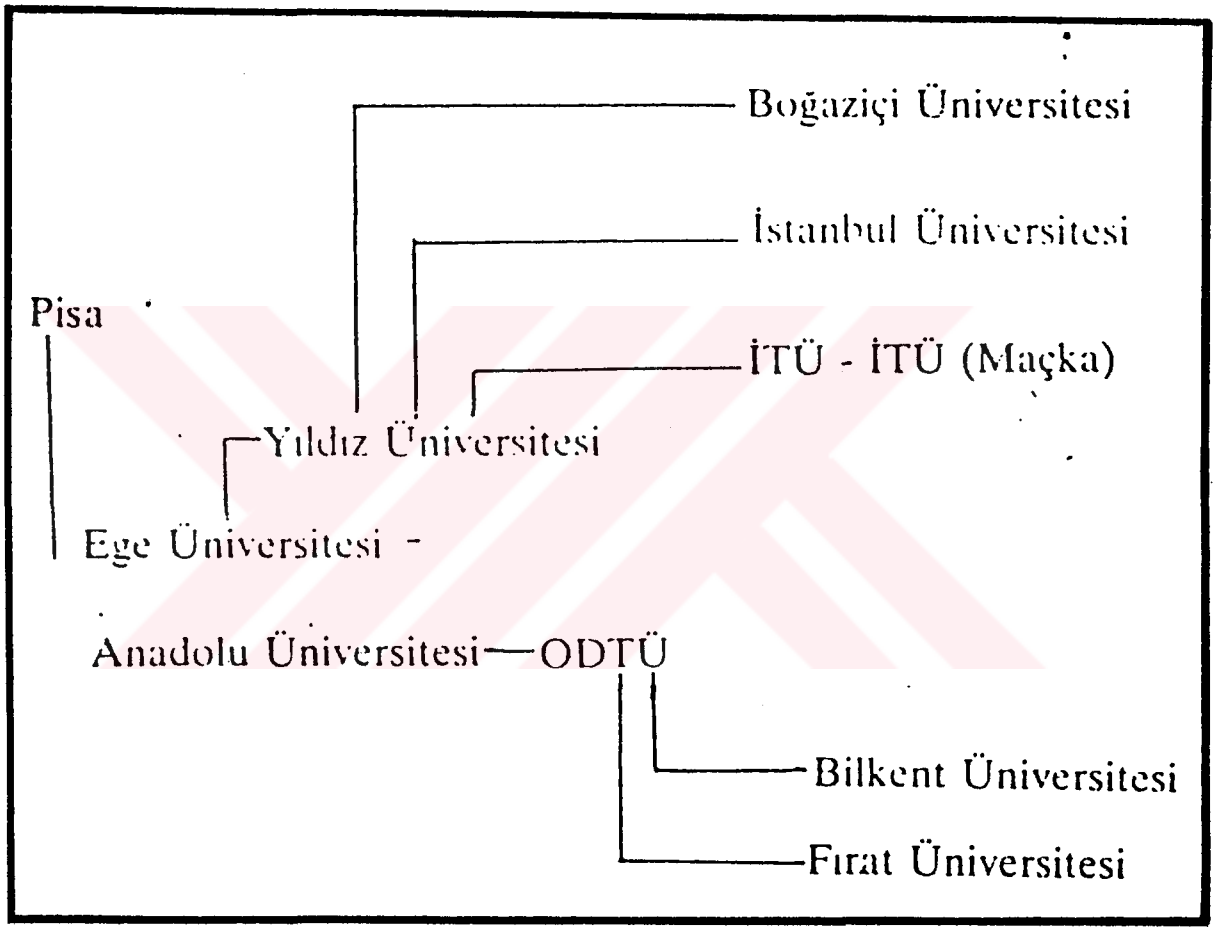

Figure 24. Topology of TUVAKA (Turkish Academic Network) -1988.

Source: Genç, Özgit, 1988: 90

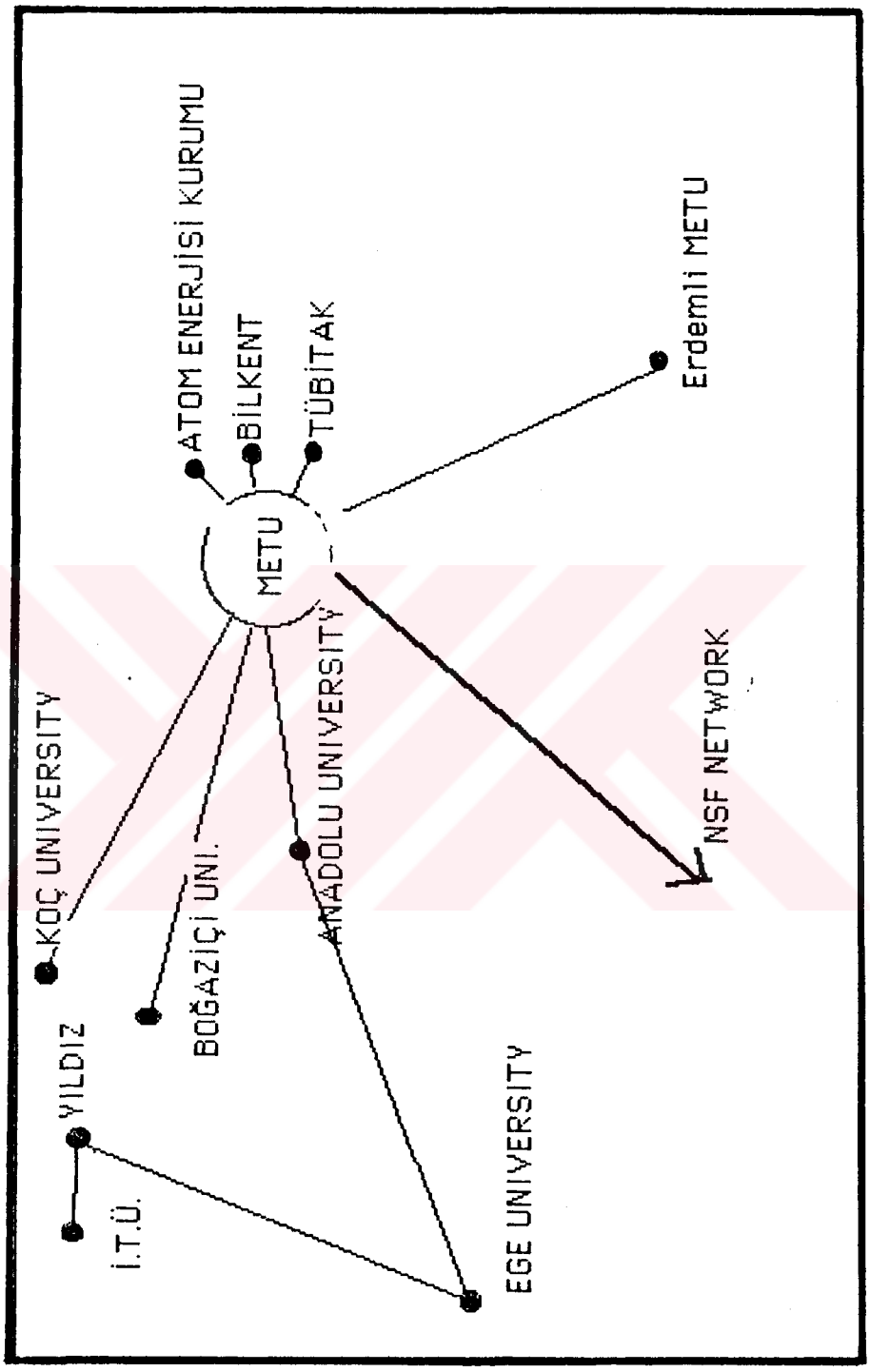

Figure 25. Topology of INTERNET in Türkiye- 1992

electronics sector is also added to information technology production. Because it includes radio and TV production as they are important mass communication devices. For the detailed historical development of information technology production in Türkiye, see Appendix C, on pages 206-209.

When explaining production conditions of information technologies in Türkiye, it will be useful to take software side of information technology production as well as hardware.(Machines, devices) Because, software guarantees the efficient operation of hardware. For example, a communication software is the main cause for operation of digital telephone exchange. Also importance of software products are increasing when compared to hardware products. Today, 80 % of informatics products depend on software. (Telciler, 1993:76) Firstly, we will examine hardware side of information technology production than we will deal with software production in Türkiye.

If we take hardware production in Türkiye, we see that especially telecommunications equipment production is sufficient to meet the national demand. As an example, 80 % of telecommunication network elements are produced by firms in Türkiye. (PTT ARGE, 1992, No. 5:27) It is important to explain that this production become possible with technology transfer or technology of multinational firms. Türkiye is not able to produce its own advanced technology. Also there are other problems of Türkiye in hardware production. Developed countries owe their advanced positions to production of industrial electronics, also newly industrialising countries owe their rapid development to component and industrial electronics production. On the other hand, there is an opposite condition in Türkiye. Leading role in electronics sector is given to consumer electronics industry. (EMO, 1992, No. 396:97) but newly industrialising countries passed this phase in early 1980's. In this respect the difference between Türkiye and other countries can be observed in the Table. 9.

Table 9: Structure of Electronics Industry in Different Countries in 1990

	Consumer Electronics (%)	Industrial Electronics (%)	Components
Türkiye(*)	67	26	7
Japan	17.8	50.8	31.6
U.S.A.	2.7	76.3	20.9
France	4.4	78.3	17.2
S. Korea	35	21.5	43.4
Taiwan	18	39.1	42.9
Singapore	16.5	47.8	35

(*) : 1992 value

Sources: EMO, 1992, no: 386 :100, DPT 1993 Programı

This structural characteristics of electronics industry may not be seen as a problem, but it is clear that Türkiye is behind other developed and developing countries in respect of electronics production. This is accepted as a disadvantage because in order to catch up information age at the same time with other countries, we have to be able to compete with developed world in production of information technologies and we have to produce our own technology.

Another problem of information technology production in Türkiye is that; telecommunications industry in Türkiye works only for domestic markets, with compulsions of Turkish PTT. Between 1990-1993 domestic consumption is 80-85 % of total production. On the other hand domestic market is taken as a security mechanism towards violent competition conditions. (3.İzmir İktisat Kongresi, Elektronik Çalışma Grubu, 1992)

The cause of all these negations is the absence of related institutional mechanisms and insufficiency of related production and supporting policies. (Ibid) The most important policy deficiencies can be observed in R-D area and in ability to produce technology. For example, in 1992 total R-D expenses in Türkiye was about 0.6 % of total GNP, while in

the same year R-D expense of IBM firm was about 15 % of Turkish GNP.(Meydan, 1993, 8 August)

Despite all these negations, there observed important developments in Turkish electronics industry. The value of electronic production was 7 trillion Tl. (1993 prices) in 1986. This value increased at an annual rate of 11 % and raised to 23 trillion Tl. (1993 prices) in 1992. Also there are important improvements in our electronics export. In 1986, the export of electronics equipment was only 1.1 % of total exports. This ratio raised to 4.3 % in 1992 (ESID Report, SPO 1993 Programme) as its peak point upto now.

We can give also some concrete examples especially for development of telecommunications industry. After 1980 with government supports firms like Aselsan, Netaş, Teletaş were established. These firms played important role on development of telecommunications industry in Türkiye. Although, Netaş and Teletaş were privatized at some degree in the mid of 1980's, they continued their importance role on information technology production in Türkiye. The most important characteristics of these firms are their significant roles on domestic technology production and their intensive R-D efforts in Turkish information technology production. Also exporting of information technologies become possible with these firms. Between 1980-82 the yearly average value of telecommunication equipment export is about 16 billion Tl. (1993 prices) After establishment of these firms this value always increased, between 1990-1992 the yearly average value of telecommunication equipment export becomes 2.19 trillion Tl. (1993 prices) Also, these firms play important role on evolution of information technology infrastructure in Türkiye. For example sales of these 3 firms in 1992 is worth about 7.5 trillion Tl. (1993 prices) These firms produce about 60 % of total telecommunications equipment in Türkiye. (Teletaş, Netaş, Aselsan Faaliyet Raporları) The R-D expenses of these three firms was about 482 billion Tl. (1993 prices) in 1992 as this value is 10 % of total R-D expenses in Türkiye. About 30-40 % of the

products of these firms are designed by themselves. Despite all the useful characteristics of these firms, after 1988, Türkiye was not able to protect its own firms. For example Netaş was oppressed with political support which was maintained by multinationals. Whereas, in whole world these type of firms are the most protected firms. (EMO, 1992, 386:32)

When we consider software production, first of all it is important to emphasise that there is a great logical difference between hardware and software products. The basic factor of software industry is the human mind. When we take software production in Türkiye, it is observed that Türkiye is at the beginning of the road, but there are also significant developments in software production. For example there was only 14 software firms in 1984, the number of these firms reached to 75 in 1992. Also number of software products in the market was reached to 300 from 60 between the years of 1986 and 1992. (Bilgisayar, 1992, No. 136:39) It is explained that in 1993, Türkiye has the software export capacity worth of 115 billion Tl. (1993 prices), but it is calculated that, possible software export capacity can reach up to 11.5 trillion Tl. (1993 prices) (Milliyet, 1993, 28 August) The existing value is very low according to this calculated value. It is clear that Turkish potential for software production is not used efficiently, because there are a lot of problems towards software production in Türkiye. One of the big problems of software industry in Türkiye is the weakness of software protection legislations. (Boratav,1991:91) We can understand this from the situation that, piracy rate is about 90 % in foreign software and 30 % in domestic software. (EMO, 1992, No. 387:162) Also authorities do not know how to support software industry. (Töreci, 1992:236) Also, lack of standardisation is one of the negative factor for the sector. Despite all these negative factors, Türkiye's condition is hopeful concerning the human and educational factors that are important for development of software industry. (EMO, 1992, 387:156) But Türkiye has no significant advantage in software industry, because there is lack of education personnel and equipment. (Hokkacı, 1988:210)

Information technology production in Türkiye developed as parallel to developments in world, as information technology production increased as 8 times between 1984 and 1992. With developments in production, we observe a significant increase in use of these technologies especially after early of 1980's in Türkiye. (For detailed information see appendix. C) On the other hand, Türkiye is dependent on other countries concerning computer hardware and value added telecommunication network as videoconference equipment etc. But this condition is not like as it was in early 1970's. It is expected that, Turkish information technology industry will produce its own advanced technology in near future.

In information age, development concept is directly related with production of new technologies. Most important issue for countries become to produce their own technologies. The countries who can not produce these technologies have to be under dominance of developed countries and they have to be the markets of technology producer countries. Who can produce its own hardware and software becomes advantageous in information age. The lack of R-D activities is the big obstacle to produce domestic technology in Türkiye. If organisational structure is well established and necessary importance is given to education and if necessary precautions are taken for development of R-D activities, than information technologies in Türkiye will have the big potential to develop in future. Also Türkiye will have the chance to produce its own technology. This condition is very important in order to be successful in information age.

3.3. Institutional and Legal Aspects of Information Technologies in Türkiye

Institutional and legal studies started just after introduction of these technologies in Türkiye. The complexity and degree of institutional and legal aspects show the importance of information technologies in various

societies. If the institutional and legal aspects of information technologies are examined, (see appendix C, pages 209-213) it can be understood that Türkiye covered a very long distance. Turkish Informatics Society (TBD- Türkiye Bilişim Derneği) works, TUBITAK works, National Information Technology commission works and works of State Planning Organisation (DPT- Devlet Planlama Teşkilatı) are some examples for institutional arrangements of information technologies. Especially after 1990, some concepts as CAD/CAM, automation, information production take place in government programmes.

If we compare all institutional and legal aspects of information technologies in Türkiye with developed countries, we see that developments in Türkiye is insufficient according to the institutional and legal aspects in developed countries. There are a lot of problems concerning this subject. First of all,it is said that, there is a lack of coordination in informatics sector. Also legal issues are so insufficient as compared with developed countries. Another important problem is the lack of standardisation activities about information technologies in our country. Türkiye can not contribute very much to standardisation efforts in world. This deficiency is very critical for us because, the new phase of information era constitutes of overall standardisation of all information technology services and applications.

International informatics standarts are started to be used in Türkiye, but they are not at the sufficient level. On the other hand, there is no national standard for information conservation, (3. İzmir İktisat Kongresi, 1992) but there are some efforts for establishing international standarts in Türkiye. (For detailed information, see appendix C, page 210) Economic crisis and other economic and social factors are some difficulties among these efforts.

As a result, institutional and legal aspects of information technologies in Türkiye did not develop much as information technology infrastructure and applications. In this respect, the use of these technologies in Türkiye can not be productive as developed countries. They do not aim for

the purpose but usually, these technologies are said to be used for show off.(Erkan, 1993)

3.4. Position of Türkiye in World Concerning Various Dimensions of Information Technologies.

Up to now, we see that some aspects of information technologies such as, infrastructure, applications, systems and use of these technologies developed very much in Türkiye. On the other hand, these developments also take place in other countries since the early 1980's. In this respect, to take all information technology developments in Türkiye out of the world can mislead all of the thoughts about this subject. It will be more appropriate to take information technology development in Türkiye within international conjuncture.

We can compare some elements such as technology development level, the situation of R-D activities,services provided, use of technology, technology production, technology infrastructure between Türkiye and other countries. The comparison of Türkiye and 16 countries include these variables. Countries from all development levels except rich Arabian countries are included in comparison. The comparison table is given at pages 104-105. (See Table. 10)

We can derive some results from this table such as;

- The quality of information technology infrastructure in Türkiye is very high as developed countries. On the other hand, all other countries exceed Türkiye considering technology production.
- The adoption period of new technologies takes more time than developed countries. Technology non-producer character of Türkiye plays important role here. But sometimes this time lag becomes an advantage, because technologies are always renovating. For example narrow band ISDN application that U.S.A. and Europe was started in 1987-1988 becomes out of

Table 10. Comparison of Information Technology Issues Between Türkiye and Other Countries.

COUNTRIES	POPULATION -1990- (MILLIONS)	GNP PER CAPITA (U.S. Dollar) -1987-	TELEPHONE DENSITY -1992- (%)	DIGITALIZATION RATE -1991- (%)	STARTING YEAROFISDN	ANNUALTELECOM. EXPENDITURE PERPERSON 1987-1991AVARAGE (DOLLARS)	TELCOMTARIFFS PERABILITYTO PURCHASE (PPP) 1990VALUES
U.S.A.	249.0	18430	77.0	52	1988	92.7	434
JAPAN	123.0	15570	55.6	75	1988	113.8	344
FRANCE	56.0	12860	83.0	72	1987	109.4	307
U.K.	57.0	10430	52.6	67	1989	NA	343
ITALY	57.0	10420	38.2	46	1992	92.9	334
SPAIN	42.0	6010	29.0	40	1991	45.0	404
SWEDEN	8.5	15690	90.9	50	1993	117.6	147
GREECE	11.5	4350	37.4	21	1994-	34.0	340
POLAND	38.0	7200	14.2	7	NA	NA	893
BULGARIA	9.0	7510	18.8	1	NA	NA	1034
INDIA	835.0	300	1.8	NA	NA	2.2	NA
BRAZIL	147.0	2020	10.0	18	NA	8.2	NA
MEXICO	84.0	1820	11.5	NA	NA	15.5	NA
SINGAPORE	2.7	7940	49.0	NA	1992	NA	NA
S.KOREA	42.0	2690	35.0	65	1991	47.6	NA
TAIWAN	20.0	5080	40.5	NA	NA	50.0	NA
TÜRKİYE	55.0	1200	20.2 (*)	56 (*)	1994-	27.3	796

Table 10. Continued

ANNUAL R-D EXPENDITURE PERPERSON 1990-1991 (DOLLARS)	R-D EXPENDITURE PERGNPEXP. 1991-1992 (%)	NUMBEROF TAKENPATENTS -1986-	NUMBEROF RESEARCHERS PER1000POP. -1992-	NUMBEROF INFORMATICSGRADUATESPERMILLION POPULATION 1990-1991	AVELECTRONIC PRODUCTIONPERP 1990-1992 (DOLLARS)	PERCENTAGEOF SERVICE EMPLOYMENT -1987-	
600	2.82	122241	7.67	1740	145.3	70	U.S.A.
590	2.85	322455	11.6	2380	198.4	59.1	JAPAN
430	2.35	57210	4.76	920	26.8	66.1	FRANCE
320	2.25	70100	4.6	610	NA	71.2	U.K.
250	1.25	NA	3.09	595	18.1	62.7	ITALY
110	0.72	14358	2.08	550	5.6	56.4	SPAIN
500	2.80	NA	4.87	570	5.5	66.9	SWEDEN
45	0.47	5324	1.38	210	NA	49.6	GREECE
NA	NA	NA	NA	NA	NA	35	POLAND
NA	NA	NA	NA	NA	NA	36.9	BULGARIA
NA	NA	NA	0.14	260	4.7	24.7	INDIA
NA	0.45	NA	NA	NA	10.4	51.2	BRAZIL
NA	0.50	NA	0.92	230	NA	53.8	MEXICO
NA	NA	NA	2.4	NA	11.5	65.8	SINGAPOR
130	2.05	NA	3.82	1100	28.3	45.8	S.KOREA
NA	NA	NA	NA	NA	12.5	44.4	TAIWAN
30	0.56	726	1.05	160	1.8	30.3	TÜRKİYE
			(*)				

Sources: Eser, 1993, Eurostat, 1990, Bilişim 1993, no: 39 :68-70, ekim 93, 124-128 64-68, Bolter, 1990, Ana Brittanica Yıllığı 1990, Dulcatel- Miles,1992, Dahlman 1992, PTT ARGE 1992 no.5:32, Güleç,1990:129, Boratav, 1993 : 84

fashion when Wideband ISDN is innovated. Türkiye has the advantage of use directly wideband ISDN application without any effort to convert older technologies.

- In Türkiye, expenditure on technology per person is more than other developing countries, but it is less than developed countries.
- Türkiye has the smallest R-D expenditure. Türkiye exceed only populated developing countries concerning brainware (skilled human power) This condition is closely related with lack of education, because number of graduates from technology related schools are the least in Türkiye. The quality of education is another question mark. With parallel to all these developments, Türkiye are not successful in scientific studies.
- The expenses on information technologies and R-D efforts are directly related with GNP's of various countries. If we compare the ratio of these type of expenses to GNP, than surprisingly we see that Türkiye exceed all of these countries.
- The use of information technology is highly advanced in Türkiye, according to the populated developing countries and old socialist block countries. On the other hand prices of information technology in Türkiye are higher than other countries when we consider ability to pay. This condition is an obstacle for diffusion of these technologies to all parts of society.
- Despite, the infrastructural developments in Türkiye, only 30 % of total manpower is employed in service sector. Only this condition show the underdeveloped character of Türkiye, because this value reaches to 50 % in other rapidly developing countries. This is one of the big deficiency of Türkiye towards the new information age.

After determining these substantial differences between Türkiye and other countries, an important point is to know mentality of different countries towards these technologies and information age. Opinions and evaluations differ in every country towards these concepts. Differentiation of effects of information technologies in different countries are due to different organisational structures, different policies, cultural differences, attitude

differences etc. So it is important to compare Türkiye with other developed countries concerning cultural differences, structural differences and attitudes about technology and information age. This comparison will help us to understand existing situation and to guess about future potential of Türkiye towards information age.

We will compare Türkiye with other 5 developed countries according to these criteria; meaning of communication, the role of government, administrative and regulatory policies, the meaning of information technologies, production of information technologies, infrastructure of information technologies, technological policy priorities, international dependency. If we compare Türkiye with 5 developed countries according to these criteria, we can derive the Table. 11, on pages 108-109.

As observed from table, there are sharp differences between Türkiye and other developed countries. Even their attitudes, aims about information technology are different from each other. This mean two things. Firstly, meaning of information technology, the way of exploiting these technologies and attitudes for information age have not to be same in all countries. Secondly, as a result of this condition, we can infer that effects of these technologies differ in every country according to political, social, economic background of that country. We will analyse effects of information technology in Türkiye in the light of the effects that we explained. There can be similarities or differences from the effects that we explained theoretically in part 2.4. In next part, effects of information technologies in Türkiye will be handled.

Table 11. Technological and Cultural Differences Between Türkiye and Five Developed Countries

	U.S.A.	JAPAN	U.K.
Meaning of Communication	* It is a commodity	* Opportunity for more participative, open, resource independent society	* Instrument capable of serving and specific community need
Administrative and Regulatory Policies	* Liberalised entire telcom system	* Substantial liberalisation	* Competition takes place even at basic level
The Role of Government	* No duty	* Regulatory, goal setting role	* Almost no duty
The Meaning of Information Technologies	* New commodity on markets	* Desirable way of living	* Focal point for strengthening international competition
The Production of Information Technology	* Very high	* High	* high
The Infrastructure of information technology	* Strong international, weak national structure	* Highly advanced structure	* advanced structure
Technological Policy Priorities	* Oriented to mission	* Eclectic	* Oriented to mission
International Dependency	* Not exist	* Not exist	* low

Table 11. Continued

	FRANCE	GERMANY	TÜRKIYE (After 1980)
Meaning of Communication	* Opportunity for more decentralised society	* More potential instrument of power	* Opportunity for integration and development
Administrative and Regulatory Policies	* Liberalisation in value added networks	* Liberalisation according to federal structure	* State owned, but accelerating liberalisation efforts
The Role of Government	* Declining power	* Most powerful role in Europe	* Public authority is the only institution
The Meaning of Information technology	* Focal point for international competition	* Instrument for more powerful structure	* Show off mechanism until 1990's,after competition tool
The production of Information technology	* Very high	* High	* Weak
The Infrastructure of Information technology	* Strongest in Europe	* Advanced but not distributed to overall country	* Fast developing structure
Technological Policy Priorities	* Oriented to mission	* Oriented to technological diffusion	* Not so much open to debate but seen as selective
- Internationali Dependency	* Not exist	* Medium	* High

Sources: Dutton, Blumler, Kreamer, 1987: 482-48, Robins, Hepworth, 1988:160, Boratav,1993:69, Erkan, 1993:127-138, Cane, 1992:1728, Kemp, 1987:196

3.5. Effects of Information Technologies in Türkiye

Despite all the debates on necessity and characteristics of information technologies, all experiences of Türkiye is the first stage for perceiving information technology effects at developed countries' level. There are some distress to explain information technology effects in Türkiye. This situation is originated from two causes. Firstly, in whole world and also in Türkiye, there is a discomfort in measuring various effects of these technologies. The number of modelling studies on this subject is very few and they are accepted as valid for only the countries they take place. Of course this condition is more true for spatial effects. Besides, another reality is that information technologies did not complete their development even in advanced countries. Technological innovations and diffusion of technology to all parts of society is still continuing. This condition are also valid for our country. Türkiye developed its existing telecommunication and other information systems very much since 1983, but Türkiye is newly establishing the advanced information technology systems such as IBS (International Business Systems), VSAT (Very Small Aperture Terminal), digital mobile telephone that can able to have intensive effects on various factors like business relations, daily lives, education etc.. Also industrial applications of information technologies are not so developed like advanced countries. A lot of information technology applications are newly developing and they are newly diffusing to all parts of society. All these factors create difficulties towards analysis of information technologies in Türkiye.

In this part, we will analyse the general known effects of information technologies that we talked about in part 2.4 for Türkiye. In order to support explanations, sometimes I will give usage and distributional characteristics of information technologies in Türkiye. I will start from economic effects. Economic effects will be taken on both international and national levels. Than social effects of these technologies in Türkiye will be explained. At last, spatial effects will be explained. Regional and local areas

will be the focal points while examining spatial effects. There is one point that has to be kept in mind that; all effects that we concern are not caused only from direct use of technologies. These has to be taken as results of all dynamics and policies behind the use of information technologies in an information age.

3.5.1 Economic Effects

Besides various factors, with development of communication technologies in Türkiye, the most noticeable change is the altered position of Türkiye concerning international comparative advantage. Türkiye become more advantageous in international markets with the help of its developed information technology infrastructure. The competition and business benefits of information technologies show themselves in the case of Türkiye. According to Geray's search, with development in telecommunication infrastructure, a lot of international firms and news agency carried their head offices from Athens to İstanbul and Türkiye became the telecommunication centre of Central Asia, Middle East and Balkans. (Geray, H., 1993:27) It is a reality that by 1994 Türkiye has the most advanced information technology infrastructure in these regions.

The establishment of Turkish bank offices in foreign countries occurred just after the development efforts for information technology infrastructure and applications in Türkiye. In this respect, international business and financial relations accelerated. Starting from this period, the prestige of Turkish financial institutions increased very much in international field. Also development of information technologies in Türkiye is one of the factors that plays role on increasing amounts of foreign capital that enters Türkiye. In 1981, foreign capital that was entered Türkiye was about 325 million dollars. This value increased 32 % annually and reached to 7.4 billion dollar in 1992. By 1991, 85 % of the biggest 33 firms in Türkiye are global

monopolies. (Özkul, 1992) We can not say that this condition is so positive because in Western countries the market share of monopolies are about 25 %, whereas in our country, this ratio is about 60 %. We only say that information technologies played important role on development of transnational companies in Türkiye.

One important and interesting point is that, as we explained before Türkiye gain some degree of comparative advantage using advanced telecommunication infrastructure and applications, but on the other hand Türkiye is losing all these advantages due to insufficient use of industrial information technology applications. Turkish industry is very far to use information technologies such as CAD/CAM/CIM and flexible manufacturing systems. The industrial applications of information technology only seriously used in electronic and automotive sector and generally, the user of these technologies are the firms who had big amounts of capital. Medium and small firms can not afford to use these technologies. (For detailed information see appendix C, page 198.) In generally, the incentives given to firms and encouragement of firms for development of technologies is not sufficient. Also some of the firms of sectors who can able to follow new innovations prefer machine, hardware technology to information and organisational technology as it is the easiest way of technological choice. (Eser, 1993:45)

Countries like Türkiye are going to lose the cost advantage of labour intensive industries, because information technologies made possible to produce these type of commodities like textile, with capital intensive hardware technologies. This situation forces Türkiye to struggle for continuing its old advantages, as well as Türkiye has to create new advantages for itself concerning products of high technology. (Kazgan, 1993:220) In this respect, the most intensive user of information technologies is innovation based electronics industry. Electronics industry has the biggest potential to contribute Turkish economy in future. We observed that military electronics industry and telecommunication industry in Türkiye started to compete in

international markets for the last 10 years. (see appendix C, also see part (2.2) Besides electronics industry, the automotive sector who started to use information technologies began to develop and began to compete in international markets. For example, in 1994, a totally Turkish made bus was chosen as second qualified vehicle in Europe. (Milliyet 17 Nisan 1994)

Some contributions of information technologies to national economies can be calculated directly. Cost reduction impact of information technologies on agriculture and on some of industrial sectors are examples for this situation. For example with using computer controlled distance irrigation system, yearly 430 million Tl. (1993 prices) of saving is maintained. (see appendix. C, page 205) Also according to a calculated benefit in industrial production with using CAD/CAM systems in Aselsan, 3 times of time saving is maintained. This saving is reflected itself to 6-9 % decrease in costs. (Aselsan, 1992, No.6:12)

Also there are some effects of information technologies that can not be calculated directly. For example information technologies have big effect on development of business relations. We see that banking sector did not much developed until 1985, but after introduction of modern computer and communication technologies in this sector, it is observed that sector developed very much and new horizons opened in front of banking sector in Türkiye. (Bilgisayar, 1985, No.57:20) These technologies make possible the existence of bank offices at foreign countries. In this respect Turkish finance sector become effective on whole economy and Turkish banks started to give qualified and modern services to their clients.

Other sector that has the potential to develop with the help of information technologies is the tourism sector. When both international and national tourism videotext networks will be given in service in 1994, (See appendix. C, page 189) Than it is expected that, there will be increase in reservations and reservation interruptions will be ended. (İpek Yolu Dergisi,

1993, No. 2) In this respect, tourism sector will get rid of illegal middle man and income of tourism will increase and of course, Turkish economy will benefit from this condition.

Another dimension of information technology effects on national economy reflects itself in increasing number of firms in some of the service sectors and increase in number of employment in these service sectors. For example by 1987, there was only 20 insurance agency in Türkiye, but number of insurance agencies increased to 36 in 1993. Again number of banks increased from 32 to 61 between 1987 and 1993. There are also some sectors that their developments are directly related to development of information technologies. For example there was only 28 advertisement agency in 1987, this number increased to 177 in 1993.Number of information processing centers increased from 40 to 177 between 1987 and 1993.

As a characteristics of an information economy, we observe an increase in number of people employed in information based services as well as increase in number of service firms. Depending on Porat's (1977), Hepworth's (1987) and Castells' (1991) information employment definitions, (see appendix B) these jobs can be evaluated as information related jobs in Türkiye: - physicists, chemists and related workers, - architects, engineers and related technicians, - statisticians, mathematicians, system analysts and related technicians, - economists, - financial counsellors and accountants, - jurists, - teachers, - authors, journalists and related writers, - clerical supervisors, - government executive officials, - stenographers, typists and card and tape punching machine operators, - bookkeepers, cashiers and related workers, - computing machine operators, - transport and communication supervisors, - mail distribution clerks, - telephone and telegraph operators, - managers, - insurance, real estate, securities and business services salesman and auctioneers, - production supervisors and general foreman, - wood preparation workers and paper makers, - electrical fitters and related electrical and electronics workers, - broadcasting station and sound equipment operators and cinema projectionists.

The number of workforce in above information related jobs increased more than increase of employment in other jobs in the last 20 years. The ratio of information based employment to total employment was 6.2 % in 1970. This number increased by 2.4 points and become 8.6 % in 1990. Between 1970 and 1990, total employment increased by the rate of 2.6 % annually, however information based employment increased 4.3 % annually in this period. This increase accelerated between 1985 and 1990. This is the period which information technology investments increased to the top level upto now. Between 1985 and 1990, the increasing rate of total employment was 1.6 % annually, however, the increasing rate of information related employment was 5.5 % annually between 1985-1990. In developed countries, the ratio of information employment to total employment differs between 20% and 40 %. Compared with these countries it can be thought that Türkiye can not reach to the levels of these countries in any time. It can be true, because no other country has the overemployment rate in agricultural sector like in Türkiye. On the other, hand it is true that service employment rate in Türkiye increases as parallel to developed world.

If we examine distribution of information jobs in Türkiye, increase in information employment can be observed best in metropolitan areas. As we explained before, the reason is that information technologies and applications are totally metropolitan originated facts. Also, all type of information technology facilities can be found best in metropolitan areas rather than other human settlements. By 1990, information employment in 3 big metropolitan areas; Ankara, İstanbul and İzmir is about 32.8 % of total information employment in Türkiye. On the other hand, total employment in these 3 metropols is only about 15.8 % of total employment in Türkiye. The historical development of information employment in these metropolitan areas is also attractive. In 1970 the ratio of information employment in Ankara, İstanbul, İzmir to total employment in these 3 metropolitans is about 9.3 %. This value increased to 17.8 % in 1990. The annual increase rate of information employment in Ankara between 1970-1990 was 4.1 % while the annual increasing rate of total employment was only 1.06 %. Example of

İstanbul is more interesting. The annual increase rate of information employment in İstanbul between 1970-1990 was 5.23 % while the annual increasing rate of total employment was 1.62 %.

Two results can be drive from all these calculations. Firstly, parallel to development of information technology activities, there are significant increases in information service firms and information employment. Second point is that, information technologies are originated from metropolitan areas in Türkiye as it is the case in all other countries.

3.5.2 Social Effects

There are various benefits of information technologies in social life. These benefits also exist in our country as other developed countries. These benefits in social life consist of various facilities in our daily lives, and social relationships. ATM's (Automated Teller Machine), office automation activities, computerised persecution of registration and computerised invoicing are some examples for these facilities. (For detailed information of development of these facilities in Türkiye, see Appendix. C, on pages 197-205) Also, with developing advanced information technologies, speed and quality factors become the most essential factors in both business relations and social relations.

Besides these facilities, it is argued that , Turkish society is more effected from mass media than advanced applications of information technology. (Şahin, 1993:35) Also another important argument point is that, Turkish society is one of the society that effected very much from mass media. It is argued that Turkish mass media is degenerated very much, and this condition effects society in a bad manner. The foreign authors claim that advanced technologies lead to alienation in their societies. In our society instead of advanced information technologies, television is the main source of alienation in society. This condition is not only the matter of our country, also in some developed countries negative effects of television on public life is widely accepted. As in other developing and developed countries, television is

one of the important factor of mass culture. There are a lot of social, political, physiological effects of television on society. In Turkish society, mostly the dark side of these effects are been observed. Some authors argue that television is used only for entertaintment in Türkiye. (Cereci, 1992:26) Besides the effects of television on Turkish society, the condition of alienation is not exist due to use of advanced information technologies in Türkiye.

3.5.3 Regional Spatial Effects

We will analyse spatial effects of information technologies in regional and local levels in Türkiye. In this respect, first of all, the most important thing is to determine spatial distribution of information technology infrastructure and applications. After that, it will be more easy to explain regional and local spatial effects of information technologies.

In Türkiye, information technology infrastructure and applications are concentrated mostly in developed regions. This condition can be observed from the map of information technology infrastructure etc. in page 80. If we compare various criteria, such as telephone densities, ownership of advanced technological devices, distribution of technology infrastructure, we observe that nearly all information technology issues in Türkiye belong to metropolitan areas. The trend in world also says that information technologies are originated from metropolitan areas. (See part 2.4.5) But as time passed, developed countries started to use these technologies in smaller settlements as a tool to support development of that areas. For example, especially in U.S.A. and Canada, it is observed that use of information technologies in rural areas increased considerably, technological investments into these areas accelerated. (Forester, 1987) In developed countries there is not much difference between the value of telephone densities in metropols and other settlements and rural areas, in Türkiye, the condition is not like that. Telephone density in our country was about 18 % in 1993, this value becomes 35 % in three big metropols in the same year. On the other hand, telephone density in medium size cities (100000- 300000) is about 15 %, and

in rural areas telephone density becomes only 6 or 8 % . As it observed from example there is so much difference between metropols and other settlements concerning the information technologies. This is the condition of developed countries in early 1980's, but they have efforts on decreasing information gap between their metropols and other regions. In our country, metropolitan originated character of information technologies are always increasing by information technology investments in big metropolitan areas.

Concerning all types of information applications and services, 6 metropolitan areas in Türkiye (Ankara, Adana, Antalya, Bursa, İstanbul, İzmir) get the biggest shares that are unproportionate to their social and economic position in Türkiye. some of the values will be so interesting. By 1990, the ratio of population of these 6 metropols to whole population was about 31.3 %. By 1986, the share of GDP'S of these 6 metropols in total GDP was about 36.9 %. On the other hand by 1992, 76. 1 % of total data lines, 93.2 % of total paging lines, 93.2 % of total mobile telephone lines and 41.3 % of total telephone lines in Türkiye take place within the borders of these 6 metropols. Also by 1993, 81.6 % of total computer sales took place in related metropols, it is not to be surprising that, 88.2 % of total computer firms are in these 6 metropols these distributions can be observed from figures below.

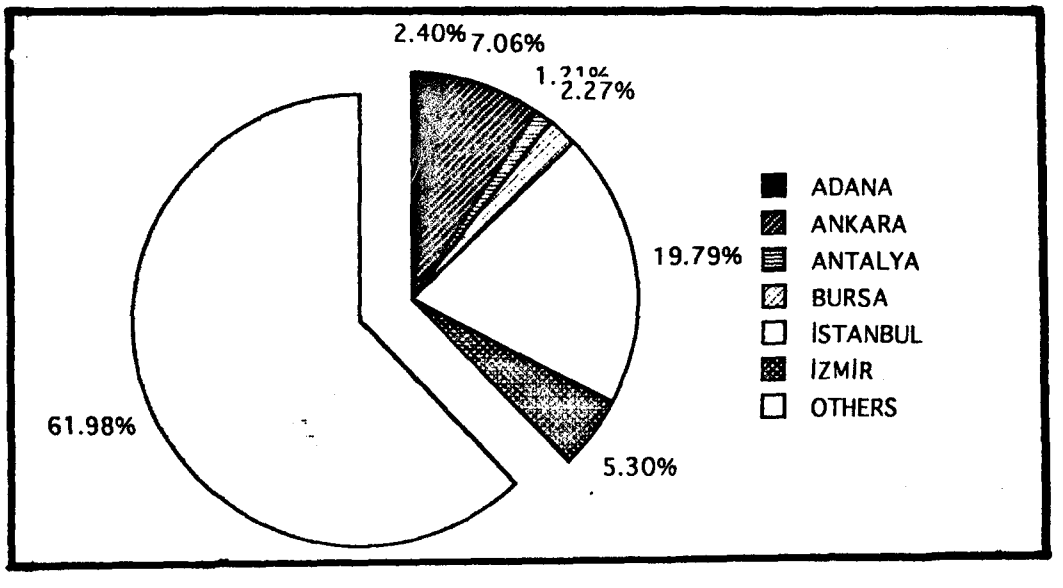

Figure 26. Population Distribution in Türkiye- 1990

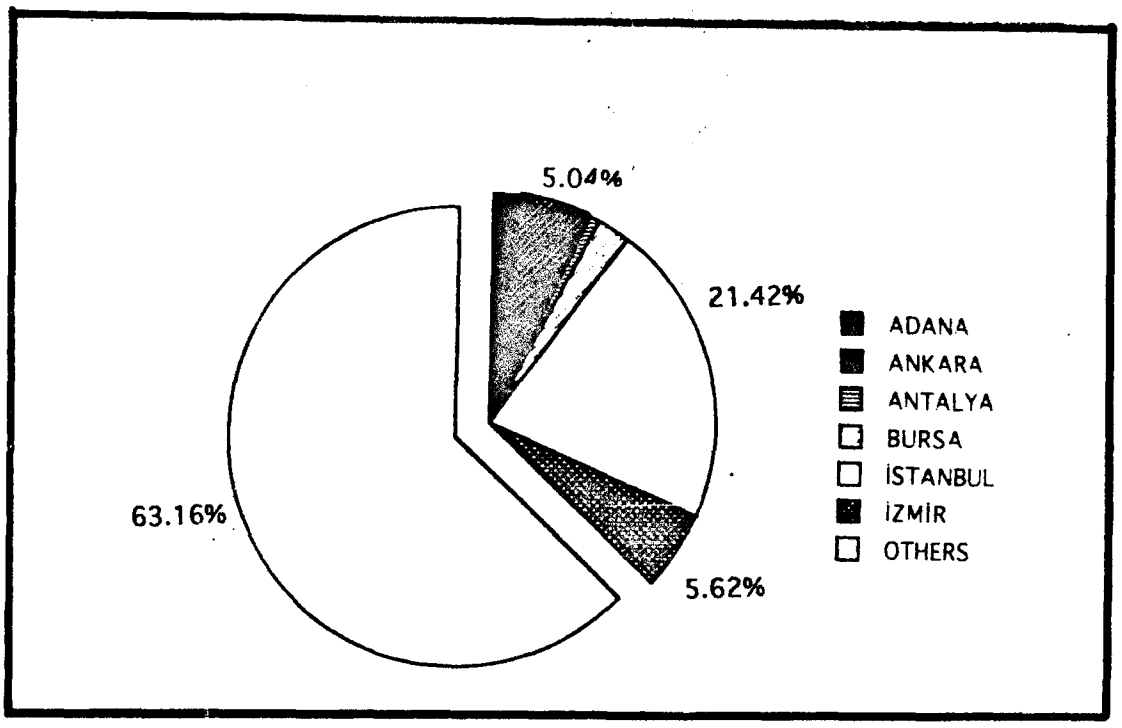

Figure 27. GDP Distribution in Türkiye- 1986

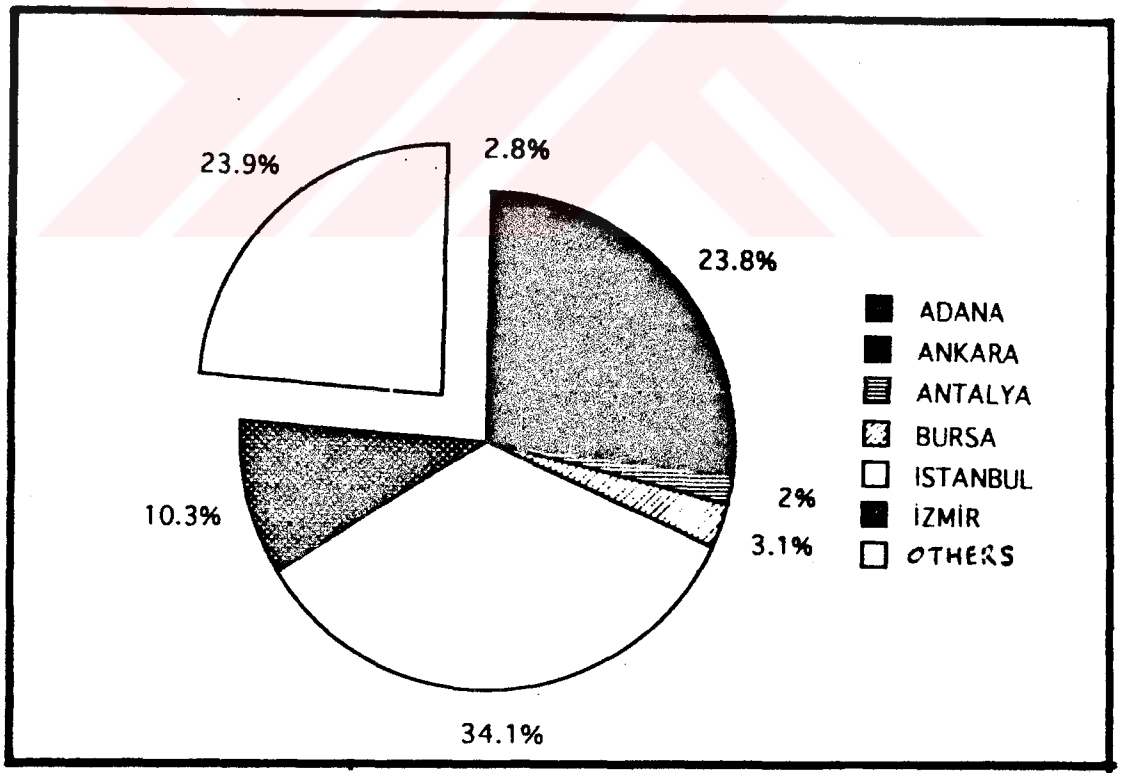

Figure 28. Data Line Distribution in Türkiye- 1992

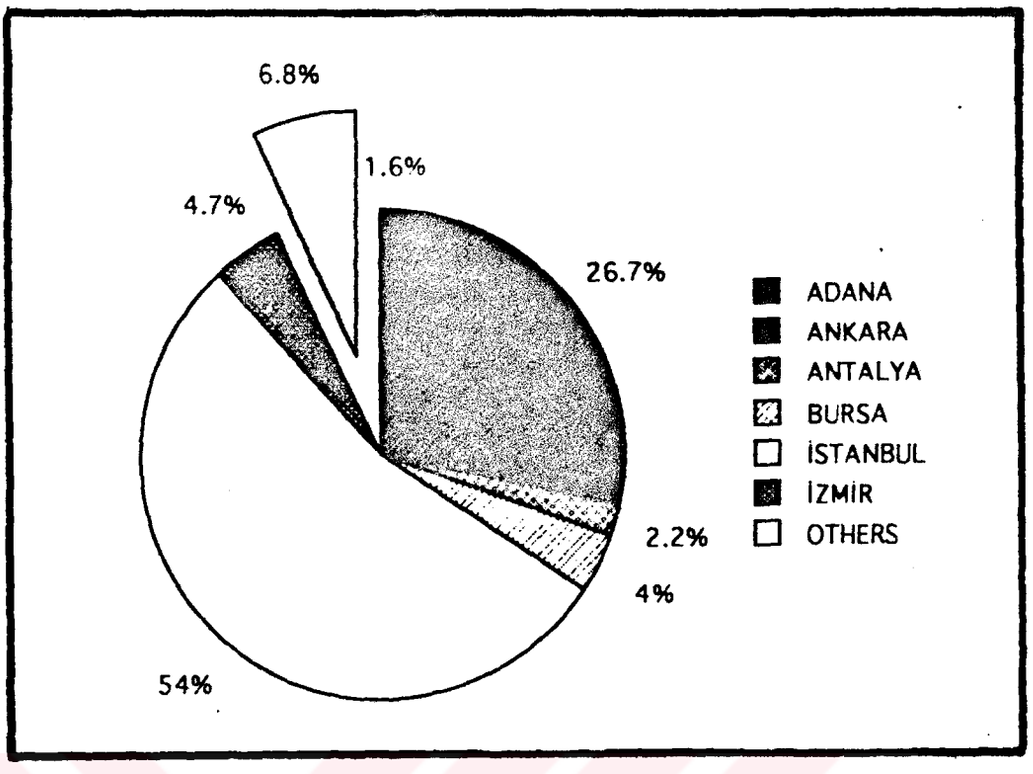

Figure 29. Paging Line Distribution in Türkiye- 1992

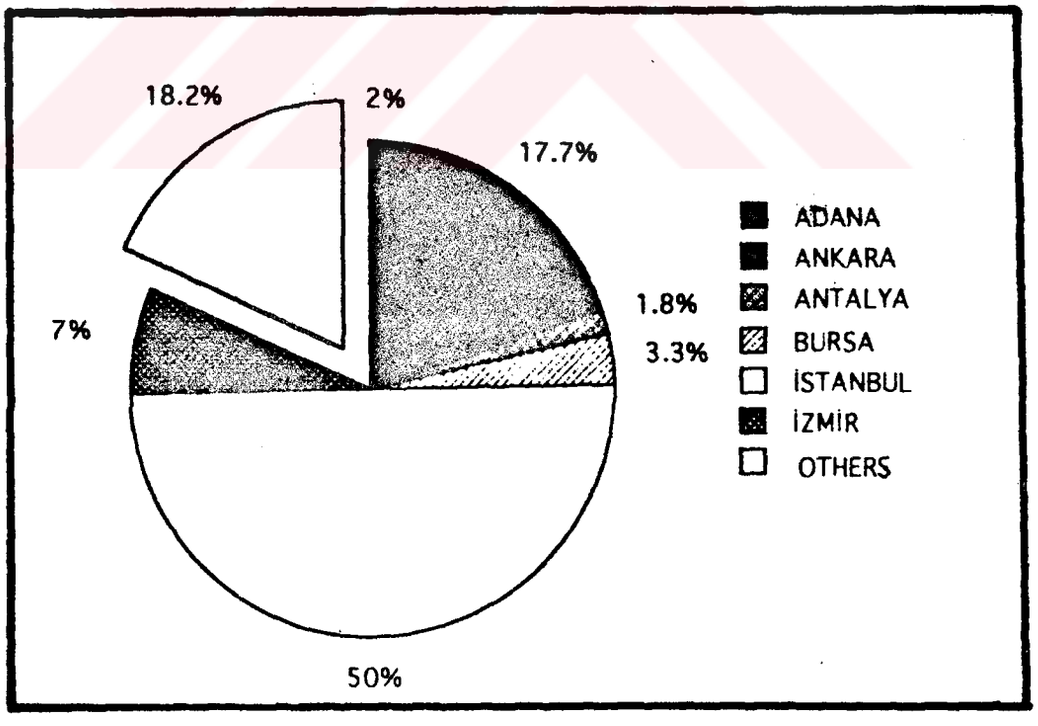

Figure 30. Mobile Telephone Line Distribution in Türkiye- 1992

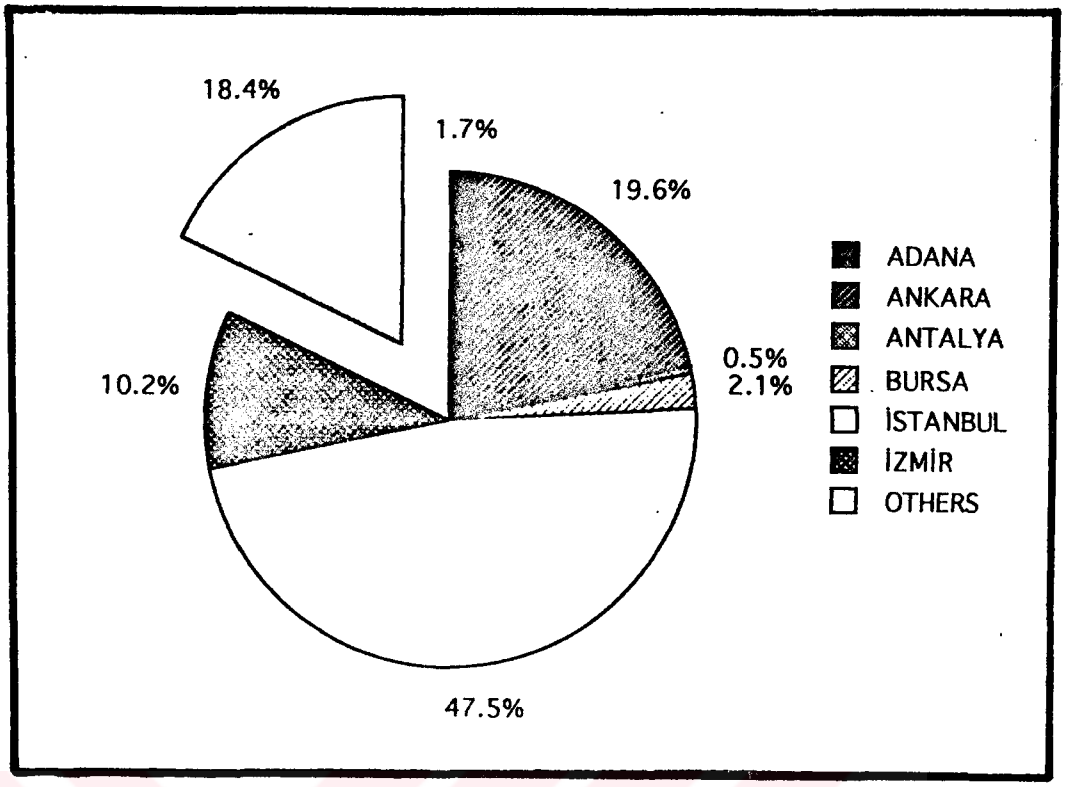

Figure 31. Computer Distribution in Türkiye- 1993

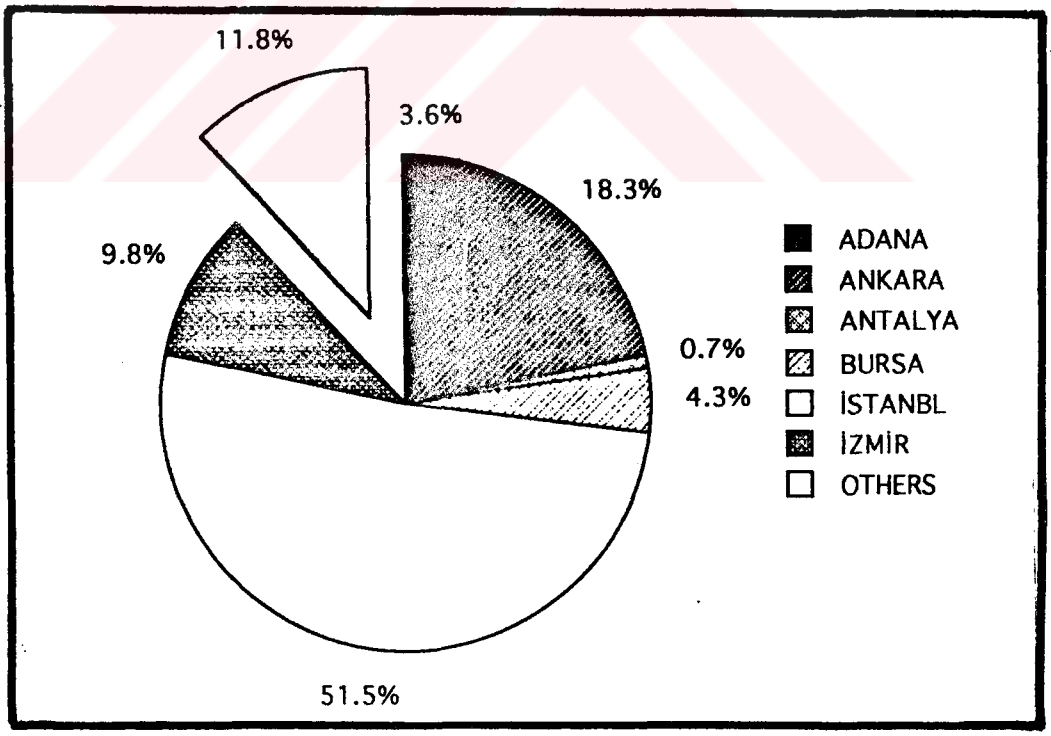

Figure 32. Computer Firm Distribution in Türkiye- 1993

It is clear that, the concept of information technologies belong to metropolitan regions in Türkiye. This is not very unusual condition, because it is most feasible to serve metropolitan areas with existing technologies even in developed countries. Meanwhile with developing satellite systems and especially with the help of Turkish national satellite system, it will be feasible to distribute information technology infrastructure and services to all type of settlements and to remote regions in Türkiye. This will be possible in one year and effects on these areas can be observed in 4 or 5 years time. But, now in Türkiye, all conditions about information technologies favour metropolitan areas, so it is true to expect that spatial effects of information technologies can be observed fully in metropolitan regions.

The direct effects of information technologies on regional development levels can not be measured. This is a reality for the whole world. It is accepted that information technologies have some kind of important impacts on regional development, but there are no much quantitative model to measure information technology effects on region as it is the condition for transportation technologies. Only, the information technology industries are taken as new development dynamics for the regions that they take place. Also the existence of information technology infrastructure and applications creates a new dimension for regional differentiation. This differentiation is explained as information- rich and information poor by academicians. (See part 2.4.4) If we examine information technology distribution according to this view, we can estimate that with using the existing information technologies in Türkiye, regional gap will be increase. Because, besides the uneven distribution of these technologies, innovation centers take place in information rich regions which, information facilities and information technology applications are intensive.

Also, the important factor of increasing gap between information rich and information poor regions is that; firms tend to locate in information rich regions which have all information technology possibilities besides all

other attractive factors. Existence of telecommunication and other informatics possibilities become the newest and one of the important factors for locational decisions. As we identify the big metropols and important touristic centers as the most information rich regions in Türkiye, increasing investment gap between these regions and other parts of Türkiye is not unusual. For example distribution of 313 foreign capital firms in 1990 was like this: İstanbul: 184, Ankara: 27, İzmir: 15, Bursa: 10, Adana: 10, Antalya and Muğla :16, and Hatay :3 as at the distant centre at the east part of Türkiye.

As we understand from this example, if necessary precautions are not taken, than information technologies have the potential for increasing regional imbalances. But at the period of diffusion of technology, usually there is nothing to do except observing increasing imbalances. This was the condition for Europe at 1980's. Use and infrastructure of technology was concentrated in most developed regions at the cost of serious regional imbalances. (Hepworth, 1987, Funck, Koblo, Kowalski, 1988, Glaoutzi, 1988) This is still a problem for Europe, but there are serious academic research and bureaucratic efforts to solve this problem. This condition is also valid for Türkiye in 1990's. Of course, this condition is a little bit related with demand for these technologies. There is very important point concerning this argument. It is accepted that information technologies need so much capital, so technology investments in less developed regions will not be feasible, but according to a one view, if important economic activities are encouraged in less developed regions, it is said that, also information technologies will be developed at that regions, than existence of information technologies will support more economic development etc. Occurrence of this vicious circle is still a popular argument in academic world that deals with relations between information technologies and regional development.

The role of information technologies on regional development is also closely related with geographic location of countries. If countries have broad land and have violent and rough land surface, than regional benefits of

information technologies can not be acquired easily. In this respect, Türkiye is at advantageous position than some other developing countries such as Brazil and India. With developing satellite technologies , this condition may not be valid in a few years time.

We know that information technologies created new dynamics for locational choice of firms. (See part 2.4.2,) There is no study that was done in Türkiye to indicate the role of information technology (especially the use of telecommunication) on location choice of firms. Than we confront with another question. What are the locational preferences of information technology producer firms. Related to this subject Only, after 1980, we see that telecommunication industries were established mostly in metropolitan areas like Ankara and İstanbul. Here, we can infer an important condition. Especially, the information technology industries or in other words, technology related industries tend to locate where information technology infrastructure and applications are available. This type of locations are also called as innovating regions. They have not only various information technology possibilities but also, have the qualified manpower and research facilities like universities. So we can conclude that, the factors that effect locational preference of technological industries are the existence of information technology possibilities, existence of research possibilities and existence of qualified manpower.

In this respect, especially after 1987, efforts to establish technopark accelerated. With efforts of TUBITAK, Defence industry and some industrial institutions, there are studies to establish technoparks in Ankara, Gebze, İstanbul and İzmir. Even, in order to maintain infrastructural needs of these technoparks an additional investment directory was put in SPO'S 1990 investment programme. (DPT, Nisan 1994:60) Technoparks can be resembled to Organised Industrial Estates. These technoparks are treated as innovation centers and their environment will become the information center with the help of these innovation centers. That is to say, these

technoparks will become the new growth poles in information age instead of industrial zones in industrial era. In this respect, it has to be expected that such regions as Ankara, İstanbul, Gebze, İzmir will be the development centers of Türkiye in information age.

3.5.4 Rural Effects

In order to explain rural effects of information technologies in Türkiye, we have to know the distribution of these technologies in rural areas in Türkiye. The information technology facilities in Turkish rural areas are seem to be insufficient when compared with rural areas in developed countries. Basic telecommunication services were given in Central, Eastern and Southeastern Anatolia, but advanced services that has direct impact on value added do not exist in less developed regions of Türkiye.

Even, the distribution of basic telecommunication services in rural areas is not balanced. By 1991, average telephone density in rural areas were calculated as 10- 14 % and average subscriber density was calculated as 6 %. The highest densities are found in rural areas of Marmara and Ege regions. Also the rural areas in these regions are beyond considering the use of existing capacity. Rural areas in the provinces listed at below use the existing capacity very efficiently, so in the future they could adopt advanced applications of information technologies and will have the potential for rural development in information age. These provinces are; Eskişehir, Balıkesir, Bursa, Çanakkale and Afyon.

If we overlook the regional rural differentiation, for a moment 96 % of total villages have telephone service. In 45 % of total villages, telephone services delivered even to homes. The most benefit of these type of telecommunication activities in rural areas is the improved integration of rural areas with urban areas. Besides, the life standarts are raising in Turkish

rural areas by using modern telecommunication facilities. Advanced information systems that supports rural development do not established in Türkiye yet. With our national satellite system, value added information technology services like IBS, SBS can be given in every rural area of Türkiye. By this way effect of information technologies on Turkish rural areas will be more clear. If this systems will established well, than the effects of these systems on rural areas of developed world that we explained at page 60 will be also possible for Turkish rural areas. Here important point is that, new services and technologies must not increase the gap between different rural areas of Türkiye.

3.5.5 Urban Effects

In general urban effects of information technologies can be classified into two parts. First is the effects of information technologies on changing patterns of settlement system, and second one is changes in physical structures of individual cities. To measure the first effect is not possible even in developed countries, but studies on this subject are still continuing. In Türkiye, there is no study that was done on this subject, even the last settlement hierarchy study of Türkiye was done in 1979. After intensive use of information technologies and balanced diffusion of these technologies to every region with the help of newest technological opportunities, it is sure that, a new hierarchical study tells us different results. (For impacts of information technology on settlement systems, see page 2.4.5) Considering the spatial effects of information technologies on city structure, there are lot of findings such as differentiation of city image, differentiated transportation behaviours etc. Also there are some signs that show the existence of these effects on Turkish cities.

We can observe urban spatial effects best in metropolitan areas in Türkiye. We observe the existence of some buildings in Ankara and İstanbul, as can be classified as intelligent buildings like in developed countries. Sabancı Center, Ak Center, Medya Plaza are some examples for

these type of buildings. These buildings have advanced LAN systems and they have every type of communication with outside. These buildings also have videoconference opportunities. Generally, these type of buildings take place in city center of metropols. Headquarters of firms usually take place in these buildings.

Second urban spatial impact of information technologies is their role on establishment of huge shopping centers in city centers. Application of information technologies make possible the operation of huge shopping centers. EFT/ POS (Electronics Funds Transfer, Point of Sale) and barcod applications play important role on increasing number of such shopping centers. With the help of these information technologies, it is possible to sale directly from storehouses. Thus the advanced commercial information technology applications in Türkiye is done by big shopping centers. Migros, Metromarket, Begendik are some examples for these shopping centers.

Related to two effects at above, another effect of information technologies on urban areas is that, information technologies play role on increasing commercial activities and commercial centers in cities. As in developed countries, also in our country, number of commercial centers are increasing rapidly with the help of information technologies.

It is important to say that, spatial effects of information technologies in Türkiye, have not to be same with developed countries. Also there is lack of research on spatial effects of information technologies in Türkiye, even there is no study on it. With developing technological opportunities, diffusion of technology and with appropriate mentality for information age, all spatial effects of information technology can be calculated and determined well. Not only spatial effects, but we will able to measure all effects of information technology on economic, social structures in Türkiye.

CHAPTER IV
CONCLUSION

The existence of information technologies become the most essential condition for new production processes, for new phase of development, for changing relationships in whole world. (Bengt, 1988:253) It is wrong to take dynamics of information technologies as only technological means. There is a great difference between effects of information technologies and effects of Kondratiev waves. Debates on the information revolution or coming information age are very recent. Information technologies and their effects are the most popular subject that academicians, managers, bureaucrats have much to say on it.

Although, some of old fashioned information technologies such as mass media systems (radio and television) are known for 40 - 50 years; the development of communication and computer technologies in unpresented rates, and their widespread use in every type of economic and social activities, made these technologies very functional. They come into a situation that created the dynamics for new information age. The concepts like "information economy", "information society" become well understood after these periods. Especially, the important potential of information technologies that causes change of economic, social, bureaucratic structures were well understood just after beginning of 1980's. Because, these technologies developed very much since 1980. Several developments in world concerning information technologies are given in Appendix A. Historical development of information technologies were analysed according to these aspects; Innovations and new ideas, applications and projects, infrastructure and networking, institutional and legal aspects.

With increasing importance and use of information technologies, many concepts and facts that are the products of industrial era effected deeply from this condition. Especially, all factors of socio economic systems are on the way to change. These changes take place in production systems, international affairs, organisational systems and even in family structures. These changes are not so simple but they are very basic changes for human kind. Various theories, thoughts, acknowledgements become invalid. A necessity was born to have new studies on income distribution, employment, social relations etc. (Reinecke, 1982:21)

To accept all of these basic structural changes in the world only as a result of technological applications is a mistake. To see information technology as the only cause of all structural changes is a kind of technological determinism. The reality is that, technologies only prepare a base and appropriate conditions for formation of all developments and changes Information technologies only ensure possibility for all developments and changes, in socio economic systems. On the other hand, the real determinants are policies. (Earl, 1992:105)

In this respect; ideas, thoughts, and acknowledgements about information technologies changed so much in 14 years, since 1980. In the beginning of 1980's, it was believed that, investments in information technologies directly lead to sectoral development. In the late 1980's, it was accepted that, information technologies lead to structural changes in some jobs and this cause the development in various sectors. In 1990's, thoughts on information technology and their effects on economic sectors changed. It is accepted to determine sectoral priorities at first, and than invest in information technologies for these sectors. (Earl, 1992:105) Like this example, also there are some basic ideas about information technologies that had changed in the last ten years very much. For example the idea that claims "information production will totally take place of classical industries" (Hamelink 1986:16) was not come true. With use and transfer of information

we observe only structural changes in industries. It is not true to say that industries will extinct in information age. There are two conclusions that can be derived from all these explanations. One is that, information technologies and their impacts are really very new concepts for the world. A certain impact assessment was not been able to be done upto now. But as time passes, all dynamics and effects of these technologies become clarified and certain results of these technologies can be known. The second result is that, upto 1994, it is understood that the use and application of information technologies give not the same results in every job and every sector. It is observed that technological effects differ according to way of use and application priorities. The choice and use of Information technologies becomes directed only to satisfy necessities. This means that, the basic determinant of information technology use and effects are policies that supports these technologies.

Also it is not possible to explain social differentiation by only a single technological variable. Social structure composed of mutual interaction of many variables such as language, arts, state, family, education etc. (Köksal, 1976:632) Important point is that, information technologies have the potential to change all these social variables. If social and economic structure is on the way of change its cause is not only technologies, but mutual interaction of technology with other social variables. Information technologies can interact with other variables very easily. So, " information society debates are not single-fold arguments of technology" (Avcı, 1990:53)

As a result, we can easily say that, "technology can only be evaluated in the social context that it take place. " (Castells,1991) It is understood that only technology itself, can not provide instant solutions to essentially human problems. (Newstead, 1989: 270) This condition is also valid for information technologies. It is important to remind that all issues and developments concerning information technologies must not be accepted only in technological means. The effects of these technologies arise due to interaction of these technologies with other variables and various systems of

societies. One of the important factor is the condition of mentality towards these technologies and their effects. Only use of advanced information technology applications are not sufficient to get desired results. There are other factors that have to be taken into consideration. For example, in the mid of 1980's, neighbourhood telework office units were donated with most advanced information technologies in Japan, but they did not work properly as planned because, a lot of problems emerged as organisational structure of offices were not appropriate for locational conditions that they take place. Also physological factors played role on this condition. As a result; it will be true to accept that technological and other factors are always in interaction with each other. Here, we are witnessing another change that born with information technologies. Technology and other factors and political processes are tied so closely to each other as it was never happened before.

With the help of other factors, it is accepted that information technologies cause various basic changes in economic- social- spatial systems. But as we talked before, new technologies are not deterministic. There are many options towards them. Information technologies created new conditions for enterprises and public policy, but it has also created new possibilities. Different macro economic and organisational policies will produce different results for use of information technologies under new conditions. (Carnoy, 1985:649)

With all these combining factors, one reality is that as Toffler pointed out; "like restructuring of economic systems, also geopolitic relations are been restructuring. This type of global development is the result of rising new type of civilisation. (Toffler, 1991:175) This means there will be totally new economic arrangements, new social structures, new political systems.

Despite the changing geopolitic relations; developed countries carry their advantages that comes from industrial age into new information age. (Mody, Dahlman, 1992) In the new information age, developed countries have

new advantages, because all change and reflection processes in information age are created as a result of two way relations. There are feedback effects from all factors to another. In other words, if political, social and cultural environments are suitable for all changes and if they have the adoptive capability for all structural changes, than regeneration and development process that are originated from technological renewal will be more effective and comprehensive. On the other hand, in non suitable social- economic and cultural environments, changing and development processes are very slow and not effective. Even in less developed countries, these processes can be prevented. (Erkan, 1993,45)

One important assumption about information technologies is that, they become the most important factor for increasing gap between developed countries and less developed countries. Because, "the information gap represents basically the most basic division of humankind. more than language, religion or nationality, it reflects two very different ways of life- a culture of plenty and culture of poverty. The increasing global interdependence of a shrinking world makes such gaps more apparent and more intolerable. New technologies provide means for uniting the human family in a commitment to eradicating this gap. Yet they also provide a basis whereby the rich societies can enhance their dominance over poor." (Janelle, 1991:57)

Despite all these existing and potential negative impacts, the condition of developing countries are not hopeless. Developing countries have a lot of problems but also they have new opportunities towards the new information age. "If developing societies can able to understand the possibilities and exploit them in a way that is consistent with local circumstances will pay the lowest social costs and gain the greatest social rewards from what high technology has to offer." (Carnoy, 1985, 653) Information technologies have big potential to maintain advantages for developing countries, when they are supported with appropriate policies.

Countries may benefit much from these technologies when they use these technologies in rational way in appropriate local conditions.

There are also many options towards Türkiye in the new information age. Before we discuss Türkiye's position towards the use information technologies and information age, it can be useful to define Türkiye's conditions in the light of ideas of foreign authorities. Türkiye's position towards information age is summarised in World Bank's report in 1992. This report says that;

> Türkiye prepared a technological and infrastructural base in order to pass information based economy in 1980's. Economic modernisation strategy forces private sector to be more knowledge intensive. Also increasing amount of foreign capital and developing international trade improved two way information flow between Türkiye and other parts of world. Huge telecommunication investments both increased economic efficiency and productivity of informatics applications and cause for the diffusion of these technologies to the all economic activities. Despite there is no certain policy of government; market dynamics, technological change, development of infrastructure and increasing demand for informatics applications prepare a base for diffusion of information technologies in Türkiye."(Kesmez, 1993, Bilişim, No.64:127)

According to Erkan; in the existing conditions, if Türkiye converts some of its disadvantages to advantage, Türkiye has the potential to be a candidate of information society. (Erkan, 1993) This thought based on 3 assumptions. 1- Effective development in telecommunications technology: In few years, Türkiye developed its communication infrastructure and applications at the same time with other developed countries. (Also see part 3.1) 2- There is no so old industrial structure exists in Türkiye that

has to be eradicated like some European countries. Türkiye has the advantage for being participated very late in industrial age. With necessary precautions and incentives, Türkiye can develop its information technology industries and other industries who use intensive information technology applications. 3- Türkiye has the greatest man power in Europa. If this young manpower is educated well, Türkiye can have one of the important inputs for information age. This input is human input or brainware in other words. (Boratav, 1993:92) One of the changes that come with information technologies is the increasing importance of science in all areas. This condition also increased the importance of education. Education becomes the most important strategic element in information age.

Besides all these advantages; Türkiye also has many disadvantages concerning new technologies and new information age. The basis of all these disadvantages, depends on insufficient mentality towards new dynamics. In Science and Technology Congress in 1990, it was dedicated that there is a deficiency of consciousness in Türkiye about the importance and benefits of information. There is no plan nor programme for how to use information technologies and how to arrange information activities. To take only technical side of information technologies and not consider other dimensions causes serious problems. For example, because of this reason Computer Aided Education (CAE) project was failed. Although it was planned in 1987, the expected result has not been obtained until 1994, because only technical hardware side of project was considered. It's educational effects were not considered. (For detailed information See appendix. C on pages 199-200) It was not totally planned. This example tells us an important condition; use and application of information technologies are effective and successful when they are applied with appropriate policies and appropriate mentality.

There are some reasons and consequences of such deficiencies in Türkiye. Two reasons can be given that are responsible of such problems. Firstly, there is lack of capability in policy making in Türkiye. This is so

essential in order to ba a member of information age. This deficiency is not only occurred in informatics field, but it is also true for other areas. Secondly, necessary importance is not given to scientific activities. For example, Türkiye has the weakest science potential among the countries who are the members of EUREKA project (See page 167) Although EUREKA was planned for high Tech industries, this type of industry is not exist in Türkiye. (Boratav, 1993:88) There are some reasons for weakness of scientific activities in Türkiye. Firstly, even the basic needs of society can not be maintained in Turkish society. Secondly, the importance of science on social and economic behaviours is not understood well. Scientific decision making and application of policies according to scientific studies are not developed much in Türkiye as in developed countries. Scientific structure in Türkiye is not able to carry Turkish society to the level of information society. (Toplu, 1992: 125)

As a result of weakness in scientific structure, R-D efforts do not developed very. According to a survey in 1992, 60 % out of 1080 firms do not give importance to R-D. There are only 17 firms that spent recognisable amounts of money on R-D. Total R-D spending of these firms in 1992 were only about 1 trillion Tl. with 1993 prices. Share of private firms in total R-D spending is only 19 %. (Eser, 1993:45-46) All these examples show the weak situation of Türkiye concerning R-D efforts. For this reason, Türkiye can not able to produce its own technology.

For some, the reason for not being able to produce our own technology is cultural lag. (Erkan, 1993) If cultural norms do not develop at the same rate with economic and social factors, than cultural lag occurs. On the other hand, societies has not essential to change their cultural values suddenly. Only change of mentality and change of some ideas towards the new transformations in world will be sufficient in order to adopt information age. This change has also strategic importance. (Erkan, 1993)

We talked about change of economic and social factors. The use of

information technologies is the main cause of these economic and social changes. (See chapter 2) Although, information technology infrastructure and applications developed very much in Türkiye, the efficient and productive use of these technologies can not be maintained because of the various deficiencies that was mentioned earlier. For example it is claimed that Türkiye catch up information age with infrastructural investments, but there is no adequate production of information that will be transferred from these channels. (Bilgisayar, 1993, No.145) In 1993, 10 Million byte of information was sent from Türkiye to abroad, but 1 Billion byte of information was entered to Türkiye using Internet network. This is the best example that shows our weakness in information production. Only to have modern infrastructure is not sufficient condition for catch up information age. According to another example, there are thousands of databases exist in Europe, but there are only 15 or 25 databases in Türkiye by 1994. Despite the lack of information production, also we can not use existing information technology facilities in productive way. For example, it is explained that, computers in public sector are being used with only 50 % of efficiency rate.(Bilişim, 1992) Also, we see that sometimes very necessary information technology applications are neglected. For example it is claimed that, presently there is no computer infrastructure to prevent tax evasion. Only 1 trillion is needed for establishment of such system but this money is spent for closing deficits of the state. So Türkiye lost about 15-20 trillion Tl. from tax evasion. Most important cause of this situation is the lack of computer system. (Taha Akyol, Milliyet) Another example is about prices of telecommunication services; although we have very advanced telecommunication infrastructure, the very expensive characteristics of telecommunication services converts our comparative advantage to disadvantage. All the necessary policies in order to prevent this type of deficiencies can not be applicated because of the lack of mentality about importance of these subjects.

After all these information about Türkiye and condition of technologies in Türkiye, we can define Türkiye's position towards information

age. But firstly, we have to define different phases of information age shortly: There are 3 phases of information age. 1- Industrialised economy in transition, 2- Limited information economy, 3- İinformation economy. In first phase, information demand increases according to development of financial sector, development of international trade and increasing importance of tax and insurance management. Infrastructural investments are in a high degree. On the other hand, there is lack of software, lack of human source and organisational deficiencies limits the economic earnings. Administrative and legal issues are not sufficient, private information industry starts to develop. In second phase; informatics applications began to be used widely in the economy, information technology applications are started to be used intensively in commercial and financial services. Education becomes important variable, legal aspects of informatics have been strenghening, communication systems are privatized and there occurs an investment boom in communication field. In third phase; economy totally depends on information production and transferring, all industries use various applications of information technologies. (3. İzmir İktisat Kongresi, Bilişim Grubu Tartışmaları) According to me, Türkiye is between the first phase and second phase concerning all information technology developments in Türkiye. Perhaps Türkiye will take part in this phase until 2000. On the other hand developed countries take place at the last stages of the second phase.

Because of different characteristics of Türkiye and other developed countries,it is not wrong to think that the effects of information technology in Türkiye differ from other countries. This condition is due to cultural differences. For example, in developed countries, development of information technologies are assumed to be the cause in decreasing in local identities, weakening of political channels, individualisation, isolation of social being etc.(All bibliography) This is related to their cultures. It has not to be the same in our country. Important thing is to determine general effects of information technologies (See part 2.4) and test their existence in our country.

We can not say that information technology effects have clearcut results. Because debates on information technologies and information age are still continuing even in developed world. Also development of information technologies and concepts like information age, etc. are very new issues for the whole world. This condition is also valid for Türkiye. For example establishment of R-D units in Türkiye was accomplished only 9-10 years ago. When these technologies complete their developments and diffuse to masses, than their effects can be definitely determined. In this process, Türkiye has to prevent its cultural lag by passing to ideal scientific structure. (Erkan, 1993:129) In this respect, Türkiye has to determine existing situation of its institutions according to the coming information age and Türkiye has to choose its education, technology policies well towards the coming information age.

Especially, policies about information technologies are very important, because these policies will determine Türkiye's position in international conjuncture. If Türkiye uses the advantages of information technologies well, with the help of rational policies than Türkiye will have the potential to rise to the central position from periphery. This is the most important international advantage of information technologies for Türkiye.

If it is used rationally, information technologies have the potential for regional development. Also it will be a tool for decreasing gap between regions. Because in Europe, these technologies are started to use as policy tool for regional development. In Türkiye information technologies are at the position that various information technology services are given to regions only after some degree of development level maintained in these regions. On the other hand according to a world trend, these technologies are started to be used as directly a development tool with supporting policy options. After defining adoptive capability of regions in Türkiye, information technologies can start to serve in these regions. The probable effects of information technologies on various regions in Türkiye is given in Figure. 33.

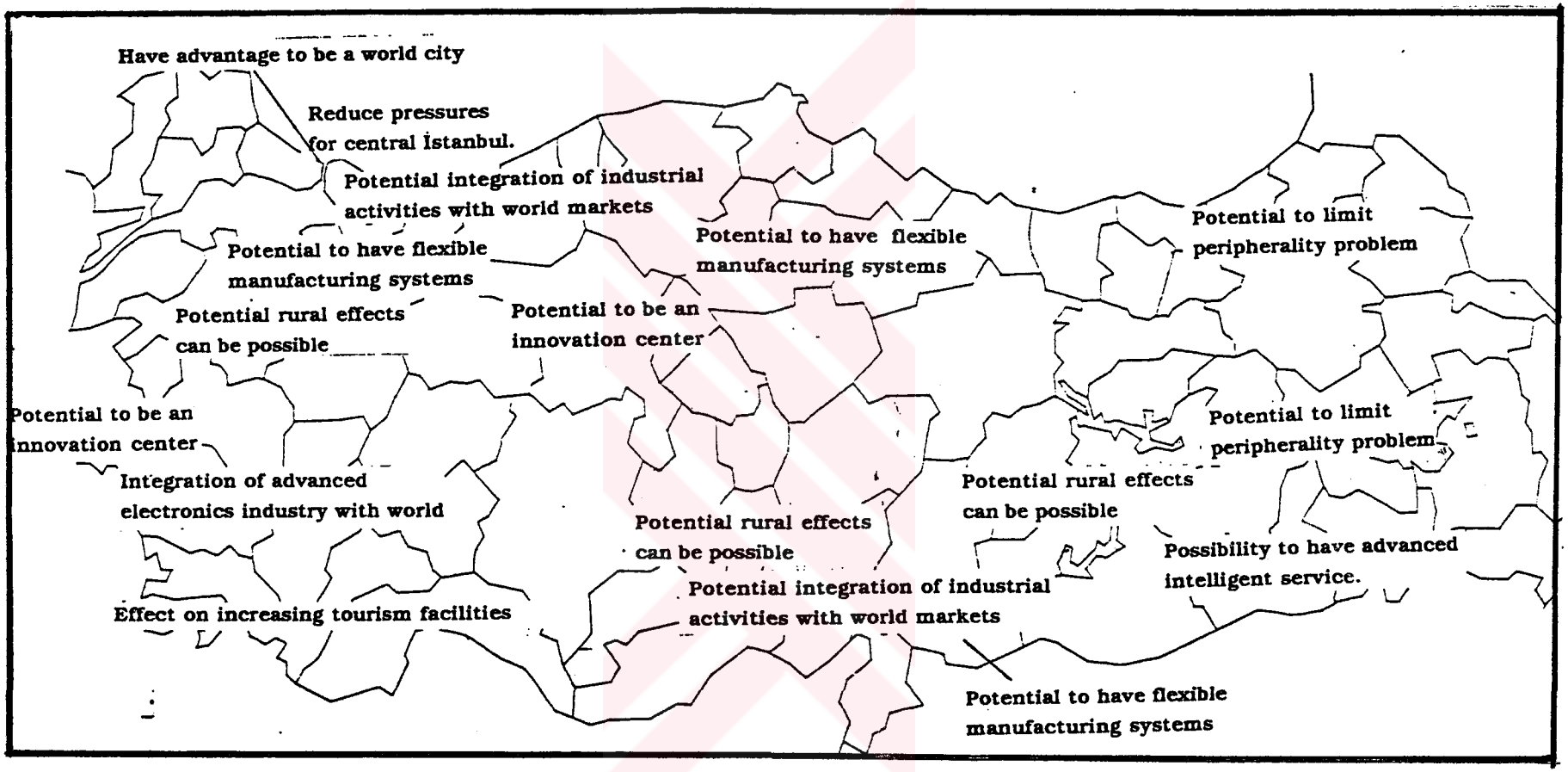

Figure 33. Potential of Regions in Türkiye Towards Information Age

As a result; information technologies offer new socio economic and organisational options for Türkiye as they offer these options to every society in world. When information is considered as the basic material of information technologies; no country, no industry, no firm has a prior advantage or disadvantage. Only advantage comes from the ownership of information. Most important consideration in the future will be the performance of administrations to utilise information in an efficient way. (Drucker, 1993:270) Türkiye's performance to utilise information technologies and information benefits will shape its future.

REFERENCES

_____, Ana Brittanica Yıllığı, 1990.

_____, 1990-1994, Aselsan Dergisi , No. 1-7, 15- 17.

_____, 1991-1993, Bilişim Dergisi, No. 8-39.

_____, 1978- 1994, Bilgisayar Dergisi , No. 1- 149.

_____, 1974- 1992, Elektrik Mühendisliği Dergisi, No. 224-388

_____, 1993, İpek Yolu Dergisi, No.2

_____, Nüfusun Sosyal ve Ekonomik Nitelikleri, DİE, 1970

_____, Nüfusun Sosyal ve Ekonomik Nitelikleri, DİE, 1985

_____, Nüfusun Sosyal ve Ekonomik Nitelikleri, DİE, 1990

_____, 1991-1993, PTT Dergisi, No. 98- 133.

_____, 1984, PTT Faaliyet Raporu, Ankara.

_____, 1986, PTT Annual Report, Ankara.

_____, 1987, PTT Annual Report, Ankara.

_____, 1988, PTT Annual Report, Ankara.

_____, 1989-1990, PTT Faaliyet Raporu, Ankara.

_____, 1990-1991, PTT Annual Report, Ankara.

_____, 1992-1993, PTT Faaliyet Raporu, Ankara.

_____, 1993, Teletaş A.Ş. - 1992 Faaliyet Raporu-

_____, 1992, Üçüncü İzmir İktisat Kongresi Bilişim Çalışma Grubu Raporu ve Tartışmalar.

_____, 1986. "Bilginin Gücü", Bilgisayar, No. 61, pp. 46-48.

_____, 1993, "1949'dan 1994'e Bilgisayar Dünyasındaki Genel Eğilimler", Bilgisayar, No. 143, pp. 12-20.

_____, 1992, DPT 1993 Yılı Programı.

_____, 1994, Ekonomist Dergisi Türkiye Yıllığı, pp. 32-34.

_____, 1987, Elektronik Sanayii'ni Yönlendirme Komisyon Raporu, T.C. Sanayi ve Ticaret Bakanlığı, pp. 1-54.

_____, 1990, "Haberleşme Şirketleri Yakınlaştıracak", Bilgisayar, No. 106, pp. 114-115.

_____, 1988, "2018'e Doğru", Bilgisayar, No. 90, pp. 108-116.

_____, 1989, "Tasarımda ve Üretimde Bilgisayar", Bilgisayar, No. 101, pp. 82-90.

_____, 1986, "Teknolojik Değişim ve Uluslararası İlişkiler", Bilgisayar, No. 69, pp. 64-68.

_____, 1987, "Türkiye'de Bilgisayarın Gündemi", Bilgisayar, No. 74, pp. 69-87.

_____, 1992, "Veri İletişiminde Bulunduğumuz Düzey", Bilişim, No. 34, pp. 14-16.

_____, 1992, "VSAT'ın Teknolojik Özellikleri", PTT Dergisi, No. 120, pp. 16-18.

Abler, R.F., 1991. "Hardware, Software and Brainware: Mapping and Understanding Information Technologies". In Collapsing Space and Time: Geographical Aspects of Communication and Information, ed. by Brunn S.D, Leinbach T.R., Harper Collins Academic, 1991, U.K., pp. 31-47.

Acar, N., 1992. "Tam Zamanında Üretim ve Kanban Sistemi", Verimlilik Dergisi, Vol. 19, No. 1, pp. 9-11.

Akarsu, Füsun., 1989. "Ortaöğretimde Bilgisayar", Bilgisayar, No. 101, pp. 84

Akgür, Teoman., 1993. "Dünyadaki Son İktisadi Gelişmeler: İşsizlik Sorunu", Uluslararası İlişkilerde Olaylar ve Yorumlar, No. 16, pp. 39-41.

Akman, Toygar., 1984. "Elektronik Sistemde Gelişmeler ve Ülkemiz Gerçekleri", Bilgisayar, No. 37, pp. 50-55.

Ansah, P.A., 1986. "Uluslararası İletişimde Haklar ve Değerler Mücadelesi". In Enformasyon Devrimi Efsanesi, ed. by Y. Kaplan, Rey Yayıncılık, 1991, İstanbul, pp. 199-231.

Arms, C.R., 1990. "A New Information Infrastructure", OnLine, vol.14, No.5, pp. 15-22.

Atlı, Selami., 1992. " Aselsan'da Bilgisayar Destekli Tasarım ve Mühendislik Olanakları", Aselsan Dergisi, No. 12, pp. 7-14.

Avcı, Nabi. 1990. Enformatik Cehalet, Rehber Yayınları, Ankara, pp. 1-144

Aydın, M., 1991. "Bilgsayar Destekli Eğitim", Bilgisayar, No. 126, pp. 192-196.

Aytaç, K., 1992. "Endüstri Ötesi Topluma Hoşgeldiniz", Bilişim, No. 34, pp. 72

Barras, R., 1987. "Technical Change and Urban Development Cycle", Urban Studies, No. 24, pp. 5-30.

Barras, R., 1986. "New Technology and New Services: Towards an Innovation Strategy for Europea", Futures, Vol. 19, No. 8, pp. 748-772.

Beckmann, M.J., 1988. "Information Technology and Location". In "Information Technology:Social and Spatial Perspectives", ed. by I.Orishimo, G.J.D. Hewings, P.Nijkamp, Lecture Notes in Economic and Mathematical Systems, 1988 Springer Verlag, Germany, pp. 153-160.

Bell, Daniel., 1973. The Coming of Post Industrial Society, U.S.A, pp. 59-68, 117, 371-378.

Bell, Daniel., 1983. " Communication Technology-for Better or Worse ?" In Telecommunication: Issues and Choices for Society, ed by Jerry L. Salvaggio, 1983, New York., pp. 34-49.

Bengt, D.R., and Olsen, A., 1988. "Justification of E-Mail and Conferencing Systems". In Networks for 1990's and Beyond, ed. by R. Reardon, On Line, U.S.A., pp. 253.

Bessant, John., 1989. Microelectronics and Change at Work, ILO, Geneva, pp. 1-99.

Bessant, John., and Cole, Sam., 1985. Stacking the Chips: Information Technology and Distribution of Income. Exeter, London, pp. 1-135.

Bettemir, Veli., 1992. "Yarın Nasıl Haberleşeceğiz", PTT ARGE Dergisi, No. 5, pp. 1-13.

Bilgen, Semih., 1990. "Günümüzde Bilişim Teknolojisi ve Biz", Elektrik Mühendisliği Dergisi, No. 373, pp. 98-101.

Bilgen, Semih., 1988. "Bilgisayar ve İşsizlik", Elektrik Mühendisliği Dergisi, No. 355, pp. 189-191.

Birinci, Nebi., 1993. "Information Technology Diffusion Prospects in Türkiye", PTT ARGE Dergisi, No. 8, pp. 65-71.

Blackler, Frank., and Brown, Collin., 1987. "Management, Organizations and the New Technologies". In Information Technology and People: Designing for Future, ed by Blackler and Oborne, 1987, U.K., pp. 23-43.

Bolter, W.G., Cannaughey, J.W., and Kelsey, F.J., 1990. Telecommunications Policy for 1990's and Beyond. New York, 359 pages.

Boratav, Korkut., and Türkcan, Ergun., 1993. Türkiye'de Sanayileşmenin Yeni Boyutları ve KİT'ler. Tarih Vakfı Yurt Yayınları, Türkiye Araştırmaları No. 1, İstanbul, pp. 1-167.

Brotchie, J.F., 1984. "Technological Change and Urban Form", Environment and Planning A, Vol. 16, pp. 583-596.

Budd, H.F., 1989. "Networking and Development". In Computers and Informatics in Developing Countries, ed. by M. Munasinghe, 1989, Essex, U.K., pp. 86-94.

Büyüksaraç, Nedret., 1993. "Telekomünikasyonda Şimdiki Zaman ve Gelecek", PTT ARGE Dergisi, No. 6

Calhoun, Craig., 1986. "Computer Technology, Large Scale Social Integration and the Local Community", Urban Affairs Quarterly, Vol. 22, No. 2, pp. 329-349.

Cane, Alan., 1992. "Information Technology and Competetive Advantage: Lessons from Developed Countries", World Development, Vol. 20, No. 12, pp. 1721-1736.

Carnoy, Martin., 1985. "High Technology and International Labor Markets", International Labor Review, Vol. 124, No. 6, pp. 643-659.

Castells, Manuel., and Blackwell, Basil., 1991. The Informational City, Oxford, U.K., pp. 1-32, 127-228, 349-353.

Cereci, Sedat., 1992. Büyülü Kutu Büyülenmiş Toplum, Şule Yayınları, Ankara

Ceyhun, Yurdakul., 1992. "Ülkemizde Bilişim Teknolojileri Araştırma Potansiyeli ", Elektrik Mühendisliği Dergisi, No. 386, pp. 225-227.

Colombo, U., 1991. "The Technological Revolution and Future of the Third World", IEEE Technology and Society Magazine, Vol. 10, No. 1, pp. 25-32.

Cowie, J.B., 1989. "Entering the Information Age: Implications for Developing Countries", IEEE Technology and Society Magazine, Vol. 8, No. 4, pp. 21-24.

Dağdeviren, Emre., 1990. Uzaysal İletişim, Dünya Yayınları, İstanbul, 90 pages.

Daniels, P.W., 1991. "Internationalization, Telecommunications and Metropolitan Development: The Role of Producer Services". In Collapsing Space and Time: Geographic Aspects of Communication and Information, ed. by S.D. Brunn, T.R. Leinbach, 1991, Harper Collins Academic, U.S.A., pp. 149-169.

Daniels, P.W., 1991. "A World of Services?", Geoforum, Vol. 22, No. 4, pp. 359-376.

Dickey, J., 1989. "Urban Impacts of Information Technology". In The Future of Urban Form, ed. by J. Brotchie, P. Newton, P. Hall, P. Nijkamp, 1989, Routledge, New York, pp. 175-187.

Drewett, R., and Engelstoft, S., 1990. "The Future of Cities: The Human Dimension and Role of Science and Technology", Fast Programme, EEC.

Drucker, Peter, F., 1993. Kapitalist Ötesi Toplum, Translated by Belkıs Çorapçı from Post-Capitalist Society. Inkilap Kitabevi, 1994, İstanbul, 303 pages.

Ducatel, Ken., and Miles, Ian., 1992. "Internationalization of Information Technology Services and Public Policy Implications", World Development Vol. 20, No. 12, pp. 1843-1857.

Durgut, Metin., 1992. "Teknolojilerin Gelişme Yönü", Elektrik Mühendisliği Dergisi, No. 386, pp. 281-285.

Dutton, W, Blumler, J.G., and Kreamer, K.L., 1987. "Continuity and Change in Conceptions of the Wired City". In Wired cities: Shaping the Future of Communications, ed. by Dutton, Blumler and Kraemer, 1987, U.S.A., pp. 2-25.

Earl, M.J., 1992. "Putting IT in its Place: A Polemic For Nineties", Journal of Information Technology, Vol. 7, No. 1, pp. 100-108.

Eksl, Rene., 1986. "Technical Modernism and Social Conservatism", Futures, Vol. 18, No. 2, pp. 258-273.

Elçi, Atila., 1984. "Bilgisayar Kullanımı Açısından Türkiye'de Durum ve Karşılaştırma", 1. Türkiye Bilgisayar Kongresi Bildirileri,

Erkan, Hüsnü., 1993. Bilgi Toplumu ve Ekonomik Gelişme, Türkiye İş Bankası Kültür Yayınları, Ankara, 147 pages.

Erkan, Hüsnü., 1993. "Bilgi Toplumunun Temel Özellikleri", Bilişim, No. 34, pp. 72-75.

Ernsberger, R., 1993. "Wiring the World", Newsweek, April 5, pp: 28-35.

Eser, Uğur., 1993. Türkiye'de Sanayileşme, İmge kitabevi, Ankara, pp. 41-47, 124-136, 171-186.

Esin, Arif., 1989. "21. Yüzyıl Şehrinde Yeni Teknolojilerin Sosyal Yapı Üzerine Etkileri: Hane Ölçeği", 5. Türkiye Bilgisayar Kongresi Bildirileri, pp. 185-189.

Eyyuboğlu, Halil, T., 1990. "Sayısal Santraller ve Getirdiği Olanaklar", PTT ARGE Dergisi, No. 1, pp. 26-29.

Eyyuboğlu, Halil, T., 1991. "Türkiye'de Telekomünikasyon Sanayileri", Elektrik Mühendisliği Dergisi, No. 383-384, pp. 324-332.

Eyyuboğlu, Halil, T., 1992. "2000'li yıllar ve Telekomünikasyon", PTT ARGE Dergisi, No. 4, pp. 1-4.

Eyyuboğlu, Halil, T., "ISDN Tartışması", PTT ARGE Dergisi, No.2

Eyyuboğlu, Halil, T., 1992. "Telekomünikasyonda Rekabet ve Tarifeler", PTT ARGE Dergisi, No. 5, pp. 26-31.

Fakiolas, Rosettos., 1986. "The Impact of New Technology on Employment", Ekistics, No. 320, pp. 326-328.

Fathy, Tarik, A., 1991. Telecity: Information Technology and Its Impact on City Form, Preager, New York., 156 pages.

Forester, Tom., 1987. High-Tech Society, Cambridge, Massechutes, U.S.A , 272 pages.

Forsstrom, Ake., and Lorentzon, Sten., 1991. " Global Development of Communication : A Frame for the Pattern of Localization in a Small Industrialized Country". In Collapsing Space and Time: Geographical Aspects of Communication and Information, ed. by Brunn S.D, Leinbach T.R., Harper Collins Academic, 1991, U.K., pp. 82-107.

Freeman, Chris., 1989. "Yeni Teknoloji ve Yetişme Sorunu". Mühendis ve Makina, Çeviren: Aykut Göker, 1990, Vol. 31, No. 368, pp. 5-14.

Fulk, J., and Steinfield C., 1990. Organizations and Communication Technology, Sage, U.S.A., pp. 275-294.

Funck, R., Koblo, R., and Kowalski, J., 1988. "Information Technology, the Urban System and Urban Policy Consequences". In Information Technology: Social and Spatial Perspectives, ed. by I. Orishimo, G.J.D. Hewings, P. Nijkamp, Lecture Notes in economic and Mathematical Systems, Springer Verlag, 1988, Germany., pp. 125-139.

Funck, R.H., and Kowalski, J.S., 1988. "Innovation, New Information Technologies and the Structure of Urban Regions". In Information Technology: Social and Spatial Perspectives, ed. by I. Orishimo, G.J.D. Hewings, P. Nijkamp, Lecture Notes in economic and Mathematical Systems, Springer Verlag, 1988, Germany.

Gassmann, H.P., 1991. "Information Technology Developments and Implications for National Policies", Futures, Vol. 23, No. 10, pp. 1019-1031.

Genç, P., Özgit, A., 1988. "EARN Kullanımı", 5. Türkiye Bilgisayar Kongresi Bildirileri, pp. 85-90.

Geray, Haluk., 1993. "Turkey's Communication Boom", Turkish Review, Vol. 17, No. 31, pp. 25-30.

Giaoutzi, M., and Nijkamp, P., 1988. " Information: A Key Force for Spatial Dynamics", In Informatics and Regional Development, 1988, Avebury, Newcastle-upon-Tyne, Great Britain., pp. 1-22.

Giaoutzi, M., 1988. "Spatial Patterns of Information Technology: The Case of Greece", In Informatics and Regional Development, 1988, Avebury, Newcastle-upon-Tyne, Great Britain., pp. 235-249.

Gillespie, A., 1987. "Telecommunications and the Development of Europea's Less Favored Regions", Geoforum, Vol. 18, No. 2, pp. 229-236.

Gillespie, A., and Cornford J.,1992. "The Coming of Wired City?, Town and Planning Review, Vol. 63, No. 3, pp. 243-264.

Gillespie, A., and Williams, H., 1988. "Telecommunications and Reconstruction of Regional Comparative Advantage", Environment and Planning A, Vol. 20, pp. 1311-1321.

Goddard, J., and Gillespie, A., 1988. " Advanced Telecommunications and Regional Economic Development", In Informatics and Regional Development, 1988, Avebury, Newcastle-upon-Tyne, Great Britain., pp. 121-146.

Gözüm, Osman., 1990. "21. Yüzyıla Girerken Türkiye'nin İletişim Alanındaki Hedefleri", PTT ARGE Dergisi, No. 1, pp. 1-4.

Graham, Stephen., 1993. "Changing Communication Landscapes", Cities, May 1993, pp. 158-166.

Günalçın, Güngör., 1989. "Değişen Üretim Teknolojisi ve Getirdikleri", 5. Türkiye Bilgisayar Kongresi Bildirileri, pp. 125-130.

Gür, M., 1992. "Evlere Kadar Fiber", PTT ARGE Dergisi, No. 5, pp. 95-97.

Güran Hasan., 1988. "Bilgisayar Destekli Eğitime Bir Bakış", Bilgisayar, No. 85, pp. 166-171.

Gürlek, Bilgehan., 1992. "Tam Zamanında Üretim, Esnek Üretim Sistemleri, Toplam Kalite Yönetimi Yönetimde Rönesans mı?", Verimlilik Dergisi, No. 3, pp. 105-119.

Halal, W. E., 1985. "Beyond Left Versus Right: Evolution of Political Economy in an Information Age", Futures, Vol. 17, No. 3, pp. 202-213.

Halal, W.E., 1982. "Information Technology and Flowering of Enterprise". In Communication and Future: Prospects, Promises, Problems, ed by, F. Howard, J.R. Disbury, 1982, World Future Society, U.S.A., pp. 39-45.

Hamelink, C.J., 1986. "Enformasyon Devriminden Sonra Yaşam Sürecek mi?", In Enformasyon Devrimi Efsanesi, ed. by Y. Kaplan, Rey Yayıncılık, 1991, İstanbul., pp. 11-32.

Hamelink, C.J., 1990. "Merkez ve Çevre Ülkeler Arasında Enformasyon Dengesizliği", In Enformasyon Devrimi Efsanesi, ed. by Y. Kaplan, Rey Yayıncılık, 1991, İstanbul., pp. 257-277.

Hancock, Alan., 1983. "Opening Up Communication Planning", Ekistics, Vol. 302, pp. 374-377.

Harkness, R, C., and Standal, J, T., 1982. "Telecommunications Alternatives to Transportation". In Communication and Future: Prospects, Promises, Problems, ed by, F. Howard, J.R. Disbury, 1982, World Future Society, U.S.A., pp. 228-233.

Hepworth, Mark, E., 1987. "The Information City", Cities, Vol. 4, No. 3, pp. 253-262.

Hepworth, Mark, E., 1985. "The Geography of Technological Change in the Information Economy", Regional Studies, Vol. 20, No. 5, pp. 407-424.

Hepworth, Mark, E., 1987. "Information Technology as Spatial Systems", Progress in Human Geography, Vol. 11, pp. 158-180.

Hepworth, Mark, E., 1990. "Planning for the Information City: The Chellange and Response", Urban Studies, Vol. 27, No. 4, pp. 537-558.

Hepworth, Mark, E., Green, A., and Gillespie, A,E., 1987. "The Spatial Division of Information Labor in Great Britain", Environment and Planning A, Vol. 19, pp. 793-806.

Hepworth, Mark, E., 1991. "Information Technology and Global Restructuring of Capital Markets". In Collapsing Space and Time: Geographical Aspects of Communication and Information, ed. by Brunn S.D, Leinbach T.R., Harper Collins Academic, 1991, U.K., pp. 132-147.

Hills, J., 1993. "Telecommunications and Democracy: The International Experience", Telecommunication Journal, Vol. 60, No. 1, pp. 21-29.

Hitchcock, H, H., and Coates, J, F., 1982. "A Scenario of Telematics Future". In Communication and Future: Prospects, Promises, Problems, ed by, F. Howard, J.R. Disbury, 1982, World Future Society, U.S.A., pp. 234-240.

Holcomb, B., 1991. "Socio- Spatial Implications of Electronic Cottages". In Collapsing Space and Time: Geographical Aspects of Communication and Information, ed. by Brunn S.D, Leinbach T.R., Harper Collins Acad. 1991, U.K., pp. 342-353.

Hon, Wong, Sen., 1992. "Exploiting IT: A Case Study of Singapore", World Development, Vol. 20, No. 12, pp. 1817-1828.

Hudson, H.E., 1989. "Overcoming the Barriers of Distance: Telecommunications and Rural Development", IEEE Technology and Society Magazine, Vol. 8, No. 4, pp. 7-10.

Hudson, H.H., and Leung, L., 1988. "The Growth of Information Sector". In Measuring the Information Society, ed. by, F. Williams, 1988, Sage, U.S.A., pp. 35-54.

Hudson, H.E., 1990. Communication Satellites: Their Development and Impact, London, pp. 146-281.

Inose, H., and Pierce, R., 1984. Information Technology and Civilization, Freeman and Company, New York, pp. 31-249.

Inose, H. 1988. "Information Technology in an International Perspective". In Information Technology: Social and Spatial Perspectives, ed. by I. Orishimo, G.J.D. Hewings, P. Nijkamp, Lecture Notes in Economic and Mathematical Systems, Springer Verlag, 1988, Germany., pp. 66-70.

Irvin, David, R., 1993. "Technology Forecasters- Soothsayers or Scientists?", IEEE Technology and Society Magazine, Vo. 12, No. 2, pp. 10-17.

Işık, Yusuf., 1990. "Bilimsel ve Teknolojik Devrim Koşullarında Ekonomik Gelişme ve Türkiye'nin Konumu", Mühendis ve Makina, Vol. 31, No. 361, pp. 42-47.

Janelle, D, G., 1991. "Global Interdependence and Its Consequences". In Collapsing Space and Time: Geographical Aspects of Communication and Information, ed. by Brunn S.D, Leinbach T.R., Harper Collins Academic, 1991, U.K., pp. 49-81.

Johanson, Börje., 1987. "Information Technology and Viability of Spatial Networks", Papers of the Regional Science Association, Vol. 61, pp. 51-64.

Kaplinsky, R., 1989. "Teknolojik Devrim ve Uluslararası İşbölümünde Üçüncü Dünyanın Yeri", translated by A. Göker from "Technological Revolution and the International Division of Labor in Manufacturing: A Place for the Third World", Mühendis ve Makina, 1990, Vol. 31, No. 369, pp. 5-14, and vol. 31, No. 370, pp. 8-19.

Kaplinsky, R., 1987. Microelectronics and Employment Revisited, ILO, Geneva., pp. 34-64, 82-138.

Kazgan, G., 1992. "Yeni Dünya Düzeninde Ekonomik Yapı ve Türkiye". In Yeni Dünya Düzeni ve Türkiye, ed. by Sebahattin Şen, Bağlam yayınları, 1992, Ankara., pp, 217-222.

Kellermann, Aharon., 1984. "Telecommunications and Geography of Metropolitan Areas", Progress in Human Geography, Vol. 8, No. 2, pp. 223-246.

Kellermann, Aharon., 1991. "The Role of Telecommunications in Assisting Peripherally Located Countries: The Case of Israel". In Collapsing Space and Time: Geographical Aspects of Communication and Information, ed. by Brunn S.D, Leinbach T.R., Harper Collins Academic, 1991, U.K., pp. 252-277.

Kemp, Nigel., 1987. "Attitudes to Information Technology". In Information Technology and People: Designing for Future, ed by Blackler and Oborne, 1987, U.K., pp. 193-209.

Kesmez, Necdet., 1993. "Bilişim ve Ekonomide Modernleşme", translated from World Bank's, Turkey: Informatics and Economic Modernization, Bilişim, No. 37, pp. 124-128, and No. 38, pp. 64-68.

Kesmez, Necdet., 1993. "Bilişim sektörü Nasıl Örgütlenmeli", Bilişim, No. 39, pp. 64-67.

Klaassen, Leo, H., 1987. "The Future of Larger European Towns", Urban Studies, Vol. 24, pp. 251-257.

Köksal, Aydın., 1976. "Bilişim Teknikbiliminin Toplumsal İşlevi ve Türkiye Bilişim Kurumu", Elektrik Mühendisliği Dergisi, No. 240, pp. 629-634.

Langdale, J.V., 1991. "Telecommunications and International Transactions in Information Services". In Collapsing Space and Time: Geographical Aspects of Communication and Information, ed. by Brunn S.D, Leinbach T.R., Harper Collins Academic, 1991, U.K., pp. 193-213.

Lindsay, J., 1989. "Primitives for Information Economy", Journal of Information Technology, Vol. 4, No. 1, pp. 55-63.

Lockton, J.D., 1987. "Information Age Developments in Telecommunications". In Wired cities: Shaping the Future of Communications, ed. by Dutton, Blumler and Kraemer, 1987, U.S.A., pp. 131-138.

Long, John., 1987. "Information Technology and Home Based Services". In Information Technology and People: Designing for Future, ed by Blackler and Oborne, 1987, U.K., pp. 211-229.

Mandaville, Thomas., 1983. " The Spatial Effects of Information Technology", Futures, vol. 15, No. 2, pp. 65-72.

Martino, V., and Wirth, L., 1990. "Telework: A New Way of Working and Living", International Labor Review, Vol. 129, No. 5, pp. 529-554.

Masser I., Sviden, O., and Wegener, M., 1992. The Geography of Europea's Futures, Beelhaven Press, Great Britain., pp. 167-174.

Meier, R.L., 1983. "Telecommunication and Urban Development", Ekistics, No. 302, pp. 363-367.

Meier, R., 1989. "Telecommunications and Urban Development". In The Future of Urban Form, ed. by J. Brotchie, P. Newton, P. Hall, P. Nijkamp, 1989, Routledge, New York., pp. 111-121.

Melody, W.H., 1985. "The Information Society: Implications for Economic Institutions and Market Theory", Journal of Economic Issues, Vol. 19, No. 2, pp. 523-537.

Meyrowitz, J., 1985. No Sense of Place: The Impact of Electronic Media on Social Behaviour, Oxford University Press, New York., pp. 307- 340.

Mody, A., Suri, R., and Sanders, J., 1992. "Keeping Face With Change: Organizational and Technological Imperatives", World Development, Vol. 20, No. 12, pp. 1797-1816.

Munasinghe, Mohan., 1989. "Computer and Informatics Policy and Issues for 3. World Development". In Computers and Informatics in Developing Countries,ed by, M. Munasinghe, Essex, U.K., pp. 8-37.

Mody, A., and Dahlman, C., 1992. "Performance and Potential of Information Technology: An International Perspective", World Development, Vol. 20, No. 12, pp. 1703-1719.

Monk, Peter., 1993. "The Economic Significance of Infrastructural IT Systems", Journal of Information Technology, Vol. 8, pp. 14-21.

Moss, M.L., 1987. "Telecommunications and the Economic Development of Cities". In Wired cities: Shaping the Future of Communications, ed. by Dutton, Blumler and Kraemer, 1987, U.S.A.., pp. 139-151.

Mousa, A., and Schware, R., 1992. "Informatics in Africa: Lessons From World Bank Experience", World Development, Vol. 20, No. 2, pp. 1737-1752.

Mowlana, Hamid., 1986. Global Information and World Communication, Longman, U.S.A., pp. 1-18, 63-107, 161-209.

Newstead, A., 1989. "Future Information Cities: Japan Vision", Futures, Vol. 21, No. 3, pp. 263-276.

Newton, P., and Taylor, M., 1989. "Poboble Urban Futures". In The Future of Urban Form, ed. by J. Brotchie, P. Newton, P. Hall, P. Nijkamp, 1989, Routledge, New York, pp. 313-335.

Nijkamp, P., 1988. " Informatics or Oracles in Regional Planning". In Informatics and Regional Development, 1988, Avebury, Newcastle-upon-Tyne, Great Britain., pp. 23-41.

Nijkamp, P., 1989. "Information Technology and Urban Planning". In The Future of Urban Form, ed. by J. Brotchie, P. Newton, P. Hall, P. Nijkamp, 1989, Routledge, New York. pp. 206-219.

Nijkamp, P., and Salomon, I., 1988. "Telecommunication and Tyranny of Space". In Information Technology: Social and Spatial Perspectives, ed. by I. Orishimo, G.J.D. Hewings, P. Nijkamp, Lecture Notes in Economic and Mathematical Systems, Springer Verlag, 1988, Germany., pp. 9-20.

Oğuz, Sami., 1991. "ISDN", Elektrik Mühendisliği Dergisi, No. 383-384, pp. 313-316.

Orishimo, Isao., 1988. "Development of Informatics and Possible Changes in Urbanization Processes". In Information Technology: Social and Spatial Perspectives, ed. by I. Orishimo, G.J.D. Hewings, P. Nijkamp, Lecture Notes in economic and Mathematical Systems, Springer Verlag, 1988, Germany., pp. 250-265.

Özkul, Halid., 1992. Yeni Dünya Düzeni, Anahtar kitaplar, İstanbul, 86 pages.

Patwardhan, J.R., 1986. "Cities of 3. World- Indian Context", Ekistics, No. 320-321, pp. 272-277.

Pelton, J.N., 1989. "Telepower: The Emerging Global Brain", Futurist, Vol. 23, No. 5, pp. 9-14.

Pelton, J.N., 1983. "Life in the Information Economy". In Telecommunication: Issues and Choices for Society, ed. by J.L. Salvaggio, New York., pp. 51-67.

Perez, Carlotta., 1985. "Microelectronics, Long Waves and World Structural Change: New Perspectives for Developing Countries", World Development, Vol. 13, No. 3, pp. 441-463.

Pitke, M.V., 1989. "Application of Information Technology to Development". In Computers and Informatics in Developing Countries, ed. by M. Munasinghe, 1989, Essex, U.K., pp. 64-70.

Ploman, E., 1985. "İletişim Devrimi Üzerine". In Enformatik Cehalet, N. Avcı, Rehber Yayınları, Ankara., pp. 147-152.

Porter, Alan., 1986. "Work in the Information Age", Futurist, Vol. 20, No. 5, pp. 9-14.

Pressman, N., 1989. "Forces For Spatial Change". In The Future of Urban Form, ed. by J. Brotchie, P. Newton, P. Hall, P. Nijkamp, 1989, Routledge, New York, pp. 349-361.

Priban, Ian., 1988. "The New Industrial Society and Its Infrastructure", Journal of Information Technology, Vol. 3, No. 1, pp. 48-57.

Prycker, M.D., 1992. "ATM Technology, A Backbone for High Speed Computer Networking", Computer Networks and ISDN Systems, Vol. 25, pp. 357-362.

Reardon, R., 1988. "Major Directions in Networking Technology". In Networks for 1990's and Beyond, ed. by R. Reardon, OnLine, U.S.A., pp. 8-12.

Reinecke, Ian., 1982. Elektroniğin Büyüsü, translated by Fatih Elmalı, İnsan Yayınları, 1992, İstanbul, 311 pages.

Robins, K., and Hepworth, M.E., 1988. "Electronic Spaces: New Technologies and the Future of Cities", Futures, Vol. 20, No. 2, pp. 155-175.

Rodd, M.G., 1989. "Information Technology and Employment", IEEE Technology and Society Magazine, Vol. 8, No. 3, pp. 11-13.

Roland, D.R., and Hueber, P.O., 1988. "Integrated Broadband Communications: The RACE Programme". In Networks for 1990's and Beyond, ed. by R. Reardon, OnLine, U.S.A., pp. 8-12.

Rosenblatt, A., 1991. "Data Communications", IEEE Spectrum, No. 1, pp.48-51.

Rush, H., and Miles, I., 1989. "Surveying the Social Implications of Information Technology", Futures, Vol. 21, No. 3, pp. 249-262.

Salomon, Ilan., 1988. "Transportation- Telecommunication Relationships and Regional Development". In Informatics and Regional Development, 1988, Avebury, Newcastle-upon-Tyne, Great Britain., pp. 90-102.

Salvaggio, J., 1983. "Dimensions of Information Society". In Telecommunication: Issues and Choices for Society, ed. by J.L. Salvaggio, New York., pp. 1-23.

Saner, Deniz, Can., 1993. Zenginler, Yoksullar ve Robotlar: Dünya Sistemi, Bağımlılık ve Türkiye. Bireşim yayınları, istanbul., 168 pages.

Sankur, Bülent., 1991. "Sayısal İmgeler", Elektrik Mühendisliği Dergisi, No. 383 -384, pp. 287-289.

Sasaki, Komei., 1990. "Information Technology and Urban Spatial Structure", RSA 13 th European Congress, İstanbul, pp. 1-20.

Schiller, H.I., 1983. "Information for What kind of Society?". In Telecommunication: Issues and Choices for Society, ed. by J.L. Salvaggio, New York., pp. 24-33.

Schiller, H.I., 1986. "Dünya Ekonomik Sisteminin Ulusal Egemenlikleri Aşındırması". In Enformasyon Devrimi Efsanesi, ed. by Y. Kaplan, Rey Yayıncılık, 1991, İstanbul., pp. 279-303.

Stöhr, W.B., 1993. "Spatial Development and Technological Change", Macaristan Konferansı, 11 pages.

Strover, S., 1988. "Urban Telecommunications Investment". In Measuring the Information Society, ed. by, F. Williams, 1988, Sage, U.S.A., pp. 117-139.

Şahin, Haluk., and Asu Aksoy., 1993. "Global Media and Cultural Identity in Turkey", Journal of Communication, Vol. 43, No. 2, pp. 31-41.

Telciler, Coşkun., 1993. "Bilgi Teknolojisi ve Kalkınma", Bilişim, No. 40, pp. 74- 78.

Toffler, Alvin., 1984. Dünyayı Nasıl bir Gelecek Bekliyor?, translated by Murat Çiftkaya, from 'Previews and Premises', İz Yayıncılık, 1984, İstanbul., 256 pages.

Toffler, Alvin., 1991. Yeni Güçler, Yeni Şoklar, translated by Belkıs Çorapçı, from 'Powershift', Altın kitaplar, 1992, İstanbul, 464 pages.

Tolun, M., and Bolat, N., 1988. "Veri İletişimi, Bilgisayar Ağları ve Uygulamaları" Bilgisayar, No. 89, pp. 116-119.

Toplu, Mehmet., 1992. "Türkiye'nin Bilimsel ve Teknolojik Alandaki Genel Sorunları", Mühendis ve Makina, Vol. 33, No. 390, pp. 12-23.

Töreci, Ersin., 1992. "Bilgi ve İletişimin Olağanüstü Birleşimi", Bilişim, No. 29, pp. 6-7.

Tarakçıoğlu, Işık., 1992. "Türk Tekstil Sanayii İçin Teknoloji Seçimi", 3. İzmir İktisat Kongresi Bildirileri.

Tornqvist, Gunnar., 1987."Systems of Cities in Changing technical Environment" Unpublished Paper, University of Lund, pp. 2-16.

Valaskakis, K., 1982. "Leapfrog Strategy in the Information Age". In Communication and Future: Prospects, Promises, Problems, ed by, F. Howard, J.R. Disbury, 1982, World Future Society, U.S.A., pp. 96-101.

Wegener, M., 1989. "Urban Information Systems and Society". In The Future of Urban Form, ed. by J. Brotchie, P. Newton, P. Hall, P. Nijkamp, 1989, Routledge, New York, pp. 221-227.

Weinberg, Natha., 1990. Computers in Information Society, Vestview Press, Oxford, U.K., pp. 5-175.

Williams, F., 1982. "Doing Traditional Untraditionally". In Communication and Future: Prospects, Promises, Problems, ed by, F. Howard, J.R. Disbury, 1982, World Future Society, U.S.A., pp. 102-113.

Williams, Fredrick., 1988. "The Information Society as an Object of Study". In Measuring the Information Society, ed. by, F. Williams, 1988, Sage, U.S.A., pp. 13-31.

Williams, Fredrick., 1991. Infrastructure for Information Age: The New Telecommunications, New York, U.S.A., pp. 1-246.

Yamamoto, A., 1986. "Japan's New Industrial Era", Long Range Planning, Vol.19 No, 2, pp. 65-71.

Yasin, M., and Green, R.F., 1991. "Global Information Systems: A Joint Venture Between Business and Education", Journal of Information Technology, Vol. 6, pp. 80-85.

Yıldız, Yavuz, G., 1992. "Uluslaraşın Sermaye merkezleri ve Türkiye". In Yeni Dünya Düzeni ve Türkiye, ed. by Sebahattin Şen, Bağlam yayınları, 1992, Ankara., pp, 231-242.

APPENDICES

APPENDIX A

HISTORICAL DEVELOPMENT OF INFORMATION TECHNOLOGY RELATED ISSUES IN WORLD

INNOVATIONS- NEW IDEAS:

1951:

* First commercial computer was put in use.

1958:

* First "integrated circuit" was produced in U.S.A.

1963:

* Idea of CAD (Computer Aided Design) and CAM (Computer Aided Manufacturing) was claimed. First applications of CAD/CAM were simple computer graphics.

1968:

* First digital exchange in world was put in service in United Kingdom.

1972:

* An American economist, Machlup claimed information as a commodity as the first time in the world.

* First microprocessor in the world was produced. It had 4 byte of word processing capacity.

1977:

* "Cash Ordinance Account" was introduced as the first time in the world. This was the first use of information technology as a strategic tool in world.

1978:

* With the use of microprocessors in computer technology, fourth generation (still in use) computers had been produced.

1980:

* First example of packet programme (for IBM) was used in U.S.A.

1981:

* Innovation of fibre optic in world.

* Japan engineers designed HDTV(High Definition Television) and introduced it to the world.

* IBM Computer Firm produced first personal computer (PC) in world.

1982:

* First micro computer based work station was produced. After this date, CAD/CAM applications were increased in industrial sector.

* "Production science" concept was introduced.

* First industrial robot with "Visual Recognition System" was used in Renault factory.

1983:

* JIT (Just in Time) concept was theorised from Toyota's practice.

* Japan scientists had started 5. generation computer programme.

1984:

* Apple Computer Firm produced Macintosh computer that is used for multimedia systems and desktop publishing.

1986:

* To order computer communication, "Open Systems Inter-connection (OSI) standards" idea was claimed.

1988:

* First CD- ROM's were produced and put in use.

* 64 byte microprocessor was produced.

1989:

* C and C (Computer and Communication) concept was claimed, that show integration of computer and communication.

* U.S.A. had started fifth generation computer programme.

* Studies on "Computer Aided Software Engineering" (CASE) were started.

1990:

* Multimedia concept gained importance and its use became widespread.

* Robotics science and CAD/CAM concepts were integrated.

* In Japan, first videophone was produced.

1993:

* Telephone device which can able to make simultaneous translation was made with partnership of U.S.A. and Japan.

* U.S.A. and Japan had integrated packet telephone and PC.

* Japan had completed fifth generation computer programme but its commercial use was not began and date is not known.

* With partnership of IBM and Apple firms, common microprocessor was produced. Thus, IBM computers will be compatible with Macintosh computers in next year. (1995)

APPLICATIONS- PROJECTS

1965:

* Establishment of first computer in banking sector.

1977:

* Bar-code application was started in 12 countries in Europe.

1978:

* European countries agreed on bar-code application.

* English videotext service; Prestel had been put in service. Its speed was 1200 bit/second in its first operation.

1979:

* First Automated Teller Machine (ATM) in world was put in use in United Kingdom.

* Dutch videotext service Viditel had been put in service.

1980:

* First experimental POS terminal was started to operate in United Kingdom.

1981:

* France had started its national videotext service; Teletel.

* U.S. videotext service was put in service, but it did not succeed as in Europe.

* Most famous digital telephone exchanges called "System 12" had been started to operate in Belgium and Germany, as the first time in Europe.

1983:

* First teletext service in world was put in service in U.S.A.

1984:

* In Japan, 8 sample cities were chosen as to measure information systems model development. Kawasaki was chosen as information city.

* In Japan, in order to maintain network integration, and maintain perfect information transfer;"National Information Network Systems" project had been started up.

* In order to develop information technology, "European Strategic Programme for Research into Information Technology" (ESPRIT) project had been started up in Europe.

* In order to develop telecommunication technologies; "Research into Advanced Communications in Europe" (RACE) programme was designed in Europe.

* South Korea started its national information system project "Computer Based Integrated National Information System" (CINIS).Project depends on expanding 5 basic information network (finance, public, education, defence, administration) overall the whole country and integration of these networks.

1985:

* Experimental Electronics Funds Transfer (EFT) / Point of Sale (POS) applications was started in Western Europe.(U.K., Germany, France, Belgium).

* EUREKA project that concern commercial applications of information technologies had been started in Europe. It includes studies on HDTV, ISDN etc.

* In Europe, Very Large Scale Integration (VLSI) had been started in order to develop integrated circuits.

* In Europe, BRITE project had been started for technological renewal of traditional sectors.

1986:

* A National information technology plan had been prepared in Singapore.

* Japan tested a public ISDN system with 500 subscribers as a first time in the world.

* After Japan, U.S.A. had started experimental ISDN applications.

1987:

* RACE programme in Europe had been started up in Europe. The aim of the programme was to establish common Integrated Broadband System (IBS) for the year 2000 in Europe. Upto 1995, all businesses, after 1995 all homes will be connected to overall European Network according to the project.

* Experimental CRISP (for rural information systems) project had been started in India. It's aim was to develop local decision support systems for "Integrated Rural Development Programme". Implementation will be on limited district.

* Experimental studies on GSM; digital mobile telephone system had been started in developed countries.

1988:

*STAR programme which was aimed to develop telecommunication facilities in less developed regions of Europe had been started.

* This year was the action year for "Direct Broadcasting System" (DBS) studies in Europe but it was failed.

* Cable TV service had been started in United Kingdom.

1991:

* Japan experimented wideband ISDN application.

1992:

* All experimental studies about digital mobile telephone system had been completed.

* Studies had been started in order to establish Pan-European vehicle mobile telephone system.

1993:

* "Real World Computing" (RWC) programme had been started in Japan. It's aim is to improve flexible information technologies. Project will last for ten years.

INFRASTRUCTURE- NETWORKING

1956:

* First copper wire network was laid down between United Kingdom and U.S.A. Thus, international phone service became easier.

1965:

* First commercial satellite system had been put in service with 240 channel capacity.

* Intelsat I satellite was launched to space. With this satellite, global TV and radio communication became possible.

1973:

*"Society for Worldwide Financial Telecommunications" (SWIFT) network had been established and put in service between 15 European and 239 north American banks.

* European countries established EURONET in order to connect their national networks and databases.

1978:

* Japan launched first Direct Broadcasting System (DBS) satellite to space, but it failed.

1979:

* First EUTELSAT (European Telecommunication Satellite) Satellite was launched to space.

1980:

* European telephone networks had started to digitalized.

* SITA (Internationale des Telecommunications Aeronatiques) world airline network had been established and put in service. Number of member countries were 15.

1981:

* Satellite Business Systems (SBS) had been put in service in Europe. System depends on communication of telephone, fax, data with small satellite terminals.

* International Network (INTERNET) had been put in service between 4 countries and connected 213 computers.

1982:

* As a first time; India as a developing country launched a communication satellite for its space programme, but it failed.(India launched second satellite in 1986)

1983:

* First international fibre optic cable system was laid down between Scotland and U.S.A.

* First communication network between banks had been established in Germany.

* U.S. academic network (BITNET) and Canadian academic network (NORTHNET) had been established and put in service.

1984:

* International Agricultural Organisations network (AGRIS) had been established. 25 agricultural library was connected to network of AGLINET that was established as a part of AGRIS.

* European Academic Research Network (EARN) had been established with 8 members and put in service.

* European commercial network TELENET had been established and put in service.

* A new coaxial cable system was laid down between Europe and U.S.A.

1985:

* Teleport concept became important. First teleport had been put in service in New Jersey in U.S.A.

* EARN, BITNET, NORTHNET was connected to Japan academic networks.

* Efforts to establish Worldwide University Network (WUNET) had started.

* European computer communication network TYMNET had been put in service.

1986:

* First fibre optic television network had been established in U.S.A.

* Computer Scientists and Engineers Network (CSNET) had been put in service between Europe and U.S.A.

1987:

* Very small aperture terminals (VSAT) had been put in service for communication facilities in Europe. In this system, telecommunication facilities can serve everywhere with small satellite antennas.

* In order to pass to ISDN facilities, Intelsat satellites replaced their analog systems with digital system.

* World Trade Network (TRADEGATE) had been put in service.

1988:

* A fibre optic cable system (TAT-8) had been laid down between U.S.A. and Europe.

* First fibre optic cable system had been laid down between California, Hawaii, Guam, Philipinnes and Hong Kong.

1989:

* A fibre optic cable system had been laid down between Japan, South Korea, Hong Kong and U.S.A.

* As a first time, Mexico as a developing country began to use VSAT terminals.

* Islamic countries prepared a plan to establish ISLAMNET telecommunication and computer network.

* CSNET was connected to BITNET.

1990:

* European countries started to use "packet switching technology", which can be converted to ISDN system easily.

* International data networks - British Telcom GNS, and SPRINT had been put in service.

1991:

* In Europa, First "Metropolitan Area Network" (MAN) was established in Germany and Italy.

1992:

* 18 European countries (European countries excluded United Kingdom,Ireland, Balkans, old socialist block and Russia.) connected their ATM's (21500 ATM and 52 million user) into one network.

* Third fibre cable system (TAT-9) had been laid down between Europe and U.S.A.

* A fibre optic land cable system (TSL) between Japan, Russia and Europe was designed.

* Two fibre optic cable systems TAT-11 and TAT-12 had been started to lay down between Europe and North America.

INSTITUTIONAL- LEGAL ISSUES

1950:

* International Telecommunication Union (ITU) had been established.

1954:

* Consultative Committee on International Telephone and Telegraph (CCITT) had been established as part of ITU.

1972:

* European Telecommunication Standards Institute (ETSI) had been established.

1977:

* European Telecommunication Satellite Concorcium EUTELSAT had been established.

1978:

* In order improve policy about informatics; "Intergovernmental Conference on Strategies and Policies for Informatics" (SPIN) assembly had been held by 78 countries.

1980:

* "New World International Communication Order" (NWICO) had been established. It's aim is to improve and restructure media and telecommunication systems of developing countries. Thus, media and communication systems will play effective role on these countries' economic, cultural political structures.

* OECD recommended guidelines about privacy protection.

1982:

* "Open Systems Interconnection" (OSI) computer communication standards model had been accepted.

* NWICO had been accepted by developing countries in order to inhibit free flow of information.

1983:

* This year was accepted as "Communication Year" all over the world.

1984:

* U.S.A. left UNESCO because of acceptance of NWICO by developing countries and UNESCO.

* As a first time in world, American PTT; AT and T (American Telephone and Telegraph) entered deregulation period, it had been privatized and divided into various parts.

* At the same year, BT (British Telcom) had been privatized.

1985:

* "International Centre for Computer and Informatics" (ICCI) had been established. It was part of Third World Academy of Sciences. It's aim was to maintain recent dialogue in international informatics and help developing countries to formulate their informatics policies.

* Japan NTT (Nippon Telegraph and Telephone) entered deregulation period.

1987:

* SADCC (South African Development of Computer and Communication) agency had been established in order to built up telecommunication and broadcasting network between African countries.

* In England, information protection law was accepted. With this law people can see their enrolments in police departments.

1988:

* ETSI started active studies on ISDN.

* UDEAC (Central African Communication Development Agency) had been established in order to improve informatics and networking possibilities of central African countries.

1989:

* OSI standards of ISO (International Standards Organisation) was accepted by whole world.

* IBM accepted OSI standards instead of its own SNA computer communication protocols.

* EARN members had accepted to use OSI standards.

1990:

* Arrangement studies on OSI standards was completed. Aim of future is widespread application of these standards in whole world.

APPENDIX B

INFORMATION OCCUPATIONS AND INFORMATION SECTORS

HEPWORTH'S INFORMATION OCCUPATION DEFINITION -1987-

A- Information Producers:

A1 Scientific and technical (for ex. chemists, engineers)

A2 Market search and coordination (for ex. salespeople and buyers)

A3 Information gatherers (for ex. surveyors and quality inspectors)

A4 Consultative services (accountants and lawyers)

A5 Health Related consultative services (for ex. doctors and vets)

B- Information Processors:

B1 Administrative and managerial; government (for ex. senior civil servants)

B2 Administrative and managerial; corporate (for ex. production managers)

B3 Managers and proprietors

B4 Process control; supervisory (for ex. office supervisors)

B5 Process control; foreman

B6 Clerical or related (for ex. clerks and bank tellers)

C- Information Distributors:

C1 Educators

C2 Public information disseminators (for ex. librarians)

C3 Communication workers (for ex. newspaper editors, television directors)

D- Information Infrastructure:

D1 Printing and Publishing

D2 Information machine workers (for ex. computer operators)

D3 Postal and Telecommunications (for ex. mail carriers)

PORAT'S INFORMATION SECTOR DEFINITION -1977-

1- Research and Development:

Commercial R-D labarotories

Commercial testing labarotories

Non profit education and scientific research agencies

2- Information Services:

Business, management, administrative and consulting services

Legal services

Engineering and architectural services

Accounting, auditing and book keeping services

Security and commodity exchangers

Radio television and publishers advertising representatives

Advertising agencies

Business associations

Agents, brokers, managers

Private employment agencies

Labour union and similar labour organisations

Insurance industries

Political organisations

APPENDIX C

HISTORICAL DEVELOPMENT OF NFORMATION TECHNOLGY RELATED ISSUES IN TÜRKİYE

INFORMATION TECHNOLOGY AND NETWORK INFRASTRUCTURE

-NATIONAL ISSUES-

1967:

* First coaxial cable system had been established in Ankara.

1970:

* First analog radio-link system was establishedbetween Ankara and İstanbul.

1971:

* Wideband radio-link system had been put in service for TV programme transmission.

1979:

* First satellite land station via Intelsat was established in Ankara.

1983:

* Rural type electronic telephone exchanges had been started to put in service in rural areas instead of manual telephone exchanges.

1984:

* Studies started about transformation of analogue signals to digital signals.

* In order to improve transmission quality and rural communication systems; rural multi access radio-relay systems had been started to put in service.

* Western Anatolia Coaxial Cable System Project (BAYKOK) was started. It's aim was to improve communication systems between Ankara-Eskişehir-Bilecik-Adapazarı-İstanbul-Afyon-İzmir-Kütahya-Uşak-Manisa-Isparta-Burdur-Antalya. Total distance was 1500 kilometres.(See Figure.10)

* In order to connect BAYKOK project to Thrace, TRAYFOK (Thrace Coaxial

Cable System) project had been started. It would be laid down between İstanbul and Edirne.

* EUTELSAT earth station was established in Ankara. It was second satellite station in Türkiye.

1985:

* First fibre cable system was laid down between EUTELSAT earth station and 4 terminal points in Ankara. Length of this first fibre network was 40 kilometres.

* First digital radio-link system with with 1920 channel capacity had been put in service between Ankara and İstanbul.

* As a first time, communication networks of 402 village was connected to radio-relay system.

1986:

* In order to improve TV programmes, 2 transponder was hired from Intelsat V satellite.

* A digital radio-link system with 140 Mbit/sec, 1920 channel capacity had been put in service between İstanbul and İzmir.

* Another 140 Mbit/sec digital radio-link system had been put in service between Ankara and Konya.

* Some part of BAYKOK project (Bilecik- Adapazarı- Acıbadem- Çamlıca) was completed. When this system would be fully completed, Turkish network will be connected to European network from 3 points.

* In order to improve TV programmes, 72 TVRO (Satellite transmitter and receivers) had been constructed all around the country.

1987:

* An On-line system had been established between postal cheque centre and main post stations.

* A digital radio-link system with 140 Mbit/sec and 1920 channel capacity had been put in service between Ankara and Adana.

* Up to this date, all junction cables in Ankara, Adana, Konya, Mersin, İzmir, İstanbul metropolitan areas had been transformed to fibre system from copper system. (495 kilometres of fibre optic cable was used in these metropolitans.

* INMARSAT (International Marine satellite) earth station was planned to establish in Türkiye.

* Ankara- İstanbul part of the BAYKOK project had been put in service.

* Studies started about donation of some of BAYKOK channels with 565 Mbit/sec (digital) exchange equipment.(It will have 7680 channel capacity.)

* Mobile telecommunication services had been put in service.

1988:

* Digital radio-link systems were established between Antalya-Eskişehir,Antalya-Konya,Adana-Gaziantep, Zonguldak- İzmit.

1989:

* It was decided to donate places over 5000 population with digital exchanges.

* It was started to set up stabile videoconference studios in Ankara and İstanbul. Ankara studio was set up in same year.

* BAYKOK project was completed.(Start date was 1984) This system improved communication capability of all settlements at Western part of Türkiye.

* In order to establish İstanbul-Edirne coaxial cable system, production of 284 kilometres of coaxial cable was started.

* In order to realise "National communication satellite Programme", TÜRKSAT satellite project was taken into investment programme.

1990:

* Kayseri, Samsun, Malatya, Erzurum regions were connected to digital radio-link system.

* Stabile videoconference studios were set up in İstanbul and İzmir.

* First fibre optic LAN application were held in M.E.T.U with 2 kilometres of fibre cable system operates at 16 Mbit/sec. This system could carry about 75 % computing potential of M.E.T.U.

1991:

* In rural areas, transmission of 2 Mbit/sec and 8 Mbit/sec signals were started to transfer by fibre optic cable systems.

* PTT declared to establish digital TDM network between Ankara and İstanbul within 5 months. TDM multiplexer make possible various communication possibilities on the same line.

* Trabzon, Rize, Şanlıurfa, Diyarbakır regions were connected to digital radio-link systems.

* TURMEOS-1 undersea fibre optic cable system which would improve communication facilities was started to lay down between Marmaris and İstanbul with 2040 channel capacity. It's length would be about 940 kilometres.

* TURCYOS-1 undersea fibre optic cable system was started to laid down between Anamur and Girne, with channel capacity of 680. Length of system would be 160 kilometres.

* PTT and U.S.A. COMSAT firm made an agreement on preparing and giving IBS (International Business Satellite) service in Türkiye for 8 years. IBS would be very useful infrastructure for widespread data, telex, facsimile communication all around the country. (By 1993, service did not start.)

* TRAYFOK which includes 165 kilometres of fibre optic cable system between Çorlu and İpsala was completed and put in service. Çorlu-Keşan part includes 140 Mbit/sec, with 1920 channel capacity and Keşan-İpsala part includes 34 Mbit/sec with 480 channel capacity. This system is the first under land fibre optic cable system in Türkiye.

* Cable TV subscribers in İstanbul, İzmir, Adana were started to be connected to cable TV network.

1992:

* First 2.5 Gbit/sec capacity of digital multiplexer (transforms copper and coaxial lines to digital lines) SDH system had been put in service between Ankara and İstanbul.

* For IBS systems, satellite telephone stations with 30 digital channel capacity has been bought and began to sent to Erzurum, Hakkari, Siirt, Diyarbakır, Adıyaman.

* Besides IBS systems, small telephone stations with 1 to 4 digital channel capacity were started to establish in some regions of Eastern and Southeastern Anatolia which has very weak communication. With these terminals, these regions will be connected directly to national and international telecommunication networks.

* TURMEOS-1 and TURCYOS-1 projects were started. Their total investment amount was about 550 billion T.L. (1993 prices)

* Construction of first Türksat satellite land station was completed in Ankara. Second station construction was started.

* In order to improve TRT INT programmes, and to improve telex, data, facsimile communication between Asian Turkish states and Türkiye; 2 transponder was hired from Intelsat systems

1993:

* IBS systems had been started to construct in Eastern and South Eastern Anatolia.

* Studies on Very Small Aperture Terminal (VSAT;for communication via satellite) system began. As a first step, 3 main stations and 200 small station would be established. In this system, with medium size antennas (45-60 cm. of radius) every type of communication can be made from every region.

* Besides, IBS and VSAT systems, also Satellite Business Services (SBS) system had been started. System depends on every type of communication via very small (20-30 cm. of radius) satellite terminals. With these terminals, linking directly to national and international networks can be possible.

1994:

* Türksat I communication satellite was launched to space, but it failed. Instead, Türksat I-b will be made and launch in the same year. In 1995, Türksat II will be made. Türksat I-b will be very modern and it will cover 25 countries from England to Pakistan. This satellite and Türksat II satellite will prepare a good infrastructure for VSAT, IBS, SBS systems and HDTV distribution and videoconference service. Also these satellites will improve less developed region's communication possibilities. As the most important effect, satellites will remove geographical barriers among different regions and supply communication possibilities. Türksat systems' cost is about 7 trillion T.L. and it's revenue will be about 1.2 trillion for a year. (1993 prices)

* For Türksat system, huge satellite dish which weighs about 230 tons was constructed in Ankara and Gölbaşı.

INFORMATION TECHNOLOGY AND NETWORK INFRASTRUCTURE

-INTERNATIONAL ISSUES-

1975:

* Undersea coaxial cable system was laid down between Antalya-Catania.

1985:

* Eutelsat land station had been put in service in Ankara. It was directly connected to 8 countries' station. It has 3 TV channels and 1920 telephone channels.

1988:

* Third land station AKA-3 had been put in service via Intelsat satellite over Indian Ocean. With this station, direct communication with Far east countries (Australia, Japan, China, Korea, Singapore, Taiwan) maintained. System had 291 telephone and 40 TV circuits. This system will serve all Türkiye except eastern parts.

1989:

* One of the INMARSAT terminals in world was established in Türkiye. It can serve 9000 ship over two oceans. Türkiye is one of the few countries who can communicate over two oceans directly, at that year. Other countries were U.S.A., Japan, old U.S.S.R., and Poland.

* Türkiye was connected to TAT-8 system between Europe and U.S.A. using Eutelsat station. By this way, Türkiye increased its communication possibilities.

* East Meditterean Optic system (EMOS) project had been started.(See Fig.21) Türkiye has 18 % share in the project. With using EMOS cable system, Türkiye will be connected to MAT-2 (between Spain and France) and TAT-9 (between France and U.S.A.) System will have 3840 telephone channels. Türkiye will own the property of Palermo-Marmaris part of the project.

1990:

* Second INMARSAT land station ATA-2 had been put in service.

* Türkiye joined to SEA-ME-WE 2 international fibre cable system project. Project has 3 parts. a-) Marseilles- Algeria- Tunusia- Palermo- İskenderiye part with 15360 channel capacity, b-) İskenderiye-Marmaris part with 7680 channel

capacity, c-) İskenderiye-Arabia-Cibuti-Bombay-Sri Lanka-Indonesia-Singapore part with 15360 channel capacity. System will be digital with 565 Mbit/sec. capacity. Turkish share was 3.91 % in project. It will be completed until 1995. At the end of the project, Türkiye will have the opportunity for every type of direct communication with 22 countries with 1845 channel capacity.

1991:

* Türkiye became the shareholder of MAT-2 fibre system, between France and Spain which will link EMOS-1 to TAT-9 system.

* Central European Fibre Optic System (CEFOS) project with 7680 channel capacity had been started. System will start from İstanbul, pass through Eastern Europe and terminate at Hamburg.

* To connect TSL (Trans Soviet Link) fibre system which will lay between Japan and Moscow, to CEFOS, EMOS-1 and SEA-ME-WE 2 fibre systems, Moscow-İstanbul fibre system was planned. It was planned to end in 1995.

* 1800 channel capacity radio-link system had been put in service between Türkiye and Azerbeijan.

1992:

* ANATOLIA station works via Inmarsat satellite had been put in service. Station has 24 24 telephone and 22 telex channels.

* TRANSSOVIET fibre optic system project was started. System will have two parts. One part will be between Moscow and Copenhag. Other will be between Moscow-Sivastopol-İstanbul-Palermo. Channel capacity of the second part will be 7680. System will cost about 1 billion dollars and it will prepared for 1994.

1993:

* Cable laying was started between Marmaris and Palermo for EMOS-1 fibre system project.

* Also, cable laying was started between İskenderiye-Marmaris-EMOS-1 for SEA-ME-WE 2 fibre system project.

* Türkiye hired 60 channels from COLOMBUS-2 fibre system between Italy-U.S.A. and 60 channels from CANTAT-3 fibre system between Canada, Europe and U.S.A.

* A digital radio-link system with 1920 channel capacity had been put in service between Türkiye-Gürcistan and Azerbeijan.

* Within Black Sea Economic Agreement; it was decided to establish KAFOS undersea fibre optic system between Bulgaria-Romania and Türkiye.

* ITUR undersea fibre optic system was planned between Italy- Türkiye-Ukraine and Russia. Odessa-İstanbul-Novosbrik part will be completed at the end of 1995.

INFORMATION TECHNOLOGY SYSTEMS DEVELOPMENT

BROADCASTING DEVELOPMENT

1968:

* Television broadcasting started as 3 days a week in Ankara.

1972:

* TV broadcasting was started in İstanbul.

1973:

* TV broadcasting was started in Ege region.

1974:

* TV broadcasting was started in Eskişehir, Adana and near zones.

* TV broadcasting became all day a week.

1975:

* TV broadcasting was started in Southeastern Anatolia.

1976:

* TV broadcasting was started in Eastern Anatolia.

1982:

* TRT passed to colour broadcasting.

1986:

* TRT 2 channel started to broadcast over several regions.

1988:

* Cable TV project was started experimentally in Ankara

1989:

* TRT 3 started to broadcast over 6 regions (Ankara, İstanbul, İzmir, Adana, Antalya, Bursa.)

* TRT GAP channel started to broadcast over Eastern and Southeastern Anatolia.

1990:

* TRT 4 started to broadcast over Ankara, İstanbul, İzmir, Adana, Antalya, Gaziantep, Diyarbakır provinces.

* TRT 5; International Channel started to broadcast over Europe.

* As a first time, a private TV channel started to broadcast via satellite. By this way, a deregulation period started at TV broadcasting. At first, only big metropols started to utilise this service.

* Cable TV studies started. Aim was to service 3.5 million subscribers in 11 provinces within 10 years time.

1991:

* 4 private TV channels started to broadcast over Türkiye.

* Cable TV agreements was done with several firms. According to this; number of subscribers according to different centers will be like that: 625000 in Ankara, 1500000 in İstanbul, 320000 in İzmir, 130000 in Adana, 70000 in Antalya, 125000 in Bursa, 32000 in Konya, 65000 in Kayseri, 70000 in Gaziantep, 49000 in İzmit.

* In the same year, cable TV service had been started to put in service in Ankara, İstanbul, İzmir and Adana.

1992:

* 2 private channels was started to broadcast over Türkiye.

* cable TV service was started in Bursa with 3000 subscribers, and in Gaziantep with 1500 subscribers.

TELECOMMUNICATION SYSTEMS DEVELOPMENT

1954:

* First manuel switching telex system was established.

1971:

* First wide band radio link system was put in service.

1974:

* Telex communication became automatic. First automatic telex exchange was established in Adana.

1976:

* Subscribers trunk dialling service had been started between cities of Türkiye.

1978:

* Subscribers trunk dialling service had been started in villages.

1980:

* Gentex service, which depends on telegraph communication via telex lines was started.

1981:

* Experimental computer integrated 01 unknown telephone numbers service was put in service in İstanbul.

* International subscriber dialling service had been started.

1982:

* In Türkiye, as a first time; 4 payphone was put in service in Ankara.

1984:

* Facsimile service had been started in 4 metropolitan ares (Ankara, İstanbul, İzmir, Adana)

* First digital exchange with 1500 lines was put in service.

* International subscriber dialling service had been started in villages.

1986:

* Teletext service had been put in use with 800 line capacity.

* Analog system mobile- radio telephone system was put in service in Ankara, İstanbul and İzmir.

* First videoconference system was put in use in Ankara.

* Paging (çağrı) system was established with 600 line capacity and put in use in Ankara and İstanbul.

1987:

* First ISDN experiment was done. It was decided to pass ISDN system in any year between 1991-1995.(It did not started by the end of 1993)

* New services had been put in use with parallel to digitalisation efforts. These new services are; Police emergency, health emergency, woke up service, masal service. Direct services of digital exchanges were, detailed

invoice, paging blocking, multi talk possibility, note transfer, determining of evil dialling etc.

* Cellular mobile telephone service was started along E-5 highway, Bursa-İzmir road and at Kuşadası, Marmaris, Fethiye, Kaş, Antalya.

* Paging service was started in Western Anatolia.

1988:

* Some new services had been started parallel to digitalisation. These were; Jandarma emergency, Telebilgi service, Water defect, Electricity defect etc.

* Paging system was started in Adana, Antalya, Bursa, Muğla and Konya.

1989:

* Alo Post service was started in Ankara-İstanbul-İzmir metropolitan areas. With calling 093, all post are at hand within 4 hours.

* Mobile telephone service was started in Diyarbakır, Malatya, Trabzon, Kayseri, Şanlıurfa and Hatay.

* Paging service was started in Southeastern Anatolia, Ege and Akdeniz regions.

1990:

* Mobile telephone service was started in 135 new settlements.

* PTT started service of direct dialling with 900 900....

1991:

* Paging service was started in 18 settlements of Türkiye.

* Alo Bilgi (900900....) direct dialling service was put in use.

* Turkish telephone number system was rearranged in order to integrate with European telephone system. Türkiye is the third country that implement this programme. Until 1995, all Europe has to rearrange their telephone number systems.

1994:

* GSM (European digital mobile telephone system) was started at the same time with Europa. System started with 50000 line capacity and 2000 subscribers. As a first step, system was started to given in Ankara, İstanbul, İzmir and Antalya regions and main airport districts. after that, other big cities and touristic regions will use this service. Cost of project is 800 million dollars. PTT paid no money and it will have 67 % of income.

DATA COMMUNICATION SYSTEM DEVELOPMENT

1972:

* It was the year to activate in information processing.

1976:

* Data communication facility had been started in Türkiye with using telex via leased lines. Speed was 50 byte/sec.

1984:

* As a first time, EDC-X automatic exchanges were put in service in İstanbul, Ankara, İzmir and Adana for teletext and data communication. Exchange speed was 9600 byte/sec. It gave new opportunities better than leased lines.

1986:

* Experimental packet switching data communication had been put in service with 104 port capacity.

* Circuit switching data communication system had been put in service in Ankara, Adana, İstanbul, İzmir with 2000 port capacity System was hired from Telenet.

1987:

* Studies about narrowband ISDN system was started.

1988:

* A public information service named 'Telebilgi' had been put in service. This service was started to given via automatic telephone lines. French Teletel system was taken as reference.

1989:

* Beyond, experimental packet switching data system, Turkish national packet switching data communication system;(TURPAK) had been put in service in Ankara, İstanbul, İzmir, Adana and Erzurum with 576 port capacity. Its speed was 64 Kbyte/sec.

* In the same year, TURPAK service expanded in Trabzon, Samsun, Bursa, İzmit, Antalya, Mersin, Gaziantep, İskenderun, Edirne, Elazığ, Kayseri, Eskişehir, Diyarbakır, Malatya, Konya, Van and Lefkoşa.

* Telebilgi service was started to given via TURPAK system.

* Studies started on value added networks that will be given via TURPAK. These services were Videotext, Electronic Data Interchange, Electronic-Mail. (These services was planned for 1992 but not started by beginning of 1994.)

1993:

* A new 'Telebilgi' service was established via TURPAK. It was started in Ankara, İstanbul, İzmir, Adana, Antalya, Bursa, Erzurum, Samsun, Diyarbakır and Muğla. It started with capacity of 224 fixed port and 3360 dial up port. This new service's aim was to establish an infrastructure for general videotext network at world standarts. With this system, national databanks will be connected to international databanks. New Telebilgi subscribers can communicate with world via new X.75 computer communication protocol.

* TURKEP E-Mail service was planned to put in service. With this service, TURPAK subscribers can able to communicate with with world via X.400 (newest) communication protocol. People can connect to TURKEP with their personal computers. Also, this e-mail service will be connected to telex, teletext, facsimile, videotext services, so it will be able to connect TURKEP with telex, teletext, facsimile, videotext terminals.

1994:

* Point of Sale (POS) system was planned to put in service in order to monitoring all sales activities.

* X.400 E-mail service was planned to put in service. It will be constructed on X.25 computer communication protocol infrastructure. With this system, PC users can able to communicate with world easily.

DATABASE ACTIVITIES

1983:

* MERNIS (Merkezi Nüfus idare sistemi) project had been started. Population statistics started to keep in electronic environment.

1985:

* All laws upto this date were started to record on special law database.

* Prime ministry started project of a database which would contain essence information about all public personnel.

* It was started to established 'Danıştay' databank.

1987:

* 'Judicial Record Center' was opened. In 5 years time, it was planned to enter about 10.5 million records into computer environment. In 1987, 750000 records entered.

* 'Diyanet İşleri' completed its database project, which contains its 70000 personnel's records.

* 'Workforce Market Information System' project had been started. Aim of the project was to keep all workforce statistics within electronic environment.

1988:

* 'PERSIS' project of Ministry of Education was started. Project contains to enter various records of all teachers and 140000 employees into computer environment.

* Stock Exchange of İstanbul Movable Values (İMKB- İstanbul Menkul Kıymetler Borsası) shares were recorded into computer. PTT links would be held by teletexts.

* Voter's database was started to prepare. In same year, 550000 records were entered into computer database.

* Data entrance of 'National Library' was completed.

1989:

* 4550000 data were entered to unknown telephone number database.

* Turkish Pharmacy Union entered information about 20000 medicine to computer.

1990:

* MERNIS project was completed. (Starting date: 1983)

* Central Office of Libraries decided to enter all information sources into common database.

1991:

* Turkish Standards Institute (TSE) started to prepare a database.

1992:

* Upto this date, statistics of 11 million person was entered into judicial record database.

* Databank of İstanbul Body of Lawyers was established. 30000 pages of

Supreme Court (Yargıtay) decisions was entered into this databank.

* Information about 6 million people who are members of political parties were started to entered to computer environment by Supreme Court.

1993:

* 'Enfo Bilgi Erişim' company produced two databases on banking (Banta) and stock exchange (Borta) There is 20000 document records exist in Banta, and 10200 document records exist in Borta.

* 'Turyap' real estate databank had been put in service.

* A database was prepared including 17000 pages of all Republic Regulations.

* Council of State (Danıştay) databank was established. It has 10000 decisions and 13000 inquiries.

* TSE databank was put in service.

1994:

* Ministry of Tourism will serve videotext databank system. With this system, international information and reservation will be possible. By this way, Türkiye can get more share from individual tourism market.

* Councillory of Treasury and Foreign Trade (HDTM -Hazine Dış Ticaret Müsteşarlığı) databank system project was started. This project will improve necessary information services and technological infrastructure for future macroeconomic plans. This databank could be linked to various databases. For this project, world bank gave 150 billion T.L.. of credit. (1993 prices)

NATIONAL NETWORKING ACTIVITIES

1983:

* National Library databank and network projects were started.

1984:

* Turkish Development Agency (TGV- Türkiye Gelişme Vakfı) started to establish a network between its centres. Network will be between Ankara- Van- Diyarbakır- Erzurum- Erzincan- Kayseri- Konya- Eskişehir- Samsun- İçel- Yozgat.

1985:

* Türkpetrol started to establish a communication network between Ankara- Mersin- İzmir and Antalya.

* T.C.. Karayolları started to establish communication network between its directories.

* TUVAKA academic network was established with the partnership of Tübitak and 12 Turkish universities.

1986:

* Networking studies were started between tax directories in 15 provinces.

* Petrolofisi started to establish a communication network between 15 regional directory and 23 store houses.

* Bağkur established a communication network between 16 directories. Network began to operated down between İstanbul- İzmir- Manisa- Kütahya- Balıkesir- Konya- Afyon- Tekirdağ- Zonguldak- Sakarya- Kayseri- Samsun- Trabzon- Malatya- Adana- Bursa.

* Security Commanding Office Smuggling Department started to operate a network between its terminals in 67 province centers.

* Social Security Agency (SSK- Sosyal Sigortalar Kurumu) connected its Ankara- İstanbul- İzmir departments with data communication lines.

* "Emekli Sandığı" prepared a project to link İstanbul- İzmir- Adana- Samsun- Diyarbakır regional directories with communication network.

* State Rail Authority (DDY- Devlet Demir Yolları) linked its Adana- Gaziantep- Sivas- Malatya- Ankara- Eskişehir- İstanbul- İzmir repartition centers with computer communication line.

* Petkim established a communication network between Kocaeli, İzmir and Ankara.

* First intelligent Ethernet local area network was established in Ankara by Aselsan.

* Anadolu News Agency started to establish a communication network between its offices in Ankara- İstanbul- Trabzon- Erzurum- Diyarbakır- Adana- Antalya- Bursa- İzmir.

1987:

* Tübitak started to operate computer communication network project between Ankara Elektronik Araştırma Merkezi and Gebze. Systems in Gebze were linked with Ethernet local area network.

* Turkish Crop Office (TMO- Türk Mahsülleri Ofisi) established computer communication network between its Ankara- İstanbul- Konya- İzmir- İskenderun- Diyarbakır- Kayseri- Samsun and Erzurum regional directories.

* "Makine Kimya Endüstrisi Kurumu" (MKEK) decided to establish network between Ankara- Elmadağ- Polatlı-Çankırı- Aliağa- Antalya- Istanbul, but it was not started.

* Sabancı-Net and Ak-Net networks were put in service between 85 office in İstanbul- Adana- İzmir- İzmit and Kahramanmaraş.

* Directory of Forestry established computer communication network between 24 directories and 207 management offices.

* Ziraat Bankası established a communication network between Ankara, İstanbul and İzmir.

* Turkish Radio and Television Institution (TRT- Türkiye Radyo Televizyon Kurumu) communication network had been put in use.

* Tax office's communication network was completed and put in use.

* Emekli sandığı network was completed and put in use.

1989:

* Ziraat Bankası established its private X.25 communication network with 1000 port capacity.

* Kale Company group established computer communication network between Çan- Bandırma- İstanbul- Ankara- İzmir- Samsun and Antalya.

* A judicial network over Turpak had been established between 24 law courts and 5 judicial record department.

* A project started in order to link all computers in public sector over a single network. With this system, HDTM, State Institute of Statistics, Ministry of Finance, State Planning Office will be linked. (Not completed by 1994)

* Ziraat Bankası decided to establish a packet switching data network between its 660 office.

1990:

* National Library network was completed and put in use.

* Tofaş established a computer communication network between 119 main departments in 71 provinces.

* Eczacıbaşı established X.25 computer communication net-work between İstanbul- Ankara- İzmir- Bursa.

* Public computer communication network project was stopped.

* Milliyet newspaper established a data network between Ankara, Adana, İstanbul and İzmir.

1991:

* Hürriyet newspaper established communication network between its offices.

* MKE's network project was stopped.

* Emlak Bankası established X.25 communication network.

1992:

* A custom communication network was established between Ankara Esenboğa airport, İzmir Adnan Menderes airport, İzmir custom and İstanbul Erenköy custom.

* It was decided to enlarge judicial record network, to link 700 courts around whole country.

1993:

* The communication system that will link Province National Education Directories was contracted.

* Public computer network project was started again. As a first step, State Institutes of Statistics (DİE- Devlet İstatistik Enstitüsü)) and State Planning Office (DPT- Devlet Planlama Teşkilatı) will be linked to each other.

* Yapı Kredi and Pamukbank connected their ATM's, with using switch application.

* Ziraat Bankası, Osmanlı Bankası and Sümerbank connected their ATM's.

* Akbank, Vakıfbank and Garanti Bankası connected their ATM's.

* A network was established between 100 offices of Turyap in İstanbul. In two years time, all Turyap offices in İstanbul, Ankara and İzmir will be linked with computer communication network.

INTERNATIONAL NETWORKING ACTIVITIES

1968:

* Türkiye became the member of Intelsat.

1972:

* First international TV transmission over radio link system occurred.

1973:

* TBMM accepted Intelsat membership. Turkish share was 0.22 %. As a first step, direct communication was maintained between Türkiye and 11 countries.

1979:

* International subscriber dialling service had been started.

1982:

* Türkiye became the member of Eutelsat.

1984:

* Facsimile service was started in 4 centres. (İstanbul, Ankara, İzmir, Bursa) linked to 9 European countries.

* Gentex service linked to 17 countries via Germany.

1985:

* Turkish banks applied to be member of SWIFT.

* Tübitak information centre TÜBES was established. With Tübes, it became possible to link Telenet to Turkish networks. Via Telenet Türkiye will have the possibility to link 14 different database in world.

1986:

* 22 Turkish bank became the member of SWIFT.

* "Türkiye Üniversitelerarası ve Araştırma Kurumları Ağı" (TÜVAKA) was linked to Earn, Bitnet, Northnet and Japan academic networks. By 1986, these institutions that are connected to international networks were; Ege University, Tübitak, Anadolu, Çukurova, Yıldız, Boğaziçi, Hacettepe Universities. Via Earn, Türkiye can access to 60 database all over the world.

* By using 800 telex lines, direct teletext communication was maintained between Türkiye and Germany, Switzerland, Luxembourg and Austria.

1987:

* Experimental packet switching data network was linked to U.S.A. as a first foreign country. This linkage was established via Telenet.

* 12 Turkish banks became the member of SWIFT. Total number of banks reached to 34.

* Turkish Air Lines (THY- Türk Hava Yolları) became the member of SITA network.

* M.E.T.U and Bilkent University were linked to Earn and Bitnet.

* Direct teletext communication started with Finland, South Africa, Norway, Sweden and Denmark.

1988:

* İstanbul, Fırat, 19 Mayıs universities were linked to Earn- Bitnet networks.

* Data communication was started with 16 countries via Telenet.

1989:

* Number of countries that are open to data communication network via Telenet reached to 29.

* Turkish Union of Chambers and Stock Exchanges (TOBB- Türkiye Odalar Borsalar Birliği) was linked to international information variation network with 55 Telebilgi terminals.

* North Cyprus North Medittrean University was linked to Earn, Bitnet via Türkiye.

* An experimental communication network was established between foreign affairs and 7 consulates.

* With Turkish national packet switching data communication system; TURPAK, Türkiye has the possibility of high quality and direct data linkage. Türkiye was linked directly to France, Sweden, Germany, Luxembourg, Spain, Denmark, England as a first step.

* Ankara University was linked to Earn- Bitnet.

1990:

* Erciyes University and Centre of Student Selection and Accomodation (ÖSYM- Öğrenci Seçme ve Yerleştirme Merkezi) was linked to Earn and Bitnet networks.

* Türkiye was directly linked to 10 new countries using TURPAK.

1991:

* Türkiye was linked to 22 new countries using TURPAK.

* Foreign Affairs network was enlarged in order to reach 22 consulates.

1992:

* Using International Business Systems (IBS) direct communication possibility was achieved with Kazakhistan, Uzbekhistan, Kırgızhistan, Türkmenistan capitals. These countries' international communication began to directed via Türkiye.

* U.S.A. started communication with Indian Ocean over Türkiye.

* Gazi University was linked to Earn- Bitnet networks.

* Türkiye was linked to INTERNET (International network) via Tübitak and M.E.T.U. 10000 workstations are linked to this network all over the world.

* TRT INT started broadcasting to Turkish Republics.

1993:

* Direct telecommunication linkage was maintained between Türkiye and Nahçıvan.

* Bilkent, Ege, İ.T.Ü., Yıldız, Boğaziçi, Koç Universities and YÖK, Instittution of Atomic Energy (TAEK- Türkiye Atom Enerjisi kurumu), Agency for Development of Small and Middle Size Industries (KOSGEB- Küçük ve Orta Ölçekli Sanayileri Geliştirme Birliği) were connected to international Internet network.

INFORMATION TECHNOLOGY APPLICATIONS- PRACTICES

RETAILING AND WHOLESALING ACTIVITIES

1987:

* Altınyıldız, Penyelux firms started computer aided production, pursuit and distribution activities. These firms started to use barcod application in their stock controls.

1988:

* Barcod application was planned to use throughout whole country. This became possible with membership to EAN (Commodity Coding Union)

1992:

* Çarşı shops started studies for full automation. Automation facilities include online systems, POS terminals and barcod readers on them.

1993:

* Beğendik Mağazaları started full automation application.

1994:

* Gima decided to start automation application. These applications include barcod readers, stock control applications and credit card applications.

INDUSTRIAL APPLICATIONS

1979:

* Very early application of CAD was implemented in Şişe-Cam glass factory.

1984:

* Computer controlled manufacturing activities started to take place in Balıkesir paper product factory.

1986:

* CAD application was started in Lassa wheel factory.

1987:

* Ereğli Iron and steel factory passed to full automation.

* Dyo and Sadolin firms, who holds 60 % of paint industry started studies about CAM applications.

* CAM applications started in MKE Çankırı Gun factory.

* Netaş firm started to operate CAD/CAM applications.

1988:

* Şişecam and Teletaş firms started to operate CAD/CAM applications.

1990:

* Computer Aided Software Engineering (CASE) system had been started to use in Aselsan firm. With the help of this system, analysis and software design can be made by computers, so this minimise design faults.

1991:

* Tofaş started to operate CAD/CAM applications in its 4 stations.

* One of the biggest textile firm; Bossa started CAD/CAM applications.

* Türkiye Iron and Steel Establishments (T.D.Ç.İ) contracted an administration information system.

1993:

* Turkish Air Force started factory information and development system in its Kayseri, Ankara and Eskişehir centers.

EDUCATION AND HEALTH APPLICATIONS

1982:

* As a first time, computer entered to our primary and secondary education system.

1984:

* İstanbul University Medicine Faculty started to test electrocardiograms of patients who holds heart cell; on the phone.

* For, computer aided education system, as a pilot application, 1100 computers were put in 100 high schools.

1987:

* Open University started in big metropolitan areas by the help of TV broadcasting. It was aimed to expand this service all over Türkiye.

1988:

* The cost of Computer Aided Education (CAE) was decided as 4 trillion T.L.

* In order to expand CAE applications, 150 sample school was chosen. 24 firms that entered CAE project will select schools.

1989:

* İ.Ü. Medicine Faculty hospital and Cerrahpaşa hospitals started automation application. Levels of this application were including patient persecution, stock persecution, payment registers.

* 1989-1990 season was decided as starting year of country wide application of CAE. 60 schools and 10 computer firms was chosen as first step. Aim was to expand this system to 5000 schools with containing 1000000 computers.

1990:

* CAE was started in 59 secondary schools.

* Studies started for integrated hospital automation system. Stock, patient, payment subsystems started to operate. Persecution, archive, medicine subsystems will operate in 2 years time.

1991:

* CAE was started in 140 new schools. Total number of schools reached to 200.

1992:

* Uludağ Hospital started to operate hospital information administration system.

* CAE started in 200 new schools. Total number of schools reached to 400. 8000 computers were in service in these schools.

* Health Information Systems (SES) project was started. Aim was to create health data banks all over Türkiye and connect them in one information network. Cost is about 4.5 million dollars. (It will start to operate after 1994)

1993:

* Red Line system was established in order to diagnose heart diseases on telephone. Center will be at İstanbul and this system will be established in order to connect this center with 180 health center as a first step.

MEDIA APPLICATIONS

1981:

* First example of computer applications in mass media took place in Yeni Asır. Inscription, page, print studies began to be done with the help of computer.

1985:

* TRT began to use computer in its various activities. These activities were, programme periods, archive series, price control etc..

1988:

* Anadolu News Agency started to give its news with computer terminals to some of its subscribers. Service started for 1000 subscribers as a first step.

1989:

* TRT started to implement Teletext application.

1990:

* Experimental Telegün programmes started. At first; only teletext coded televisions could follow this service.

* Milliyet Newspaper passed to computer aided press. All news will be written in computers, transfer to main center with telecommunication network and printed with the help of computers.

1991:

* Milliyet, Cumhuriyet, Türkiye newspapers passed to desktop publishing. All news were started to written and transfer at electronic environment.

* Hürriyet newspaper passed to computer aided press.

* TRT started to use computer aided information system. All news that comes to TRT will be in computer environment.

1992:

* Sabah and Yeni Asır newspaper groups started to use desktop publishing.

1994:

* First paperless newspaper; REGA (Resmi Gazete) will be put in service. System will give information via telephone lines, with the help of modems. System will start with 1500 subscribers. Cost will be 42500 T.L. (1993 prices) for a minute.

BANKING AND FINANCIAL APPLICATIONS

1986:

* Central bank started studies to establish electronic Funds Transfer (EFT) system in Türkiye. EFT is very important for integrated infrastructure for totally electronic banking.

1987:

* İş Bankası started experimental EFT system.

* For the first time in Türkiye, İş Bankası started Automated Teller Machine (ATM) service. Service was started in Ankara, İstanbul and İzmir.

1988:

* Yapı Kredi and Akbank started ATM application.

1989:

* Pamukbank, Ziraat Bankası, Garanti Bankası, Egebank started ATM application.

1990:

* Esbank, Emlak Bankası, Halkbank, Akbank, Vakıflar Bankası started ATM application.

1991:

* Visacard application started in ATM services.

* Yapı Kredi, Ziraat Bankası, Pamukbank started telephone banking application in Türkiye. Telephone banking is only possible with robot operator system. System depends on getting information from main database, using telephone lines.

* Yapı Kredi and Garanti Bankası started a project on Point of Sale (POS) application.

* Credit cards application started in Turkish banks.

* İktisat Bankası, Osmanlı Bankası and Sümerbank started ATM application.

* EFT system had been started by the help of Central Bank. This system will facilitate technological infrastructure for communication between banks.

1993:

* Central switch application started between bank credit cards. With the help of this system, banks can link their ATM's, communication between banks will be improved. Also, Turkish banking network can be linked to international banking networks. 25 Turkish banks has this capability in Türkiye.

1994:

* VISA entered Turkish telecommunication network who use satellite technology. With using VSAT networks, all ATM's can be connected to satellite network. First banks that will enter to this system will be Yapı Kredi and Şekerbank. In 1995, 20 more banks will be connected to this network. The new countries that utilise these services are Hungary, Portequese, Chezk Republic and Türkiye.

AUTOMATION APPLICATIONS

1981:

* Tax offices automation project was started.

1982:

* State Institute of Statistics (DİE) started to use computer system in order to monitor statistical developments easily.

1983:

* İş Bankası started bank office automation. After this, all banks entered to automation period.

*Ziraat Bankası started information processing application.

1984:

* All tax offices in Ankara and İstanbul started automation applications.

1989:

* For the first time in Türkiye, Bilkent university started library automation system.

1990:

* Countrywide automation system for all customs project was started.

* Emniyet Genel Müdürlüğü started information processing project worth about 57 billion T.L. (1993 prices)

1991:

* Integrated computer system of Ankara municipality was started.

* Ankara Esenboğa custom started automation application.

1993:

* All sale activities in "İstanbul Menkul Kıymetler Borsası" was started to done with computers.

* M.E.T.U. library automation project had been started.

1994:

* Council of State (Danıştay) started automation application.

CONSTRUCTION- TRNSPORTATION APPLICATIONS

1986:

* Information processing activity started in Atatürk Dam construction.

* CAD systems started to use in second Bhosphorus bridge design.

1988:

* İstanbul Municipality started integrated traffic signalisation system project. System will control all traffic lambs at all junctions in city.

* CAD system was started to use in light rail transit project design.

1989:

* Turkish Airlines (THY) started to use Minitel videotext communication system between its 39 agency.

1991:

* Between Kınalı and İstanbul on E-5 highway, first aid telephone system had been started to operate.

INFORMATION SYSTEMS DEVELOPMENT

1960:

* First computer was started to use in Türkiye.

1965:

* First computer was started to use in banking sector.

1967:

* First computer was started to use in industrial sector.

1987:

* Geology department of Hacettepe, established Distant Perception Center.

1988:

* İstanbul Municipality started Mapping Information System Project.

1989:

* 1/5000 maps of İstanbul were started to entered into computer environment. Project was planned for 3 years. But it was stopped after Dalan left municipality.

* İSKİ started Administration Information System. Decisions will be given according to data that will come to main computers.

1992:

* 1/ 25000 maps of Türkiye had been started to entered into computer environment, with using Geographical Information Systems. The name of project was ARBİS.

* Ministry of Energy started Mining Resources Management Information Systems project.

1993:

* First time in Türkiye, Interactive Voice Response system was started in Eczacıbaşı Movable values company. This system will be in service for 24 hours and all decisions will be entered to computer environment.

1994:

* Interactive Voice Response System will be started to use in Akbank, Yapı Kredi Bankası, Koçbank, Pamukbank, Esbank, Tekstilbank, Dışbank, İmar Bankası, İnterstar, Show TV, PTT, THY, Milliyet, TGRT, İSKİ, Yıldız Üniversitesi, Çavuşoğlu Lisesi in one years time.

* In March 27 elections, a part of Voice Response System; Tele-Seçim was used.

AGRICULTURAL APPLICATIONS

1987:

* All activities except feeding and harvest activities started to be done with computer control system in Çukurova greenhouse. This was the first application of information technology in agriculture.

1989:

* DSİ and Aselsan firms started Distant Computer Controlled Irrigation Project. System was providing a lot of advantages such as; preventing exaggerated irrigation, maintain fair payment, determine defects and management advantages. With this system, 410 million T.L. (1993 prices) will be saved for each year.

OTHER APPLICATIONS

1984:

* ASKİ started to give computerised invoice to its subscribers.

1993:

* IBM sport services had been started to given in Türkiye. Within football and basketball matches, all statistics were started to given at the moment.

INFORMATION TECHNOLOGY INDUSTRY AND PRODUCTION ISSUES

1958:

* In order to produce telephone devices, SİMKO had been established with partnership of SIEMENS.

1967:

* In order to produce domestic PTT electronic equipment, AR-LA had been established as part of Turkish PTT.

* In order to produce, telephone exchange equipment and automatic telephone devices, NETAŞ had been established with partnership of PTT and Northern Telcom. (Canadian firm) (PTT share was 49 %)

1974:

* 'Hes' firm started to produce copper cable in Türkiye.

1976:

* ASELSAN (Askeri Elektronik Sanayii) had been established as military electronics firm.

1982:

* First Turkish computer was produced by 'Mega' firm.

* 'Biltek' firm produced computer with 65 % of Turkish share.

* 100 % Turkish designed first electronic exchange (SPACENET) had been produced by NETAŞ.

1983:

* AR-LA had been privatized by the share of 51 % and its name was changed as 'Teletaş'.

* As a first time in Türkiye, analogue radio-link system with 1800 channel capacity had been produced.

1984:

* In order to digitalize whole telecommunication network, an agreement was made with Northern Telcom for digital exchanges as a first step.

* Turkish cable firms began to produce coaxial cable.

* Biltek firm stopped its computer production.

* In order to produce multi access radio telephone systems, an agreement had been made with Teletaş and Northern Telcom.

* In Teletaş, production of digital exchanges, telephone devices, fibre cable, fibre equipment, digital multiplexer
had been started with taken licences.

1985:

* Production of first Turkish computer was stopped.
* NETAŞ and TELETAŞ began to produce digital exchanges.

1986:

* Cordless telephone devices entered telecommunication market.
* First Turkish made PABX had been produced by NETAŞ.
* TELETAŞ began to produce famous 'system 12' digital telephone exchanges.
* STFA Savtronik Electronic Company had been established. It began to produce private telecommunication equipment, commercial automation systems, CASE equipment, banking automation systems etc.
* VESTEL Ltd. began to produce home-type computer with foreign licence. (Turkish share was 20 %)
* SIMKO firm began to produce telephone exchanges.
* Robotek (Robot Teknolojisi Araştırma Ünitesi) and Ölçsan (Ölçü Aletleri) firm began to produce serial robotic arms.

1987:

* ATARİ firm began to produce home type computers.
* TELETAŞ began to produce 34 Mbit/sec and 140 Mbit/sec radio-link systems.

1988:

* VESTEL Ltd. agreed with IBM U.K. Ltd. in order to produce IBM screens in Manisa. In 1988 50000 screen were produced and exported.
* PROFILO TELRA firm started to produce videotext terminals in Türkiye with French license.
* TÜBİTAK and HEMA Ltd. agreed on production of 100000 micro computer which will used in CAE (Computer Aided Education) programme. (But this project was failed)

1989:

* KAREL firm started to produce personal computer hardware in İstanbul with 15 % of Turkish share. It was generally a montage industry.
* Turkish TEOS and its partner Taiwan UNITRON firms started to produce computer hardware in Ankara.
* TÜBİTAK developed a computer prototype for CAE, with 100 % of Turkish design and production.
* ALTRON firm began to produce personal computer hardware using montage technology.

1990:

* First Turkish licensed computer hardware production foundation had been established in İstanbul Hadımköy by TELETEKNİK firm, in order to produce Commodore computers. These computers would export to U.S.S.R.
* 1/4 of "Night Vision Systems" project was contracted to ASELSAN, by Milli Savunma Bakanlığı.(250 billion T.L. at 1993 prices)
* ASELSAN produced "Computer checked irrigation" system.
* KAREL firm produced personal computer with 50 % of Turkish share. KAREL production had been started in Kilyos (İstanbul) and its share in total computer market was 5 %.
* ERICSON telecommunication company began to activate in Turkish market.

1991:

* First Turkish made digital rural telephone exchange "Levent" had been put in service by TELETAŞ.
* Aselsan started to produce TV transmitters.
* Aselsan started to study on "Night Vision Systems" project.
* Akyurt microelectronics factory had been put in use in İstanbul by Aselsan.

1992:

* Protocom firm started to produce Excell computers in Türkiye with montage technology.
* Efforts started to establish Radar and Microwave Technology Center by ASELSAN.

1993:

* Aselsan started to produce "trunk telsiz" system.

* Siemens Simko started to produce power source for IBM. Total export value was 150 billion T.L.(1993 prices)

* Teleteknik company started to produce 'Parrot' computers in Türkiye using montage technology.

* It was decided to produce ISPBX (PBX with ISDN) in Türkiye.

* Radar and Microwave Technology center was established in Ankara, by Aselsan.

INSTITUTIONAL ISSUES

1963:

* Turkish Scientific and Technical Research Institution (TÜBİTAK) was established in order to regulate Turkish scientific activities, to support R-D activities and to help government for determining science policies.

1967:

* Turkish Documentation Association (TÜRDOK- Türkiye Dökümantasyon Kurulu) was established depending on Tübitak.

1971:

* Turkish Informatics Society (TBD- Türkiye Bilişim Derneği) was established. It became the only institution that works on informatics.

1973:

* As a first time in Türkiye, Scientific and Technical Special Information Sensation Commission was held by the help of State Planning Organisation.

1975:

* Electronic Information Processing Special Commission was established. It's aim was to help public institutions in computer purchasing. But it was stopped in 1990, the reason was ; institutions get sufficient experience in informatics.

1981:

* A part concerning "information process" was held in government programme.

1982:

* UNESCO- Türkiye National Commission was started studies on national information network in Türkiye. But, soon, it was stopped.

1984:

* As a first time in Türkiye, 1. Computer congress was held.

* Türkiye became the member of European Technological Standarts Institute (ETSI)

1985:

* Tübitak National Computer Center (TÜBİM- Tübitak Ulusal Bilgisayar Merkezi) was established. It's aim was to supply consultation service about computers.

* Türkiye became high degree director of EUREKA

* PTT prepared a plan for digitalisation of its lines in 3 years time.

1986:

* Tübitak Information Technology Center (TETM- Tübitak Enformasyon Teknolojileri Merkezi) was established. It's aim was to follow up developments about information technologies. It's subject were CAE, Networks, databases, expert systems, CAD/CAM, robotics, introduction of Information technology in Türkiye.

* Robotics Technology Research Unity (Robotek) was established.

1987:

* Studies on determining Turkish language computer standarts was completed.

* Computer Networks National Committee was established dependent on Prime Ministry. Aim was to establish national networks , research systems and became member of computer networks.

1988:

* Turkish Standarts Institute (TSE- Türk Standartlari Enstittüsü) determined Turkish coding standarts which are used in computer and data communication.

* Electronic Industrialists Association was established. Aim was to provide partnership between them.

* Information Technology Development Foundation was established. Aim was to join international research projects, to make studies on software sector, standarts, copyrights. This foundation will improve relations between public and private sectors.

1989:

* A Special Commission was established in order to develop software activities in Türkiye, within 6. development plan.

* Türkiye became the member of Independent European Programme Group. By this way, Türkiye has the opportunity for exporting software to European countries.

1990:

* KOSGEB was established dependent on Ministry of Industry. It's aim was to support small and middle size industries by technological means, to support their R-D activities and to become an advisor. It became active in Ankara, İstanbul, İzmir, Konya, Eskişehir and Trabzon.

* Informatics High Council was established depended on Turkish Informatics Society. It's aim was to improve informatics sector, to maintain coordination in informatics sector. It's activities were concerning copyrights, CAE, development of software, investments in informatics.

* As a first time, a Council on Science and Technology was held in Türkiye.

* Programmes about ISDN service and software development took part in sixth development plan.

1991:

* National Information Technology Commission was established dependent on Prime Ministry. Information Processing Unit. Aim was to control computer purchasing to organise data communication activities and standardisation.

* An "Overall Informatics Project" was started in Türkiye with the help of World bank. All information technology projects of S.I.S, T.S.I., S.P.O., P.T.T., T.I.S., T.R.T., M.E. will be evaluated and coordinated by this project.

* A project had been prepared in order to maintain national communication network between all public institutions. These institutions will be concerning economy, land planning, social security, health, education, law, transportation, national defence, finance.... but it was not started by the end of 1993.

1992:

* Informatics working group was established in second İzmir Economy Congress.

* World bank prepared a report named " Turkey: Informatics and economic Modernisation".

* In order to activate CAE, a directorate was established.

1993:

* Turkish Technology Development Foundation was established. It's aim was to improve R-D activities of Turkish industrial establishments. It has the capital of 1 trillion T.L. (1993 prices) which was taken from World Bank. It gives credit to every R-D project about 10 billion T.L. (1993 prices) In one year, 64 project was applicated worth about 431 billion T.l.. (1993 prices)

* TBD applicated in order to be a public association.

* This year was decided to be an infrastructure year for national CAE project.

* First Turkish satellite Türksat was delivered to Turkish authorities.

* Ministry of Health hired a transponder from Türksat for SES project.(Health information systems project)

* Türkiye signed European Transnational Television Contract. Contract depends on prohibition of TV programmes which deteriorates general and public moral.

1994:

* It is decided to use Turkish in European paging system.

LEGAL ISSUES

1977:

* Import of computer hardware was prohibited.

1980:

* Import of computer hardware becomes free.

1983:

* Import of computer hardware was prohibited and become free in the same year.

1984:

* Import of computer environment became totally free.

1989:

* Management of radio and TV stations was given to PTT with the law of 3517.

* All computer elements became free from custom.

* Crimes concerning informatics issues, were entered to Turkish law. It's range includes copyrights, patent using, and intimacy in communication.

1990:

* Taxes were decreased in computer sector.

1991:

* Law about informatics crimes was accepted in T.B.M.M. Justice Commission. Punishment of informatics' crimes will be differentiated between 1-6 year of jail punishment and 1- 50 million T.L. (current prices) of money punishment.

* Ministry of Finance and Customs permitted sale of POS terminals.

1993:

* A legal decision was offered in order to change Television Law in Türkiye.

* A legal decision was offered in order to privatize telecommunication services.

* Privatisation of telecommunication services was rejected by Anayasa Court.

1994:

* New Radio Television Law was accepted by parliamentary.

INFORMATION TECHNOLOGY EDUCATION AND R-D ISSUES

1952:

* Turkish Technical communication Center (Türk Teknik Haberleşme Merkezi) was established in İ.T.Ü as an example for industry- university partnership. But it was closed after 18 years.

1972:

* Computer engineering department was opened in M.E.T.U. as post graduate programme.

1977:

* Computer engineering department was opened in M.E.T.U and Hacettepe as bachelor programme.

* Aselsan R-D unit was established.

1981:

* Semi-Conductor Technology Research Laboratory was opened in Tübitak Marmara Research Institute.

1986:

* Computer engineering department was opened in Bilkent University.

1987:

* Fırat University and Industry Partnership Development Center was established. aim was the training of of people for industry, to supply research and documentation services for industry and to help industries in their R-D activities.

* In Tübitak Marmara Research Institute, a project of Very Large scale Integration (VLSI) was started within NATO's Science for Stability programme.

* Studies started on university- industry partnership in Uludağ university.

1988:

* Netaş R-D unit was established.

1989:

* Teletaş R-D unit was established.

1990:

* İ.Ü. Computer engineering department was opened.

* PTT R-D unit was established.

1992:

* M.E.T.U. Biltir center was opened as an example for university- industry partnership. Design, analysis, production services was given to firms who produce machinery.

1993:

* High technology institute was established in İzmir and Gebze.

* Marmara university Technology Foundation CAM Laboratories was put in service as an example for first example for university- industry- foundation partnership.

* M.E.T.U ODAK Center had been put in service for an example for university- industry partnership. With the help of ODAK, all research activities can be integrated.

APPENDIX D

TECHNOLOGICAL GLOSSARY

Automated Teller Machine: (ATM) An information technology device, especially used in banking services.

Asynchronous Transfer Mode: (ATM) A network concept that, integrates circuit and packet switching technologies and assign bandwidth according to

Analog: Electronic waves that transfer voice signals.

Digital: System which converts voice and vision signals into computer signals of 0 and 1.

Electronic Funds Transfer: (EFT) An information technology application which involves the physical transfer of paper, bank notes, cheques, money orders.

Ethernet: A type of local area network with fibre optic cable system.

International Business Systems: (IBS) Rural satellite telephone systems especially with 30-50 channels. It allows all type of communication via small satellite antennas.

Local Area Network: (LAN) A network which provides communication link within building or campus.

Open Systems Interconnection: (OSI) A universal computer communication standard.

Packet Switching: A Communication system which codes all information into 0-1 system and transfer this information in the form of packages.

Point of Sale Terminal: (POS) An information technology device for electronic transfer of information about sells.

Private Branch Exchange: (PBX) An automatic/digital telephone exchange which allows various callings via same line.

Protocol: The rules that consists of agreed coding schemes for computer communication to guarantee good communication.

Satellite Business Systems: (SBS) Satellite communication system with 1 to 4 channel capacity. System allows voice, text and data communication almost at very remote regions.

Teleport: Most obvious physical form of advancement in communication technology, receiving and transmitting information via satellites.

Telework: Work carried out in a location where, remote from central offices or production facilities, the worker has no personal contact with co workers there, but is able to communicate with them using new technology.

Very Small Aperture Terminal: (VSAT) Small satellite earth stations with receiving dishes about 1.8 meters or less in diameter. It includes voice, e-mail, facsimile, database distribution and videotext.

Very Large Scale Integration: (VLSI) Entire integration of computer and telecommunication technologies.

X.25, X.75, X.400: Different computer communication protocols.