CHAPTER III

THE INTERNET IN THE DEVELOPING COUNTRIES

What are the Obstacles to the Growth of the Internet in the Developing Countries?

3.1 The Causes of Underdevelopment of the Internet

The most recurring question about the development of the Internet is: *'Can the Net and the new information and communications technologies be directly applied to all the social and economic realities in the world?'*. The most banal answer is in the affirmative, as the Internet can be used by everyone and in any organisational context. In reality, however, we must keep in mind the wide gaps between the small number of rich, advanced and industrialised countries, on the one hand, and the large number of poor, somewhat backward and underdeveloped countries, on the other. In order to understand the extent of this gap, one needs, in traditional terms, to consider data pertaining to the *Gross National Product* (GNP), that is, *the value of the goods and services produced in one year in a country.* The more advanced countries, with a total population of not more than 20% of the world population, produce more than 80% of the world GNP, while the *per capita* income in the rich countries is 100 times higher than the per capita income in the poor countries.

The analysis of the wealth distribution worldwide shows that, with the exception of Australia and New Zealand, all the most advanced countries are in the Northern hemisphere, over the thirtieth parallel, while all the poor countries are under this latitude. For this reason, the subject of underdevelopment can be dealt with by referring to the North and the South. This definition has gradually substituted the term 'The Third World Countries'[4] which, until a few years ago, was used to describe all the countries belonging neither to the First World, made of the

industrialised countries and with a capitalist economy, nor belonging to the Second World, made of the countries with a planned economy in Socialist Europe. Today, after the end of the socialist governments in Europe, this definition is no more adequate and, furthermore, the reality of the underdevelopment is much diverse in the various countries. TABLE 9 in the Appendix represents the subdivision adopted by the United Nations to classify the various countries of the world in three groups: *industrialised countries, developing countries and countries with a minimum or less advanced development.* [UNDP 98].

How is the Internet growing in these countries? What are the obstacles to its development? This question and others will be addressed in this chapter, by looking carefully into the development of the *telecommunications* as necessary infrastructures for implementing of the Net; the *satellite technologies,* which are to date used to transfer both sound and data; the *ISP and the information technology factories that are now developing in these countries.*

3.1.1 The Growth of Internet in the Developing Countries

The installing and the use of the Internet are increasing faster and faster in the Developing Countries in comparison with the other countries, the Industrialised Countries (ICs) and the Less Advanced, or Less Developed Countries, but the Net can still be exploited just by a small part of the population. According to the data by International Data Corporation (IDC), the number of Internet users in Africa, Latin America, Central America and in Central-Eastern Europe will quadruple from 7.6 million in March 1998 to 25.6 millions in 2001; while in the USA the Users Number metric will just redouble, from 51.6 million to 106.8 million; the growth in Western Europe will be similar: from 23.7 million to 56 million in 2001 [IDC 98].

In some of the Developing Countries the development and/or growth of the Net is much faster than in the other countries: for instance, in Argentina, Brazil, Paraguay and Uruguay the new connections to the Internet have increased by 352% between January 1996 and January 1997.

The valuations of the Internet User metric must be read with a certain caution and sometimes with skepticism because of the nature of the method of measurement that is used to obtain the metric. For example,

the valuations about the rapid growth in Africa hide the fact that the development of the Net has occurred, in particular, predominantlty just in a few states: South Africa, for example, has about 48,00-50,000 Internet hosts and it is at the 16th place in the world for the Internet hosts number [Pano 98a].

Below is an illustration of the data by Network Wizard of January and July 1998, by considering the top 12 Non OECD Countries with more than 50 million of inhabitants, more than 1,000 Internet hosts, but a really low density in the use of the Internet:

Countries	Host Number	% Growth Between January and July 1998
Brazil	163.890	+39,8%
Russia	150.466	+28,4%
Mexico	83.949	+101,5%
Turkey	27.861	+12,4%
Thailand	25.459	+77,1%
China (without Hong Kong)	19.313	+18,3%
Ukraine	13.271	+44,6%
Indonesia	10.691	+11,3%
India	10.436	+45,8%
Philippine	7.602	+76,3%
Egypt	2.043	+1,5%
Pakistan	1.923	+48,9%

TABLE 4: The Top 12 Non OECD Countries with more than 50 million of Inhabitants and more than 1,000 hosts - Data Elaboration by Network Wizard, 1998

By analysing the density, that is the number of hosts per 1,000 inhabitants, these countries can be classified into two groups: seven countries with a density index between 0.1 and 1.2 hosts per 1,000 inhabitants (FIGURE 3-1) and five countries with a density index between 0.01 and 0.06 (FIGURE 3-2); we do not take into consideration the other countries with less than 1,000 hosts and that are nearly isolated.

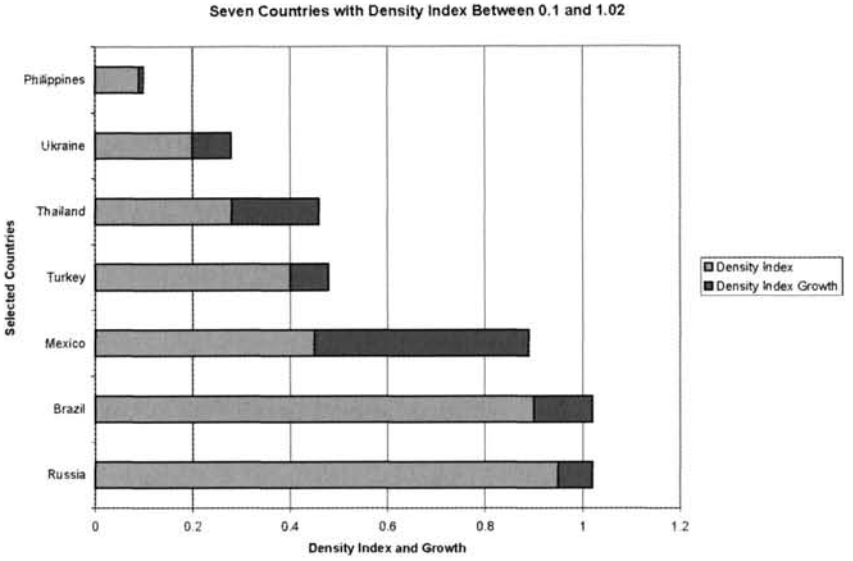


FIGURE 3-1: Seven Countries with Density between 0.1 and 1.02 - Data Elaboration by Network Wizard, 1998.

In the first group one finds countries with a really rapid growth, such as Mexico and Brazil. Russia is likely to follow similar trends, but its presence in the Net is still inferior compared to that of Mexico or Brazil (the green part represents the growth in 1998).

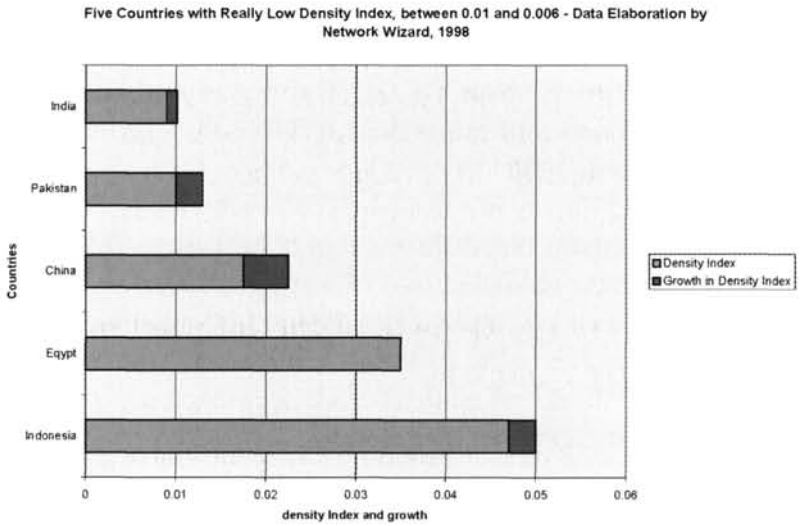


FIGURE 3-2: Five Countries with Really Low Density Index, between 0.01 and 0.006 - Data Elaboration by Network Wizard, 1998.

In order to compare the graphs, it has to be remembered that in the second group (FIGURE 3-2) the scale is 1/20 of the first one (FIGURE 3-1). The situation in China and India is similar to the one in 1997: in China the density increase is a result of the annexation of Hong Kong, in fact 2/3 of the hosts are from Hong Kong, while the rest are from Peking, Shanghai and a few other towns.

India has a population approximating 900 million inhabitants, but its presence on the Net is smaller than the that of of Estonia.

Other countries are in a situation of nearly total isolation: 264 Internet hosts in Iran, 91 in Nigeria, 76 in Ethiopia, and 25 in Vietnam.

There are marked differences even in the big continents like Africa: for example, there are some countries, such as Namibia and Botswana with a density of 0.4 hosts per 1,000 inhabitants, a figure relatively higher if compared with the 0.02 of Kenya and Senegal. In Northern Africa the low density of Egypt and Morocco, which is only 0.03, appears to be high if compared with Tunisia (0.006) and Algeria (0.001). Network Wizard has found just one host in Libya, Liberia, Gabon and Congo, while it has not found any on-line presence in Sudan, Somalia, Rwanda, Guinea, Chad or Eritrea.

Finally, the Net is really not adequately diffused in the Developing Countries. What are the reasons for this situation? The main obstacles, as will be expounded below, are three: *the low tempo of life*, deficiencies in infrastructure for the telecommunications and the *incompatibility of culture, besides the unpredictability of the economic and political* situation of these countries, all of which militate against using the new information and communications technologies with ease.

3.1.2 Obstacles to the Growth of the Internet in Developing Countries

Does the high level of human development help the emancipation towards the Net? Or does the presence of the Internet increase human development? These two questions opened the Fifth Session of INET 98 [Inet 98a], a conference about the world of the Internet that was held during 1998 in Geneva: INET 98 tried to compare the different evolutions of the Net in the Industrialised Countries and in the

Developing Countries. The conclusion that can be drawn from the INET 98 report is clear: the Developing Countries have more problems in respect electronic connectivity in relation to the Net. Various explanations can be given in respect of this apparent to this apparent gap between the North and the South.

- The first problem is *the low wealth* of the Developing Countries. This means that the necessary resource to survive is not directly available and that the Internet is not an indispensable object.

- The second factor is in the *general lack of available requisite information and communications infrastructure,* which constitute both an **obstacle** and an **impulse,** as many less resourced countries have limited telecommunications networks and the Internet totally depends on the existence of a minimal requisite connectivity infrastructure.
- The third factor is represented by *the education, the language, and the culture* of these countries. Many Internet users are young people, exactly the ones who are usually keen on the application of the new technologies. In 1995, 17% of the population of the Developing Countries was under the age of 14, as opposed to just 9% of the population in the industrialised countries. The low education level in these countries does not help significantly towards support in respect of the introduction of the technology. In 1993 more than a half of the population of the low wealth countries had no opportunity to attend secondary schools both because of their low income and the lack of schools. According to ITU, the International Communication Union [ITU 97], except for India and China, the number of young people who cannot attend secondary school increased to 75% of the population of these countries; in the industrialised countries, instead, the percentage of the people attending a secondary school is 97%.

English, on which most of on-line communication is based, is certainly an obstacle in the majority Developing Countries, as it is not the main language in the majority of these countries. India has to be excluded from these countries; India's population comprises 100-200 million of people who speak English, are culturally advanced and professionally prepared in many sectors. According to a report by Panos Institute called *'The Internet and Poverty'* [Pano 98a], *the development of Internet in the*

Developing Countries will possibly depend more on the capacity of this population to educate the young rather than on the technologies and on the costs.

Many people studying the communications, such as Giancarlo Livraghi [Medi 97a], state that *'the technologies are just a means, what counts is the human and social culture'*. In order to exploit completely the human, civil and social potentiality of the networks a cultural growth, not just of few people but extended to all social categories, is necessary. To date the wealth of nations cannot be valued only in terms of money, but they have to be considered also in terms of the means of access to information .

The aim of the recent European ministerial conference called *'Global Information Networks: Realising the Potential'* [Conf 98], held in Bonn from the 6th to the 8th of July 1998, with the participation of the representatives of many countries of the EU and of other nations, among which USA, Canada, Russia and Japan, was to spread information about the use of the Global Information Networks, in order to identify the limits in their use, to discuss some possible solutions and start an open dialogue about possible potential European and international co-operations.

A quote of some important passages of a ministerial declaration, which was published a few days later, will illustrate the advantages provided by Internet to education: *'The Global Networks represent a powerful influence in the social, cultural and education areas; by giving more power to the teachers' education means, by reducing the access barriers for the creation and the spreading of contents of different languages, by eliminating the distance effect for the remote users and by providing the users with richer and richer sources of information... they make the freedom of speech and of access to the information become concrete'*.

The Internet can be a useful medium to give a lot of impulses to the development of education in the Developing Countries, as an efficient telecommunications network could provide them with a pool of information and education resources; these could make it possible for thousands of people to attend university and specialisation courses from geographically disparate locations at relatively low costs, compared with the traditional modes of *in situ* education and training.

3.2 The Telecommunications Infrastructure

The situation of the telecommunications infrastructure represents an obstacle to the development of the Internet. In this section it will be illustrated how the various telecommunications infrastructure becomes necessary for the transmission of data and of voice, in relation to the status of diffusion in the Developing Countries.

3.2.1 The Fixed Telephone Service

A measurement termed **teledensity,** is used by ITU - *International Telecommunications Union* [ITU 97] to define the metric which corresponds *to the number of telephone lines per 100 people.* The teledensity for the Developing Countries, on average, is equal to just 1.5. In the low-wealth countries, such as Afghanistan, Guinea, Liberia, Niger and Somalia, the figure falls down to 0.002, implying that in these countries, on average, there is just one telephone for every 500 people. While in Cambodia, Chad, and Zaire there is, on average, just one telephone for every 1,000 inhabitants. On the contrary, the situation in the USA corresponds to 57 telephones lines per 100 inhabitants whilst in in Sweden for Europe,the corresponding result is 68 telephone lines for every 100 inhabitants of the population.

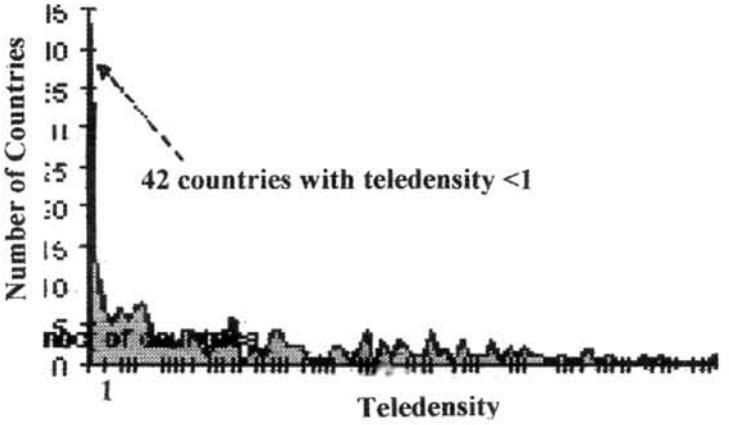


FIGURE 3-3: Teledensity in the world -
ITU World Telecommunication Indicators Database, 1998.

FIGURE 3-3 shows that in 42 countries the teledensity is less than 1, while FIGURE 3-4 shows the teledensity in the various countries with regard to the world population:

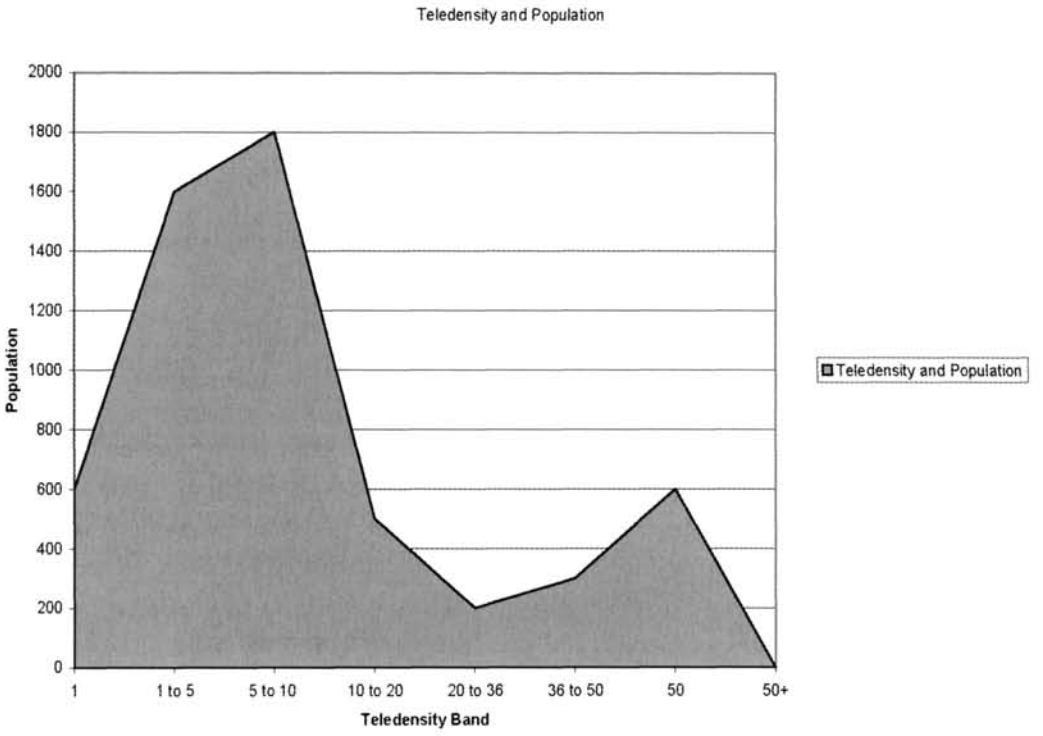


FIGURE 3-4: Teledensity and Population - ITU World Telecommunication Indicators Database, 1998.

According to an article by Hudson Heather [Huds 97], *about 80% of the world population has no access to the telecommunications networks, while 75% of the telephone lines are only in eight industrialised countries.* In order to address the difference between the North and the South, an agreement was signed in Geneva in February 1997 among the 39 countries controlling 90% of the world telecommunications traffic. The agreement, signed at the WTO - *World Trade Organisation* [WTO 97], the organisation for the control of the world trade, *establishes the liberalisation of the global telecommunications, so that the national telecommunications services can operate in new foreign markets.* This agreement marked the formal start of the age of competition in the telecommunications markets where the monopoly of the State was scheduled to give way to competition not only among national operators, but also among the foreign investors .

The WTO pact promises a happy marriage of interests between the *telecommunications operators/service providers* and the *telecommunications infrastructure firms* that are routinely responsible for

building the infrastructures to provide the various services in both the Industrialised Countries and the Developing Countries. The telecommunications operators want to invest in these new and profitable markets and the telecommunications infrastructure firms will be supported in their work of supplying more and more advanced telecommunication infrastructure.

In the report by *Panos Institute* [Pano 98a] some critics have expressed caution and doubt in respect of the WTO Agreement, as they believe foreign operators could provide sophisticated telecommunications infrastructures that would contribute to the realisation of greater towns and cities, but could exclude from civilisation the poor and rural little villages in near or far neighbouhoods. The latter have already been excluded from the supplying of the essential telephone services for decades. Also, the WTO Agreement could further increase the difference between the North and the South as the foreign investor firms will find it easier to enter these markets than the local firms

Nevertheless, an efficient telecommunications network would make the economic development of any country easier, for instance:

- By transforming the business prospects of the big or small-middle enterprises, which can communicate with the rest of the world both to buy raw materials from new suppliers, and also to sell their own goods to new customers;

- By giving to the Farmers' Unions and to the Individual Farmer access to information on the of the crop in the various markets to enable them adjust their own prices based on market trends;

- By providing for facilities to enable rescue under disaster or emergency conditions through easy consultation channels between experts including doctors at geographically disparate locations .

These are but a few of the uses of this technology, which could help the development of new ideas and new activities for the improvement of peoples' conditions of life, and could even create a real globalisation of the world communication.

3.2.2. The Mobile Telephones

The wireless communication, namely, mobile telephony in particular, is to date becoming more and more diffused: world-wide, a new user out of six has a mobile telephone. As at June 1998, a total of 22 million new mobile telephones had been bought all over the world [ITU 98a]; globally, the estimated number of possessors of mobile telephones is 248,934,766.

FIGURE 3-5 demonstrates the number of mobile telephones per continent and the growth of the possessors of mobile telephones over 3 months, from January 1998 until March 1998.

Geographical Area	March 1998	June 1998
North America	62,256,250	66,481,132
Central Europe	60,969,595	68,501,443
Asia-Pacific	44,822,860	50,209,642
Japan	31,524,900	34,076,300
Latin America	14,829,177	16,306,372
Middle East	5,775,300	6,465,383
Eastern Europe	3,989,923	4,756,013
Africa	2,441,329	3,166,481
TOTAL	226,609,334	248,934,766

FIGURE 3-5: Number of mobile telephones per geographical areas - ITU Global Mobile, 1998.

Even in the Developing Countries this kind of communication is evolving more and more rapidly, as it makes it possible to avoid the problems of costs implied in the installation of cables that form characteristic features of the fixed line telecommunications infrastructure in these countries. The use of mobile telephones is increasing, perhaps, more rapidly in the Developing Countries than in the Industrialised Countries, especially in the South-East Asia and in Latin America. In some of the countries whilst a lot of distant villages still use the traditional fixed-line network, the big cities, such as Sao Paulo in Brazil, use the mobile network more than Paris.

In April 1998 *Nortel - Northern Telecom* and *United Utilities* announced the birth of a joint venture aimed at the development and the selling all over the world of the innovative solution called **Digital Power Line** (DPL): this will make it possible to *use the electrical lines for the transmission of data and the access to the Internet* with a speed 10 times

faster than the best digital link now available on the market [IDG 98a]. This technology will give the electric companies worldwide, including those in the Developing Countries, where the electric network is much more widely diffused than the fixed-line telecommunications infrastructure, the possibility of becoming a new group of ISPs worldwide. This will be able to provide Internet users with high-quality services through smaller investsments compared to corresponding investments needed by traditional kinds of network.

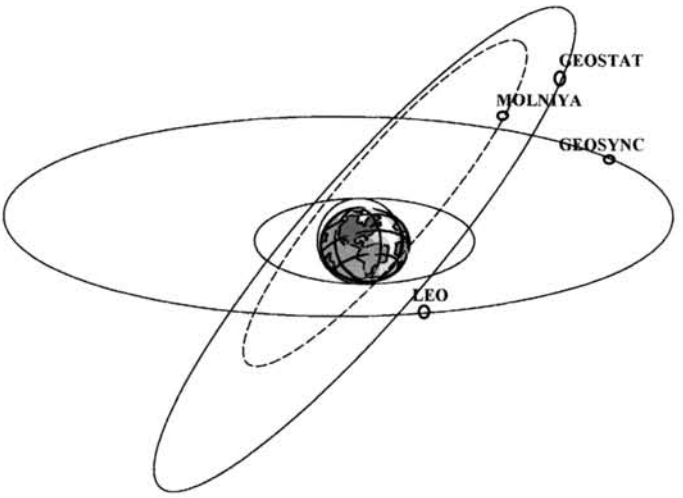
3.2.3 Satellite Technology

The installation of cables in the Developing Countries will take a long time, and high costs and will somewhat be difficult because of the conditions of the environment. In order to reach the rural population spread in the vast territories of Africa, Asia, or South America, an up-to-date *medium* such as the satellite has been used: it is flexible, reliable, safe and it does not need any fixed networks of cables or recall signals.

The satellite was born because of the need of the great nations to conquer space. In particular, the first satellites were launched in the 1950s and 1960's by the Russians (in 1965 the first satellite called 'Early Bird' was launched); then the US appropriated large sums of money to launch projects such as the INTELSAT with the first intercontinental satellites covering the Northern hemisphere.

A geostationary satellite is an object with a mass of up to 2,000 kg and it is launched into orbit at a distance of 400 km from the Earth by a rocket. The satellite is equipped with an engine by means which the satellite is enabled to move into the 'Clarke's band': the main feature of this band is its distance from the Equator, which is 36,000 km[5]. A satellite is called *geostationary* or *geosynchronous* as it is *synchronised with the rotation of the Earth:* it is designed always to turn in the same direction as that of the Earth's rotation, so that it can always be seen from the same point on Earth or from any place.

In order to calculate satellite orbit positions, a full revolution of 360 degrees is divided into parts of two degree sectors, obtaining in this way 180 sectors. In every orbit pole, various satellites are placed to form a kind of fleet. Some of these fleets refer to a territorial coverage, as for instance, at the 13 degree latitude East there is the fleet called EUTELSAT and at the 19 degrees latitude east there the fleet called ASTRA, both fleets being for the European territory.



There are four kinds of orbits used for satellite communication [Gomo 93], as FIGURE 3-6 shows:

- **Geostationary** (GEO): Here, apogee and perigee, namely, the maximum and minimum distance from the Earth corresponds to 35,786 km. A satellite in this band takes 23 h and 56 m (sidereal day) to turn around the Earth. The angle between the orbit plane and the Earth's eclliptic of the Earth, is equal to 0. The Doppler effect, proportional to the change rate of the distance between the satellite and the station on Earth, can be ignored;

- **Geosynchronous:** In this case apogee and perigee are the same and equal to 35,786 km, with a period of time of 23 h and 56 m. The angle goes from 0 to 90°, while the Doppler effect is limited;

- **Molniya:** Here the apogee is 39,400 km, while the perigee is 1,000km. The necessary time to turn around the Earth is 11 h and 58 m. The angle is 62.9° and the Doppler effect is high;

- **Low orbit** (LEO): In this case the apogee is less than 1,400 km while the perigee is greater than 500 km. The period of time is 1.5-2 h, while the angle goes from 0 to 90°. In this kind of orbit the Doppler effect is really high.

To date the applications to which satellites are applied are varied and various: telephony, telecasting and data communication. For instance, it is possible to transmit bank or financial data, journalistic news or data from the oilrigs. Again, it is possible to communicate through mobile means, not vocal, but through a small screen. It is the case of the 'flots' of the lorries, through which two elements can be determined: the position of the lorry with a precision of nearly 90 metres and the possibility to communicate with the driver: All these things imply a substantial improvement in the communication technology for transport.

The first important innovation comes from EUTELSAT which, ever since 1995, with the collaboration of industrial partners and research institutes, has been developing digital platforms to offer services such as the Internet and the transmission of data via satellite. Any person who has used the Net has certainly noticed the substantial problem of slowness of the system in receiving video images or pictures. Through the use of satellite communication it will be possible to transfer with a high quality all these data to the final user.

Projects that deploy satellite application are made not only for Europe or for the big industrialised countries, but also for the Developing Countries. The projects now in progress can be schematically represented in TABLE 11 in Appendix II, which refers to:

- The name of the project;
- The kind of project;
- The date of realisation or the expected one;
- The services provided and the prices;
- The features;
- The covered area;
- The promoters; and
- The backers.

There are, however, some disadvantages that have to be considered:

- First, for the final user the *cost of the telephone call* via satellite is about 1-3 US Dollars a minute, which is more expensive than the terrestrial telephone system.

- The second problem concerns the companies which invest hundreds of millions not in providing the Developing Countries with telecommunications, but in order to develop, for money, the market of the urban areas and of the industrial centres. A report by Panos Institute [Pano 98a] remarks that *satellites can be used in those countries where there are competent technicians, with requisite education, knowledge, and skills about the new information and communications technologies.*

To illustrate the cost-implication of using satellite communication, it may be observed, for instance, that at the moment Internet connection in Chile is via satellite; implying that the cost of the dial-up connection reaches 60 US Dollars per month and the speed of connection reaches 9 kbits per second, equivalent to that of a small ISP in the USA. The people, however, are really enthusiastic about the Internet and connect at night or early in the morning. In order to solve this problem, however, Chile is planning to install cables all over the country so that the speed will increase by 200% and the connection will no more be disturbed by the weather [Nua 97b]. This example shows that *the best kind of telecommunications infrastructure that can be adopted by a state varies according to the area and also on the different environmental conditions.*

Another problem concerning satellite communication is the *reception quality.* In fact, once a satellite has been launched into the orbit in order to supply the Developing Countries with communication systems, these countries must be provided with the devices to receive the information. The English company Hermes Data Communications International Ltd. [Herm 98a], previously working for the defunct Soviet Union, supply its systems for satellite reception to the end users and the international organisations in Africa and Eastern Asia. In their site (http://www.hermes.datacomms.co.uk) information is available about their products and the projects they have developed in the Developing Countries in the last few years [Herm 98b].

3.3 ISP in the Developing Countries

ISPs are companies which, through investsment, aim at the installation of the necessary devices for connection to the Net, and offer to the users the possibility to connect to the Internet through payment of subscription. The development of the Internet represents a source of profit for the ISP, as supplying users of the Internet with various services produces additional

income for these companies. In general, this happens in markets with middle-class users and where the telephone connections are good.

None of the above conditions is satisfied in the rural areas of the Developing Counries. The development of the ISP in the Developing Countries are generally up against many difficulties because of the inadequacy of the telecommunications networks. In the rural areas, in particular, the request for connection to the Net is practically non-existent. *'Internet is not our priority in the sector of telecommunications'*, says Dr Abdul Mejid Hussein, Minister of the Transport and Telecommunications in Ethiopia, in an interview recorded in the report by *Panos Institute* [Pano 98a], *'but we give the right of priority to supplying our people with a telephone line'.*

A lot of scholars, among others, Professor Mohammed Yunus, founder of the *Grameen Bank* in Bangladesh [Yunu 97], think that providing connection to the Internet would imply for the Developing Countries both business opportunities and, with the passing of time, the satisfying of social needs. An example is provided by Prof. Yunus who, through his bank, issues loans at low interest to women in the rural areas of Bangladesh and in other Developing Countries. He is trying to promote the *GrameenPhone*, a mobile telephone service at a low cost for every village in Bangladesh. This is but a *medium* to make women be in a position to have access to the internet and look for jobs or even seen to work via the Net.

The obstacles still remain huge, as even when the rural areas have the telephone lines the rural end-users will have to pay much more than the urban-dwellers for the same time of connection. In order to solve this problem, *Sonatel* in Senegal, the local telecommunications company, has fixed one price rate for the whole country. *Sonatel* is planning to build an Internet backbone of its own, while *Metissacan,* an ISP in Dakar and Ziguinchor, is looking for funds to provide the most distant and isolated areas of the country with computers [Hump 97].

The new technologies, in particular the **wireless technologies,** can make it easier for the rural areas to connect to the Internet. For instance, *in mid 1997,* a pilot project launched in Arua, a small town in the North of Uganda, provided Internet services through a wireless radio system connected to a satellite. The system, provided by *Uganda Connection and World Food Programme,* is aimed at giving help hospitals, to agricultural

projects and various missions in the region [Pano 98a].

If one looks at some of the most important countries of the developing nations in respect of provision of Internet services, one cannot fail to notice that the ISPs were once mostly under the control of the State, or that the market was monopolised by one company providing the users with few and expensive services. In India, for instance, until September 1997, [Wired 97], the ISP market was a monopoly: *Videsh Sanchar Nigam Ltd.* provided the service from Delhi to Bombay at 64 Kbps for 1 million Rupees per year; the users paid 83 cents per minute and they were required to have a subscription of at least 500 hours of connection. In September 1997 the Indian government finally realised that this kind of ISP cost administration for connecting was expensive and decided to liberalise the market by allowing an unlimited number of ISPs to offer Internet services. The aim of this decision, according to Dewang Metha, Executive Director of the *National Association of Software and Service Companies (NASSCOM),* was to transform the Internet into a national phenomenon and to reach 1.5 million users within three years. In February 1998 [Nua 98f] the Indian government was accused by *Telecom Regulatory Authority of India* (TRAI) of preventing the development of the Internet in India. The market laws for ISP operating in India were rewritten. At the end of the year privatisation increased the interests and the competition; about 30 ISPs were scheduled to compete for the market, with a strong reduction of the connection costs: TRAI promised cuts in expenditure from 60% to 90% in order to catch many new users. DoT *(Department of Telecom)* was scheduled to launch its Internet services in March 1998, with 25 POPs in 25 towns that would allow it to offer dial-in connections to 106 places in India. The private ISP *Saytam Infoway* made an alliance with Intel Asia to offer its connection services and software products to the consumers of Intel by building services through the Intel-based desktop. According to Kanwaljit Singh, Marketing Manager of *Intel Asia Electronics,* this *'will make both Saytam and Intel enter more easily the computer market in India'* [Indi 98].

In **China** the only Chinese provider of telephone services and the main provider of access to the Internet was *China Telecom,* which was rather expensive for the ordinary end-user. At the end of 1998, a young student of Nanchino University, Huang Zhenjiang, [Dea 98a], made a web page against the monopoly of the on-line services of this ISP, as he percieved that the high telephone rates of *China Telecom* were the main reason for the insufficient development of the Internet in China. According to

Huang, the average Chinese could spend up to US$27 for 20 hours of connection to the Internet, as this actually meant 25% of a worker's monthly salary. A few days later the promoter of this campaign sent a message offering his apologies to all users for the problems caused by his action. In this case, Huang's plan seemed to have stopped because of the pressure by authorities that had ordered a stop to what they deemed to be illegal activities. The reality was that Huang did not seem to have given up and, through the facilitation of communication by a group fighting for the civil rights in China, with its headquarters in Hong Kong, he set to promote a one-day strike against the State telephone company [Dea 98b]. From a technical point of view, China Telecom has not the monopoly of the Internet services, but in reality most of the local ISPs were obliged to have access to the international backbones and gateways through China Telecom, whose costs for these services were monopolistic and protectionist. Subsequently most ISPs sought to complain about the situation most of the private service providers seemed to be making a loss in their operations. In a short time the telecommunications sector was poised to be reformed in China with the restructuring of China Telecom, whose operations should be probably divided following some business directions, by separating the telephone services, mobile telephones, data transmission, the long-distance transmission, and the international services.

In **Kenya,** till June 1998 [Nua 98g], there had been five ISP licences, all operating under the control of the *East African Internet Association,* which had about 150 partners in Kenya, Uganda and Tanzania. Kenya's main ISP was KPTC - *Kenya Posts and Telecommunications Corporation,* the State telecommunications company. '*The use of the Internet in Kenya is really spread',* according to Suchindranath Aiyer, President of the *East African Association, 'even if the users belong to a kind of élite, because of the high costs'.* With regard to the low band connection and to the frequent poor performances of the Net, the connection costs operated at about US$ 10,800 a month at 64 Kbps connectivity, and the licence fees started from US$ 13,900, of which KPTC took a 1% share over the total entry of every ISP in the country.

In **Sri Lanka** the situation started off on a better footing [News 98]: during the year 1999 the number of users had increased to 14,000 and was deemed to increase to 50,000 by 2000. This rapid change in Internet use was attributed to the liberalisation of the telecommunications sector during the previous three years and because two new operators, *Lanka*

Bell and Suntel, obtained ISP licences during the previous two years. The favourable starting conditions made it possible to install, rapidly, new telephone lines and, thanks to the abolition of the import duties on hardware and software in 1997, many people had the opportunity to buy computers and computer equipment affordable prices. *Sri Lanka Telecom* (SLT) increased the number of new telephones after the Government, in 1997, sold 35% of its profits to *Japan's Nippon Telephone and Telegraph.* The official data show that as a result of this, a total of 160,000 new telephones were installed, of which 110,000 installations were by SLT. The rise occurred almost exclusively in the capital of Sri Lanka, Colombo, and on its outskirts, but 30% of the market had already been covered. The ISP community, totalling seven in 1998, was planning to make an interconnection agreement for the transmission of data in the country through servers in the US and other nations. At the time of writing, all e-mails must pass through an overseas server before arriving at their destination.

Saudi Arabia, one of the richest countries in the world, has a population of 20 million people, of which 120,000 were awaiting taking a subscription for the Internet within a year of 1998 [Nua 98h]. In fact, in October 1998 the Government finally decided to give the licences for ISP operation: about 40 companies were waiting for passing a selection. A proviso for ISP operation was that the Government would control the market and all the information on the Net. Furthermore, in November 1998 KATCST - *The King Abdulaziz City for Science and Technology* [Nua 98i] announced the prices that all ISPs would have to apply: the minimum cost per hour of connection would be between 0.40 US$ and 1.20 US$; the monthly cost would be from 27 to 40 US$. Only users with a dial-up account would pay these costs and the state connection taxes. The ISPs were not satisfied with this decision: some deemed the minimum cost to be too high, others deemed the State should not have any control over these costs.

3.4 The Information and Communications Technology Industry

The problem of access to the telecommunications networks becomes secondary if one considers that in order to use the Internet it is necessary first of all to have a computer or at least the possibility of using one. According to ITU - *International Telecommunication Union* [Pano 98a],

a person living in a rich, Industrialised Country has a higher probability of access to a television compared to a person living in a poor, Developing Country; his/her access to a telephone line is 25 times easier and the access to an Internet host computer is 8000 times easier.

In the Industrialised Countries every Internet host serves 3 or 4 computer-users, while in the Developing Countries every host serves about 100 users [ITU 97]. The analysts state that the costs that should be paid to install a computer in every house, or to establish the necessary telecommunications infrastructure or to provide every house with electricity are too high. Even the price of a computer is much higher in the Developing Countries: for instance, the average price of a PC (personal computer) in Ethiopia is 15 times the per-capita monthly income [ITU 98b]. Furthermore, the import duties on the computers make the access to Internet even more expensive: in India, for example, the taxes on the computers reach even 120% [Pano 98a].

In 1996 more computers were sold than television sets and this trend of increasing demand is becoming predominant in the Developing Countries.. The demand for Information Technology (IT) products is increasing by 12% a year in Africa and at the beginning of 1997 Microsoft opened the first of a series of 12 shops in Africa in order to meet the demand for its products [UAE 97] and [Pano 98a].

In **Israel,** *'About 15% of the development of the Internet comes from Israel', says Alan Meckler of Mecklermedia, 'because our country has always been famous for its IT industries and our population is one of the most technologically advanced. Furthermore, Israel has the highest percentage (40%) of PC purchases.'* [Nua 98e].

In **Latin America,** according to a report by *Gartner Group* [Nua 98j], more than 950,000 PCs were bought in the first four months of 1998, more than 10.6% than in 1997; even the small computer suppliers have increased their sales, 24.6% more than in 1997. The company *Compaq* has increased its sales by 18% and until November 1997 Compaq represented the greatest PC distributor in Latin America; IBM kept the second place and *Acer* the third one [Nua 97]. *Gartner Group* predicts that this rise in the number of computers purchased is due to the low prices that will make it possible for the education sector to enter the market and will increase opportunities for the people. The demand for PCs, however, varies from country to country: the rise occurred in

particular in Mexico and in Argentina, while Chile, Colombia, and Venezuela have a negative record of demand for PCs and, finally, Brazil and Peru showed a minimum increase in the demand.

The computer market in the **Middle East** keeps on increasing with a surprising speed: the development rate is twice the world average. The introduction of the Internet, according to the experts, makes one think that this huge development is destined to go on without limit. The figures obtained at the electronics exhibition Gitex in Dubai show a total increase by 25% every year in the region and an increase that in some Arab states reaches even 40% [Dea 98i].

From the above information, good news can be drawn for Internet users and for the potential buyers of computers and computer equipment in the Developing Countries: this is attributed to the *widening of the market,* to a strong import and to the *effort of the information technology industries of these countries, and decreasing trend in the price of the PC.* This does not mean that all the economically - disadvantaged people of the Developing Countries will have the opportunity to buy a PC, but it will be easier for them to use it in regional or national organisations.

3.4.1 Costs and Limits of the Market

Information technology without limits could become reality within the decade of the year 2000. This, in effect, is partially what came out of the agreement for the cutting of prices, which was subscribed at the *Ministerial Conference of the World Trade Organisation (WTO),* held in Singapore in December 1996. It was adopted in Geneva in March 1997 by 39 countries representing more than 90% of a market with a yearly income of nearly more than 600 billion of dollars [WTO 97].

The WTO pact implies a trend towards the progressive reduction of the cost-limits in four phases, starting from July 1997 until the total elimination in 2000, at least in theory. Some Developing Countries have obtained a concession establishing the total removal of taxes by 2005. The elimination of the taxes could mean for the end users a saving of between 10 and 15 billion dollars per year. The pact concerns 300 categories of products: hardware, software, telecommunications equipment, scientific instruments, semiconductors, but excludes the consumer electronics, on which there are average taxes of 14%. This is not a serious matter, as the multimedia technologies gradually make the difference between

information technology products and consumer electronics products become smaller and smaller.

'It is a new success of the multilateral trade system' said the General Manager of WTO, Renato Ruggiero, *'which will take to a reduction of the prices for the consumers and to a reduction of the customs barriers; all this will make the diffusion of the technology easier'* [Sold 97].

In addition to the costs for the purchase of these products end users who are connected to the Internet or those who would like to be connected to the Internet must pay some connection costs. Even with regard to Internet connectivity, there has been a great improvement, as the Governments are finally realising the importance of this new *medium.*

The **Sudanese government,** for instance, in November 1998 established the costs the national ISPs can apply to Internet connections. According to the official news the cost for users for an hour of connection should correspond to about US$0.18, and under no circumstance should the cost of a connection be over US$0.89. [Dea 98h].

In **Brazil** the authorities have reduced in the last few years the connection costs from 17.26 Centavos in 1985 to 6.04 Centavos for two minutes of connection to the Internet [CG 98].

Internet access costs in some regions of Africa are represented in FIGURE 3-7. The annual costs are in US Dollars and include the cost of 5 hours of local calls per month [Mike 98].

In order to provide Internet services, satellite technology can be used instead of cable. Below is a comparison of some evaluations relating to the costs of the various telecommunications infrastructure announced by TELEDESIC at the beginning of the project, keeping in mind that the cost is 4 cents of US$ a minute and per 16 Kbps channel:

Cost of the Band:

- **Local interconnection:** the cost is equal to US $0.45 a day; the total cost over 5 years is US$815;

- **Fixed telecommunications:** the cost is equal to US$0.45 a day, which in five years becomes US$1.6 million as the multiplication

of the band by the distance is constant and equal to US$1.80 within 100 km;

- **Satellite telecommunications:** the cost is equal to US$2.20 a day (including interconnection), which means US$7.2 billion amortised over 5 years, divided over 2 million simultaneous users;

Tax on the Band:

- **Urban calls:** US$16 a day;
- **Long-distance calls:** US$147 a day;
- **Urban mobile telephone:** US$181 a day;
- **Intercontinental distances:** US$65 a day;
- **Satellite telephones:** US$47 a day.

Below the economic aspects of three projects of LEO satellite constellations are addressed as an example:

- **GLOBALSTAR:** the phone/data per minute service can be provided at 2.4/9.6 Kbps at the cost of 1.25-1.5 US Dollars. The download of a newspaper (equal to 1 MB) is made in 0.9 hours with a cost of 260-320 US Dollars;

- **IRIDIUM:** the phone service per minute at 2.4 Kbps is provided at a cost of 2-5.5 US Dollars, while the download of a newspaper (1 MB) is made in 3.5 hours with a cost equal to 420 - 1,150 US Dollars;

- **TELEDESIC:** it provides a phone / data per minute service at 16/64 Kbps/Mbps at a cost of 0.04 US Dollars, while the download of a newspaper (1 MB) is made in 4 seconds with a cost of 32 cents.

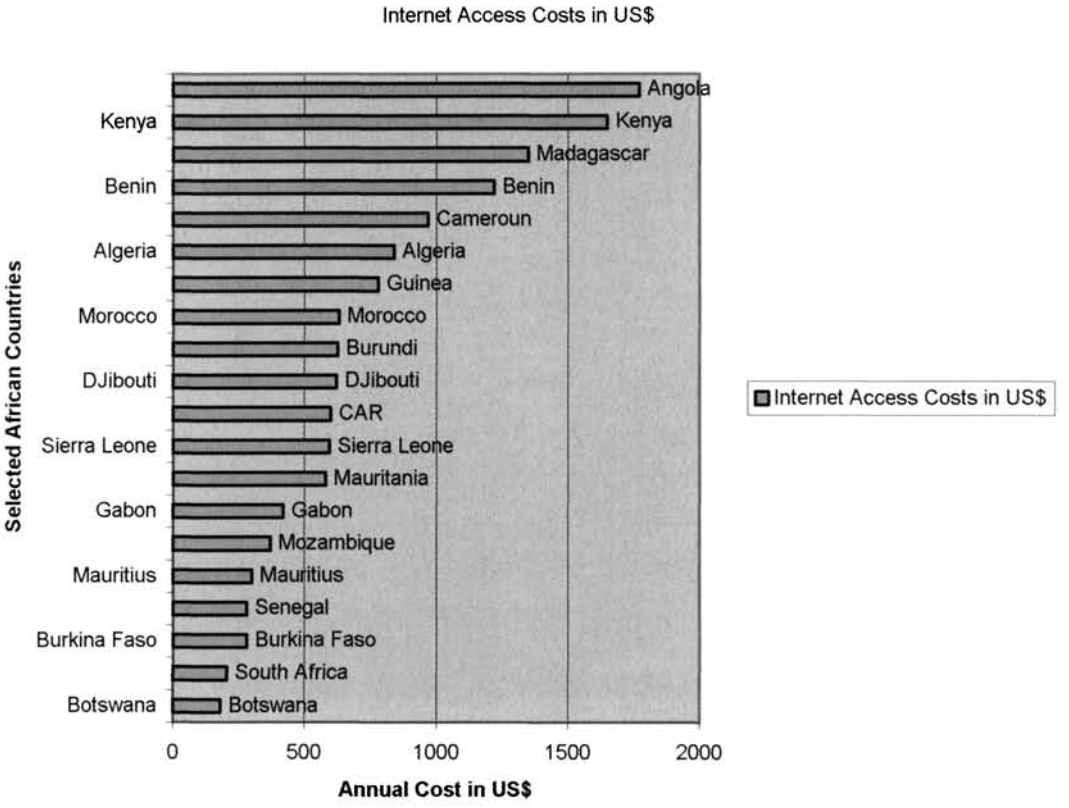


FIGURE 3-7: African Internet Access Costs (US $) - Data elaboration by Mike Jensen, 1998.

All these costs can be compared with the phone service per minute provided to date, for example, by the local ISPs in Tanzania and Kenya, which charge on average 8.95 US Dollars, plus a percentage tax amounting to 25%. This means that in the near future satellite transmission will make it possible for many Developing Countries to communicate with the whole world, by paying relatively low costs and without the problems of the vagaries of the weather or of natural disasters, which are prevalent in many of the Developing Countries.

There is to date an apparent tendency towards progressive saturation of the ground networks. The impossibility to use them in certain geographical areas give relative advantage to the observation that satellite communication can play a relevant role in the context of access to, and deployment of, the Internet.

Furthermore, irrespective of the costs associated with access and

deployment of the Internet in the Developing Countries, there are huge differences between its growth in the rural areas and in the big urban metropolitan centres. Some Developing Countries are already using the Net both in social and economic contexts, bringing in this way advantages and improvements to the community. This is exactly the topic we are going to deal with in the next chapters: What are the advantages that the Internet can give to the growth and development of the Developing Countries?