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Telecommunications Development: Policy Recommendations for Developing Countries

by

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ABSTRACT

Reform of the telecommunications sector has been a worldwide policy trend since the United States, the United Kingdom and Japan drastically reorganized their domestic industries in the early 1980s. Competition has been introduced into a previously monopolistic telecommunications market by many developing as well as industrialized countries. In earlier periods, however, telecommunications monopolies effectively developed national telecommunications networks. Rushing to break up the monopolies could potentially involve certain risks unless it is done at the right moment and in the proper manner.

By analyzing history, institutions and performance indicators for the telecommunications sectors in several countries, we show that institutional issue such as ownership does not affect the performance of the telecommunications sectors as much as is widely believed. Rather, a country's economy, an enterprise's autonomy and a government's attitude determine performance. Based on these findings, this thesis presents policy recommendations to foster the healthy growth of telecommunications in developing countries.

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May 1996

Takashi Hoshino
Belmont, Massachusetts

*For
Hanako*

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List of Abbreviations

ASST	Azienda di Stato per i Servizi Telefonici
AT&T	American Telephone and Telegraph Company
BT	The British Telecommunications
CPE	Customer Premises Equipment
CTC	Continental Telephone Company
DBP	Deutsche Bundespost
DGT	Direction Générale de Télécommunications or Dirección General de Telecomunicaciones
DTI	Department of Trade and Industry
EC	The European Community
EU	The European Union
FAG	Fernmeldeanlagenengesetz
FCC	Federal Communications Commission
FT	France Télécom
GDP	Gross Domestic Product
IRI	Istituto per la Ricostruzione Industriale
ITT	International Telephone and Telegraph
ITU	International Telecommunication Union
KDD	Kokusai Denshin Denwa
MCI	Micro Communications, Inc.
MFJ	Modified Final Judgment
MOC	Ministry of Communications
MOTC	Ministry of Transportation and Communications
MPT	Ministry of Posts and Telecommunications
NTT	Nippon Telegraph and Telephone Corporation
NTTPC	Nippon Telegraph and Telephone Public Corporation
OECD	Organisation for Economic Co-operation and Development
OFTEL	Office of Telecommunications
PTT	Posts, Telegraph and Telephone
SGT	Société des Générale des Téléphones
SIP	Società Italiana per l' Esercizio Telefonico
STET	Società Finanziaria Telefonica
TELMEX	Teléfonos de México
VAN	Value Added Network

1 Introduction

Since the 1980s, telecommunications reform has become a leading policy issue in every part of the world, regardless of a country's economic scale. The divestiture of the American Telephone and Telegraph in the United States and the privatization of British Telecom in the United Kingdom in 1984, followed by the privatization of the Nippon Telegraph and Telephone Corporation in Japan in 1985, became examples for other nations to follow.

These reforms are considered successful and effective at improving the performance of telecommunications enterprises. The number of countries working to reform these sectors has been growing. For instance, in Latin America, countries such as Argentina, Chile, Mexico and Venezuela, have privatized their telecommunications enterprises, which were formerly owned by those countries' governments. In Europe, Deutsche Bundespost Telekom became a joint-stock company in Germany in 1995 and France is planning to privatize France Télécom. It seems that nothing can stop this trend of reform in the telecommunications sector.

However, it should not be forgotten that the old-fashioned government monopoly was in fact effective at least in the early stages of telecommunications development, as a century of telecommunications development history in industrialized countries shows. We should also be aware that there are probably certain limitations in any kind of reform. Moreover, we do not yet know the final results of reforms that were carried out in the 1980s. Therefore, in order to implement a successful policy reform, recognizing what possible changes the reform will actually bring to a country's existing telecommunications system, is essential.

To consider effective policy to support the growth of telecommunications for developing countries, the key question addressed in this thesis is how institutions affect the performance of telecommunications sectors. The hypothesis of this thesis is that what determines the performance of the telecommunications sector is not institutional issues including ownership or regulation as is widely believed, but issues that are particular to the case in question, such as the autonomy of the financial and managerial aspects of the enterprise, isolation of the enterprise from political pressure, and the government's general attitude to telecommunications. To examine this hypothesis, we first review why regulation is necessary for telecommunications. Next, a historical survey of telecommunications development in selected countries, mostly industrialized nations, will be presented. Then, the performance of telecommunications sectors will be examined. Finally, policy recommendations for developing countries will be presented.

2 Telecommunications Regulatory Frameworks

Regulations are imposed on business activities, including telecommunications, for various reasons. Price regulation, entry regulation and universal service obligation, for instance, are imposed on the telecommunications industry in many countries.

Regulations usually fall into two categories concerning their functions: social regulation and economic regulation, although both are not always clearly distinguished. On the one hand, social regulations exist to secure public health or safety. On the other hand, a goal of economic regulations is to achieve economic efficiency.

The measures to realize these goals differ for social and economic regulations; however, the ultimate objective should be to work for an increase of benefits for the public. Of those regulations imposed on telecommunications sectors, price regulation and entry regulation are categorized as economic regulation. The universal service obligation, however, is a mixture of social and economic regulations.

What those regulations should be in the 1990s, has been and still is discussed intensively. As we will see in Chapter 3, the telecommunications sector has traditionally been tightly regulated in many countries. However, reforms including deregulation, liberalization, corporatization and privatization have been not only discussed but also actually carried out in some of the developed countries, led by the United States and the United Kingdom in the early 1980s. The trend of telecommunications reform was followed by a number of developing countries.

However, when considering the economic nature of the telecommunications industry, some regulations are in fact necessary, whereas some are existing just because of historical reasons and are no longer necessary. Therefore, distinguishing between necessary regulations and unnecessary ones is essential for planning and implementing any telecommunications reform. In this chapter, we will review why telecommunications requires certain regulations.

2.1 The Need for Regulation

Several economic reasons could justify the regulation of telecommunications. If the market mechanisms function perfectly, no regulation would be the preferred choice. By competing with each other, any number of private telecommunications companies could provide services in the most efficient way; simultaneously, consumers would gain the maximum benefit from this competition. However, the telecommunications industry is in fact a

far from perfect market. In addition, even perfect markets do not always lead to allocative efficiency, given the right circumstances, otherwise known as market failure.

Distance from Perfect Market

Ultimate objective of economic regulation is to achieve economic efficiency, a condition where the allocation of resources reach a certain optimum level. In other words, it is a situation where no one could benefit more without reallocating resources and worsen someone else's situation. This condition is known as Pareto optimum (Cullis & Jones, 1987, pp.5–13).

Under certain ideal assumptions, economic efficiency can be achieved only by means of pure competition through a perfect market: people's actions, seeking to improve just their own profits, will allocate the resources in the most efficient way (Cullis & Jones, 1987, p.4).

However, assumptions required for the perfect market are too strict to be realized: all of the producers in the industry have to make a homogenous good by means of an identical production process; there have to be many producers and consumers; complete information regarding the industry has to be shared by all producers and consumers; and free entry and exit to the industry have to be also assured (Pindyck & Rubinfeld, 1995, pp.271–272).

Most of the industries, including telecommunications, do not satisfy these assumptions and thus their markets are considered far from perfect. Therefore, achieving economic efficiency by only depending on market mechanisms for most of the industries may be very difficult or almost impossible.

Market Failure

Moreover, even when all the assumptions for perfect markets are held and thus a market is considered perfect, achieving economic efficiency through the market is difficult for numbers of reasons. This is known as market failure, the market would be not fully functioning and hence the products would not be provided at optimal level under certain circumstances (Cullis & Jones, 1987, p.14). The sources of market failure are the existence of natural monopolies, incomplete information, externalities and public goods. If these are present, some measure is necessary to help the market work properly.

Natural Monopoly

When there is only one producer in the industry for any reason, the producer is called a monopolist. The market monopolized by such a producer is called a monopolistic market. In such an industry, the monopolist can maximize its profit by selling products at higher prices than would be possible in a competitive market. This is achieved by reducing the quantity of products available. In general, the monopoly is considered harmful because it most likely exploits the consumers. That is why the Sherman Antitrust Act was established in the United

States, which prohibits monopolies. However, as we will see later, a monopoly is considered desirable and justified under certain conditions known as a natural monopoly, under which a market will necessarily fail.

A natural monopoly is probably the most cited reason to justify a monopoly in certain kinds of industries such as public utilities (Sharkey, 1982, pp.147–151; Duch, 1991, pp.12–14). A monopoly is usually considered harmful because of its power to control prices, resulting in exploitation of consumers. However, a natural monopoly is allowed because it can provide the products at the lowest cost—with relevant regulation. For instance, the Japanese Antimonopoly and Fair Trade Act exclude explicitly its application to the production, sales and supply of certain kinds of industries: railways, electricity and gas – utilities. Water supply and canal operation are exempted implicitly. A natural monopoly is clearly stated as a reason for the act of exclusion of these industries (Antimonopoly and Fare Trade Act, Article 21).

A natural monopoly is justified when there is cost subadditivity, a term that will be explained below, within the industry in question. In such an industry, larger firms can always produce at lower cost and thus can sell at lower prices than smaller firms can. Not being able to compete with larger firms, smaller firms will go out of business or be acquired by larger firms. Eventually, this industry will be solely occupied by the winner, or the natural monopolist.

As this process of selection is inevitable for industries in which the presence of cost subadditivity is known, allowing a monopoly is the most desirable from the outset. This is mainly because the products can be provided at lower cost by a natural monopolist than by many different firms, and because the duplicate investment in facilities by the firms can be avoided. However, unlike a competitive market where the price of a product is equated to the marginal cost of its production, the monopolist, regardless of whether it is natural or artificial, can raise the price of products to above the marginal cost. This justifies a private monopoly with regulation or a public monopoly.

Cost Subadditivity

An industry will be subject to natural monopoly, when the industry's production cost structure shows subadditivity. Assuming that all the producers in a given industry have the same cost function $C(q)$ where q equals the units of products, cost subadditivity exists when the following condition is satisfied:

$$C(Q) < C(q_1) + C(q_2) + \dots + C(q_n) \quad (2.1)$$

where $Q = q_1 + q_2 + \dots + q_n$

This implies that producing Q units would cost less if all the products would be made by only one firm rather than by many firms producing smaller numbers of units.

The condition (2.1) is easily expanded for the multi-product case, simply replacing scalar by vector, representing outputs.

$$C(\mathbf{Q}) < C(\mathbf{q}_1) + C(\mathbf{q}_2) + \dots + C(\mathbf{q}_n) \quad (2.2)$$

$$\text{where } \mathbf{Q} = \mathbf{q}_1 + \mathbf{q}_2 + \dots + \mathbf{q}_n$$

In single and multi-product cases alike, cost subadditivity is a necessary and sufficient condition for a natural monopoly (Sharkey, 1982, p.58; p.64). Even though it is mathematically simple, cost subadditivity is not easily verified in reality. Therefore, when discussing a natural monopoly, concepts of economies of scale or scope are used to verify subadditivity of the industry in question (Sharkey, 1982, p.56).

Economies of Scale

Natural monopolies will occur in the presence of economies of scale. When the increase in cost is less than the ratio of increased output quantity, economies of scale are said to exist.

Mathematically, this is expressed as:

$$C(q_2) / C(q_1) < q_2 / q_1 \quad (q_1 < q_2) \quad (2.3)$$

This can be interpreted as a decreasing average cost of production:

$$C(q_1) / q_1 > C(q_2) / q_2 \quad (q_1 < q_2) \quad (2.4)$$

Suppose that the i -th firm would produce q_i units, then

$$C(Q) / Q < C(q_i) / q_i \quad (2.5)$$

$$\sum q_i \cdot C(Q) / Q < \sum C(q_i) \quad (2.6)$$

$$C(Q) < \sum C(q_i) \quad (2.7)$$

Since the last equation is the same as (2.1), we can conclude that economies of scale are a sufficient condition for cost subadditivity. Notice that since the only condition to make (2.7) valid is (2.5), (2.4) is not necessarily kept for all of the range of q . Therefore, economies of scale are not a necessary condition for cost subadditivity.

Economies of Scope

When various kinds of products can be produced more inexpensively by only one producer than by numbers of producers, it is said that there are economies of scope (Stehmann, 1995, 46). We should be aware that there is no direct relationship between economies of scale and economies of scope (Pindyck & Rubinfeld, 1995, p.218).

We assume that the amount of Q_1 and Q_2 are produced for the product 1 and 2, respectively. The condition for economies of scopes is written as:

$$C(Q_1, Q_2) < C(Q_1, 0) + C(0, Q_2) \quad (2.8)$$

Since this condition is a special case of (2.2), as we can easily examine, economies of scope are a necessary condition for cost subadditivity.¹ Economies of scope usually exist when input can be used to create two or more final products in a complementary fashion.

Incomplete Information

When the pertinent information regarding products, such as quality or true value, is not open to consumers, they cannot make proper decisions on purchasing the products. Consequently, products of lower quality tend to be supplied and purchased. This will result in wide diffusion of low quality products. A similar problem will also occur when only the consumers have accurate information, as in the case of buying life insurance. Both will eventually lead to market failure (Pindyck & Rubinfeld, 1995, p.594).

Externalities

Externalities are any action by firms or consumers that affect the behavior of other producers or consumers, but not through market activity. As the externality is not incorporated in the market mechanism, market failure will occur. The price and quantity of the products determined by the market do not properly reflect the true demand and supply. This is due to disregarding external effects. As a result, the products will be supplied in quantities less or more than consumers are actually demanding (Cullis & Jones, 1987, p.14–17).

Public Goods

A good that is both nonrival and nonexclusive is called a public good. If the marginal cost of producing the good is zero, the good is called nonrival. When any group of people cannot be excluded from consuming the good, it is called nonexclusive. Market failure will happen because the supply will be insufficient due to difficulty in charging everyone who benefits from public goods (Cullis & Jones, 1987, pp.18–21).

¹ Sufficient condition for cost subadditivity in the multi-product case is much more complicated than in single-product cases. For further discussion of sufficient conditions, see Sharkey (1982, pp.67-73).

2.2 Economic Properties of Telecommunications

In this section, we will examine how we can apply the general discussion from the previous section to telecommunications.

Natural Monopoly and Telecommunications

The question whether or not telecommunications is subject to a natural monopoly, is an essential issue to telecommunications regulations. Exploring the status of telecommunications requires us to examine cost subadditivity in the telecommunications industry; however, this is not very easy to accomplish. A number of studies have been carried out to examine the rationale for a natural monopoly. However, there is very little evidence to support the existence of natural monopoly characteristics in the telecommunications industry.

Stehmann (1995, p.50) concludes that “little empirical evidence could be found for a natural monopoly in telecommunications networks.” In a survey of past studies one can find the following: On the one hand, Waverman concludes that there were neither significant economies of scale nor scope, examining AT&T during the period 1947–77 (cited in Stehmann, 1995, p.49). On the other hand, some studies ascertain the existence of a natural monopoly only in a part of the networks. As for the United Kingdom, Hunt and Lynk studied the telephone department of the Post Office, the forerunner of the British Telecom, during 1951–81. They found that there was subadditivity in the local networks (cited in Stehmann, 1995, p.49). A study of Intelsat by Snow proved the existence of cost subadditivity networks (cited in Stehmann, 1995, p.49).

Armstrong, Cowan and Vickers (1994, p.200) conclude that “there is no strong reason to expect significant natural monopoly in the supply or manufacture of apparatus or in the supply of services over a network, but aspects of network operation and construction may be naturally monopolistic to a degree.” Examining several studies, they summarize that the empirical evidence on natural monopoly in networks operation is mixed: Evans and Heckman, and Hunt and Lynk find evidence to support the hypothesis that prior to divestiture, the Bell network in the United States was not a natural monopoly, whereas Röller reaches the opposite conclusion; Shin and Ying argued that the regional networks in the United States are not natural monopolies (cited in Armstrong, Cowan & Vickers, 1994, p.200).

The fact that many conclusions were mixed, may tell us that not enough data is available to show the existence of economies of scale. When considering economies of scope, discussions regarding natural monopoly would be more difficult. If there were diseconomies of scale, the effect of economies of scope might be offset. There is little persuasive reason to

believe that telecommunications are subject to a natural monopoly. However, partial natural monopoly may be recognized when considering particular parts of the networks.

Externalities and Telecommunications

Telecommunications definitely has the characteristic of network externality. The more telephones there are, the more the subscribers benefit. However, because the social benefit is not reflected in the price, supply of telephone lines, if determined by the market, will be fewer than people would demand. This affects the network's growth in two stages of the telecommunications development: One effect can be seen in the infancy stage, the other in the mature stage (Figure 2.1).

Even without considering social benefits, certain subsidies or regulations are necessary until "critical mass" point and after the "exit" point (Noam, 1994, pp.19–25). However, if we allow for the social benefit as an externality, more government intervention would be necessary to increase the number of telephones in both stages.

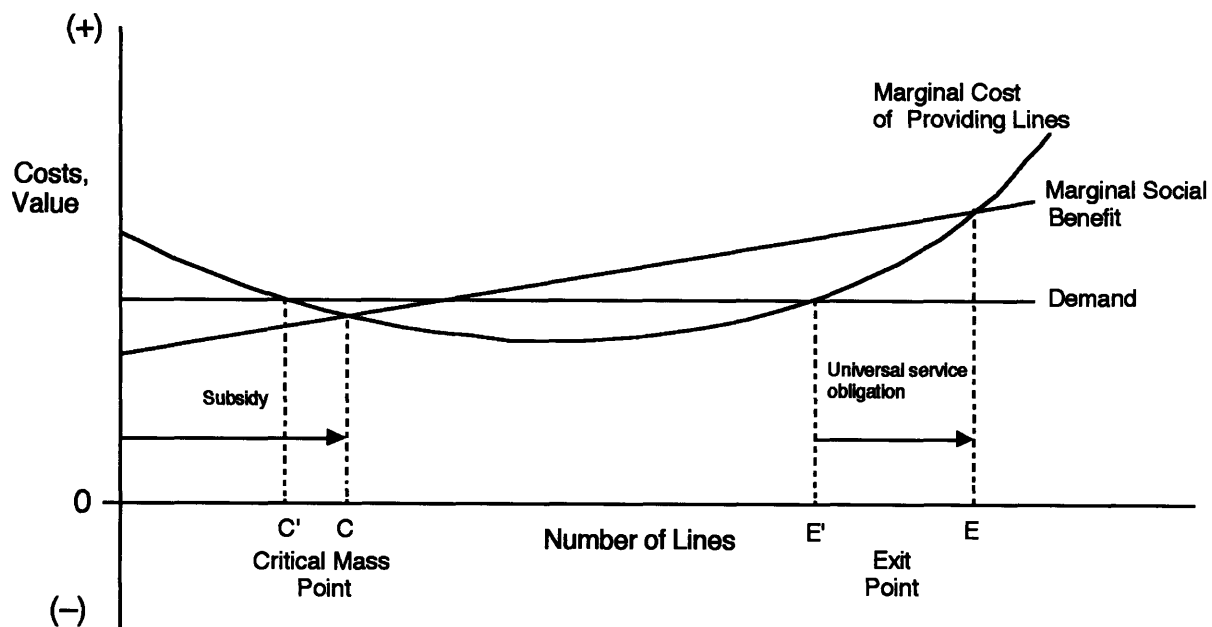


Figure 2.1 Effect of Network Externality

Source: Adapted from Noam, 1995, p.19.

In the early stage of development, the benefit from using telephones is minimal because there are few people to whom one could talk. Thus the subscribers receive fewer benefits than they are expecting from their investments in the telephone. As a result, fewer telephone lines will be supplied than desired. Until reaching the critical mass, development of telephone networks requires subsidies. As shown in Figure 2.1, an actual critical mass point, C, would be underestimated as C', if not considering the external social benefit as a network externality.

Once the number of telephones is raised to the critical mass level, by government subsidy or by charging an expensive installation fee, the number of subscribers will be increased automatically, because the benefit from using a telephone is more than the marginal cost of providing telephone lines. After the critical mass point, people become willing to pay for the telephones.

An actual exit point, E , is more than the level determined by demand, E' (Figure 2.1). Thus, to raise the number of lines, a so-called universal service obligation is necessary. Without this obligation, private enterprise might not serve unprofitable areas such as remote islands or less populated regions.

Therefore, pertinent actions by regulators are required to sustain the development of telephone networks, both in the initial and final stage of telephone network evolution.

Other Considerations

The telecommunications infrastructure is considered to have a nonexclusive nature; however, it is not regarded as a public good in the exact sense of the term, because the marginal cost of service provision does not equal zero. Incomplete information may apply to telecommunications because the exact cost of a telephone call is not open to the consumers.

Although it is not necessarily connected to market failure, sunk costs are worth mentioning here because they are usually large in the telecommunications industry. Sunk costs are the investments that cannot be recovered when quitting the business. This is different from fixed costs, which is any fixed amount of investment during business. The fixed costs may or may not be recovered afterwards. Sunk costs are usually large for the telecommunications industry, because most of the telecommunications facility, including telephone lines and exchange machines, cannot be used for purposes other than telecommunications. Moreover, such a facility is usually expensive. Therefore, unless new investors are wishing to inherit the facility, the initial investment will be a sunk cost. It is widely believed that allowing a monopoly is appropriate in an industry like telecommunications, which has a large sunk cost, in order to avoid multiple investments (Stehmann, 1995, p.58).

2.3 Regulation of Telecommunications

As we saw, theoretically, the industry with the characteristic of natural monopoly will be dominated by the monopolist. Therefore, the capital that cannot be recovered and was invested by the dropped-out firms might be considered wasted unless assets could be inherited by the winner, the monopolist. Moreover, without any regulation, the monopolist might abuse the market by using its strong market power. These are the reasons for the regulations for entry and price. In the case of private ownership, regulations are often strict. Alternatively, public ownership is a solution in many countries, although it is not an economic consequence of natural monopolies.

Entry Regulation

Theoretically, because of competition in the industry subject to natural monopoly, only one firm will remain, as already mentioned. Investments in the facility by a firm other than the winner, will be redundant, if the costs cannot be recovered. Therefore, some form of entry regulation is imposed on the industry with the natural monopoly in order to avoid the social loss of duplicate investment in advance (Stehmann, 1995, p.57). These entry regulation may be by franchise, concession or license as we will see later in Chapter 3.

Price Regulation

In the case of perfect competition, an individual enterprise does not have the power to control the price. The price and quantity of the products is determined by the demand and supply balance. Under the perfect competition condition, firms will adjust their output in such a way that the marginal cost is equal to the price. This assures maximum profits for the firms and maximum benefits for the consumers at the same time.

However, because the monopolist has the power to control the price and the output as well, equating the marginal cost and the marginal revenue will result in higher price and lower output than in the competitive market.

This will bring excessive profit to the monopolist. Consumers will suffer most from lost benefits. Therefore, pertinent price regulation is necessary, because there is no incentive for the monopolist to reduce the price (Armstrong, Cowan & Vickers, pp.39–44).

Marginal Cost Pricing

The best solution is to impose marginal cost pricing on the monopolist, because this will achieve economic efficiency in the sense that no dead weight loss will occur (Armstrong, Cowan & Vickers, 1994, pp.14–16, pp.49–50).

However, in the industry subject to a natural monopoly, a firm always has losses under marginal cost pricing. The profit for the firm can be described as:

$$\pi = q(p) \cdot p - c(q(p)) \quad (2.9)$$

Break-even price will be obtained by letting $\pi = 0$:

$$p = c(q(p)) / q(p) = AC \quad (2.10)$$

In a natural monopoly, the marginal cost of production is always below the average cost, AC. Therefore, the monopolist will inevitably have a loss with marginal cost pricing. A government subsidy would be necessary to cover the production cost of the monopolist.

Rate-of-Return Regulation

Rate-of-return regulation is a way to determine the price based on a fair return on an investment. Usually, the price is determined by the following formula under the rate-of-return regulation (Pindyck & Rubinfeld, 1995, p.344):

$$P = AVC + (D + T + s \cdot K) / Q \quad (2.11)$$

where AVC: Average variable cost of production

D: Depreciation, T: Taxes

s: Rate-of-return, K: Capital stock

In many countries, the rate-of-return regulation has been widely used to decide the price for public utilities because of its ease of use (Saunders, Warford & Wellenius, 1994, p.259). It is very easy to understand the principle and calculate the price. In addition, the price assures public utility companies to recover their huge sunk costs. In Japan, the prices for telecommunications are based on the rate-of-return principle (Telecommunications Business Law, Article 31). Before the regulatory reforms, rate-of-return regulation had been used for telecommunications in the United States and the United Kingdom (Vickers & Yarrow, 1988, p.204; pp.205–208).

Nevertheless, there are also disadvantages. First, because the price depends on the capital stock, the firm tends to make excessive investments in unnecessary facilities. Second, because knowing the exact cost of a particular product is usually difficult for the regulator, the price involves a certain degree of arbitrariness, which is advantageous for the firm. Third, increases in the costs, regardless of internal or external reasons, can easily be rolled over to the price. Altogether, there is very little incentive to improve internal efficiency under rate-of-return regulations (Saunders, Warford & Wellenius, 1994, p.296; Vickers & Yarrow, 1988, pp.82–85).

2.4 Organizational Variations

Telecommunications enterprises could be categorized into either public or private in terms of ownership. However, as there are many variants between pure public and pure private, classifying the ownership of a particular enterprise is often difficult.

When a business entity is a government department or agency, public ownership is clear. It is also true for the case of a public corporation, which is often totally owned by the government but separated from the government body. In the case of joint-stock corporations, stock shares will determine the ownership.

AT&T is clearly a private company, whose shares are entirely held by the private sector. NTT in Japan was said to be privatized in 1985; however, the government still holds two thirds of its stock. Telefónica in Spain is neither a pure private company nor a public corporation. It is reasonable to refer to NTT, Telefónica and others like them, as semi-private companies.

Table 2.1 Government Shares in the Selected Telecommunications Enterprises

Country	Company	Government Share (%)
US	AT&T	0.0
Japan	NTT	65.57
UK	British Telecom	0.0
France	France Télécom	100.0
Germany	DBP Telekom	100.0
Spain	Telefónica	32.0
Mexico	TELMEX	4.8

Source: Toyo Keizai Database, Wellenius & Stern (1994), Petrazzini (1995), Duch (1991).

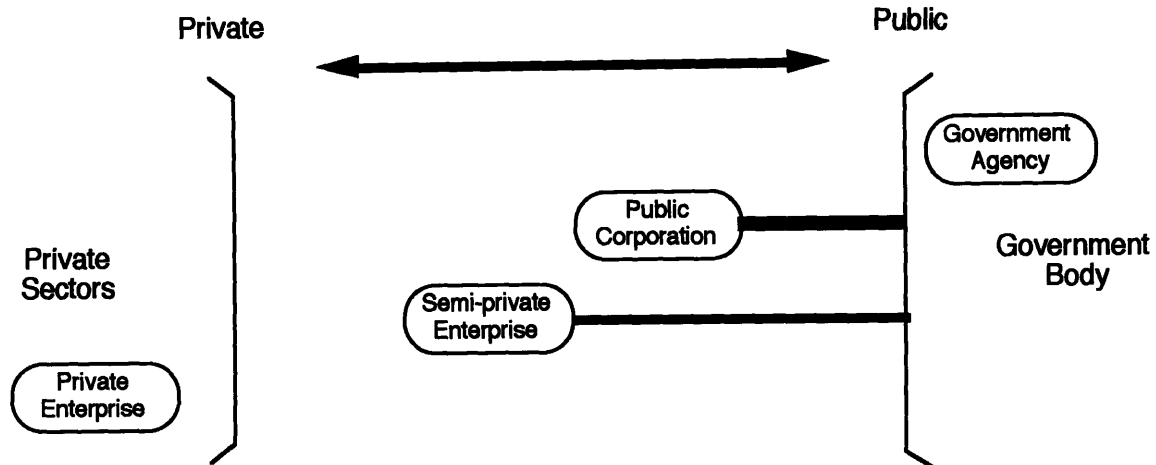


Figure 2.2 Private–Public Spectrum

Within the public–private spectrum, it is convenient to place categories like public corporation and semi–private enterprise.

- Government Agency

In the case of telecommunications, a government agency itself quite often carries out business. Being within government, a business entity typically has less autonomy regarding financial and management issues (Duch, 1991, p.43). Traditional European PTTs are examples of government agencies providing telecommunications services.

- Public Corporation

A public corporation is an entity separated from the government body. Therefore, it has more autonomy than a government agency does. A public corporation is often subject to a special law as well as to general business law. Tax is often exempted. British Telecom before privatization is an example of a public corporation.

- Semi–private Enterprise

A semi–private enterprise is somewhere between a public corporation and a pure private enterprise (Duch, 1991, p.42), such as NTT in Japan or Telefónica in Spain.

- Private Enterprise

A private enterprise is a company totally owned by the private sector as in the case of AT&T in the United States.

2.5 Problems with Public Ownership

Some criticize that the public sector has not kept up a good performance. Several reasons are proposed to explain the internal problems of the publicly owned enterprise.

Principal–Agent Problem

As discussed in Chapter 2, simply pursuing profit maximization will accomplish economic efficiency. In this sense, any enterprise has to try to maximize its profit by reducing the production cost and increasing sales. However, within an enterprise, numbers of people are motivated by different incentives, seeking objectives other than profit maximization. The principal–agent problem explains this situation (Armstrong, Cowan & Vickers, 1994, pp.27–28).

For the company where the principal (i.e., owners) and the agent (i.e., managers) are the same, motivating a company as a whole toward profit maximization is easy, because income for all will be raised as a direct result of their efforts toward profit maximization. However, except in very small companies, the goals of a principal and an agent are often different, because profit maximization does not necessarily lead to raised incomes for managers. Even though both the owner and the managers pursue profit maximization, the actions of the managers toward profit maximization will not always result in income maximization for the same managers. Thus there is less incentive for profit maximization for managers, even in private companies.

The principal–agent problem is more complicated, especially with publicly owned enterprise: an owner's goal is quite often not profit maximization. For example, the government tries to maximize social benefits or public interests by using the enterprise as a political instrument, e.g., increase employment, or by offering necessities at a lower cost. In addition to increasing social benefits, sometimes publicly owned enterprises are used to attract public attentions and gather votes. For instance, constructing unnecessary highways in less populated areas may be politically popular. Therefore, because the difference in objectives between principal and agent is wider in public enterprises than in private ones, internal inefficiency is said to occur commonly with public ownership.

X–inefficiency

Another source of internal inefficiency is called X–inefficiency. This is a situation in which a firm's total cost is not minimized because the actual output achieved from the given input is less than the maximum feasible level. X–inefficiency is also categorized as technical

inefficiency because it is related to the production process (Saunders, Warford & Wellenius, 1994, p.281).

For a monopolist, due to the absence of competitive pressures, a firm has little incentive to increase productivity. In the first place, no measure for comparing productivity is available to the monopolist. Secondly, improving productivity does not bring benefits to the monopolist because the profit is usually assured. The consumer will suffer from higher prices as a result of X-inefficiency. Competition is expected to improve X-inefficiency by giving incentives to reduce the costs of production in order to stay in the market. Other than improving economic efficiency, X-inefficiency is frequently cited as a reason for introducing competition into the industry, which was formerly believed to be subject to a natural monopoly (Duch, 1991, pp.90–91; Stehmann, 1995, p.51).

3 Telecommunications Development Histories

In this chapter, we review the development history of telecommunications in selected countries, mostly from the industrialized world, in order to examine the reasons for successful or unsuccessful development.

3.1 The United States

Telephony in the United States was characterized by private provision from day one—unlike most other industrialized countries. The Bell System had been expanded successfully by protecting itself through a patent in the early years and later by rejecting connections requested by new entrants. However, challenged by the Justice Department, AT&T was finally broken up in 1984 (Brock, 1994, p.168).

Early Years of Development

The history of the telephone began when Alexander Graham Bell filed his patent application for the telephone as an “improvement in Telegraphy” to the Patent Office on February 14, 1876. After the success in creating a workable telephone by using patented techniques, the Bell Telephone Company was established in August 1877. In the early years of the Bell’s business, there was a competitor, the American Speaking Telephone Company, formed in December. It was a subsidiary of Western Union, the company that had created telegraphy networks, first with the financial support of the federal government (Oslin, 1992, pp.217–222).

American Speaking used the technique developed by Elisa Gray, who filed the patent application regarding the method of transmission of the human voice a little later on the same day as Bell did, and Thomas Alvah Edison, who developed a better transmitter of the telephone than Bell’s. American Speaking expanded its networks, taking advantage of Western Union’s facilities (Oslin, 1992, p.222).

AT&T Monopoly

In 1878, the Bell Telephone Company sued Western Union, charging Gray infringed on Bell’s patent. Expecting that the law suit would take much time and money, Western Union offered a compromise to the Bell company. There had been long arguments, which included the plan that Western Union would take long–distance and the Bell local networks. Finally, in November 1879, both agreed that Bell would operate only telephones and Western Union only telegrams (Oslin, 1992, p.228). In November 1879, Bell Telephone was expanded and

renamed the National Bell Telephone Company. It soon became a nationwide long-distance company called American Telephone and Telegraph Company (AT&T), serving 240,000 telephones with 10,000 employees by the year 1892 (Oslin, 1992, p.231).

Until the mid-1890s, AT&T had enjoyed its monopolistic position protected by the Patent Act. After the expiration of the patent, many new companies entered the local market. However, refusing to open its long-distance network to local independent companies, AT&T managed to keep its position (Noam, 1994, p.474).

The First Antitrust Case

In 1934, the Communications Act was passed. The purpose of the act was to regulate interstate and international telecommunications and to create the Federal Communications Commission (FCC). AT&T, as a private monopolist, operated under the FCC's supervision (Brock, 1994, pp.49-56).

After World War II, pressures on AT&T gradually began to increase. In 1949, AT&T's vertical integration was challenged by the Department of Justice. The antitrust case charged a part of AT&T, monopolistic status of Western Electric in telephone and related equipment markets, and asked for separation of Western Electric from AT&T. Insisting that Western Electric was an integral part of AT&T, and with strong lobbying and support by the Defense Department, however, AT&T managed to avoid the separation. Instead, the Consent Decree of 1956 restricted Western Electric to telephone manufacturing and forced it to open its patents, including transistors, to third-party licensing. This time, AT&T successfully maintained its monopoly status (Brock, 1994, pp.70-72).

Challenges by MCI

Although full liberalization was not intended, partial or specialized entry to the telecommunications industry—motivated by technological progress—had been a part of FCC policy. In 1959, the FCC permitted private use of microwaves with its Above 890 Decision (Brock, 1994, p.107). Satellite communications were also opened by the FCC's open-sky policy in 1974. The policy opened domestic satellite communications to companies other than AT&T (Noam, 1995, p.36).

In 1969, Microwave Communications, Inc. (MCI), obtained approval from the FCC to construct a microwave line between St. Louis and Chicago. Since then, expansion of MCI has continued (Brock, 1994, p.114). In 1975, MCI began to offer a dial-up long-distance service called Execunet by using its long-distance microwave lines and AT&T's local networks.

Because the service was not compatible with the FCC's initial authorization for MCI as a special common carrier, the FCC ordered MCI to discontinue Execunet (Noam, 1995, p.36).

However, in 1977, Judge J. Skelly Wright of the Appeals Court reversed the FCC's decision. The FCC's appeal to the Supreme Court was refused. Finally, in 1978, the FCC came to a decision regarding Execunet and authorized MCI's service (Brock, 1994, p.139).

AT&T Divestiture

Another antitrust case concerning AT&T had been filed in 1974, charging that AT&T used unfair trade practices, which prevented its competitors from interconnection, by imposing high connection fees (Brock, 1994, p.152). The Department of Justice viewed AT&T as participating in three separate markets: as a long-distance service, local service and customer premises equipment fee service (Brock, 1994, p.153). By restricting connection of long-distance lines or equipment to its local networks, AT&T was deemed to be abusing its monopoly power allowed in local service by state regulation (Noam, 1995, p.36).

In 1982, the Justice Department and AT&T reached an agreement. The Consent Decree of 1956 was modified by Judge Harold Green, known as the Modified Final Judgment (MFJ). As a result, in 1984, AT&T was split into the new AT&T as a long-distance operator, and twenty-two regional Bell operating companies, or Baby Bells grouped into seven Regional Bell Operating Companies (RBOCs). Western Electric and Bell Laboratory were allowed to remain within AT&T (Brock, 1994, pp.161-162).

During this period, deregulation for customer premises equipment (CPE) had been completed, advancing from the early Hush-a-Phone decision in 1956 and Carterfone decision in 1968. After January 1, 1983, subscribers were able to install any equipment on the telephone line they desired, as long as the equipment conformed to certain technical standards (Brock, 1994, p.97).

Telecommunications Act of 1996

Although the regulatory framework of telecommunications was altered drastically by the MFJ, the basic law governing the telecommunication sector was still a dated one, the Communication Act of 1934. However, in February 1996, a new act introduced major changes to the legal framework. The Telecommunications Act of 1996 overrules restriction imposed by the state regarding new entry or competition in both local and long-distance telephone services (Section 253(a))². The Baby Bells are allowed to engage in long-distance business outside their regions (Section 271(b)(2)). Within their regions, long-distance service will be allowed

² Responding to the new Act, merger of two regional Bell operating companies, Nynex and Bell Atlantic was announced in April 1996. The merger will create the second-largest telephone company in the United States after AT&T (The New York Times, 1996).

(Section 271(b)(1)), after completing a series of steps to remove entry barriers for local telephone competition, known as competitive checklist (Section 271(c)(2)(B)).

The prohibition of cross-ownership of telephone and cable television services has been abolished: a local exchange carrier can distribute video programming to the subscribers either by open-video system (Section 653) or becoming cable television operator (Section 651). In addition, new universal service rules are defined to continue subsidizing telephone service for rural and low-income subscribers, and to require discounts for schools, libraries and other public institutions upon request (Section 254). As for telephone equipment, the Act allows the Baby Bells to manufacture telephone equipment after the FCC approves their application for out-of-region long-distance services (Section 273).

The Act intends to accelerate development of competitive markets within all fields of the telecommunications industry. Removing entry barriers will attract many entrepreneurs to the industry, and thus will lead to job creation. Among others, however, the consumers will benefit most from the Act: they will be able to choose from a variety of local telephone operators, just like we now choose long-distance companies.

Through this competition, it is expected that the cost of local telephone services will also be lowered, similar to what has been occurring for long-distance services. Low price is also assured by one of the universal service principles stipulating that quality services should be available at a just, reasonable, and affordable rate (Section 254(b)(1)). Another principle also assures that the consumer in rural or high-cost areas will have access to telecommunications services at rates that are reasonable when compared to those same services provided in urban areas and that are available at rates that are reasonable when compared to rates charged for similar services in urban areas (Section 254(b)(2)). Children will also have advantages: schools will have access to advanced telecommunications services with discount rates (Section 254(b)(6); Section 254(h)(1)(B)). This will promote the connection of every school by computer networks. In sum, the act is expected to make telecommunications services more accessible, beneficial and affordable for consumers.

3.2 The United Kingdom

As in France, telephony in the United Kingdom had been owned and operated by the private sector since the beginning. In 1911, the British Post Office acquired private telephone companies to protect revenue from their telegraph, which had been profitable before (Stehmann, 1995, p.238). Although the government run telephone business was not terrible in terms of service, internal inefficiency had been criticized (Duch, 1991, p.217). With Mrs. Thatcher's enthusiasm for the market economy, in 1981, British Telecom (BT) was created as a separate telecommunications enterprise and separated from the Post Office. Later, in 1984, BT was privatized. At the same time, a so-called duopoly policy, which only allowed Mercury to enter the industry, was introduced to foster a competitive environment. As it turned out, the duopoly policy was not successful and thus was removed in 1991 (Stehmann, 1995, p.255).

Early Development by the Private Sector

In the United Kingdom, the telephone service was established and carried out by the private sector. For the government, the telephone was not very attractive in those days, because it was considered to be limited to local communications. The telegraph, however, was deemed important because of the capability of long-distance communications and profitability as well.

A couple of private companies had begun local telephone service with their own facilities. Soon it was proven, however, that the duplication of the networks was inefficient. For example, the Telephone Company and the Edison Telephone Company were merged to create the United Telephone Company. This way, the local companies expanded and created inter-city telephone lines in spite of tight regulation by a government that feared losing telegraph revenues (Duch, 1991, pp.219–220).

Nationalization

The government began to consider nationalization of the telephone industry, mainly because of the diminishing telegraph revenue because of the growing competition with the telephone. By providing all the telecommunications services including telegraph and telephone as well as mail, the government Post Office could capture all the revenue from both businesses.

Private telephone companies were consolidated into one company, called the National Telephone Company, to raise their value when the government purchased the company. By the end of the year 1911, thirty years of private provision of the telephone had ended. The Post Office became the sole entity responsible for all telephone services.

Nationalization, however, was not a good fuel for the development of the telephone. The reason for nationalization was, as in France, in order to protect the telegraph, not to promote telephones as mentioned (Duch, 1991, pp.220–221).

Interwar Period

As customers were not satisfied with the deficient telephone services, the number of criticisms against the Post Office was growing. In 1920, a select committee consisting of business users of telephones was established to make recommendation for telephone services. The conclusion of the Committee was that the Post Office was restricting the development of telephony especially in the rural areas, and that the intervention of the Treasury prevented the Post Office from making long-term plans (Duch, 1991, p.222).

The Liberal Party's election platform in 1929 emphasized the importance of increasing investment in telephony, influenced by the Keynesian policies. The platform suggested that telephone services should be run on businesslike principles (Duch, 1991, p.222).

In 1932, supported by industrial interests, Members of Parliament signed Memorial (a sort of petition). It recommended the elimination of Treasury intervention to the Post Office and the adoption of business oriented principles by the telephone service. Reacting to the Memorial, the government made recommendations stating that the Treasury should reduce strict Treasury auditing over expenditure, and that the autonomy of the telephone sections within the Post Office should be expanded (Duch, 1991, p.223).

In spite of these pressures, changes were refused by both the Treasury and the Post Office. The Treasury wanted to keep its power to control as many other government agencies as possible. Similarly, officials in the postal service did not want to lose their positions, which was stronger than those in the telephone service. Within the government body, the telephone officials were their only proponents. Other recommendations by the Institute of Professional Civil Servants that the telephone and telegraph be separated from the Post Office were also ignored (Duch, 1991, p.224).

After the War

The year World War II ended, the Labour Party government made it a policy to create public corporations, which had a flexible management and more freedom from auditing by the Parliament and Treasury. However, the Post Office was not included in the list of public corporations, due to strong opposition from workers within the Post Office. They insisted that it is not appropriate to separate such a central department with a long history like the Post Office from the government body. It was also argued that the telecommunications business

should be run by the government itself for national security reasons (Duch, 1991, pp.225–226).

Although the pressure for telephone service improvement continued, recommendations included in a number of the White Papers and other reports were not effectively implemented (Duch, 1991, pp.227–228). However, telephone networks were becoming successful, compared with the telephone networks in neighboring countries. Rather, internal inefficiency was the critical problem. As shown in Table 3.1, shortly before telecommunications reform began, the productivity of telecommunications sectors in the UK was considerably behind that of other industrialized countries with similar levels of telecommunications development.

Table 3.1 Performance of Telecommunications Enterprises in Selected Countries in 1980

Country	Main Lines per 100 Inhabitants	Main Lines per Employee	Income per Employee ¹
UK	31.70	73.79	28,922
France	29.33	97.90	51,114
Germany	33.39	105.31	61,137
Japan	33.13	115.26	41,444
USA	41.20	98.56	58,154

Source: ITU (1984).

¹ In 1980 US dollar.

Drastic Changes

For a long period, there had been little change in the regulatory framework of telecommunications. However, drastic change began when Margaret Thatcher became the Prime Minister in 1979. She brought a strong belief in liberalization and privatization of industries to her new post. In 1981, the British Telecommunications Act was enacted. It created a public corporation, British Telecom, as a separated entity from the Post Office. With a certain degree of autonomy, BT was expected to change and become more market-oriented and customer-oriented. However, BT's right to borrow in the private market was denied, tariffs continued to be manipulated for political purposes, and purchasing remained under government supervision (Duch, 1991, pp.231–232).

Apart from the creation of BT, the act liberalized telecommunications equipment provision, which had been formerly monopolized by the Post Office. Anyone was then able to

supply customer premises equipment—all but the first telephone.³ Value added network (VAN) services over BT's networks were also liberalized. In addition, a competitor to BT was allowed to enter the industry. Mercury Communications was established in 1982 as a subsidiary of Cable and Wireless to offer nationwide fixed-link telecommunications networks (Vickers & Yarrow, 1988, pp.204–205).

In addition to liberalization in 1981, further change was carried out and took form in the 1984 Telecommunications Act. Privatization of BT was carried out by the act, although it was not clearly intended at the time when BT was created. Initially in 1984, 51% of BT's share was sold to the private sector. By mid-1993 all of the shares were sold. Major expectations for privatization were to increase internal efficiency and give financial freedom to BT (Duch, 1991, p.233).

The act also reorganized regulators. While ultimate responsibility for telecommunication is attributed to the Secretary of State for the Department of Trade and Industry (DTI), a nonministerial regulatory body called the Office of Telecommunications (OFTEL) was created. Supervision of telecommunication policy implementation, overseeing competition and licensing are responsibilities of the OFTEL. The Director General of Telecommunications, head of the OFTEL, is appointed by the Secretary of State for the DTI (Stehmann, 1995, p.240).

Known as duopoly policy, BT and Mercury were assured in 1983 that there would be no more competitors in a nationwide fixed network for seven years. The policy was intended to encourage the healthy growth of the new entrant, Mercury. While BT was tightly regulated with, for example, universal service obligations, Mercury was allowed more freedom. This policy, however, led both players to pursue peaceful coexistence rather than competition. In 1994, BT still dominated with a market share of 89%, although Mercury was able to serve 75% of the UK population by 1991 (Stehmann, 1995, p.246).

A White Paper published in 1991 declared that duopoly would be abolished (Armstrong, Cowan, & Vickers, 1994, pp.230-232). By 1994, about fifteen new entrants mainly from the cable TV industry, which have their own network infrastructure, had been issued licenses to operate telephony, aiming at stimulating competition (Stehmann, 1995, p. 255).

³ Later in 1985, BT's monopoly for the first telephone set was dissolved (Stehmann, 1995, p.242).

3.3 Japan

Japan's telecommunications networks had been developed by public monopoly: before World War II, by the government itself; afterward, by a public corporation called the Nippon Telegraph and Telephone Public Corporation (NTT). Although the government was strongly involved in the planning process, its intervention was, mostly, looking toward the promotion of telecommunications, unlike the French case before the mid-1970s, as shown later. Accordingly, telecommunications networks in Japan have been successfully developed. In the late 1970s, two major objectives, completing nationwide full automatic dialing and clearing waiting lists, were achieved. Aiming at further progress, liberalization of entry to certain service areas and partial privatization of the NTT was carried out in 1985. Since then, many entrepreneurs entered several areas of the telecommunications industry. Breaking-up the NTT into a long-distance and several local companies has been discussed for over a decade, aiming at competition in local services.

Early Development

In Japan, development of the telephone networks has been carried out by the government from the beginning. Although there were many petitions from private companies asking for entry to the business, the government rejected them all, due mainly to the concern regarding national security. The government believed that important communications for military, police and other government agencies should be done by itself. Universal service was another concern: private companies would not serve unprofitable areas like rural or remote islands. The Ministry of Communications (MOC) was given the exclusive right to construct and operate any means of telecommunications in 1890. Independent telephone networks, which were established by other government agencies including police and military (for their own use), were transferred to the hand of the MOC and interconnected with each other (Ito & Iwata, 1994, p.441).

The development of the network was not very satisfactory in the early period. Due to the Sino-Japanese War in 1894-95, the MOT had not received sufficient funding for the development of the telephone network and hence could not establish a sufficient number of telephone lines. In 1896, the number of lines waiting to be connected numbered 6,500, which was more than double the subscribers at the time, 3,200 (Ito & Iwata, 1994, p.442).

To match the demand with the supply, the MOC introduced a system similar to an auction: those who were willing to pay more could be served earlier. Although it helped the development of the networks, the MOC still suffered from an increasing backlog. But the operation of the telephone service was profitable. The revenue from operating the telephones

became a substantial revenue source, which was used to subsidize declining telegraph service operated by the MOC as well as agencies within other ministries (Ito & Iwata, 1994, p.442).

Even during World War II, the number of telephone lines increased to 1,080,000 by the year 1943 (Ito & Iwata, 1994, p.442). The same year, the MOC merged with the Ministry of Transportation to establish the Ministry of Transportation and Communications (MOTC). During war time, it was considered better to concentrate power within a few government agencies. Shortly after the war, however, the MOTC was separated into two again and was as before. In addition, in 1949, the MOC was divided into the Ministry of Telecommunications and the Ministry of Postal Service.

Recovery from the War

Due to the severe destruction by World War II, the number of telephones dropped to 470,000 (Ito & Iwata, 1994, p.442). An urgent task for the government was the reconstruction of the nation. The Advisory Council for the Reconstruction of Telegraph and Telephone, which was created to make a recommendation to the government, made a report in 1950. It recommended that the most efficient way to redevelop telecommunications was through the creation of a new telecommunications entity separated from the government in order to give autonomy and flexibility in both management and budget. Separation of domestic and international telecommunications, which was not included in the report, had been discussed within the government. (Ito & Iwata, 1994, p.443).

In 1952, a public corporation called the Nippon Telegraph and Telephone Public Corporation was established as a monopolist, responsible for domestic telecommunications. Another monopolistic public corporation called the Kokusai Denshin Denwa (KDD) was created to provide international telecommunications services. At the same time, by combining the Ministry of Telecommunications and Ministry of Postal Service, the Ministry of Posts and Telecommunications (MPT) was established (Ito & Iwata, 1994, p.443).

Nevertheless, these corporations were totally owned by the government. Based on the special acts, both corporations were also separate entities from the government. Shortly after KDD started its operation in 1953, its status was changed to a private company by selling its stock to the private sector. Most of the personnel and facility formerly belonging to MOC and related to both domestic and international telecommunications were transferred to the pertinent sections of either NTTPC or KDD. The regulatory body for the telecommunications and postal services was left in the hands of the MPT (Ito & Iwata, 1994, p.443).

Recovery from the war was the most urgent task for the NTTPC. Two clear objectives were to work off the long waiting list for telephone lines and to create the nationwide automatic dialing system. To gather sufficient capital for achieving these goals, NTTPC was allowed to

charge high calling rates and expensive one-time installation charges. Moreover, subscribers had to buy telephone bonds. For years, one quarter of the funds came from bonds (Ito & Iwata, 1994, p.443). Compared with other public corporations like Japan National Railway, producing huge amounts of deficit year by year, NTTPC's overall performance was successful.⁴ The two objectives, clearing the waiting line and automating the dialing system, were achieved in 1977 and 1978 respectively. Telecommunications infrastructures in Japan had attained more than just a recovery level.

Still, the NTTPC clearly had lots of internal problems such as managerial slack and over-enhancement. In addition, suffering from persistent government budget deficits, possibilities of privatizing the public corporations including NTTPC had been discussed (Takano, 1992, pp.3-5).

Privatization and Liberalization

In April 1985, two laws were enacted: the Telecommunications Business Law and the Nippon Telegraph and Telephone Corporation Law. By the latter, Nippon Telegraph and Telephone (NTT) was to be established as a private company, thus transforming the NTTPC. The former law liberalized entry to any of the telecommunications businesses.

The law does not stipulate any monopolistic status for NTT. Therefore, legally speaking, anyone can engage in any kind of telecommunications business, although the MPT has the discretion to select new entrants in the light of the balance of the demand and supply, and other criteria. (Telecommunications Business Law, Article 10.) Several entrepreneurs began business in services such as long-distance, international, satellite and VAN. Three long-distance telephone, two international telephone and two satellite communications companies have entered the business.

Though privatized, the law stipulates that the Japanese Government should always have one-third or more of the total shares of the NTT (NTT Law, Article 4).⁵ Before the first placement in October 1996, all of NTT's shares had been owned by the Finance Minister. After three placements, the government still holds 65.57% of NTT's shares.⁶ Revenue from stock placements, totaling \$102 billion, has been used to redeem government bonds.

⁴The accumulated debt became 25.1 trillion yen, or US\$251 billion, when JNR was privatized and broken-up in 1987 (Fukui, 1992, p.20). Throughout this section, all price in US\$ is converted from yen value in original data, assuming US\$1=100 yen.

⁵Removal of government's obligation of share-holding for long-distance entity of divested NTT was discussed (Telecommunications Council, 1996).

⁶So far, stocks were sold only three times. Of total 15,600,000, in FY 1986, 1,950,000 stocks were sold for US\$23.8 billion. In FY 1987, 1,950,000 for US\$49.8 billion, and in FY 1988, 1,500,000 for US\$28.5 billion (data compiled from Takano, 1992, p.29). Finance Minister plans to sell additional 500,000 stocks in near future (The Yomiuri Shimbun, 1996b).

By having competition, both long-distance and international call rates have been dramatically decreased. For instance, a three minute daytime long-distance call by NTT between Tokyo and Osaka, some 300 miles away, which cost \$4 just after the privatization in 1985, sank to \$1.80 in 1993 (MPT, 1995, p.180). Similarly, the cost for a three minute KDD international call from Japan to the United States has decreased from \$15.30 in 1985 to \$4.80 in 1995 (MPT, 1995, p.180). In contrast, the local service still monopolized by NTT is still relatively expensive: for instance, a three minute inter-city call has been raised from 10 cents in 1985 to 30 cents in 1994 (Telecommunications Council, 1996).

Debates regarding the breakup of NTT have been continuing since the privatization of the NTT was first discussed in 1982. However, the plan has been prolonged repeatedly. The most recent debate ended in March 1996, and resulted in further postponement for a year. Protest for change comes from politicians backed by NTT's workers' union and from the electronic equipment industry afraid to lose international competitiveness by the world largest telecommunications company (The Yomiuri Shimbun, 1996a).

3.4 France

In France, telephony was initiated by the private sector due to a lack of government funds as well as enthusiasm. As a result, development of the networks was only slowly progressing, after and before the nationalization of the sector. Until the early 1970s, little attention had been paid to telecommunications. However, after politicians recognized its importance for economic growth, intensive investment and also sector reforms have been made. Now, France enjoys one of the most advanced telecommunications infrastructures in the world. France's telecommunications history suggests to us both the advantages and disadvantages of a strong government intervention in the telecommunications industry.

Private Development

When the telephone was first introduced to France at the World Fair in Paris in 1878, the government was not very interested in it (Stehmann, 1995, p.178). Mainly because of financial problems as a result of the Franco-Prussian War (1870-71), the government was very reluctant to develop telephony. Any government expenditure other than for national defense was highly restricted. Therefore, development of the infrastructure including electricity and water supply as well as telephone had to be carried out by the private sector. In addition, the government was not enthusiastic about telephony itself, because telegraphy was a profitable business for the government in those days. Telegraphy had to be protected by putting lesser priority on telephony (Duch, 1991, pp.167-168).

Thus, telephone services in France began with the help of the private sector. Several local companies obtained five-year concessions to provide service from local authorities in 1879. Years later, all the local concessionaires were merged into one private company called Société des Générale des Téléphones (SGT). As the period of some concessions was very short, the concessionaires did not have strong incentive to invest in networks. The possibility of nationalization was also the reason for lack of enthusiasm for telephony. Unlike local telephone service, long-distance service was regarded as a menace for telegraphy. The French government decided to undertake the service by itself, thus minimizing the risk of losing telegraphy revenue. Promoting telephony was not the first agenda of the government policy (Duch, 1991, pp.168-169).

Nationalization

As the threat to telegraphy increased with the development of local networks, the SGT was finally nationalized and transferred to the French Post and Telegraph Administration in 1889. This decision gave little or no consideration to economic or technology issues. The

reason for nationalization was in fact only to protect the revenue from the government-run telegraph service, which was still profitable. The French government was afraid that competition between telegraph and telephone would injure the telegraph (Duch, 1991, pp.169–170).

In spite of nationalization, the French government could not raise the funds needed for telephone development. The policy, that local authorities were responsible for establishing the local network, was adopted. The revenues from the telephone service, however, would go to the central government. Therefore, there was little incentive to invest in the telephone networks for local authorities. On the whole, the telephone network developed very slowly even after the nationalization, because of the reluctance of the government to commit itself to the cause of telephony (Duch, 1991, p.170).

Slow Development

In the 1920s, much criticism was voiced regarding the inability of the French government to develop telephone networks. Although privatization had been discussed several times, it had never been realized. A separate budget for telephony was adopted in 1923; however, it was not effective because of the depression. France still had to accept its position as a country with a poor telephone infrastructure (Duch, 1991, p.172). During World War II, a major change regarding the telecommunications policy was the creation of the Direction Générale de Télécommunications (DGT), which was separated from the Direction Générale de Post et Télécommunications (Duch, 1991, p.175).

After the war, the government initiated an intensive plan to help the French economy recover from the devastating caused by the war. Several industries were selected to receive funds; however, telecommunications was excluded. The first time this sector was included was in 1966; however, the allocated budget for telecommunications was a small amount (Duch, 1991, pp.173–174). Therefore, until the mid-1970s, France suffered seriously from an underdeveloped telephone network. In 1975, the number of main lines per 100 inhabitants was only 13.44, a figure far below the level of the Western Europe average, 17.50, as shown in Table 3.2. Quality was poor too: on average, it took three calls to get connected properly when making a long-distance call (Stehmann, 1995, p.178).

Table 3.2 Telephone Main Lines per 100 Inhabitants in Selected EC Nations in 1975

Country	France	Germany	UK	Spain	Italy	Average
Line density	13.44	20.76	22.90	13.17	17.24	17.50

Source: ITU (1984).

Rapid Growth

As France’s underdeveloped telecommunications system appeared to be in a very serious state, the issue began to attract the attention of politicians. As for financing, since the importance of telecommunications was first recognized in the government economic plan in 1966, investment in the telecommunications sector increased markedly (Duch, 1991, p.173) (Figure 3.1). During the Giscard d’Estaing administration, a telecommunications promotion policy called Télématique was introduced in 1978 (Duch, 1991, p.165). Strong government intervention remained, however, even though the policy had been changed drastically towards promoting the development of telecommunications, instead of just being an impediment. By 1994, France came to have one of the most advanced telecommunications networks in the world (Table 3.3).

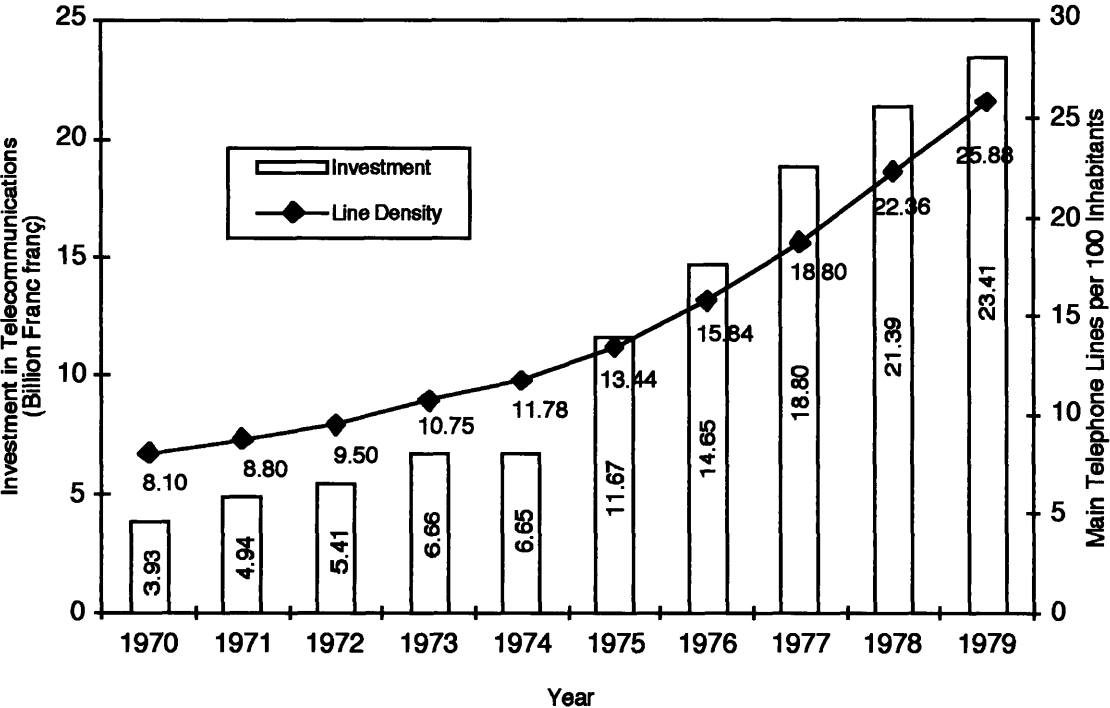


Figure 3.1 Investment in Telecommunications and Line Density in France in 1970s

Source: ITU (1975; 1984).

Table 3.3 Rate of Digitized Lines in Selected Countries in 1993–94

Country	France	Japan	USA	UK
Digitized Rate	85% ¹	83% ¹	65% ²	64% ²

Source: MPT (1995).

¹ In 1994. ² In 1993.

Reform

During the Chirac administration (1986–88), separation of the telecommunications and postal business entity from the Ministère des Postes, and des Télécommunications et de Télédiffusion had been discussed. Based on this idea, two laws were adopted in 1990. One was to reorganize the institution as a whole, and the other was to introduce regulatory reform (Stehmann, 1995, pp.179–180).

France Télécom (FT) and La Poste were transformed into public corporations and separated entities from the Ministère. Broader autonomy was given to FT. The management of FT is responsible to its board of directors, president and a chief executive officer. FT's budget is no longer required to be approved by the government. In addition, separate regulatory regimes were adopted for each aspect of the infrastructure, services and terminals for telecommunications. While FT's monopolistic status was confirmed in the field of basic telephone infrastructure and service, other markets including mobile and satellite communications, value added service, independent networks and terminals were liberalized (Stehmann, 1995, pp.179–180).

Privatization of FT has been discussed. In 1993, the French Cabinet decided to transform FT to a joint stock company in the near future. However, strong opposition from labor unions makes privatization difficult (MPT, 1995, p.343).

3.5 Germany

German telecommunications is characterized by a government monopoly from the beginning. Until World War I, the development of networks had been steadily progressing. However, due to losing financial autonomy from the growing political pressure, the growth of telecommunications had been decelerated instead of accelerated. After recovery from the devastation of World War II, German telecommunications became revitalized. In recent years, however, disadvantages of government monopoly have been brought to light. The German telecommunications entity, DBP Telekom, has been separated from the government body and competition was introduced into parts of the telecommunications services. Privatization of DBP Telekom is now under consideration.

Early Development

Unlike the United Kingdom and France, telephony in Germany has been developed by the government from the outset—with the German Constitution of 1871 as a basis (Duch, 1991, p.125). In 1880, the responsibility of the Reichspost, the German mail and telegraph authority, was extended to include telephony. Although private companies tried to enter the telephone service market, the government rejected all the applications and thereby assured the exclusive right of the Reichspost for telephones and telegraph. In 1892, the Telegraphengesetz was established (Stehmann, 1995, p.187). Later, in 1928, the monopoly status of the Reichspost was also authorized by the Telecommunications Installation Act (Fernmeldeanlagen-gesetz or FAG) (Stehmann, 1995, p.188).

Steady investment in networks was carried out. As a result, development of telephony had progressed rapidly by the early 1900s. In fact, in 1887, the number of telephones in Germany was greater than in any other European country (Duch, 1991, p.126).

Government ownership of the telephone service seemed to be functioning well in Germany. However, as politicians came to be aware of the importance of telephones, political pressure gradually increased. Due to political instability, investment in the telephone became unreliable. As a result, rapid development of telephones could no longer be expected (Duch, 1991, p.127).

Decline

After World War I, the cost of telephone development dramatically increased, because of network extensions to smaller communities and the replacement of manual exchanges with automatic ones. In addition, hyper-inflation decreased telephone revenues. To keep a profit and still cover all the increased expenditures caused by inflation, tariffs should have been

raised. However, to make any change in tariffs was time consuming due to required legislative approval. Shortage of capital had seriously injured the Reichspost (Duch, 1991, pp.129–131).

It was widely recognized that some measure had to be taken to improve the situation. Reform of the telephone sector was discussed to extend a certain amount of autonomy to some financing and regulatory aspects. The Imperial Postal Finances Act (Reichspostfinanzgesetz), was enacted in 1924 to assure the Reichspost of financial and managerial independence. However, there were few opportunities to take advantage of this change. After the Nazis took over power in 1933, independence of government organizations was lost again (Duch, 1991, pp.129–131). With the devastation of World War II, the German telephone situation became worse.

Creation of the Deutsche Bundespost

The most urgent task for the government after the war was, of course, recovering from the devastation. Although almost all institutional structures were destroyed too, a regulatory framework for postal affairs and telecommunications was soon restored by adopting the old FAG created in 1928 (Stehmann, 1995, p.188).

After the formation of the Federal Republic of Germany, the Deutsche Bundespost (DBP) was created in 1950 as a government agency, responsible for postal service, postal banking and telecommunications (Duch, 1991, p.138). As shown in Table 3.4, the German telephony situation had improved rapidly. Within ten years after losing the war, Germany got ahead of France in terms of the number of telephone sets. By 1980, Germany reached a level similar to the one of the United Kingdom.

Table 3.4 Telephone Sets per 100 Inhabitants in Germany, France and UK in 1950–80

Country	Germany	France	UK
1950	4.4	6.6	10.2
1955	13.2	11.1	17.4
1965	14.9	12.5	18.4
1970	22.5	17.2	25.1
1980	46.4	45.9	47.7

Source: Duch (1991, 133) and ITU (1972; 1984).

Although it appeared that the DBP had been functioning well, the DBP also clearly had problems: less incentive to improve internal efficiency due to its public ownership, and payment of 10% of its profit to the federal budget in exchange for tax exemption. However, the

DBP usually had to pay more than just the amount of the tax—cross subsidies from long-distance to local services, from less profitable areas to more profitable areas, from telephone to postal service; and enjoyed the dual function of DBP's ministers as regulators and the status of a business entity (Stehmann, 1995, p.189).

Reforming the Sector

In 1987, the Witte Commission issued a report recommending reformation of the telecommunications sector. It emphasized the introduction of competition into the sector. However, the possibility of privatization was not discussed due mainly to the question of constitutionality. Moreover, basic telephony was not considered an object for competition to avoid duplicate investments (Duch, 1991, p.156).

In 1989, a law concerning the restructuring of the postal and telecommunications sector and of the Deutsche Bundespost (Postsstrukturgesetz) was enacted. The law separated the DBP into a regulator, Ministry of Posts and Telecommunications, and three business entities, DBP Telekom (telecommunications), DBP Postdienst (postal) and DBP Postbank (banking). At the same time, the FAG was amended to introduce partial competition to the telecommunication sectors. However, a federal monopoly over network infrastructures as well as basic telephone services was retained. Although privatization had been discussed, a modification of Germany's constitution is necessary, which requires a two-thirds majority of Parliament. Thus, DBP Telekom is totally owned by the federal government (Wellenius & Stern, 1994, p.614).

Intentions of separating DBP Telekom from DBP were voiced in order to avoid abuse of its special status as a government agency when operating in the liberalized market. In addition, separate regulators were necessary to oversee price and quantity of telecommunications services, especially when introducing partial competition. In the absence of pertinent regulation, cross-subsidizing from a monopolistic service to a competitive service would occur easily, resulting in reduced quality and higher charge in the monopolistic service (Stehmann, 1995, p.205).

However, the 1989 reform turned out to be not sufficient to give autonomy to DBP Telekom to pursue these goals. The government continued to use DBP Telekom as a political device. Because of political control, heavy financial burdens were imposed on DBP Telekom: the cost for developing networks in the former East Germany, subsidies for the DBP Postdienst and DBP Postbank and payment of 10% of turnover to the federal budget. Additional reforms were taking place in 1992 to reduce these shortcomings, aiming at privatization of DBP Telekom. However, it will only be possible after the amendment of the German constitution (Stehmann, 1995, pp.206–207).

3.6 Italy

Telephone service in Italy is best characterized by fragmentation. Local networks were started and served by the private sector, whereas long-distance service was provided by the government. Although the local operators were nationalized later, different regulators are responsible for local and long-distance service. Moreover, international service, telex and telegraph are served by different operators. As a result of this fragmentation, Italian telecommunications could not be developed efficiently. As opposed to the reforms other countries undertook at an earlier time in history, integration of the Italian operators was only recently initiated and finally realized in 1994.

Fragmentation

Initially, the Ministry of Posts and Telecommunications (MPT) of Italy tried to establish telephone networks by itself. However, due to lack of sufficient funds, the MPT in the 1920s entrusted the task to private hands, both domestic and foreign, by offering concessions. A few private companies created and offered services in local areas. But the Ministry offered services for long-distance and local in the areas where no concessionaire could be found.

During the 1930s, the Institute per la Ricostruzione Industriale (IRI) consolidated all of the private telephone companies. Since then, no fundamental reform has happened up to this to date in the telecommunications regulatory framework except for a short period of nationalization for national security reason during World War II (Stehmann, 1995, p.209).

The telecommunications sector has been governed by two government bodies, the MPT and the IRI. Under the IRI, there is a state owned institute called Società Finanziaria Telefonica (STET), which controls four separate private companies: Società Italiana per l'Esercizio Telefonico (SIP), responsible for local networks; Italcable for international telephone, telex and telegraph outside the EU; Italtel for manufactures of telecommunications equipment; and Telespazio for satellite communications (Stehmann, 1995, p.210).

The MPT also controls three separate organizations: Azienda di Stato per i Servizi Telefonici (ASST), which is responsible for domestic long-distance and intra EU international services; Direzione Centrale Servizi Telegrafici (DCST) for domestic telex and telegraph services; and Direzione Centrale Servizi Radioelettrici (DCSR) for maritime radio-telephone services (Stehmann, 1995, p.210).

Reorganization

Because of a complicated institutional structure, the Italian system has been inefficient. For example, a long-distance call from Rome to Milan requires the use of the Rome SIP local

network, ASST long-distance network and Milan SIP local network. This kind of interconnection might not cause any problems, if connections among networks would be well coordinated. However, because ASST and SIP are supervised by different government agencies, the MPT and the IRI respectively, long-distance calls are often cumbersome (Stehmann, 1995, p.211).

As shown in Figure 3.2, the growth of networks seemed to be not very slow until the mid-1970s, compared with neighboring countries. However, after the French government began intensive investment in telecommunications, the negligence in progress became obvious.

Recognizing the poor condition of telecommunications in Italy, reform had been discussed aiming mainly to eliminate, if possible, inefficiencies due to organizational fragmentation in both operator and regulator entities. In 1992, the Italian parliament ratified the transfer of ASST to IRI, after approval by the Senate. However, because the transfer of the operator involves the transfer of power from the MPT to the IRI, political obstacles made it difficult to realize the plan (Stehmann, 1995, p.212). Finally in August 1994, all of the telecommunications operators were replaced by newly created company called Telecom Italia (Financial Times, 1994). Now, the company is the sixth largest telecommunications operator in the world in terms of revenue as well as the number of main lines (ITU, 1995, p.A84-A85). The reform in Italy seems successful so far: the number of lines per employee increased from 258 in 1994 to 280 in 1995; net income was increased by 20% in 1995, whereas net borrowings were reduced by 20% (Telecom Italia, 1996).

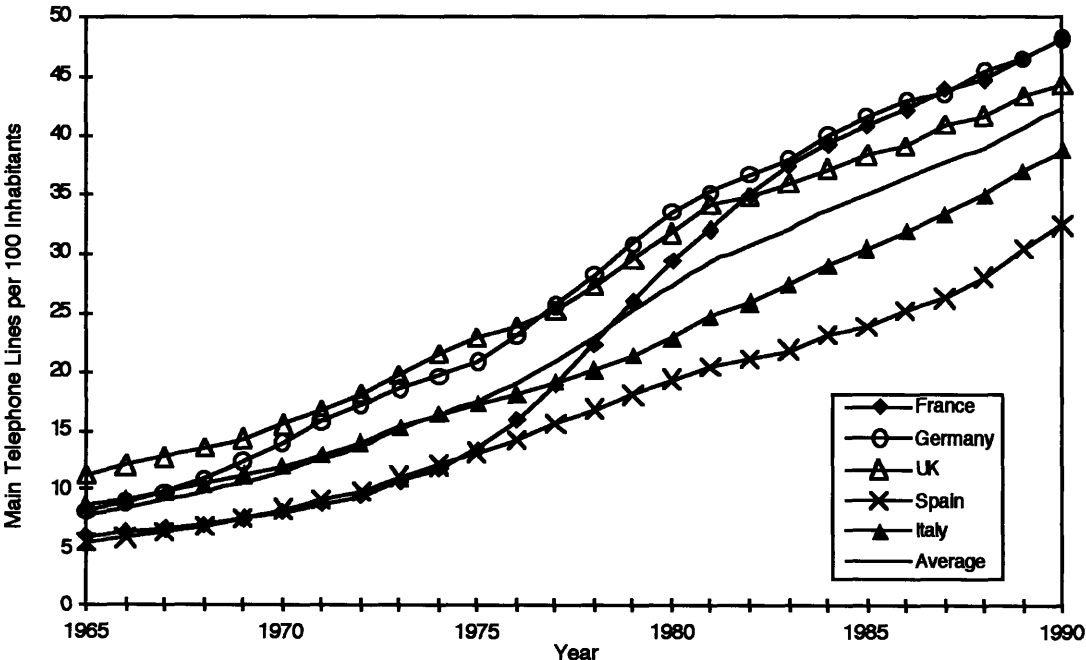


Figure 3.2 Growth of Telephone Main Lines in Europe in 1965–90

Source: ITU (1972; 1984; 1992).

3.7 Spain

A private monopoly with strong governmental influences is the phrase best characterizing Spanish telecommunications sectors. Institutions appear to have not been contributing to the development of telecommunications networks in Spain, which is far below the Western European standard. In spite of reforms carried out during the 1980s, which included liberalization in VAN and separation of the regulatory body from the business entities, Spain still requires further improvement on the local information infrastructure.

Private Monopoly

During the half century from its beginning in 1877, telephone service in Spain has been owned and operated by private companies and local authorities. In 1924, International Telephone and Telegraph established a company called Compañía Telefónica Nacional de España with a license from the Spanish government. Telefónica was granted a concession, allowing the exclusive rights for telephone operation for 20 years. The concession has been renewed several times and is still valid today (Stehmann, 1995, p.225).

After a short period of nationalization after World War II, a decree issued in 1946 confirmed Telefónica's exclusive right of basic telephone service, as well as the responsibility for planning and development of the networks. Autonomy as a private company was given to a certain extent; however, the budget and tariff were subject to government approval (Stehmann, 1995, p.225).

Service that Telefónica can provide has been extended several times by state decrees. In 1970, Telefónica obtained the right to provide radio-telephone serving coasts and ports and data communications. Rights to provide teletext, facsimile, videotext and teletex services were granted in 1978. Although Telefónica's function has been expanded, the regulatory framework has remained almost unchanged for a very long time since its establishment (Stehmann, 1995, p.225).

Restructuring

The private monopoly status for Telefónica had not contributed to the growth of telecommunications networks in Spain. Obviously, Spanish telecommunications was less developed, especially when compared with those in most other European Community member states. Nevertheless, the number of telephone main lines is not necessarily a good measure of network development; we will refer to it as a performance measure. Table 3.5 shows the slow network development in Spain.

Table 3.5 Telephone Main Lines per 100 Inhabitants in Selected EC Nations in 1965–80

Year	Spain	France	Germany	UK	Italy	Average
1965	5.51	6.10	8.21	11.21	8.70	8.56
1970	8.38	8.10	13.97	15.50	12.00	12.39
1975	13.17	13.44	20.76	22.90	17.24	18.59
1980	19.32	29.33	33.39	31.70	22.77	29.30

Source: ITU (1972; 1984).

Consequently, there was a growing concern regarding the influence of poor telecommunications on the economy in the early 1980s. Because of discussions within the government, telecommunications was incorporated into the national economic plan in 1984 (Stehmann, 1995, p.227). In addition, a decree was introduced in the following year to promote improvement of telecommunications networks. The reform included establishment of the Dirección General de Telecomunicaciones (DGT) and the Junta Nacional de Telecomunicaciones (JNT) within the government. The former is responsible for regulation, legislation, licensing and authorization of telecommunications. The latter is in charge of planning policy and introducing new technology regarding telecommunications. Also, the functions assigned to newly established government entities were removed from Telefónica (Stehmann, 1995, p.226).

In 1987, a new law called the Ley de Ordenación de Telecomunicaciones (LOT) was established, incorporating the former decree. The law stipulates, that any radio and cable communication are the exclusive right of the state. Therefore, any telecommunications company will be operating on behalf of the state with a concession or license. That those bearer services, including telecommunications infrastructures themselves, will be provided by a monopoly is also stipulated in the law. Thus, the monopoly status of Telefónica is legally confirmed.

Competition was introduced only into VAN services (Stehmann, 1995, p.226). Being a legal private company, Telefónica has autonomy; however, government intervention is strong: 32% of its share is owned by the government (Wellenius & Stern, 1994, p.657); a delegate who has veto power is sent to the board of directors from the government; and the government reserves the right to renegotiate the concession agreement and to impose further obligations on Telefónica (Stehmann, 1995, p.236).

A series of government initiatives clearly promoted the development of telecommunications. Investment in telecommunications infrastructures had increased fivefold during a decade in the 1980s. Telephone main lines, which counted less than 20 per 100 people in 1980, became more than 30 in 1989 (ITU, 1992). Of all lines installed in that year, 87% were digital (Stehmann, 1995, p.228).

In spite of significant growth during the 1980s, telecommunications in Spain was still considered less developed by European standards as shown in Table 3.6. As we will discuss in Chapter 4, line density is closely connected to GDP per capita of the country. However, even allowing for the low Spanish GDP, the number of main lines was still considered insufficient as shown in Figure 3.3.

To stimulate markets further, something has to be done; however, the monopoly of Telefónica in voice telephony is confirmed until the year 2003 by the Council of the Ministers of the EU (Wellenius & Stern, 1994, p.657).

Table 3.6 Telephone Main Lines per 100 Inhabitants in All EU Member Nations in 1994

Country	Line Density	Country	Line Density
Sweden	68.31	Greece	47.81
Denmark	60.37	Austria	46.51
Luxembourg	55.35	Belgium	44.90
Finland	55.11	Italy	42.94
France	54.74	Spain	37.13
The Netherlands	50.87	Portugal	35.03
UK	48.87	Ireland	35.00
Germany	48.31	Average	48.75

Source: ITU (1995).

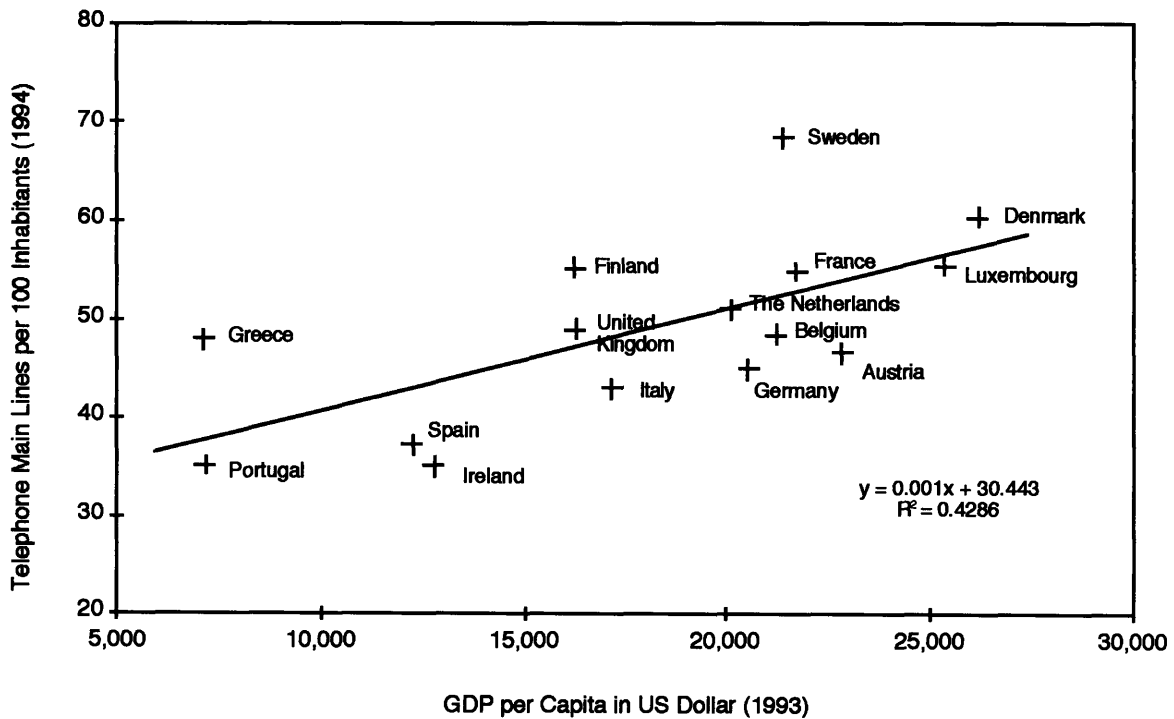


Figure 3.3 GDP per Capita vs. Line Density in EU Member Nations in 1994

Source: ITU (1995).

3.8 Mexico

Telephony in Mexico had been developed by two private companies with foreign capital from the United States and Sweden, although both companies were initiated by Mexican entrepreneurs. Later, two companies were merged to form the TELMEX, which had been a private company until 1972 except for a short period during the Mexican revolution. Although it had been growing steadily, after nationalization, the TELMEX was severely affected by a foreign debt crisis during the 1980s and therefore its performance declined. In 1990, TELMEX was re-privatized as part of President Salinas's economic reform plan.

Early Development by Foreign Capital

Mexico's telephone service was begun by a local entrepreneur in 1878. Federal licenses were issued to permit private companies to establish local telephone networks. Later, a license was given to a Mexican national called A. G. Greenwood to establish long-distance networks that interconnect established local networks. However, lacking finance and technology as well, Greenwood soon sold the concession of his company to an American-owned company, the Continental Telephone Company (CTC), which was later renamed to Mextelco. Although, Mextelco did not have exclusive rights to provide telephone service in Mexico, supported by American capital and technology, it acquired most of its competitors (Petrazzini, 1995, p.106).

However, as the Mexican government's interest in telecommunications stimulated competition, a new license was issued to a Mexican entrepreneur for establishing local lines within Mexico City. The consequence was similar to the case of Greenwood. Two years later, the license was sold to a Swedish company, L.M. Ericsson & Co. The company was renamed to Mexeric in 1907. During the Mexican revolution in the 1910s, Mextelco was nationalized while Mexeric was allowed to remain in private status. Later in 1925, Mextelco was returned to private hands, the International Telephone and Telegraph (ITT). Until the mid-1940s, duopoly by Mextelco and Mexeric continued their competition with each other, although both were not well interconnected (Petrazzini, 1995, p.107).

Integration and Nationalization

After World War II, Mexeric was dissolved in 1947 to form a new company, Telefonos de Mexico, S.A., known as TELMEX. The majority of this private company was owned by Mexicans, a small part by Swedish investors. Although it was a private company, the Mexican government dispatched two high officials to the executive board of TELMEX. Since then, the tradition of weak government intervention into the telecommunications industry in Mexico has

been changed to strong one. Three years later, almost all of the telecommunications structures came under the control of TELMEX through the acquisition of Mextelco.

One of the government policies that helped to extend the networks was the requirement for subscribers to purchase TELMEX shares. This action contributed greatly to network development. But it also resulted in the loss of the position of major shareholder for Ericsson. Finally, in 1958, the government forced ITT and Ericsson to sell their shares of TELMEX to Mexican nationals. TELMEX now became purely domestic and was still a private company whose majority was owned by the private sector. In 1972, however, TELMEX's 51% of shares was acquired by the government and thus it was considered nationalized (Petrazzini, 1995, pp.108–109).

Re-Privatization

TELMEX had as good a performance record during the decade after nationalization as before (Figure 3.4). Network expansion to rural areas and upgrading dated networks to digital was intensively undertaken.

However, problems became apparent in the 1980s. As TELMEX was a very profitable enterprise, the government used it as a tool for raising revenues. The tax on local calls was 69.94% in 1980, and was raised to 90.48% in 1989 (Petrazzini, 1995, p.109). As the budget was subject to government approval, TELMEX could not receive funds when necessary. Consequently, TELMEX became to depend on foreign loans (Petrazzini, 1995, p.110).

Although the performance of TELMEX dropped in the 1980s compared with the previous decade, it was not very serious: by 1981, 99% of the exchanges became automatic; in a single year of 1989, 22% of lines were digitized (Ramamurti, 1996, p.75). Far more terrible for Mexico was, in fact, a huge amount of internal and foreign debts due to the decline of the world oil market in the 1980s.

After Carlos Salinas de Gortari became the President of Mexico in 1988, programs to restructure the economy were carried out, including privatization of TELMEX (Ramamurti, 1996, p.77). However, because it had kept a relatively good performance record, as mentioned, privatization of TELMEX did not intend to improve its performance in the first place. Ramamurti (1996, p.101) wrote that the major objectives of privatization were: (1) using the privatization of TELMEX to send a signal to local and foreign investors that Mexico was embarking on a new economic strategy, and (2) using the sale proceeds to reduce the country's fiscal deficit and public indebtedness. Because it was Mexico's largest state-owned enterprise, privatizing TELMEX was considered a good advertisement for economic restructuring—which was an undertaking of the Salinas administration.

In 1990, 20.4% of TELMEX's shares were sold to both domestic and foreign private sectors, including France Cable et Radio and Southwestern Bell International (Petrazzini, 1995, p.120). TELMEX has exclusive rights for basic service through 1996. A TELMEX subsidiary called TELCEL is providing cellular service, competing with new entrants in several regions (Wellenius & Stern, 1994, p.635).

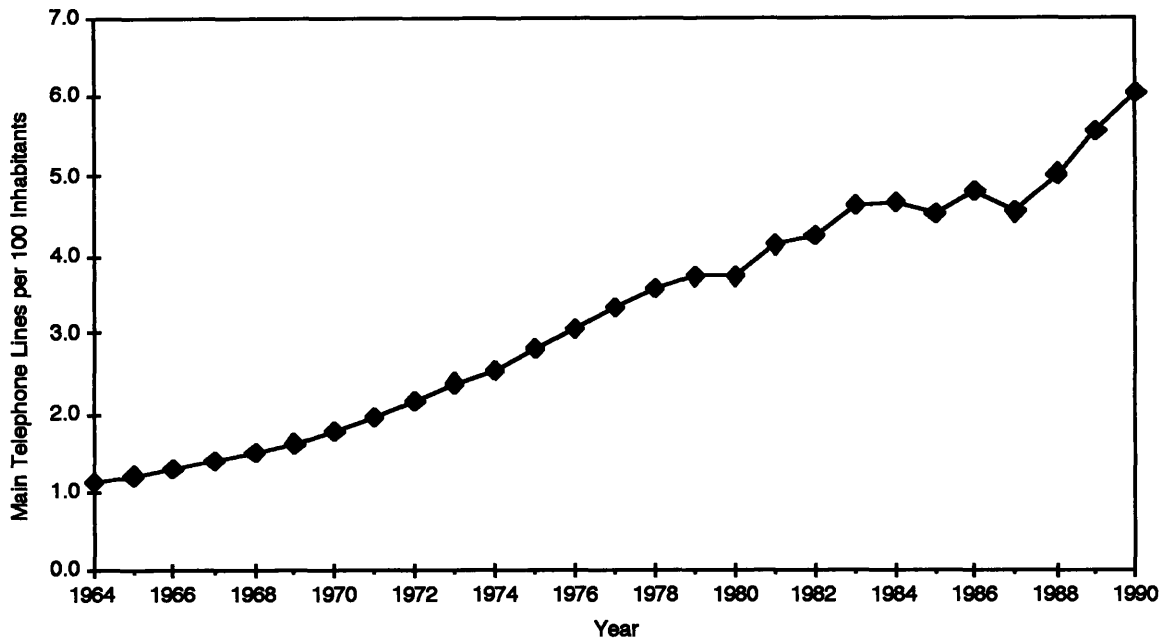


Figure 3.4 Growth of Telephone Main Lines in Mexico in 1964–90

Source: ITU (1975; 1984; 1992).

4 National Telecommunications Sector Performance Analyses

Designing telecommunications policy requires performance analysis, since any reform seeks to improve performance of telecommunications enterprises. To perform an analysis, first the performance should be measured; however, in fact, to define performance seems difficult. Although various kinds of indicators for telecommunications sectors are available, any combination of such indicators is deemed to be irrelevant with regard to representing “performance” of the sector.

However, telephone density can be a good index as a performance measurement, when examining the density in relationship to GDP per capita in all economic classes of the world. Nevertheless, even though such correlation certainly exists in general, it cannot be observed for high-income economies. As the reasons for deviation can be attributed to regulatory, organizational and/or institutional issues, ownership of the telecommunications enterprise seems not as significant as is widely believed.

4.1 Performance Indicators

Many indicators are available for telecommunications sectors that may reflect their performance, quantitatively or qualitatively. Quantitative indicators include the number of telephone sets, the number of telephone main lines, the number of pay phones, telephone traffic volume and revenue of the telephone company. Qualitative indicators include the waiting time, the call failure rate, the line fault rate and so on (ITU 1992, ITU 1995). Examples of available indicators are line density and fault rates.

The problem is that any single indicator cannot explain overall performance of any telecommunications sector. Moreover, finding the best combination of the available indicators that may reflect the performance of telecommunications in a particular country is difficult.

On the one hand, if there is frequent trouble with the network, having many phones might be useless. On the other hand, less communication failure might mean excessive investment in the networks and thus a high telephone charge to the consumer. Less time on the waiting list could be explained by a lesser demand for telephones due to underdevelopment of networks, not by efficiency of the operator. Small numbers of pay phones might imply a high diffusion rate of telephones installed in offices and homes or the existence of mobile telephones. Low growth rates of main lines might indicate not underdevelopment but saturation.

In fact, an attempt by OECD to find criteria to measure telecommunications performance seemed not to be very successful:

There is no single indicator of performance but a variety of measures that provide an insight into the operation of the PTO⁷ from economic, social, managerial and consumer perspectives. The standards by which the PTO should be judged vary according to the objectives that are set by management or the regulators. These may relate to price, quality, user choice or efficiency. International comparisons reveal interesting and growing disparities between PTO performance, but there is surprisingly little correspondence between indicators. A good performance in one service does not allow one to predict a favorable performance in other services, and no PTO can claim to be perfect in all respects. (OECD, 1990, p.159)

It also warns of abuse of performance statistics stating that “the selective use of comparative statistics can be used to prove almost anything” (OECD, 1990, p.159).

⁷ Public Telecommunications Operator

4.2 Telephone Density vs. GDP per Capita

A deductive approach to find appropriate indicators seems very difficult. Instead, we will take the inductive approach. We begin with the assumption that a wealthier country has a better telecommunications system. Every country recognizes that the telecommunications are not only luxuries to be enjoyed by the wealthy but a necessity for further economic growth of the nation. Wealthy countries have continued to invest in telecommunications networks as much as they can. As a result, countries with large scale economies have well-established networks. Therefore, by examining the wealthy countries' telecommunications situations, we can know what the performance level could be. We also assume that the wealth of the nation is represented by GDP per capita.

Relationship between line density and GDP per capita is shown in Figure 4.1. Fault rate and waiting time vs. the GDP per capita is shown in Figure 4.2 and Figure 4.3, respectively. We can observe clear relationships between the GDP per capita and line density, while, in contrast, fault rate and waiting time shows less of a correlation with the GDP. In fact, relationship between the GDP per capita and the line density probably has been the most referred to fact to explain and to persuade others of the importance of telecommunications in economic development since Jipp pointed this out in 1963 (cited in Saunders, Warford & Wellenius, 1994, p.86).

To a certain extent, the existence of such a relationship seems self-evident. Assuming that the most advanced telecommunications system is the one with the highest line density, the lowest fault rate and the least waiting time, investment would naturally be made to accomplish these objectives—if there are sufficient funds available for telecommunications. Consequently, the GDP per capita and the performance of the telecommunications sector would eventually be closely connected.

With the above mentioned considerations in mind, we will choose a single indicator as a standard to measure the performance of a telecommunications sector in a particular country. Placing emphasis on simplicity and availability, we will use telephone main lines per 100 inhabitants, or line density, as a performance indicator.

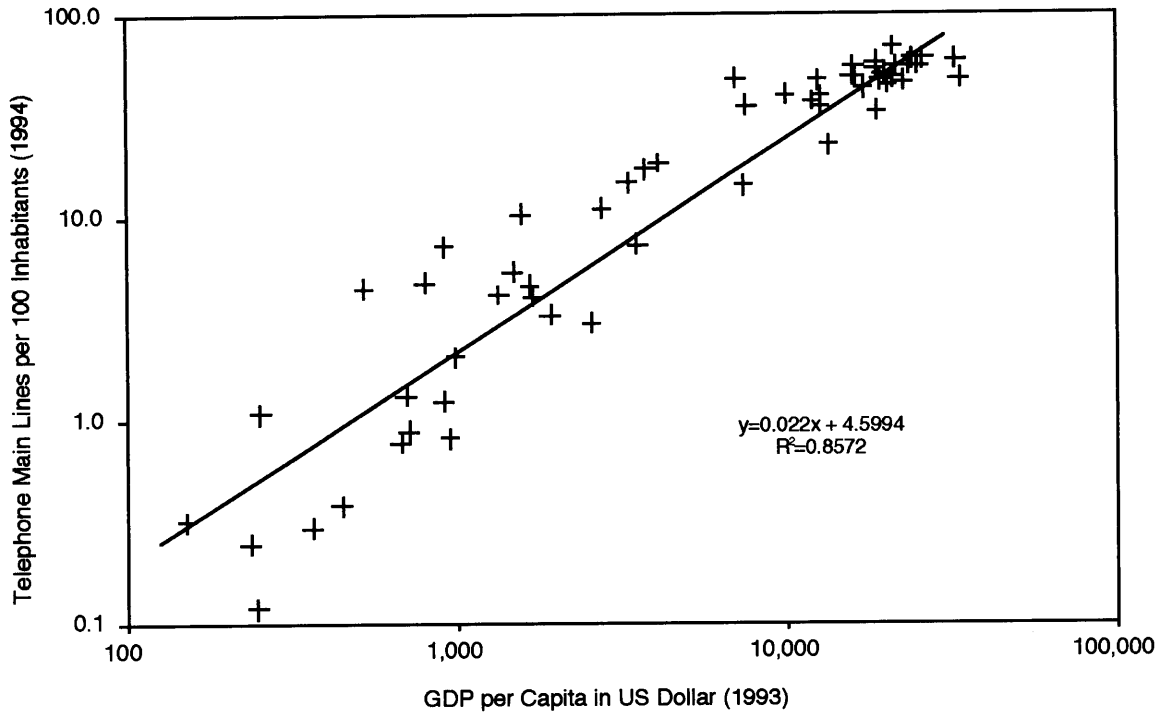


Figure 4.1 GDP per Capita vs. Line Density

Source: ITU (1995).

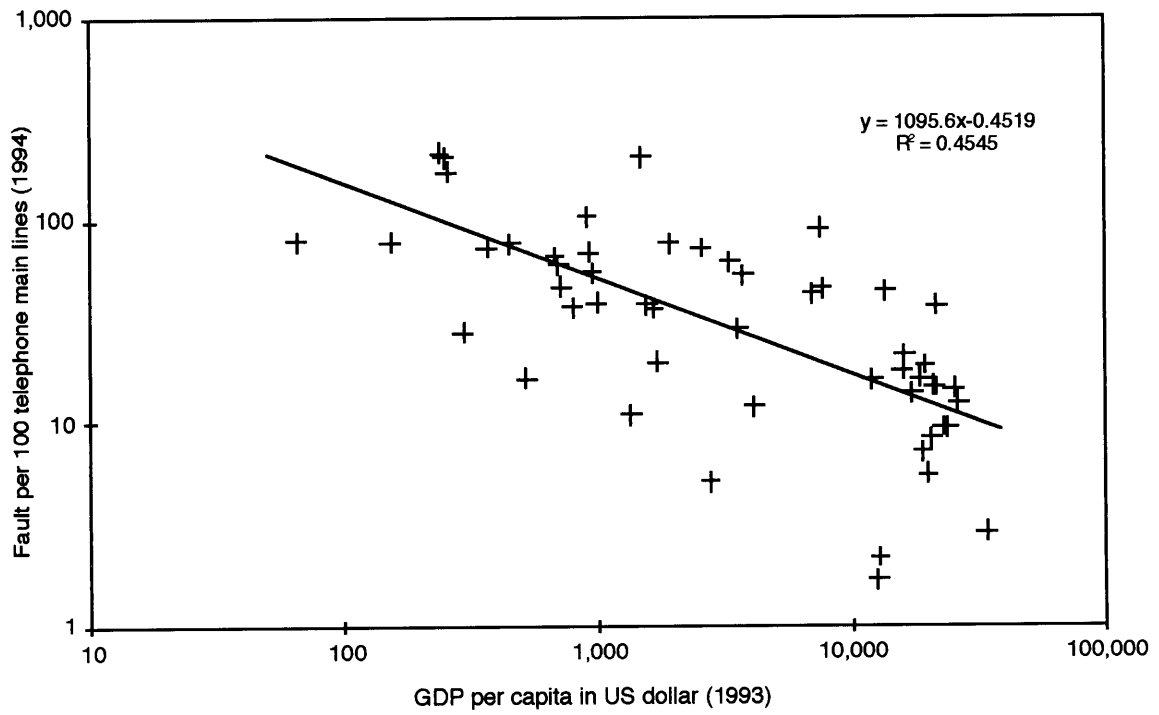


Figure 4.2 GDP per Capita vs. Fault Rate

Source: ITU (1995).

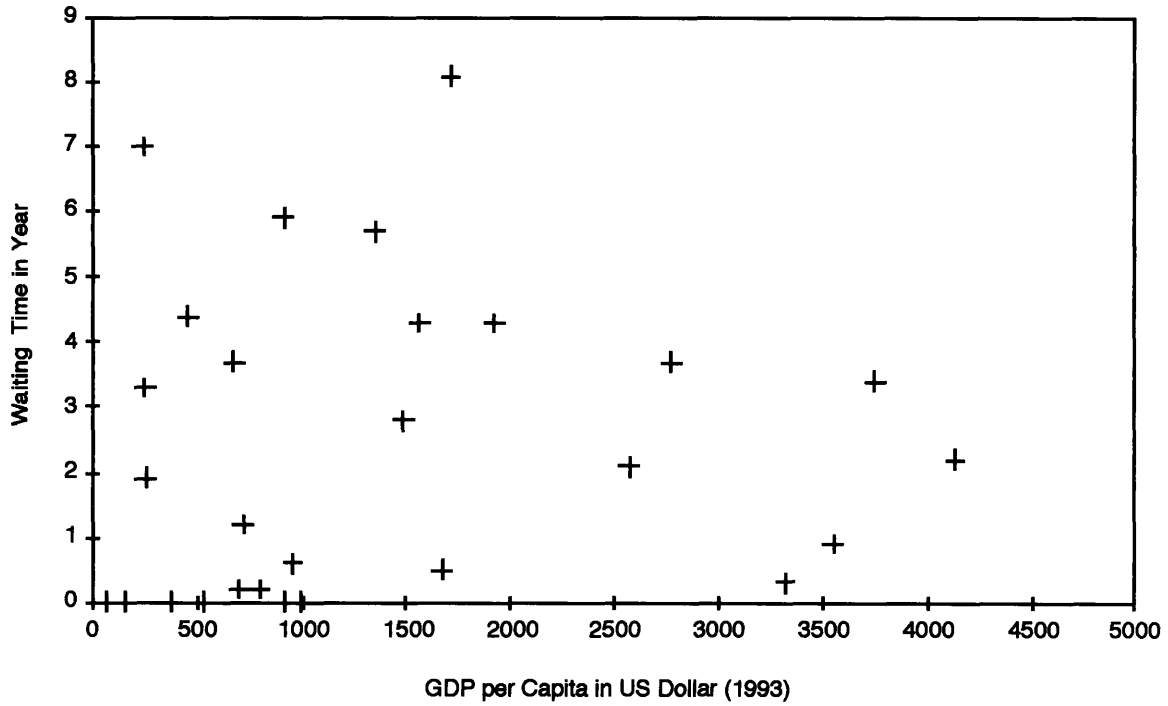


Figure 4.3 GDP per Capita vs. Waiting Time for Low- and Middle-Income Economies

Source: ITU (1995).

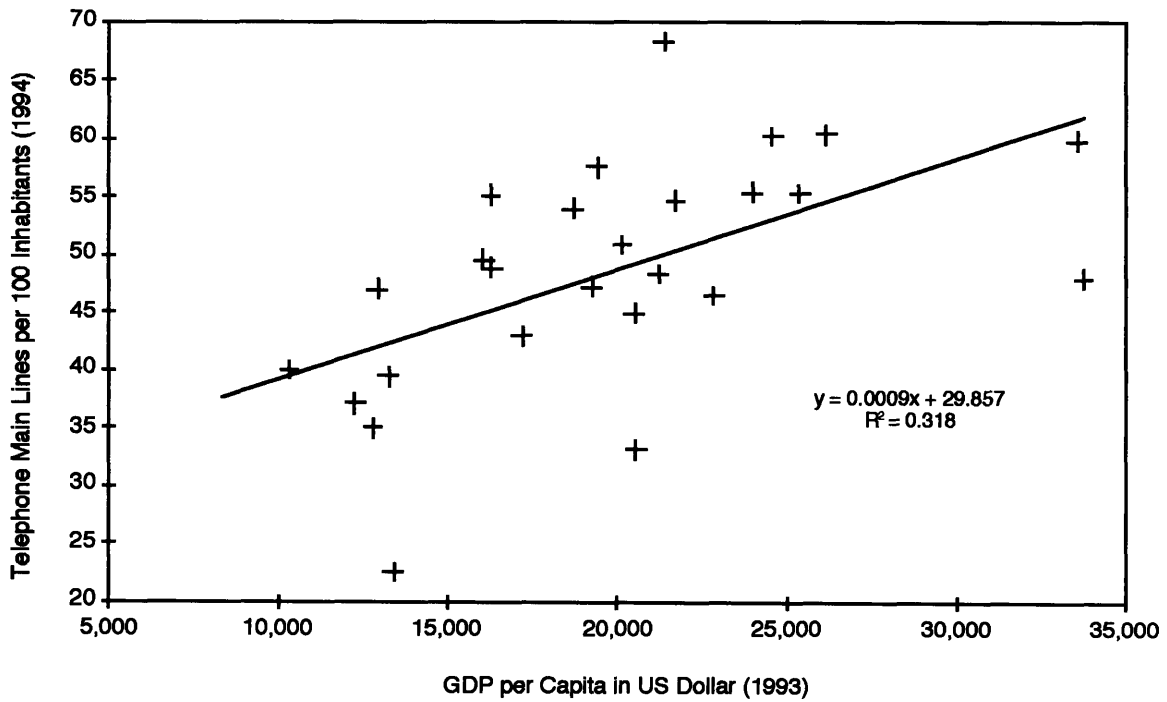


Figure 4.4 GDP per Capita vs. Line Density for High-Income Economies

Source: ITU (1995).

4.3 Performance Divergence

In the previous section, we observed that the existence of a strong relationship between the GDP per capita and line density. However, if we take a closer look at the relationship for a specific economic class, it is proven that there is deviation from the trend line. In the case of high-income economic classes, we can no longer observe a strong relationship between income and the line density, as we could see in all other economic classes.

Figure 4.4 shows the relationship between the GDP per capita and the line density only for high income economies⁸, which include all the upper income countries (population totals are less than one million). Therefore, factors other than the GDP per capita might dominate the performance of the telecommunications enterprises. The wealth of a nation largely determines the performance of telecommunications; however, the deviation cannot be explained only by the economy.

As we saw in Chapter 3, in most of the industrialized countries, telecommunications network development has been conducted by governments. Thus, differences cannot be attributed to ownership alone; institutions, political influence and organization are other possible sources of deviation.

As we reviewed in Chapter 3, they greatly vary from nation to nation. One of the countries with strong governmental intervention, France, now possesses one of the most advanced telecommunications systems available; however, until the mid-1970s, France had been known for its underdeveloped telecommunications. Strong government initiative and intensive investment could be an explanation for that country's rapid expansion in recent decades.

In the United States, telecommunications development has been carried out by the private sector. It also enjoys one of the most developed telecommunications systems in the world. Not only did the federal government not intervene in AT&T's business policies or development plans, but regulations even protected its existing monopolistic status for a long time. Because these environments assured AT&T's economic and political stability, telephone networks in the United States have been growing successfully.

Like the United States, Spanish telephony has been developed by private companies; however, its line density still ranks close to the bottom of EC nations. While the Spanish government strongly intervenes into Telefónica's plans and budgets, it has not been very enthusiastic in developing new networks. Stehmann (1995, p.227) points out that geography is another reason for this conservative attitude: while Spain's population is concentrated in a few

⁸ According to the World Bank grouping, in this paper, countries are classified by their GNP per capita in 1993 US\$, as low (smaller than \$695), lower-middle (between \$696 and \$2,785), upper-middle (between \$2,785 and \$8,625) and high (greater than \$8,626).

key cities, many sparsely populated areas remain. Extending networks to such peripheral areas would be expensive.

Although we did not include Sweden's case in our survey, it is an interesting one. Initially, there was a short period of competition between Bell's subsidiary, Swedish entrepreneurs, local authorities and the government, with the result that Stockholm had the largest number of telephones in Europe in 1885 (Bohlin, 1993, p.245). Soon they were integrated into Telegrafverket, a typical European state-owned PTT. After reaching a line density of 40 by the year 1967, line density in Sweden now almost extends past 70—a number that ranks Sweden at the top worldwide.

The United Kingdom, which also had been served by a government monopoly until 1984, has had a good record of telecommunications development. In terms of line density, the UK always kept above neighboring European countries, as we saw in Figure 3.2. The BT privatization was done not due to performance but to diminish internal inefficiency, and government deficits. Margaret Thatcher's ideology toward a market oriented economy also helped to improve the telecommunications developments. Initially, government agencies and later public corporations had been developing Japan's telecommunications infrastructures. Line density is not very high, as expected from its GDP per capita. This does not necessarily mean an underdevelopment of the telephone networks, because by mid-1970s, the waiting list for telephone lines was completely cleared.

As shown in Figure 4.4 as well as in Figure 3.3, the relationship between GDP per capita and line density for countries in a high income class, is weak. Because R-square is about 0.32, it is not statistically meaningful. The result, however, can be used as a reference. Table 4.1 shows inconsistency among institutions, organization, performance and wealth.

Table 4.1 Expected Line Density for Selected High–Income Countries

Country	GDP per Capita ¹	Line Density ²	Expected Line Density ³	Deviation (%) ⁴	Telecom Ownership ⁵	Government Intervention
Japan	33,757	47.98	61.81	-28.82	Public	Strong
USA	24,580	60.17	53.12	11.71	Private	Weak
France	21,719	54.74	50.41	7.90	Government	Strong
Sweden	21,376	68.31	50.09	26.67	Government	Strong
Germany	21,198	48.31	49.92	-3.33	Government	Strong
Canada	19,384	57.54	48.20	16.23	Mixed	Medium
Italy	17,141	42.94	46.08	-7.31	Government	Strong
UK	16,251	48.87	45.24	7.43	Government	Strong
Spain	12,229	37.13	41.43	-11.59	Semi–Private	Strong

Source: ITU (1995).

Notes: As it is difficult to determine the degree of government intervention, what indicated here are author's subjective views, judging from historical review in Chapter 3 and other materials.

¹ In US dollar in 1993. ² In 1994. ³ Calculated by least–square regression. ⁴ $1 - (\text{Expected Line Density} / \text{Line Density})$. ⁵ An enterprise contributed to major development of telecommunications.

5 Conclusion: Policy Recommendations for Developing Countries

As we saw in Chapter 3, in most industrialized countries, telecommunications services and other kinds of public utilities have been provided mainly by the public sector. Expansion of public sectors continued until the 1970s. However, due mainly to decreasing economic growth and budget deficit crises in the 1980s, most governments could no longer sustain public sectors. As a result, the question whether or not public sectors should be retained in order to reduce the burden on governments, was argued intensely.

The worldwide trend of telecommunications reform began in most industrialized countries in the early 1980s. In the United States, the break up of AT&T in 1984 opened entry to the telecommunications business. In the same year, privatization of BT took place in the United Kingdom, following its separation from the Post Office in 1981. NTT of Japan was transformed from a public corporation into a joint stock company in 1985. This privatization trend also held for developing countries. With the strong support of President Carlos Salinas, 20% of TELMEX shares were sold in 1990.

It seems that nothing can stop the trend of reform, especially privatization, which is considered a universal remedy for improving telecommunications in any country. However, what kind of reform would actually be effective for developing countries has to be well considered before implementation.

5.1 Modes of Reform

As discussed in Chapter 2, telecommunications inevitably needs regulations regarding, for instance, price or universal service. In the case of natural monopolies, tighter regulation on the monopolist or public ownership would be justified. However, regulation and local, often bureaucratic, institutions have been blamed for the creation of inefficient telecommunications systems and therefore reforms are considered necessary.

Deregulation, liberalization, corporatization and privatization are common measures of reform. Deregulation and liberalization are alterations of regulatory frameworks, whereas corporatization and privatization involve transformation of telecommunications enterprises. Usually, these four measures are applied together. As we reviewed Japan's case, we have seen that it involved liberalization of the telecommunications market and privatization of the NTTPC. In the United Kingdom, liberalization of equipment, supply and corporatization of BT had been done two years prior to the process of privatization.

Deregulation

Deregulation denotes a policy of reducing or removing regulations that have been imposed by local governments on industries or consumers (Petrazzini, 1995, p.17; Straubhaar, 1995, p.3). By eliminating unnecessary regulations that, for the most part, have been put in place for historical or political reasons, an increase in performance, greater freedom of choice, and elimination of the cost of implementing regulations, are expected. Examples surveyed in Chapter 3 are the deregulation of provision for customer premises equipment in the United States in 1983, and the United Kingdom and Japan in 1985.

Liberalization

Liberalization is considered to be a special form of deregulation. While deregulation denotes decreasing of regulations in general, liberalization means removal of the entry barrier for industries (Petrazzini, 1995, p.16–17; Noam, 1995, pp.32–33). The policy of removing the entry barrier to allow different companies to enter the market, is what is most often meant by liberalization. Although full liberalization can rarely be seen, partial liberalization is common. As we reviewed in Chapter 3, European countries, including France, Germany and Spain, opened VAN markets to new entrants. Japan liberalized its long–distance, international, satellite and mobile service markets in 1985.

Corporatization

Corporatization is the process of introducing corporate principles to public enterprise. Usually, the mechanism of corporatization involves separating the enterprise from the government body and granting independent status to the enterprise (The World Bank, 1995, pp.40–41; Straubhaar, 1995, pp.24–26). Although a corporatized enterprise remains at least initially in public hands, the enterprise is subject to law and regulations governing private sectors, expecting increased managerial autonomy on the one hand, and decreased political interference on the other. An example of corporatization is separation of BT from the Post Office in 1981, as we described in Chapter 3.

Privatization

Privatization is the transformation of a public entity, which was formerly a government agency or public corporation, into a private company (Petrazzini, 1995, p.16; Straubhaar, 1995, pp.19–24). As we saw in Chapter 3, one of the public corporations discussed, British Telecom, was privatized in 1984 by selling its 51% stock to private sectors. By mid–1993, all the government shares had been sold. Similarly, NTTPC became a private company in 1985. Although it is said to be privatized, the Japanese government still holds 65.57% of all NTT shares. Therefore we should be aware that the use of the term private covers a broad spectrum, ranging from pure private to semi–private, as we discussed in section 4 of Chapter 2.

5.2 Lessons from History

In Chapter 3, we surveyed telecommunications development histories in several countries mostly from industrialized countries. The survey showed significant diversity of regulations, ownership and performance among countries.

Telephone infrastructure in the United States was developed by the Bell System. By protecting itself by controlling key patents in the early years and later by refusing connections requested by new entrants, the Bell System had preserved its monopoly status, in spite of several antitrust challenges and other suits against it. After telecommunications development had reached a mature level, the monopoly was finally broken up to introduce competition mainly into the long-distance market. Competition in local telephony was made possible by the recently passed Telecommunications Act of 1996.

In the United Kingdom, private operators did not perform well in the early period. Nationalization of the telephone sector did not improve the situation markedly, because of the government's indifference toward telephony. However, after World War II, telephone networks expanded successfully, in spite of the internal inefficiency within the Post Office. During the Thatcher administration, the telecommunications sector was separated from the Post Office in 1981 and then privatized in 1984. Because a so-called duopoly policy, which introduced limited competition into the telecommunications industry, was not successful at stimulating the market, it was abolished in 1991. New entrants, mainly from the cable television industry, were allowed to operate telephone service, expecting further competition.

In Japan, telecommunications had been developed by government initiative: before the World War II by the government itself; and then by a public corporation. Overall, Japan's telecommunications networks have been growing successfully, thanks to the government's recognition that telecommunications is indispensable for economic growth as well as overall national development. Similar to the United Kingdom, internal inefficiency of NTTPC was criticized. In 1985, NTTPC became a private company and new operators entered long-distance, international and satellite communications markets.

The history of telephony in France is similar to that of the United Kingdom: initial private development and later nationalization. Unlike the United Kingdom, as the French government almost totally ignored the importance of telecommunications, the situation had long been poor by the mid-1970s. However, after politicians came to be aware of the importance of telecommunications, intensive investment was begun. As a result, now France has the most advanced telecommunications infrastructure in the world.

German telecommunications is characterized by a traditional European PTT. Telephony was developed by a public monopolist as in Japan. However, it had not successfully grown

compared to Japan, due to lack of financial autonomy; the revenue from telephony was not always available to the telecommunications sector — sometimes it was used as a tool of collecting revenue for the other sectors of the government. Aiming at increased autonomy, DBP Telekom was corporatized in 1989. Privatization is to begin with the sale of shares in Deutsche Telekom in 1996.

Italy's telecommunications situation was different from other countries. Many separate public entities, both operators and regulators, were poorly organized. Accordingly, development of telecommunications infrastructure was not successful. Although it had been long discussed, to consolidate the players was difficult. Finally, in 1994, Telecom Italia was established to unite all the telephone operators in Italy.

Telecommunications in Spain was owned and operated by a private company called Telefónica. Contrary to the successful development by the private sector in the United States, Spanish telephony developed slowly. It is due mainly to lack of financial autonomy and partly to Spain's geography.

Mexican telephony was initiated by foreign capital from the United States and Sweden. They were later integrated into TELMEX and sold to the Mexican private sector in 1948. Afterward, it was nationalized in 1972. TELMEX has performed well for the middle-income country's standard, both before and after nationalization. With the strong support of President Salinas, TELMEX was re-privatized in 1988 and was intended to be a good advertisement of the Salinas administration's economic restructuring, rather than for improving performance.

The private sector led successful development of the networks in the United States, while the French government's initiative finally achieved one of the most advanced telecommunications infrastructures in the world. Although telephony in Germany was developed by a government agency as in Japan, it had grown slowly because of less autonomy in financial issues. Similarly, due mainly to lack of autonomy, Telefónica in Spain seems not to perform well, although it is a private company. The public telecommunications sector in Italy has not worked efficiently either, due to fragmentation of the players of both the regulators and business entities. In the case of TELMEX, nationalization did not effect on the performance of the company.

As we observed, telecommunications development processes vary greatly from country to country. No uniform explanation about a relationship between performance and institution, organization and ownership would be possible. Successful countries employed approaches of development that varied considerably. Similarly, reasons for failure cannot be explained in a consistent manner.

5.3 Economic Performance Considerations

The economic characteristics that we surveyed in Chapter 2 imply that in the initial development of telecommunications networks, some form of a subsidy is necessary to raise the number of telephones to a critical mass level; due to a positive network externality, a required subsidy is more than expected from the demand curve. The methods adopted by Japan justify the necessity of a subsidy of some form or other: to foster initial development, those who paid most were served first; after World War II, expensive one-time installation costs had been required. Similarly, in Mexico, subscribers had to purchase TELMEX shares to support network development.

In addition, because of a network externality, so-called universal service obligations are necessary to extend telephone networks to unprofitable areas such as sparsely populated rural regions or remote islands. Even with this obligation, universal service can hardly be accomplished by a private enterprise. For instance, Telefónica in Spain does not fully cover remote villages with small population.

Natural monopolies cannot be justified, when the existence of economies of scale or scope cannot be determined correctly. From the viewpoint of the telecommunications economy, question of ownership does not have a clear-cut answer.

New technologies may alter the economic characteristics of telecommunications — economies of scale or scope and sunk cost, which were regarded as reasons for entry regulation, will be affected. Examples of such technologies are satellite communications, cellular telephone, pager or VANS. It is better to allow new entrants into these non-basic services, because economic efficiency can be achieved through competition rather than through regulation.

Performance considerations in Chapter 4 suggest that, in general, telecommunications development depends heavily on a country's GDP per capita rather than on its institutional or organizational structure. If we look at this in detail, however, we find that among high income countries, telecommunications situations considerably vary from country to country for institutional, organizational and political reasons.

5.4 Recommendations for Developing Countries

As this thesis has shown, choice of ownership does not affect performance to the extent that is widely believed. What is more important, is how the government fosters the telecommunication enterprise regardless of its ownership. Accordingly, the choice of privatization or corporatization might not be a matter of concern in so far as it determines ownership, although we cannot ignore effects of such reforms on, for instance, financial issue.

However, public ownership could be justified, at least in the developmental stages of telecommunications networks. As we surveyed, nationalization of the telecommunications sector in France and the United Kingdom resulted in initial failure of the private provisions, and initially the German government successfully ran a telephone enterprise. Moreover, even in the later stage of network development, public ownership can be effective as we saw in the case of Japan and France.

Introducing competition through liberalization and deregulation are effective measures, as proven in the United States and Japan in the 1980s. Nevertheless, these events happened after infrastructures reached a certain mature level. In the infancy stage, monopolistic provisions should not be regarded as harmful.

We should also be aware that there will be potential risks involved in any reform. Since many of the drastic reforms discussed were begun just some 15 years ago, we do not know yet what will be the result of those attempts in industrialized countries. Additional reform considerations and actual implementation in the United States, the United Kingdom or Japan are proving that further adjustment of the policy is required, although initially the reforms were considered a success. Before knowing the final answers, the solutions cannot be judged as right.

In addition, private provisions might be harmful for early development, if strict enforcement of universal service obligations by regulators is absent from the picture. As we saw in Spain, Telefónica has not covered less profitable or remote areas well. The Italian government had to provide long-distance plus rural local service, instead of the private local operators already in place in the profitable regions.

Finally, sometimes the logistical aspects of reform are hard to carry out or take a very long time. As we reviewed, attempts at divestiture of the Bell System in the United States took 35 years since the antitrust challenge in 1949. The British Government had spent over a half century to privatize its telecommunications entity, reacting to the complaints regarding its inefficiency since the 1920s. Since 1982, there is talk of NTT's break up in Japan, but it has not come true so far. And we did not survey Thailand, Colombia and other developing countries that failed to privatize their telecommunications entity due mainly to strong opposition

from employees, who would lose their advantageous positions as government officials (Petrazzini, 1995, pp.136–143).

Recognizing these findings and facts, we recommend that developing countries should incorporate the following considerations in making or reforming telecommunications policy:

- separation of telecommunications entity from government body to assure managerial and financial autonomy;
- isolation from political pressure to avoid abuse of the telecommunications sector as a political device to attract public attention;
- introduction of business principles to decrease internal inefficiency, caused by X-inefficiency and managerial slack; and
- avoiding radical changes including privatization, carried out in the most industrialized countries, which already reached a mature level of telecommunications development.

To achieve these objectives, we suggest that creating a public corporation is a good choice, as several examples show its effectiveness, although it may appear to be modest.

In addition, a government's attitude to telecommunications is important. It should be recognized that telecommunications is a necessity for both people's daily life and business activities, not a luxury only for the rich. In terms of technology, developing countries have an advantage — most advanced technologies are readily available. Developing countries should not hesitate to introduce new means of telecommunications, such as satellite communications or cellular telephone, although a regulatory framework has to be properly designed.

Since Bell's invention of the telephone in 1876, it took more than a century to accomplish universal service by monopolists in most industrialized countries. Adopting any type of reform, after a certain level of network development is reached, is never too late. What is necessary for developing countries is to review and adopt successful cases of early development stages of telecommunications sectors in the industrialized countries, rather than simply adopt post-developed stages. Reforms are not likely to improve the situation, unless they are done at the right moment and in the proper manner.

Bibliography

- Armstrong, M., Cowan, S., & Vickers, J. (1994). *Regulatory Reform: Economic Analysis and British Experience*. Cambridge: The MIT Press.
- Bohlin, E. (1993). Telecommunications Liberalization in Sweden 1980–1993: An Over View. In Christoffersen, M., & Henten A. (Eds.). *Telecommunications: Limits to Deregulation?*. Amsterdam: IOS Press.
- Brock, G. W. (1994). *Telecommunications Policy for the Information Age: From Monopoly to Competition*. Cambridge: Harvard University Press.
- Cullis, J. G., & Jones, P. R. (1987). *Microeconomics and the Public Economy: A Defense of Leviathan*. New York: Basil Blackwell.
- de Neufville, R. (1990). *Applied System Analysis: Engineering Planning and Technology Management*. New York: McGraw–Hill.
- Duch, R. M. (1991). *Privatizing the Economy: Telecommunications Policy in Comparative Perspective*. Ann Arbor: The University of Michigan Press.
- Financial Times*. (1994, August 18). p.15.
- Fukui, K. (1992). *Japanese National Railways Privatization Study: The experience of Japan and Lessons for Developing Countries* (World Bank Discussion Papers No.172). Washington DC: The World Bank.
- International Telecommunication Union. (1972). *Year Book of Common Carrier Telecommunications Statistics*. Genève: Author.
- International Telecommunication Union. (1984). *Year Book of Common Carrier Telecommunications Statistics*. (11th ed.). Genève: Author.
- International Telecommunication Union. (1992). *Year Book of Common Carrier Telecommunications Statistics*. (19th ed.). Genève: Author.
- International Telecommunication Union. (1995). *World Telecommunication Development Report*. Genève: Author.
- Ito, Y., & Iwata, A. (1994). Japan: Creating the Domestic and International Networks. In E. Noam, S. Komatsuzaki & D. A. Conn (Eds.). *Telecommunications in the Pacific Basin: An Evolutionary Approach* (pp. 440–457). New York: Oxford University Press.
- Ministry of Posts and Telecommunications. (1995). *Telecommunications White Paper*. Tokyo: Office of Publishing of Ministry of Finance.
- Mody, B., Bauer, J. M., & Straubhaar, J. D. (1995). *Telecommunications Politics*. Mahwah: Lawrence Erlbaum Associates.
- The New York Times*. (1996, April 22). p.A1, p.D5.
- Noam, E. M. (1994). Beyond Telecommunications Liberalization: Past Performance, Present Hype and Future Direction. In W. J. Drake (Ed.). *The New Information Infrastructure: Strategies for U.S. Policy* (pp. 31–54). New York: The Twentieth Century Fund Press.

- Noam, E. M. (1995). The United States. In E. Noam, S. Komatsuzaki, & D. A. Conn (Eds.). *Telecommunications in the Pacific Basin: An Evolutionary Approach* (pp.473–490). New York: Oxford University Press.
- Organisation for Economic Co-operation and Development. (1990). *Performance Indicators for Public Telecommunications Operators*. Paris: Author.
- Oslin, G. P. (1992). *The Story of Telecommunications*. Macon: Mercer University Press.
- Petrazzini, B. A. (1995). *The Political Economy of Telecommunications Reform in Developing Countries: Privatization and Liberalization in comparative Perspective*. Westport: Prager Publishers.
- Pindyck, R. S., & Rubinfeld, D. L. (1994). *Microeconomics* (3rd ed.), Englewood Cliffs: Prentice–Hall.
- Ramamurti, R. (1996). Telephone Privatization in a Large Country: Mexico. In R. Ramamurti (Ed.), *Privatizing Monopolies: Lessons from the Telecommunications and Transport Sectors in Latin America* (pp.72–107). Baltimore: The Johns Hopkins University Press.
- Saunders, R. J., Warford, J. J., & Wellenius, B. (1994). *Telecommunications and Economic Development* (2nd ed.). Baltimore: The Johns Hopkins University Press.
- Sharkey, W. W. (1982), *The Theory of Natural Monopoly*. New York: Cambridge University Press.
- Stehmann, O. (1995). *Network Competition for European Telecommunications*. New York: Oxford University Press.
- Straubhaar, J. D. (1995). From PTT to Private: Liberalization and Privatization in Eastern Europe and the Third World. In B. Mody, J. M. Bauer & J. D. Straubhaar (Eds.) *Telecommunications Politics: Ownership and Control of Information Highway in Developing Countries* (pp.3–30). Mahwah: Lawrence Erlbaum Associates.
- Takano, Y. (1992). *Nippon Telegraph and Telephone Privatization Study: Experience of Japan and Lessons for Developing Countries* (World Bank Discussion Papers No.179). Washington DC: The World Bank.
- Telecom Italia (1996, April 29). *Letter to the Stockholders*. Rome: Author.
- Telecommunications Council. (Japan) (1996). *Report on the “Status of Nippon Telegraph and Telephone Corporation”*.
- Vickers, J., & Yarrow, G. (1988). *Privatization: An Economic Analysis*. Cambridge: The MIT Press.
- Wellenius, B., & Stern, P. A. (Eds.) (1994). *Implementing Reforms in the Telecommunications Sector: Lessons from Experience*. Washington DC: The World Bank.
- The World Bank. (1994). *World Development Report 1994: Infrastructure for Development*. New York: Oxford University Press.
- The Yomiuri Shimbun*. (1996a, April 1). p.6.
- The Yomiuri Shimbun*. (1996b, April 7). p.1.

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