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## Choices and Consequences: A Cross-National Evaluation of Telecommunication Policies in Developing Countries

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# Choices and Consequences: A Cross-National Evaluation of Telecommunication Policies in Developing Countries

## Abstract

Telecommunications are increasingly being recognized as critical strategic infrastructure for ensuring the success of national social and economic development plans and programs, improving international competitiveness and integrating domestic economies into the world economy. In an effort to overcome chronic deficiencies in telecommunication performance and distribution of services, many developing countries have been engaged in liberalizing their telecommunication sectors. Liberalization here referring to the movement away from the traditional state-owned monopoly structure and towards the introduction of privatization and competition. This study examines the consequences of these developments by analyzing telecommunication developments in 81 developing countries from 1977 to 1988. The study is in two parts. The first part is theoretical and (a) identifies the technological and economic forces driving change in the sector; (b) reviews the policy options available to developing countries; (c) critically discusses the arguments both for and against the introduction of competition and privatization in the sector; and (d) outlines the importance of governmental commitment to the growth of telecommunications. The second part is empirical and presents the findings of a cross-national longitudinal evaluation of the impact of changes in policies governing sector structure for the supply and manufacture of telecommunications equipment, facilities and services, as well as the impact of governmental commitment, on sector performance and distribution. The evaluation is conducted in the context of the economic factors which are thought to condition the relationship between telecommunication policies and outcomes. It finds that movement toward liberalization has had little independent impact on telecommunications sector performance, but is associated with adverse conditions of access to and availability of services. In contrast, governmental commitment to the growth of the sector is found to be positively related with improvements in both sector performance and distribution at all levels of national income and under different compositions of economic activity. The findings suggest that if sector growth and development are important national priorities then attention should be turned more toward stepping-up government investments rather than towards sector restructuring.

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## First Advisor

Oscar Gandy

## Comments

CHOICES AND CONSEQUENCES: A CROSS-NATIONAL EVALUATION  
OF TELECOMMUNICATION POLICIES IN  
DEVELOPING COUNTRIES

Nikhil Sinha


A DISSERTATION

in

Communications

Presented to the Faculties of the University of Pennsylvania  
in Partial Fulfillment of the Requirements for the Degree of  
Doctor of Philosophy

1991

  
\_\_\_\_\_  
Supervisor of Dissertation

  
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Graduate Group Chairperson

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**NIKHIL SINHA**

**1991**

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## **ABSTRACT**

# **CHOICES AND CONSEQUENCES: A CROSS-NATIONAL EVALUATION OF TELECOMMUNICATION POLICIES IN DEVELOPING COUNTRIES**

**NIKHIL SINHA**

**OSCAR H. GANDY JR.**

Telecommunications are increasingly being recognized as critical strategic infrastructure for ensuring the success of national social and economic development plans and programs, improving international competitiveness and integrating domestic economies into the world economy. In an effort to overcome chronic deficiencies in telecommunication performance and distribution of services, many developing countries have been engaged in liberalizing their telecommunication sectors. Liberalization here referring to the movement away from the traditional state-owned monopoly structure and towards the introduction of privatization and competition.

This study examines the consequences of these developments by analyzing telecommunication developments in 81 developing countries from 1977 to 1988. The study is in two parts.

The first part is theoretical and (a) identifies the technological and economic forces driving change in the sector (b) reviews the policy options available to developing countries (c) critically discusses the arguments both for and against the introduction of competition and privatization in the sector and (d) outlines the importance of governmental commitment to the growth of telecommunications. The second part is empirical and presents the findings of a cross-national longitudinal evaluation of the impact of changes in policies governing sector structure for the supply and manufacture of telecommunications equipment, facilities and services, as well as the impact of governmental commitment, on sector performance and distribution. The evaluation is conducted in the context of the economic factors which are thought to condition the relationship between telecommunication policies and outcomes. It finds that movement toward liberalization has had little independent impact on telecommunications sector performance, but is associated with adverse conditions of access to and availability of services. In contrast, governmental commitment to the growth of the sector is found to positively related with improvements in both sector performance and distribution at all levels of national income and under different

compositions of economic activity. The findings suggest that if sector growth and development are important national priorities than attention should be turned more toward stepping-up government investments rather than towards sector restructuring.



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## Chapter 1

### INTRODUCTION

Telecommunications are increasingly being recognized as critical strategic infrastructure for ensuring the success of national social and economic development plans and programs, improving international competitiveness and integrating domestic economies into the world economy. New attitudes toward the economics of telecommunications and the role it plays in overall growth and development are gradually being translated into stepped-up investments in the sector in many developing countries.

At the same time, telecommunications sectors the world over are undergoing rapid change. New information and communication technologies, characterized by the convergence of telecommunications and computers and the development of integrated voice, video and data communication systems, are creating opportunities for the introduction of new services, changing the ways of delivering and accessing old services and lowering costs across the board.

Reacting to these developments, governments, legislatures and regulatory bodies in most developed countries are engaged in rapidly transforming their telecommunications sectors. These administrations are also pressing for the

restructuring of the international arrangement of telecommunications and the opening up of telecommunications markets in developing countries. Governments in many developing countries are themselves faced with the prospect of pursuing internal policy reforms to overcome chronic deficiencies in telecommunications performance and distribution.

However, there is little knowledge on the conditions under which telecommunications investments are best translated into development benefits and the kinds of policies, regulatory mechanisms and sectoral arrangements which further the effective development of the sector. Despite this lack of awareness on the possible consequences of telecommunication policies, many developing countries have been engaged in the process of policy reform. These changes have almost unexceptionably been directed toward liberalizing the sector. Liberalization here referring to the movement toward privatization and the introduction of competition.

This drive toward liberalization is a marked departure from the policy framework which has governed the telecommunications sector in developing countries for a number of years. In the past, telecommunications was considered a good example of a natural monopoly, an essential public good that governments should provide in a

non-commercial mode. Consequently telecommunication services were provided by public enterprises under monopoly conditions. Changes in the technology and economics of telecommunications, it is argued, have eroded the condition of natural monopoly. Consequently, the state monopoly structure is increasingly being held responsible for the inadequate growth of the telecommunications sector in the past, and is deemed likely to hinder expansion in the future.

The theoretical underpinnings of this drive toward liberalizing telecommunication policies are based on the many virtues of the market mechanism that have been detailed in neoclassical economics and which are being more or less vigorously embraced by a number of countries. Open competition and the relatively unhindered operation of market forces, it is argued, will result in stepped-up sector growth and improved sector performance and efficiency. Therefore, Saunders, Warford and Wellenius (1983) argue that if the telecommunications sector in developing countries were:

"...opened up to competition...there should be few reasons why large amounts of private capital would not be attracted. It is possible that if governments backed away from total control of the resources allocated to the sector...that telephones would begin appearing more rapidly in response to the large unsatisfied demand.....It can also be argued on technological grounds that , during the next ten years in particular, extensive government regulation of telecommunication services in developing countries or a franchised government monopoly may not be the best way to create a dynamic, efficient, and responsive telecommunications sector". (p. 283)

In short, the drive toward liberalization is based on the assumption that private competition may be the most appropriate mechanism for ensuring the growth and development of telecommunications. However, this belief in the ability of markets to foster the growth of telecommunications in developing countries, is not without its critics.

Raul Katz (1988) in his study of the information sectors in developing countries, argues that -- in contrast to developed countries where the development of telecommunications is the result of economics forces -- it is politics, rather than markets, that drives the growth of telecommunications in developing countries. There are two main reasons for this, the first concerned with sector efficiency, the second with sector equity.

First, despite the existence of some elements of competition, telecommunication markets in developing



countries are far from efficient. Whether or not the sector is a natural monopoly, there do exist significant economies of scale which tend to be lost with the break-up of the public network. Additionally, the efficient operation of the market depends upon effective competition which is often difficult to achieve when economies of scale are large.

Second, markets usually deal inadequately with the provision of public goods or services like telecommunications. The market system works by putting a price on a service and the allocation of that service between consumers is made by their willingness to pay that price. When prices reach equilibrium it is assumed that demand for the service matches supply. This reliance on willingness to pay has obvious consequences for equity since, as Sen (1990) points out, "the willingness to pay also depends on the *ability to pay*" (p. 19; emphasis in original). Hence, even under conditions where competition can lead to improved sector performance and efficiency, its introduction could concurrently lead to a worsening of conditions of distribution and equity.

Because of these dual shortcomings of the operation of market forces, particularly with respect to developing countries, Katz (1988) argues that "the expansion of the telecommunications infrastructure in most countries is a

decision that pertains to political authorities" (p. 58). And one of the most effective instruments of political commitment to sector growth is the amount of governmental resources allocated to telecommunications. Pool (1963) argues that different investment practices may lead to the development of very different communication systems and, therefore, a major issue for most developing countries is how much of their resources to invest in communications.

Thus we see that in seeking to find ways to further the development of telecommunications in developing countries we are faced with a number of competing approaches. On the one hand, there are those who argue that policy liberalization, characterized by the movement toward the introduction of private competition, -- i.e., the operation of market forces -- may be the best solution for the problems of future sector growth and expansion. On the other hand, governmental control and commitment to sector growth, reflected in increased government investment in telecommunications -- i.e., the operation of political forces -- is also posited as the most appropriate mechanism for telecommunications growth in developing countries.

At the same time telecommunication policies need to reconcile the possibly conflicting objectives of performance and efficiency vs. those of distribution and equity. This is an important issue since misplaced sector goals may run

contrary to the strategies and objectives of the overall development process. Before we can determine what succeeds in fostering sector growth and distribution and what doesn't, we need to examine and define the role of performance and distribution in the context of overall development objectives. This, in turn, requires the delineation of the overall strategies and goals of the development process.

In addition, the relationship between policies and sector development needs to be examined in the context of the economic environment within which it perforce operates. There is considerable evidence from developed and developing countries alike that the extent of economic growth and the nature of economic activity are closely related to the development of the information and communication sectors. It appears probable, therefore, that different telecommunications choices will have different consequences for groups of developing countries differentiated from one another on the basis of common characteristics and features that impact significantly on the development of telecommunications. It follows that part of the challenge of research is to construct such a typology which can assist in the evaluation of the impact of telecommunications policies in developing countries.

This empirical study is a modest, albeit pioneering, attempt to fill the knowledge gap that exists in the evaluation of the policies that developing countries have followed with respect to their telecommunication sectors. It describes the changes that have taken place in telecommunications policies in 81 developing countries over a ten year period as well as the ways in which their telecommunication sectors have changed both in terms of performance and distribution. It examines the relationship between policies and telecommunication outcomes in the context of the economic and political factors which condition the impact of policies on performance and distribution.

The study identifies the technological and market forces driving change and the pressures being faced by governments to restructure or reform their telecommunications sectors. It details the choices available to developing countries in terms of changes in policy, regulatory mechanisms and sector restructuring

It is argued in the study that telecommunication sector performance should be viewed not merely as improved commercial efficiency, but that the importance of telecommunications as developmental infrastructure requires the definition of performance also in terms of developmental objectives. Through a historical and thematic review of the literature of development economics and development

communications, it formulates a perspective toward development, establishes a mechanism for linking development to telecommunications and lays down criteria for evaluating policies.

Finally, it constructs a typology of countries based on their telecommunication policies and relevant economic and political factors and tests the usefulness of this classification scheme in predicting telecommunication outcomes.

The importance of evaluating telecommunication policies in terms of their distributional consequences is laid out in Chapter 2, in which the work in the sub-disciplines of development economics and development communications is reviewed in an effort to forge a link between telecommunication policies and overall development objectives.

In Chapter 3, the growing pressure on national governments to re-evaluate their telecommunications policies and the problems they face in reacting to these pressures are discussed in the context of international developments in telecommunications. These pressures include: the need to rapidly expand and improve basic services; to provide new, less expensive services based on the latest technologies; to raise investment levels by broadening the investment base

and mobilizing new sources of capital; and to permit domestic and international competition in the supply of equipment, ownership of facilities and provision of services.

Most developing countries, are severely constrained in their ability to respond to the forces that are driving change in the sector and, consequently, in their ability to cope with these pressures. Their problems are, *inter alia*, related to investment levels, pricing policies, choices in sources of equipment and provision of services and sectoral and regulatory arrangements. In addition, they are very often faced with the difficult task of reconciling attempts toward commercial efficiency with goals of distributional equity.

Chapter 3 also focuses on the economic dimensions of the restructuring debate with particular emphasis on the performance of state-owned or controlled monopolies and the economic factors which condition the impact of policies on performance. It concludes with a discussion of the different policy options available to and pursued by developing countries.

In contrast, Chapter 4 is based on the contention that economic factors are in and of themselves inadequate for explaining telecommunications performance in developing countries where the state is a critical factor in shaping

economic outcomes. This political dimension is implicit in a study of policies, since policies are the expression of political processes. But the effective implementation of policies in turn requires effective political commitment and the importance of examining the impact of such commitment (or lack of commitment as the case may be) in shaping the telecommunications sector in developing countries is laid out in this chapter. This is done within a systematic analysis of the role of the state in fostering industrial growth in general, and in the telecommunications sector in particular.

Chapter 5, lays the ground-work for the construction of the classification scheme and ends with a statement of the research questions examined in the study as a whole. The next chapter lays out the methodological issues involved in the selection and operationalization of the variables used in the study. Chapters 7 through 11 present the empirical evidence and discuss the results. Chapter 7 deals with developments in telecommunications policies, outcomes and commitment from 1977 to 1988. Chapter 8 briefly looks at economic changes over the same period. Chapter 9 and 10 examine the relationships between policies, commitment and economics first with telecommunications performance and then with telecommunications distribution. The results of the classification analysis are discussed in Chapter 11, while the conclusions are presented in the final chapter.

The overall purpose of the study is to provide a theoretical and empirical basis for developing countries to examine issues relating to the restructuring of their telecommunications sectors in the context of overall developmental objectives. In doing so it hopes to provide a more informed basis for evaluating the consequences of the various choices these countries have made with regard to telecommunications policies in the near past, thereby providing guidance on the selection and implementation of these policies in the future.



## Chapter 2

### THEORETICAL FRAMEWORK

#### Literature Review

The evaluation of policies followed by developing countries with respect to the organization of their telecommunication sectors is one of the central tasks of this study. This evaluation is based on the impact of these policies with respect to two areas of telecommunications outcomes: sector performance and distribution of services. But before any evaluation can be taken up it is essential to understand just what exactly is meant by performance and distribution and why the study of these two areas is important. While the next chapter deals in detail with issues relating to sector performance, this chapter focuses on distributional issues.

The review of literature that follows is guided by the belief that sector policies in developing countries, whether in the telecommunications sector or in any other sector of the economy, must be framed in the context of overall national developmental objectives and that corresponding evaluatory criteria need to be derived from these overall developmental objectives. This requires, first of all, an understanding and explication of goals and strategies of development.

Most explorations of the relationship between telecommunications and development rarely attempt a systematic definition, or even description, of the nature of development. For instance, in their influential review of the role of telecommunications in development, Saunders, Warford and Wellenius (1983), identify three perspectives on the relationship between telecommunication and development.

First, they suggest, there are those who feel that telecommunications investments should be held well below what is indicated through the operation of normal market demand, particularly where such investments come at the expense of outlays in other more "vital" sectors.

Second, there is the group that contends that telecommunications should grow mostly as indicated by the market, with operating entities behaving in most respects like commercial enterprises with relatively unhindered access to capital markets for investment funds, subject to some governmental regulation to ensure wide access to basic services and to protect the public's interest.

Finally, there is a more activist technology-oriented group that promotes rapidly advancing telecommunications technology as a prime means to achieve a wide range of social and economic goals. This group would not only implement the growth of telecommunications as called for by

market forces, it would push the growth further even if supply outstripped demand and even if this called for government subsidies for some services. At the end of their review, the authors ask:

Who is right? The importance of answering this question can scarcely be exaggerated. If a strong telecommunications infrastructure is indeed essential for rapid and efficient development, its neglect may severely hinder the success of development efforts in both directly productive and social sectors, and could impose inefficient spatial settlement patterns on the rapidly growing urban areas in the developing world. If, however, the present level of telecommunications service in developing countries is sufficient (although in many towns, villages and semi-urban settlements it is virtually nonexistent), then massive investments in the premature expansion of a major infrastructure would be not only a misdirection of resources, but would create a serious burden of unnecessary administration, training and maintenance (p. 18).

This question is ill conceived without a detailing of what comprises development. This is not merely a classificatory issue, but as will be brought out during the review of literature, the definition of development determines not only the strategy of development but the role various sectors and policies within these sectors can play in the development process.

Even if researchers have some operational definition of development and relate telecommunications to that definition, they rarely provide a framework which links their definitions to the actual formulation of

telecommunications policy in such a way as to provide a set of criteria through which the objectives of those policies can be laid down and/or their effectiveness in fostering development can be evaluated.

As indicated in the introduction, commercial criteria for measuring telecommunications performance (e.g., profitability or national density measures) may be inadequate in the face of developmental objectives. The perspective toward development which will be established in this chapter, requires the inclusion of distributional outcomes as critical components of policy evaluation. This position is established in this chapter through a review of the theoretical perspectives that have emerged from the two sub-disciplines of development economics and development communications.

It is difficult to make one-to-one correspondences between the development of general intellectual traditions and specific theoretical perspectives that have emerged in different disciplines over time. It is tempting however, to explicate and describe trends in different disciplines in a manner which suggests that they were historically coexistent and shared the same intellectual roots, particularly while dealing with two sub-disciplines that are concerned with the same problem area. However, poor historiography, may be too

high a price to pay for contrived convergences, no matter how well the glove appears to fit the hand.

In fact, it is far from easy to trace historical developments in any one field in a manner that precisely delineates the periods during which one or another theoretical position dominated. This is equally true of both development economics and development communication where received "histories" of the field do not always reflect the fact that different theoretical approaches have co-existed in the same historical periods.<sup>1</sup>

Though such "histories" make for poor historiography, they do, nevertheless, serve an important purpose: to distinguish between different perspectives thus assisting in the identification of the assumptions driving them and furthering the growth of new perspectives that may modify or extend the old paradigms. What follows is not an attempt at such a history but rather an effort at identifying different ways of conceptualizing the economic foundations of

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1. See for example Henriot (1979); Stewart and Streetan (1979) and Meier (1984) for historical perspectives on development economics. And Lowery and DeFleur (1986) and McQuail (1987) for received histories of the field of communication in general and Rogers (1976); Schramm and Lerner (1976) for development communication in particular. More recently, a number of scholars have provided alternate readings of the growth of the sub-field of development communication, with an attempt to place its "history" in political and ideological contexts, e.g., Golding (1974); Beltran (1976); Narula and Pearce (1986); Jayaweera and Amunugama (1987).

development and the role of communications in development, based on thematic and/or postulatory commonalties. The two sub-disciplines will be considered separately before attempting to identify congruences. It should be emphasized that the different perspectives which will be identified within development economics and development communication have not always been exclusive: theoretically, historically or in their application.

### ***Economics and Development***

Dissatisfaction with the results of developmental efforts in the Third World over the past four decades have led, in recent years, to a refocussing and indeed redefinition of the problems and strategies of development. It is clear that the manner in which the problem is defined has much to do with the possible solutions which can be suggested.

In its earliest formulations, development economics viewed the problem of development as a problem of growth. The per capita gross national product (GNP/capita) was considered the appropriate measure of the level of development and the strategy of development aimed at boosting its growth rate (Henriot, 1979). This strategy focussed upon the "creation of conditions for self-sustained growth in per capita GNP

and the requisite modernization of economic, social and political structures implicit in the achievement of this goal" (Adelman, 1975, p. 306). Influential accounts of development in the industrialized countries, such as Rostow's *The Stages of Economic Growth* (1960) served to put the stamp of historical approval on the development-as-growth assumption.

Consequently, the United Nation's First Development Decade (1960-1970) set a quantitative target of a five percent annual increase of GNP in developing countries. Heavy industrialization and capital accumulation through increased national savings were the chosen instruments for achieving this target. The industrial sector was given prime consideration in plans and programs. This was usually concentrated in or around cities and many countries experienced rapid urbanization. The strategy by-passed the agricultural sector which was considered either a source for primary products for export (e.g., cash crops like cotton, sugar, coffee) or a support sector for the needs of the industrial sector.

It is important to note that in this strategy for promoting development, the question of income distribution and equality were postponed. The question of distributive effects was subservient to the question of the rate of growth. It was expected that an ever increasing output of

goods and services will in fact mean increased national income which will "trickle down" to the masses. That is, given sufficient prosperity it was expected that benefits would flow to the poorer sections because of increased employment, redistributive taxation and the general health and stability of the economy.

The second important dimension of this approach was its treatment of developing countries in isolation. Their problems were seen to be primarily internal, the result of local structures inadequate to the task of increasing GNP/capita. Essentially, the impact of colonialism and its present-day legacy for underdevelopment were largely neglected.

In terms of its own objectives, the strategy of growth-as development was a remarkable success. As Owens and Shaw observed in their 1972 book *Development Reconsidered*: "[t]he 5 percent annual increase in gross national product achieved as a Third World average during the 1960s, and which was the quantitative target for the United Nations' First Development Decade, is roughly double the rate of economic growth achieved in nineteenth century Western Europe and North America" (p. 1). Such a performance should have been a indication of significant "development". Yet even as early as the end of the 1960s it had become clear that this



"development" was not reaching the lives of ordinary people in terms of any reduction of poverty.

One development economist put the issue in the following way:

The questions to ask about a country's development are therefore: What has been happening to poverty? What has been happening to unemployment? What has been happening to inequality? If all three of these have declined from high levels, then beyond doubt there has been a period of development for the country concerned. If one or two of these central problems have been growing worse, especially if all three have, it would be strange to call the result "development," even if per capita income doubled. (Seers, 1969 p. 3)

Questions such as these led to the gradual emergence of an alternate view of how to define the problem of development. According to this view, the problem of development was not the pace of growth but the relationship any increase in GNP had to the poor -- especially the poorest 40 percent of the population in the developing countries. These poorest 40 percent were the marginals, people who neither contribute to the productivity of a nation nor share in the benefits of increased production (Henriot, 1979).

Their worsening situation was acutely brought out in the so-called "success stories" of Brazil, Mexico and India, which had experienced relatively high growth rates of the national product in the 1960s. Writing of the growth-as-development

approach, Adelman (1975) notes, "[n]ot only is there no automatic trickle-down of the benefits of development; on the contrary, the development process leads typically to a trickle-up in favor of the middle classes and the rich" (p. 302).

The problem of "marginals", exacerbated by development models aimed chiefly at GNP/capita increase and which ignored distributive characteristics, was addressed directly by Robert McNamara before the board of governors of the significant World Bank Group meeting in Nairobi in 1973:

The basic problem of poverty and growth in the developing world can be stated very simply. The growth is not equitably reaching the poor. And the poor are not significantly contributing to growth....The data suggest that the decade of rapid growth has been accompanied by greater maldistribution of income in many developing countries, and that the problem is most severe in the countryside. There has been an increase in the output of mining, industry, and government -- and in the incomes of the people dependent on these sectors -- but the productivity and income of the small farmer have stagnated. One can conclude that policies aimed primarily at accelerating economic growth in most developing countries, have benefitted mainly the upper 40% of the population and the allocation of public services and investment funds has tended to strengthen rather than offset this trend (McNamara, 1973, pp. 10-11).

When the strategy for the Second Development Decade of the United Nations (1970-1980) was devised, therefore, income distribution, land reform and community organization were given top priority along with objectives to develop social

infrastructures like education, health and housing. In emphasizing the rural sector, this strategy did not neglect industrialization. But the criteria for evaluating the success of developmental efforts were not simply the rate of increase in GNP/capita. Rather, this approach aimed at ensuring that patterns of industrialization and rural development led to the narrowing of income disparities and improvement in the availability of key social resources.

Growth with redistribution, therefore, was the official strategy of the Second Development Decade. However, even before the decade came to end, it had become clear that not much headway had been made in most of the developing world during the 1970s, particularly with regard to improvements in the quality of life of the vast majority of the peoples of these countries. Writing in 1979, Norman Hicks and Paul Streeten observed:

The disappointment with GNP per head and its growth has led to a greater emphasis on employment and redistribution. But it was soon seen, on the one hand, that unemployment in the sense in which the term is used in the developed countries was not the problem in the developing countries and that, on the other hand, redistribution from growth yielded only very meager results (p. 568).

Moreover, new evidence from "model" countries like China indicated that mass poverty can coexist with a high degree of equality. During the 1980s, equity-oriented countries like China, Cuba, Sri Lanka, Tanzania and India found it

necessary to give greater attention to economic efficiency and growth. An additional problem with this growth-with-redistribution strategy was that, similar to the first definition which emphasized "growth", it also located the problem primarily as *internal* to the developing countries. No effort was made in the analysis -- or in the consequent policy response recommended -- to place the problem of development in any kind of international context.

A number of analysts, however, particularly from Latin American developing countries, preferred a definition of the problem which was much more historical in its emphasis upon the evolving relationships between developed and developing countries. They saw the focus of the problem not located principally within the developing world, but rather in patterns of international economic interaction.

The basic issue, for these researchers, was not so much the *quantity of economic growth* (as per the growth-as-development perspective) or even the *quality of social growth* (as per the growth-with-redistribution perspective) but the *quality of the process* by which development was achieved. Economic and social development was important, but the key question to be asked, according to this third alternative was: who is controlling the process of development? To apply Paulo Friere's (1970) terminology of the educational process to the international economic

process, are Third World countries *objects* of development -- at someone else's hand, or are they *subjects* of development -- in control of their own destiny? Attempts to answer these questions gave rise to the theories of "dependency" and "underdevelopment."

The different variations of theories of dependency and underdevelopment are well represented in the writings of Celso Furtado (1972); Andre Gunder Frank (1972); Theotonio Dos Santos (1970) and Immanuel Wallerstein (1974). All of them pay serious attention to the colonial relationships which have historically marked the growth of the countries of Latin America, Asia and Africa. They argue that outside of an explicit recognition of the consequences of that relationship no accurate understanding of the present situation of these countries, characterized by "dependency" and "underdevelopment," is possible.

"Dependency" means that the major decisions which affect socioeconomic progress within developing countries -- decisions, for example, about commodity production and prices, investment patterns and monetary relationships -- are made by individuals, institutions (including corporate entities) and governments outside these countries. It is a situation in which, according to Dos Santos, "the economy of certain countries is conditioned by the development and expansion of another economy to which the former is

subjected....The concept of dependence permits us to see the internal situations of these countries as part of the world economy" (pp. 289-90).

"Underdevelopment" is the obverse of "development". It refers to the process whereby a country, characterized by subsistence agriculture and domestic production, progressively (or rather retrogressively) becomes integrated as a dependent unit into the world market through patterns of trade and/or investment. The production of that country thus becomes geared to the demands of the world market, in particular the demands dictated by the industrialized nations, with a consequent lack of integration within the country between the various parts of its own domestic economy.

Consequently, the *dependicistas* strategy of development aimed at reducing dependency by taking greater control of the functioning of domestic economies and insulation from what they saw as the deleterious effects of external economic relationships. In its most extreme form, the specific policies aimed at these objectives involved delinking national economies from the world economy by promoting self-reliance in production through import-substitution, development of indigenous technology, protectionist and restrictive trade practices and resistance to integration in world trade.

In its more moderate manifestations (this is not to suggest that elements of the above policies are not followed, but that they are more flexibly and leniently applied) this approach called for the reform of the international economic order under the recognition that some degree of integration is essential for growth. In fact, under the pressure exerted by developing countries adhering to this international economic-reform-as-prerequisite-to-growth strategy, the Sixth Special Session of the UN. General Assembly adopted, in April 1974 (over the objections of the industrialized democracies), a declaration on the establishment of a New International Economic Order.

What is emphasized, therefore, in this third alternative to defining development, is the problem of the international economic order, the structured relationships between rich and poor nations. "What is at stake," wrote an African political scientist, "is indeed the belated but still sorely needed transition from an interdependence based on hierarchy and Western charity, to an interdependence based on symmetry and mutual accountability" (Mazrui, 1975, p. 134).

Despite the ideological appeal of this conceptualization of the problem of development, efforts to validate many of the basic postulates of dependency theory, particularly as explicators (as different from descriptors) of *continuing*

underdevelopment have had little success.<sup>2</sup> As Lall (1975) argues, validation of dependency requires that two criteria be satisfied: that there be identified certain characteristics of dependent economies which are not found in non-dependent ones; and, that these characteristics be shown to affect adversely the pattern of development in the underdeveloped countries. It appears, from his analysis of both developed and developing countries that neither of these criteria are fully satisfied leading him to conclude that:

"dependence" is defined in a circular manner: less developed countries are poor because they are dependent, and any characteristics that they display signify dependence (p. 800).

Furthermore, the development performance of "export-oriented" countries like Japan, South Korea, Taiwan and Singapore is held out as a telling indictment of import-

2. These problems of empirical validation exist even after accepting that the concept of dependency holds together as a theory of underdevelopment and one that is useful for explaining the continuation of underdevelopment in third world countries. In fact, this is far from being established. As Laclau (1971) and Brenner (1977) attempt to show, the ways in which the dependency theorists use the concepts of development and underdevelopment are not only incorrect from a Marxist point of view (the intellectual tradition from which many of the dependency theorists explicitly or implicitly derive inspiration) but also do not very well succeed in demonstrating what they attempt to demonstrate. For example, Laclau (*ibid*) points out that the only way in which Gunder Frank can "demonstrate" that all the periphery is capitalist and has been since the colonial period is by using the concept of capitalism in a sense which is erroneous from a Marxist point of view, and useless for his central proposition, that of showing that a bourgeois revolution in the periphery is impossible.



substitution, insulation and self-reliance -- the strategic offshoots of dependency theory. Technology importation, export orientation and above all integration into the world economy, it is argued, have been the underpinnings of the performance of these countries, which has been marked by growth as well as the lowering of inequality (Meier, 1984).

Perhaps equally important is the fact that in the process of establishing inequities in the international economic order, dependency theorists tend to gloss over and even ignore the problems in domestic economic situations. Though Dos Santos (1970) does make an attempt to recognize, at the outset, that there is no mechanical determination of internal by external structures, as he proceeds in his analysis he gradually re-establishes the primacy of the latter over the former leading up to an analysis typified by antecedent causation and inert consequences.

This all too brief exposition of the main tenets of the divergent approaches to identifying and defining the problem of development has perhaps suggested that they were incorporated into the process of development exclusive of each other or that they represent a historical succession in the formulation of ideas in this area. This is not so. In fact, most developing countries have manifested some of the strategies indicated by all three approaches in their development plans and programs through the 1960s, 1970s and

well into the '80s. In fact, it is possible to isolate some common features of these approaches which have been propounded, in one form or another and with differential degrees of emphasis, since the earliest formulations of development economics.

In his illuminating, and rather controversial, essay, "The Rise and Decline of Development Economics," Albert Hirschman (1981) identifies two major ideas with which development economics came into being, namely, "rural underdevelopment" and "late industrialization." The former idea led naturally to a focus on utilization of underemployed manpower and to growth through capital accumulation. The latter called for an activist state and for planning to overcome the disadvantages of lateness through what Hirschman (1981) calls "a deliberate, intensive, guided effort....with new rationales for protection, planning, and industrialization itself," (pp. 10-11) in short -- an economically active state.

Within these themes, differential emphasis was placed on growth, redistribution, and self-reliance at different times in different countries. These themes, particularly the notion of planning and state action (which was perhaps the single common strategy applied by all countries) were closely linked to criticisms of traditional neoclassical

economics as applied to developing countries.<sup>3</sup> It was argued that neoclassical economics did not apply terribly well to underdeveloped countries. But, as Sen (1984) points out, this was no surprising contention, since neoclassical economics did not appear to apply very well anywhere else either! However, the role of the state and the need for planning and deliberate public action seemed stronger in underdeveloped countries,<sup>4</sup> and the departure from traditional neoclassical economics was, in many ways, more radical.

As indicated earlier, the failure to substantially improve the condition of the people of developing countries over the past three decades, has encouraged the formulation of alternatives to the traditional definitions and strategies of development followed during this period. The main attacks have come from three very different directions.

The first, which may be termed the *basic or minimum needs approach*, grew out of the earlier growth-with-redistribution strategy. The second approach, focussing on *structural*

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3. See, for example, Rosenstein-Rodan (1943); Dobb (1951); Nurkse (1953).

4. Primarily because it was believed that the neoclassical mechanism for the processing of social claims, i.e., the market (at least in the rudimentary form it existed) was incapable of maximizing welfare since the assumptions on which the maximization function was based did not hold in developing countries. For detailed critiques of the market mechanism see Rosenstein-Rodan (1955) and Chakravarty (1973).

*constraints*, gets its inspiration from neomarxist and radical political-economy positions. The third perspective, increasingly popular (or perhaps fashionable may be a better description) and influential in terms of deciding the future direction of development in general and the development of telecommunications in particular, emphasizes economic *liberalization and deregulation* and has emerged as an almost natural outcome of the resurgence of neoclassical economics in recent years. These three positions will be considered in reverse order.

The discrediting of traditional development economics that has lately taken place, and to which Hirschman made reference, is undoubtedly partly due to the reestablishment of neoclassical economics, both in theory and in application, at the forefront of national and international development. The market, it is argued, has the many virtues that standard neoclassical analysis has done so much to analyze, and state intervention could be harmful to the efficient operation of this "natural" domain of economic exchange (Johnson, 1984; Mckinnon, 1984). Moreover, state ownership, monopolization and/or regulation of economic activities detract from the establishment of a market equilibrium, promote inefficiencies in the allocation of resources, underprice capital and overprice labor, and encourage disguised unemployment (Gurley, 1979).

The attack on state activism and planning has been combined with criticism of some of the other features of traditional development economics. It has been argued that enterprise, is the real bottleneck, not capital (Sen, 1984). Therefore, capital accumulation through state intervention -- as was suggested by Maurice Dobb (1951, 1960) and Paul Baran (1957) -- was not only to bark up the wrong tree but also to climb it, since the concurrent impact of state intervention is to throttle free enterprise. Externally, the isolation or semi-isolation of nations pursuing import-substitution and restrictive trade practices has contributed to the decline of economic efficiency and technological development. Liberalization, deregulation and the promotion of competition (both domestic and international) are, consequently, the key to future development strategy.

The neoclassical resurgence has drawn much sustenance from the success of some countries and the failure of others. The decade of unprecedented growth for the industrialized democracies in the 1980s was coincidental with the liberalization of state control over many economic activities and the rolling back of the welfare state, particularly in the U.S.A. and the U.K., constructed so painstakingly during the Keynesian Revolution. The collapse of the state controlled economies of Eastern Europe and the Soviet Union at the very end of the last decade has probably

done little to alter the perception of the "naturalness" of the free enterprise system.

In the developing world, the high performance of economies like South Korea, Taiwan, Hong Kong and Singapore -- based on markets and profits and trade -- has been seen as bringing Adam Smith back to life.<sup>5</sup> On the other hand, the low performance of a great many countries in Asia, Africa and Latin America has been cited as proof that it does not pay for the government to mess about much with the market mechanism. In fact, the neoclassical position has been instrumental in instigating telecommunication sector restructuring in developing countries. The economic arguments for such restructuring and the potential benefits of liberalization of telecommunications are discussed in detail in the next chapter.

Neomarxist analysts of the development process attempt to adapt a system of thought that was initially formulated for

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5. However, the attempt to interpret the South Korean economic experience as a triumph of unguided market mechanism, is not easy to sustain. As Sen (1981) points out, aside from having a powerful influence over the direction of investment through control of financial institutions (including nationalized banks), the government of South Korea fostered export-oriented growth on the secure foundations of more than a decade of intensive import-substitution, based on trade restrictions, to build up an industrial base. Imports of a great many items are still prohibited or restricted. The pattern of South Korean economic expansion has been carefully planned by a strong government. This is true of a number of the other so-called "success stories."

the study of industrialized societies, to the less developed countries. Inspired perhaps by Paul Sweezy's (1964) assertion that "capitalist development inevitably produces development at one pole and underdevelopment at the other," the argument runs that the process of development in what are essentially capitalist economies, will lead to (and has in fact led to) the exacerbation of economic inequalities (Gurley, 1979). Whether due to the deliberate policies of governments controlled by domestic or foreign capitalist interests or due to the structural constraints imposed by the existing power structure in societies, the result of developmental efforts will be to promote the interests of the dominant classes to the detriment of the emerging proletariat or extant peasantry. Thus capitalism, or state capitalism as is usually the case in developing countries, produces polarization day in and day out (Amin, 1976).

The only real path to development, from this position, lies in the radical redistribution of power in developing societies. The redistribution of income or resources is impossible as long as the structure of power remains intact and inimical to the interests of the vast majority of people in these countries (Stewart and Streetan, 1979). Only through such "structural" changes, whether peacefully and gradually or through revolution and quickly, can growth and equality be achieved.

Within the mainstream of development economics, the failure of the growth-with-redistribution strategy of the 1970s led to a shift in concerns to the eradication of absolute poverty, particularly by concentrating on basic human needs. Meeting these needs in health, education, food, water supply, sanitation and housing provides the new focus (Hicks and Streetan, 1979; Streetan, et. al., 1981). As Paul Streetan (1981) points out, "the basic needs concept is a reminder that the objective of the developmental effort is to provide all human beings with the *opportunity* for a full life" (p. 21).

Basic needs are defined in terms of commodities (goods and services) required to achieve certain results (adequate nutrition, education, etc.). Its essential premise is that some needs can be satisfied only, or more effectively, through public services, through subsidized goods and services, or through transfer payments. Mere redistribution of income is not enough to ensure that these needs will be met. The consequences of not meeting these needs may, in fact, be an increase in inequalities in income distribution.

Policies should, therefore, be directed toward the provision of those goods and services which meet basic needs and the yardstick for measuring the progress and effectiveness of development should be some index of the extent to which basic needs are fulfilled. For example, indicators of



infant mortality, life expectancy and basic literacy have been used as the components of a composite "Physical Quality of Life Index" (PQLI) that is designed to measure results in the meeting of basic needs, rather than inputs such as income (Morris, 1979).

Recently, the Indian economist Amartya Sen, has proposed an approach that ties together and extends many of the ideas of the "new" thinking embodied in the above approaches. According to Sen, it is important to focus on what people can do or can be, and development should be seen as a process of emancipation from the enforced necessity to "live less or be less."<sup>6</sup>

The capabilities approach relates to but is fundamentally different from characterizing development as either (1) expansion of goods and services (as was emphasized by the growth-as-development economists and the early dominant paradigm of development communications) or (2) structural reform (as radical scholars insist upon) (3) meeting basic needs (the current orthodoxy in both sub-disciplines) or (4) liberalization through the operation of market forces (as emphasized by the emerging neo-classicists in both development economics and development communications). The next few paragraphs will consider the differences between the capabilities and these other approaches and will lead up

6. See Sen (1979, 1980, 1982, 1983 and 1985).

to a formal definition of development in terms of capabilities.

It has already been discussed how economic development was thought of in terms of the expansion of the availability of goods and services in a country, as measured by growth of GNP/capita. In fact, GNP/capita remains an important indicator of development even today. The World Bank classifies countries according to this criterion and GNP growth rates are still among the most oft quoted statistics in any discussion of development. And indeed such measures are not altogether useless. It is, if nothing else, a good antidote to the temptation of building castles in the air through overlooking the material basis of prosperity.

However, as Sen (1983) points out, while goods and services are valuable, they are not valuable in themselves. Their value rests on what they can do for people, or rather, what people can do with these goods and services. This distinction is important because "commodity fetishism" - to borrow an expression from Marx (1887) - is such a widespread phenomenon, and the role that exchange of commodities plays in modern society tends to sustain that fetishism. If the capabilities of each person were uniquely (and positively) related to the national availability of goods and services, then there would have been perhaps no great harm in focusing on the total supply of goods and services. But that

assumption is a non-starter simply because, if for no other reason, the distribution (or rather maldistribution) of national income ensures that the ability to acquire control over those goods and services is highly skewed.

For example, the nutrition of people depends not merely on the national availability of food per head, but also on distributional characteristic of the supply of food. Hence the capability of a person to be well nourished cannot be identified or linked in a straight forward way with the national availability of food. Similarly, in the case of communications, the right of individuals to be informed and their right to access communication facilities cannot be simply satisfied by increasing the number of media channels (TV/Radio Stations; Newspapers) or the number of telephones per thousand population. Development, therefore, is not a matter, ultimately, of expanding supplies of commodities or services, but of enhancing the capabilities of people.

Analysts of the structural causes of underdevelopment take as their starting point the problem of unequal distribution of goods and services (or, more generally, resources) in countries. They trace this inequality to the distribution of power in these countries. This inequality exists because some groups (usually a small minority) own and/or control more of the resources (like land or income) of a country than other groups (usually comprising the majority of the

people) This uneven distribution and the institutional mechanisms it depends upon is the root cause of continuing underdevelopment. Therefore, it is suggested that development can only take place through changes in the power structure of these countries manifest through an equalization of resources.

However, as evidence from land reforms in a number of countries has shown equalization of resources does not necessarily lead to either meeting of basic needs or improvements in the capability of persons to meet those needs. The problem with the structural approach is that it takes the unequal distribution of goods, services and resources as an indicator of the unequal distribution of power rather than treating power as the *relationship* between persons (or groups, regions or whatever the unit of analysis) and goods, services and resources. Consequently, it fails to consider structural reform as only a means to an end, namely, equality, and even when it does, then equality is treated as an end in itself. The capabilities approach also considers structural reform in relation to its ability to foster equality, but equality, in turn, is considered only as a means to improve the lives of people.

The approach of meeting "basic needs" which has emerged as an important strategy of development (both for economists and for communication scholars), has some similarities with

the capabilities approach. There are, however, significant differences. First, "basic needs" are defined in terms of commodities,<sup>7</sup> even though attention is paid to differences in the commodities needed by different persons to satisfy the same human requirements. Thus the focus remains on commodities even though the contingent nature of commodity requirements is fully acknowledged (Streetan, 1981). But often the requirements for goods or services may not be at all derivable from a specified set of capabilities, since as Sen (1985) points out, the relation between a bundle of commodities and a bundle of capabilities may quite possibly be a many-one correspondence, with the capabilities being achievable by more than one particular bundle of goods and services. For example, different combinations of media and telecommunication services and interpersonal networks, may deliver the same level of information.

Second, the commodity requirements for specific capabilities may not be independently decidable for each person, group or community, due to structural constraints and social interdependence. For instance, caste membership may be an important constraint on the capability of an individual to fully take part in the life of an Indian village. Part of this problem arises from an identification of "needs" largely from the point-of-view of policy makers. It is

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7. In Streetan's (1981) words, "particular goods and services required to achieve certain results."

possible, therefore, that though "basic needs" may be fulfilled, basic capabilities may remain unimproved.

Third, the notion of basic needs continues to view individuals as passive targets of development. The objective of fulfillment of basic needs leads to the asking of the question of what can be *done for* a person? While the capabilities approach leads to asking what can the person *do*?<sup>8</sup> Though this distinction may appear to be merely a matter of outlook and emphasis, it can be quite important in analyzing both the general objectives of development and the specific policies pursued toward the attainment of those objectives.

In one form or another, all the above approaches are concerned with the supply and distribution of goods and services, i.e., commodities. In modern consumer theory in economics, the nature of commodities has been seen in terms of their "characteristics" (Gorman, 1956; Lancaster, 1966). For instance, rice has nutrition giving characteristics, but other characteristics as well, e.g., satisfying hunger, providing stimulation, meeting social conventions, offering the opportunity to get together, etc., (Douglas and Isherwood, 1979). Not all these characteristics are easy to pursue through the market particularly when dealing with,

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8. Both now and in the future.

what economists call, a public good, such as information and, by extension, information technologies.

Even if the market could capture all the characteristics of telecommunications (or for that matter any other good or service), it would still treat them in terms of goods or services (in the interest of preventing tedious repetitions goods and services will subsequently be clubbed together under the label of goods) and would not indicate their value beyond the monetary figure attached to them. The capabilities approach seeks to go beyond this by bringing the user of the good into the equation. A capability, then, can be defined as a feature of a person (group, community, region or any other form of social and/or economic division which will subsequently be referred by the general term "social entity") in relation to a good. (Sen, 1982). This rather, simple sounding definition contains within it a number of different notions. There is the notion of a good - its total and distributional availability; that of the different characteristics of the good; that of the functioning of a social entity-and the limitations placed on it through either individual or social factors; that of the fulfillment of a need.

Taking the telephone as an example, the capabilities approach to development is concerned with whether or not the service is available (and the conditions of availability);

its characteristic as an information channel (and other characteristics, e.g, as a status symbol); the use social entities can make of the service because of individual characteristics related to age, gender, class, income, education, social relationships, values and beliefs, etc., and social factors related to community norms, access to other resources, the nature of the economic environment (e.g., competitive, cooperative or collective) etc; and fulfillment of needs like the acquisition of desired information. The capabilities approach sees development as the outcome of the complex interrelationships between these factors.

### ***Telecommunications and Development***

Like the initial formulations of mainstream development economists, early communication scholars also tended to locate the roots of underdevelopment within developing countries. These endogenous causes, to which communication solutions were considered to exist, included traditional value systems, lack of innovativeness, lack of entrepreneurial ability and lack of a national consciousness. In short, the problem was one of old ideas hindering the process of social change and modernization. As Rogers and Svenning (1969) asserted, "[d]evelopment is a



type of social change in which *new ideas* are introduced into a social system" [emphasis added].

Consequently, the role of communication in development was to provide an inlet for the flow of ideas. And what better way to do this than to utilize the relatively modern technology of mass communication. As Katz and Wedell (1977) point out, radio-listening and newspaper-reading were considered "as the sociopsychological bricks of nation building." The role of the mass media was perceived at two levels. At the individual or community level they served, firstly, to introduce new ideas so as to overcome traditional normative and psychological barriers. Thus Lerner (1958) wrote: "what is required to motivate the isolated and illiterate peasants and tribesmen who compose the bulk of the world's population is to provide them with clues of what the better things in life might be" (p. 19). Secondly, to introduce innovations which could change traditional modes of economic activity and result in what Rogers and Svenning (1969) thought would be "higher per capita incomes and levels of living through modern production methods and improved social organization" (p. 9).

At a society wide level, the mass media are thought to aid in the process of national integration. Thus Schramm (1963) claims:

In the traditional society a village is self-contained. Its news is the gossip of the neighborhood. Its concerns are those of the families that live there. In the process of economic development the news becomes national news. The neighborhood interest persists, but now must be related to the national interest. The man who had been chiefly a citizen of the village is now self-consciously a citizen of the nation (p. 38).

Second, the mass media were considered an important instrument of social change. Schramm (1964) again emphasizes this point:

Free and adequate information is not only a goal, it is also the means of bringing about social change. Without adequate and effective communication, economic and social development will be retarded, and may be counter-productive. With adequate and effective communication, the pathways to change can be made easier and shorter (p. ix).

With such emphasis being placed on overcoming behavioral and attitudinal obstacles to development through the injection of new ideas, it was inevitable that the early proponents of development communication promoted the growth of the mass media rather than telecommunications. Karl Deutsch (1957) did consider the role of telecommunications (or more generally point-to-point communications) in the process of nation building, but even for him the intensity of the use of mail and telephones was more an indicator of national integration than a cause of it. Consequently, the developmental emphasis in terms of communication was on the rapid growth and penetration of the mass media (particularly

radio) and the implementation of informational and motivational campaigns through these channels.

The failure of these early approaches to fostering development through communication has now been fairly well documented and the reasons for the failure outlined in some detail. These critical reviews range from the self-flagellation of the early theorists (Schramm, 1972, 1976; Rogers, 1976), to the radical fulminations of Marxist scholars in the west and in the developing countries (Golding, 1974; Beltran, 1976); and from critiques from the practitioner's point-of-view (Hornik, 1988) to critiques of normative assumptions (Krippendorff, 1988).

The reformulation of the main tenets and goals of development communication, within the mainstream of the sub-discipline, was put forward by Rogers and Schramm. Schramm (1972) led the way by admitting that, "[t]he Western model did not work as its proponents had expected." In 1976, Rogers attempted to bury the mistakes of the past (by announcing the "passing of the dominant paradigm") and claim authorship of the new wave by redefining development as:

a widely participatory process of social change in a society, intended to bring about social and material advancement including greater equality, freedom, and other valued qualities for the majority of the people through their gaining greater control over their own environment (p. 225).

The degree to which this definition is substantively different from the old one is debatable. However, in its shift in focus to the distributional effects of development, it was not unlike the growth-with-redistribution approach in development economics and its extension the basic-needs strategy. And in similar fashion it was quickly elevated to the position of the new orthodoxy in development communication literature. Thus Hudson (1974) identifies the two fundamental aspects of development as: "provision of services to meet basic human needs, and shifting responsibility for such functions from trained outsiders to the people themselves" (p. 35). And Parker (1976) speaks of the reduction of economic disparities through the provision of increased opportunities through telecommunications.

However, conceptualization of the role of telecommunications in development and the relationship between economic growth and development was hampered at the outset by the lack of past theorizing in this area.<sup>9</sup> In a review of literature on the subject conducted by Hudson, et. al., (1978) for the

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9. This is not to suggest that the relationship between telecommunications and development was not being examined in other areas. As early as 1963 Jipp was writing about "The Wealth of Nations and Telephone Density", and by 1964 the International Telecommunication Union's Consultative Committee on International Telephone and Telegraph had launched its decade long GAS-5 studies. However, even these studies were more concerned with identifying statistical relationships and generating hypotheses for research with particular attention to industrialized countries, rather than developing theories about the role of telecommunications in development in the third world.

International Telecommunications Union (ITU), the authors write:

The role of telecommunications in developing regions and countries within this new "development"<sup>10</sup> framework is uncertain. The lack of anything approaching definitive studies concerning how telecommunications may affect, and be used in economic development, and in particular rural development, has caused difficulties for national planners, telecommunications planners, and international lending agencies such as the development banks, in determining both investment and price policies in the telecommunications sector to make the best use of limited capital resources for promoting national development (p. 5).

Though this shortfall in theory was never quite remedied,<sup>11</sup> there emerged, soon enough, a proliferation of literature on the advantages of promoting the growth of telecommunications in the development process. A representative selection of work in this area can be found in the works of Philip Okundi (1975), Ithiel de Sola Pool (1976), Edwin Parker (1978), Heather Hudson (1984), Melvin Webber (1980) and Manfred Kochen (1982).

For instance, Pool argues that telecommunications can bridge the gap between the North and South in terms of access of scientific knowledge; Kochen contends that teleconferencing would assist in the efficient allocation of resources; and Webber suggests that telecommunications enables countries to

10. As put forward by Rogers (1976).

11. Indeed the issue of what comprises development seemed to fade almost as quickly into the background.

more rationally organize and control the process of urbanization. Parker maintains that telecommunications is critical to national cohesion defined as the ability of diverse segments of society to communicate with one another, while Hudson concentrates on telecommunication applications in rural development in general and in health and education in particular. These diverse applications of telecommunications indicate that they may be vital to the ability to provide the "basic needs" that development economists are currently focussing upon and are, therefore, a vital infrastructure for development.

While these scholars take an "activist" stance toward the development of telecommunications, another set of scholars, influenced perhaps by the resurgence of neoclassical economics, call for the development of telecommunications in line with the operation of market forces. In contrast to the "activist" school, which implicitly or explicitly recognizes the role of the state in accelerated development of telecommunication facilities, this "market oriented" group argues that the introduction of privatization and competition are the most optimal ways to develop telecommunications and the growth of telecommunication services should be in response to market demand (Saunders, et. al., 1983; Nulty, 1989; Wellenius, 1989; Aronson and Cowhey, 1988).

This view suggests that at least the demonstrated market demand for telecommunications should be met and that new technical applications should be provided when they are demonstrated to be the most cost-effective way to meet registered demand and to provide minimum telephone access to more provincial areas. Here again policy prescriptions take the place of a theoretical discussion because of an implicit or explicit assumption that telecommunications form a vital part of the national economic infrastructure and result in widespread benefits (ITU, 1976). However, the concern here is more with the role of telecommunications as infrastructure for the successful conduct of commercial activities (including industrial production, provision of services and trade) both domestic and international.

These two groups of scholars rely on a common body of empirical research to support their position that telecommunications are beneficial to the development process. This research falls into four main categories:

- o analysis of aggregate national data to identify the relationship between key development indicators, and investments in telecommunications;
- o input-output analysis of national economic data to determine the sectoral benefits of telecommunications;
- o cost-benefit analyses of telecommunication project or program specific data to determine the rate of return on investments or consumer surplus achieved by these projects;

o case studies of the application of telecommunications in various sectors including health services, education, agricultural production and marketing, fisheries and primary industries.

Perhaps the most extensive survey of the impact of telecommunications was conducted by the Consultative Committee on Telephones and Telegraphs (CCITT) of the International Telecommunications Union (ITU) between 1964 and 1976. Known commonly as the GAS-5 studies (ITU, 1976), they identified a number of benefits accruing from investments in telecommunications. These include:

1. Improved productivity in secondary manufacturing and service sectors;
2. Potential energy savings through travel substitution;
3. Decentralization of business and industry through capability to transfer information quickly and rapidly;
4. Benefits to consumers in providing information and facilitating accurate ordering and delivery of services;
5. Increased efficiency and geographic coverage for government administration and delivery of services;
6. Maintenance and expansion of tourism;
7. Organizational impacts on agricultural production through improvements in ordering and delivery of supplies and equipment, more timely access to information and increased availability of marketing information.

The GAS-5 studies suffer from two major deficiencies. First, most of the discussion is nonempirical. While the



hypotheses generated in the reports about what telecommunications may do for a society seem reasonable, the high level of aggregation militates against their validation through the provision of systematic or reliable data.

Second, the research and writing are almost exclusively oriented toward industrialized nations. The studies present telecommunications as essential to mass production and mass consumption societies. Countries which depend largely on agriculture and primary sector industries, due to the simplicity of production processes, may have little need for this set of benefits associated with telecommunications.

The most common national or cross-national studies of the impact of telecommunications have been correlational in nature. A typical procedure has been to correlate telephones per 100 population with GNP or GDP (sometimes per capita) with the ensuing coefficient always being of a high magnitude (Marsh, 1976; Shapiro, 1976; ITU, 1968, 1972). Unfortunately, national level indicators of telephone density are inadequate, in themselves, for linking telephone development with overall development objectives. These figures do not fully indicate the conditions of access and availability of telephone service for different social and geographical groups. Moreover, statistical indicators in this area are often heterogeneous, as with the case of telephone density where the figures for industrial nations

reflect demand, while for developing countries they reflect supply.

Also, no causal inferences may be made from these studies since it is impossible to parse out the degree to which telecommunications are influencing development or development is influencing telecommunications. Cross-sectional correlational analysis does not permit for the specification of the direction or magnitude of telecommunications contribution to socioeconomic development.

More recently, several studies have attempted to use more sophisticated statistical techniques to uncover the nature of the relationship between telecommunications and development. Hardy (1980, 1981) used a cross-national, time-series regression analysis to analyze data for 37 developing countries over a 14 year period (1960-1973). He used GDP as a development indicator and telephone density as a telecommunications indicator. His results indicate that a 1 percent rise in the number of telephones per 100 population between 1950 and 1955 contributed to a 3 percent rise in per capita GDP between 1955 and 1962. However, the lack of significant control variables undermines the strength of these findings. For instance, it is quite possible that increases in installed industrial capacity

during this period resulted in a growth of both GDP/capita and telephone density.

Perhaps more importantly, Hardy's study also suffers from some of the same problems as do the correlational studies cited earlier. His analysis used national indicators which does not indicate distribution within a country. Income is not likely to be evenly distributed and the number of beneficiaries of economic growth may be very small.

Telephones are likely to be clustered in cities, so that rural telephone densities (especially in countries in which the vast majority of the people live in villages), may be many times lower than national average.

While aggregate studies relate telecommunications with national indicators like GNP, input-output analyses (referred to by Saunders, et. al. (1983) as structural economic analyses) concentrate on the role of telecommunications in the production process. The typical approach involves determining which sectors of the economy utilize how much of telecommunications services (ITU, 1965; Lonnstrom, et. al., 1975) or the extent to which the output of the telecommunications sector goes to final demand (i.e. to consumers whether individuals or businesses) and how much of it is used as an intermediate service that contributes to the production of other goods and services in different sectors (ITU, 1976; Kaul, 1979).

Saunders, et. al. (1983) report the findings of a World Bank cross country input-output analysis which computed communication input coefficients (the amount of communication services purchased by each sector per unit of sales of that sector), communication inputs to each sector as a proportion of total purchases of that sector and communication output distribution coefficients (the proportion of total output of the communications sector purchased by each of the other sectors) for several developed and developing countries.

They found that the communications industry serves as an input to nearly every other industry; most intermediate communications output is utilized by the service sector; and that most communication intensive industries have high value-added and produce goods primarily for final consumption. Differences between developed and developing countries in their sectoral use of communications inputs are highest in the agriculture sector, and lowest in the services sector with manufacturing occupying a middle position.

Input-output analyses suffer from a number of short-comings. Methodologically, such analyses rely on national income accounts that generally do not have the level of disaggregation of economic activities required to accurately estimate the contribution of communications to various

sectors.<sup>12</sup> In addition, the variance in prices of communication services among countries and the fact that in most cases prices bear little relation to costs, make cross-country comparisons based on conventional input-output data in terms of value of transaction, highly suspect.

More generally, input-output analyses are based on the assumption that there exists an equilibrium between demand and supply. But, as Saunders, et. al. (1983) point out, the amount of telecommunications services consumed in developing countries usually reflect supply not demand. This is because of the acute and persistent shortages in the supply of telecommunications services as well as the poor quality of most of these services, in many developing countries.

Cost-benefit analyses of telecommunication projects in developing country are based on a variation of the prescription of economic theory that financing of projects in any sector should continue until as long as the rates of return on investment of such projects exceeds the opportunity cost of capital. They claim that the real opportunity cost of capital in these countries can be determined only by comparing the rate of return of a telecommunication project with the rate of return of the

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12. For a general discussion of the problems associated with using national income accounts for estimating the contribution of information activities in economies see Machlup (1980); Rubin (1986).

best alternative investment program that would be implemented if the funds were not spent on telecommunications (see for instance Chapter 8 in Saunders, et. al., 1983).

Thus Kamal (1981) found that the use of telephones in 146 Egyptian villages resulted in cost-benefit ratios ranging from 69:1 to 126:1 (depending on the user) based on monetary savings (difference between the cost of a phone call and the next "best" alternative), savings in time, indirect monetary savings (value of losses avoided in emergency situations) and monetary savings from the efficient use of capital and equipment. Similarly Kaul (1981) computed cost-benefit ratios ranging from 4:1 to 10:1 for a group of villages in India.

The problem with the two studies reported above, problems which they share with other cost-benefit studies, is that they assume that the communication activity will take place in the absence of telecommunications and that such communication will necessarily be of a face-to-face type. Consequently, when the "best" alternative to telecommunications is identified as taking a bus to the point where the phone-call was made to, the cost-benefit ratio is bound to be of a high order. In fact, when users are allowed to determine whether or not they will still perform the communication activity in the absence of

telephones, as well as to specify the alternative channel they will use (e.g. travel by bus, train or write a letter as set up by Chu, et. al., 1985, in their study of rural telephone service in Thailand) the cost-benefit ratio was rather low.

Case studies claim to offer considerable evidence of the beneficial impact of telecommunications in specific areas of socioeconomic development. Such studies have focussed on areas as diverse as market information, transport efficiency, spatial isolation, trade, agriculture, health and education.

To give just a few examples, the introduction of telephone service into several rural towns and villages in Sri Lanka allowed farmers to obtain, among other things, current and direct information on wholesale and retail prices of fruits, coconuts and other produce in Colombo (Saunders, et. al., 1983). In Ethiopia, radio checkpoints between the port of Assab and Addis Ababa to monitor the progress of trucks carrying essential supplies for the capital have cut the average journey time in half by providing early information of breakdowns etc. (Hudson, 1981). In Guyana, weekly conference calls between rural health workers and physicians in Georgetown facilitate early diagnosis, treatment and evacuation of patients (Goldschmidt, et. al, 1982). A copper mining company in Papua New Guinea uses

telecommunications to manage its international investment portfolio while remaining headquartered close to the mine (Hudson, 1984; for a full review of case studies see Hudson, 1984; Saunders, et. al., 1983).

Case studies in the area of telecommunications and development suffer from the same problems as do case studies in other fields: they are not easily generalizable and the lack of quantitative data makes it virtually impossible to rule out other explanations for the relationships described. More specific to the area is the fact that there may be, quite conceivably, some threshold or take-off point below which the country, region or sector simply does not have the resources in terms of capital, trained workers and infrastructure to apply telecommunications constructively. For example, installing telephones in a semi-arid region sparsely populated by nomads living at a subsistence level would, in all likelihood, contribute little to the economic development of the region.

Unlike the "activist" and "market-oriented" approaches just discussed, structuralist approaches are far from optimistic about the role of telecommunications in development. Their basic tenet is that communication processes cannot be seen in isolation from the societal arrangements under which they have developed and the structural constraints which determine both the outcome and the nature of the process



through which they exert their influence. Structural constraints are defined as societal obstacles that restrict the opportunities of an important number of individuals to participate fully and equitably in the development process and in the sharing of benefits of a given social system (McAnany, 1980). Clippinger (1977) sums up the position as follows:

Telephony development...is generally by and for the elite groups...primarily confined to the more modern and urban areas of society....By creating an urban-based communications infrastructure, which is only accessible to a limited segment of society, economic opportunity becomes further concentrated in urban settings, and hence urban migration is encouraged (p. 23).

For instance, Karunaratne (1982) points out that telecommunications investment in a country must be examined in terms of who is served. For example, in Papua New Guinea, the density of telephones is nearly 1.3. However, only 0.6 percent of the total indigenous population are telephone subscribers, while over 30 percent of the expatriates have telephones. About 70 percent of Brazil's telephone lines, in 1985, were in cities that accounted for only 20 percent of the country's population; in Thailand, in 1981, 89 percent of administrative subdistricts with 75 percent of the country's population, had no telephone (Wellenius, 1989).

In its more radical manifestations, this approach maintains that revolutionary structural and institutional reform must precede the introduction of telecommunications in developing countries. Thus Schiller (1989) argues that:

[i]t is a mistake to believe that the changes required to overcome the global and local disparities in human existence will be facilitated by developing telecommunication systems. In fact, the opposite result may be expected. Existing differentials and inequities will be deepened and extended with the new instrumentation and processes, despite their loudly proclaimed and widely publicized potential benefits. Only after sweeping changes inside dozens of nations, in which ages-old social relationships are uprooted and overturned, can the possibility of using new communication technologies for human advantage begin to be considered (p. 112).

As in the sub-field of development economics, there exists in the development communication literature a group of scholars who examine the role of communications in the context of the structure of the asymmetrical relationships between developed and developing countries. The main foundations of the dependency approach in development communications are generally similar to those in development economics. The main thesis of these scholars is that the dependency relationship, including the communication aspect, has been historically imposed on the developing countries and external structural factors play a dominant role in determining underdevelopment. Therefore, it is necessary to remove the ways in which communication dependency is being maintained.

Two main approaches exist within this tradition. There are those who consider that communication dependency leads to "cultural imperialism" (Schiller, 1973, 1976; Mattelart, 1979; Beltran 1975) and those who view communication development as following the impulses of capitalist expansion by seeking out new markets in developing countries (Guback and Varis, 1982; McAnany, 1984, Schnitman, 1981). For both, the developed countries use communication to recolonize the developing countries in ideological or economic terms.

It is apparent from the above review that most of the theoretical and empirical research in development communication has been done with respect to the impact of mass media or diffusion of innovations. Consequently, whether the work is in the now much maligned "dominant paradigm" of development communication or whether representative of one of the many extensions, modifications or critiques of this tradition, the role of communication in development is assessed almost entirely in relation to information which comes from outside of the unit of analysis. In similar fashion, much of the work in the emerging telecommunication and development sub-field also focuses on the impact of telecommunication with respect to their ability to bring information from distant areas, usually from urban to rural areas. Information, information

technology and communication processes are treated as exogenous to the development process.

More recently some scholars have begun to formulate models in which communication plays an endogenous role in development. For example, the convergence theory of communication (Kincaid, 1988) views communication as "a dynamic process of convergence and social systems as networks of interconnected individuals who are linked by patterned flows of information" (Kincaid, 1988, p. 209). From this perspective, the extent of exchange of information between social entities is a circular or interactive process leading to systemic equilibrium, social-structural unity or development. By extension, this paradigm enhances the role of interactive communication technologies, i.e., telecommunications, in the development process. Thus Kincaid writes, "a two-way flow of information would represent a much more 'unrestricted' flow of information, according to the convergence theory. In other words, dialogue is a less restrictive flow of information than monologue" (Kincaid, 1988, p. 219).

Kincaid (1988) maintains that the level of information that a society can support is a function of the amount of resources and time that it can devote to the processing and sharing of new information while maintaining the minimum amount of cultural cohesion necessary for sustaining the

society. Modern communications technology, which both increases the amount of energy that can be expended for information sharing and reduces the time, would enable a society to support higher levels of information and information sharing.

Telecommunications also increase the possibility of many more members of society being engaged in this process of "information sharing." However, this possibility is realizable only when telecommunication resources are distributed evenly within countries. Skewed distributions, whether vertical (e.g., class based) or horizontal (e.g., region based) may lead to the isolation and marginalization of deprived groups.

The role of telecommunications in increasing societies' developmental potentialities is also implicit in Krippendorff's (1988) discussion of autopoietic systems. Krippendorff distinguishes between the ecosphere and noosphere of a social system. The ecosphere is "the totality of observable behaviors" in a social system and the noosphere "is the information (pattern, difference, knowledge) which underlies the observable phenomena" (1988, p. 132)

Changes in the ecosphere are essentially allopoietic, tending toward equilibrium and integration, but communication plays an important role in these processes

too. For example, interactive technologies bring dispersed, distant or otherwise independent elements into interaction. But essentially, elements in the ecosphere are the realization of the patterns of information existing in the noosphere. These patterns contain specifications or blueprints for the organization of processes in the ecosphere.

Information processes in the noosphere give rise to the rules or codes which govern observable behavior in the ecosphere. These communication processes are called "multisexual" by Krippendorff in that they may be assembled by connecting or linking a multiplicity of different parts or domains, thus creating new specifications or codes for the subsystems in the ecosphere. Thus, as Krippendorff point out, "information processes in the noosphere can limit or create the potentiality of behaviors that are realizable in the ecosphere...information processes applied to the noosphere expand society's potentialities" (1988, p. 135). Telecommunications can possibly expand those potentialities, and that of society, by making possible more and new combinations of the multisexual reproduction of information. The amount and variety of communicative interaction sustainable in the noosphere may possibly be increased many times through the multiplicity of communication channels made possible by telecommunications, and the multiplicity of nodes linked by it through these channels.

### Summary

The preceding review of the development of theoretical positions in development economics and development communications has traced how the earlier approaches in both subdisciplines gradually gave way to new perspectives. These perspectives have either extended the old orthodoxies or critiqued them from what may be termed radical, liberal and neoclassical perspectives.

It is apparent that there is a wide divergence between these views as to what constitutes development and the strategies required to bring it about. Perhaps the most critical difference is that the first two strategies place emphasis on the equitable distribution of resources, while the third, the neoclassical position, view the operation of market forces as the best mechanism for the achievement of developmental goals.

It is apparent that the movement of thought in development economics and development communications (except for the neoclassical perspective) has been mainly toward recognizing the importance of distributional outcomes of development processes. While the earlier approaches focussed mainly on growth through exogenous forces, the more recent approaches underscore the importance of the equitable distribution of resources, goods and services, i.e., the importance of

balanced growth. A major reason for this change has been the shift in the overall perspective of development from the national level to the development of regions, groups and individuals within countries.

It is now increasingly recognized that regional, economic and social entities can play an important role in the development process, as long as they are provided the means and resources to fully participate in the lives of their nations. The role of governments, and by extension of the policies governments formulate to govern various sectors like telecommunications, must therefore be to ensure that the conditions necessary for such participation are available and that no regional, economic or social entity is systematically deprived of access to those resources.

It is only from the neoclassical perspective that the operation of market forces is considered the most appropriate mode of allocation of resources, largely irrespective of the distributional consequences of market mechanisms.

Based on this review it is possible to establish a general criterion for the evaluation of telecommunication policies:

telecommunication policies should foster the growth of telecommunications so as to achieve equitable conditions of access to and availability of services among regions, communities and individuals with the aim of increasing their potential for capability enhancement.



This important understanding -- that the equitable distribution of telecommunication services is an important component in the development process -- is one that has been ignored in most studies of telecommunications. It follows that the evaluation of telecommunications policies in terms of developmental objectives should necessarily include distributional outcome measures in addition to the usual evaluatory criteria of commercial performance and/or national level indicators of the availability of telecommunication services.

## Chapter 3

### DEVELOPMENTS IN TELECOMMUNICATIONS

Despite the importance of examining the distributional consequences of telecommunications policies, most of the debate on sector restructuring has centered around issues of performance and commercial efficiency. This policy debate has been triggered by recent changes in the technology and economics of telecommunications.

#### **Telecommunications, Technology and Economics**

The world environment of telecommunications has changed dramatically in recent years and is continuing to do so at an accelerating rate. Merging communication and computer technologies have sparked innovations that are transforming global and local activities of all sorts. No economic, political, or social entity is exempt from the influence of the telecommunications revolution. The pressure on traditional telecommunications systems stemming from changes in technology first became acute in the United States about fifteen years ago. During the last five to seven years, they have manifested themselves throughout the industrialized world and have instigated profound changes in the policy and structure of the telecommunications sector.

It was inevitable that these forces would also impact upon the developing countries.

In developed countries, policy formulators have responded by rolling back regulatory mechanisms and permitting different degrees of competition in the supply of equipment and services. This is the same prescription that is being suggested to developing countries for two main reasons. First, because as neoclassical economists argue, telecommunications can no longer be considered a natural monopoly. Therefore, the state monopoly structure, which has characterized the supply of telecommunications in developing countries for decades is now seen as the main hurdle to sector growth. Second, because of the belief that competition will result in the realization of the social benefits of cost based pricing.

### ***The Demise of Natural Monopoly***

Telecommunications have traditionally been viewed as the quintessential public utility. Economies of scale, combined with political sensitivity created high entry barriers and large externalities (Nulty, 1989; Aronson and Cowhey, 1988). Telecommunication was believed to be a natural monopoly, an essential public good that governments should provide in a noncommercial mode. Put briefly, a natural monopoly is said

to exist where the economies of scale are such that to have more than one entity in the market would increase costs to an extent that would be detrimental to society. That is, it is a situation in which one entity can supply the entire market at lower cost than two or more entities. The second major characteristic of a natural monopoly is large sunk costs, or capital investment. That is, the development of the infrastructure or facilities required to provide telecommunication services requires such high capital investment that it would be a waste of societal resources to duplicate these facilities. Such high sunk cost also function as a very real barrier to entry for potential competitors. As a consequence telecommunication services in most countries were provided by public sector enterprises under monopoly conditions.

This situation pertained not only to the provision of services but also to the ownership of facilities and the manufacture and supply of equipment. Within this environment, development activity focused primarily on the extension of standard service, the building of basic networks and improvements in the performance of operating entities. Recent developments in information and communication technologies, it is argued, have dramatically changed this situation.

First, it is argued that technological developments have dramatically *lowered barriers to entry* in the manufacture of telecommunication equipments, establishment of telecommunications facilities and provision of telecommunication services. The plummeting cost of basic network components (switches, microwave links, cables, multiplexers, etc.) as well as the development of alternative facilities (cellular radio, DBS systems) have made it easier and cheaper for customers and competitors to communicate by means other than the traditional public switched telephone network.

The second important impact of the "telecommunications revolution" has been the *creation of new services and new ways of delivering traditional services*. As information and communication techniques are extended, they have been continuously adapted to the specific needs of widely differing activities. The result has been a proliferation of new services. U.S. judicial opinions, for example, are abstracted and entered into an electronic data base by clerical workers in South Korea, are stored in Mead Data Central's computers in the United states, and are accessed by lawyers all over the world. Similar data networks exist in medicine and agriculture. Computer programmers in India write software for Texas Instruments in Dallas (Feketekuty and Hauser, 1984). In short, the real impact of the telecommunications revolution has been the transformation of

world markets into integrated global information systems based on electronic interchange. Participation in international finance at the present time, for instance -- as a major borrower, investor or banker -- requires access to telecommunications and information systems that connect the financial centers around the world twenty-four hours a day. The same goes for the tourism and travel industries, commodities exchange, fashion design and many other activities.<sup>13</sup>

In other words, the global economic system is increasingly being electronically integrated: without adequate access to the systems by which the world's business is done, no country can do business in the world. Access to reliable telecommunications appears to have become an economic necessity for commercial interests in every country, while, at the same time, the "technological revolution" has multiplied the available, or potentially available, forms of telecommunications access and has drastically altered their costs. These two developments are generating enormous pressures, from both the demand and the supply sides of the industry, on existing telecommunications organizations in all countries.

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13. The foregoing discussion does not intend to suggest that the emergence of new technologies by itself necessitates new structural arrangements, but rather that technological change creates the pressures and opportunities for regulatory reform of existing structures.

On the demand side, as more and more companies and individuals perceive that access to adequate telecommunications services is essential to their livelihood, they try to make telecommunications entities (usually PTTs) provide the needed services. If the latter are unable to respond adequately and at prices the customers consider reasonable, customers are driven to seek other remedies. Not infrequently, these unsatisfied customers include some branches of government -- the military, railways, power utilities, major state enterprises and so on. For instance, the Indian Railways are currently in the process of installing a multi-million dollar optical communications net that will almost completely by-pass the domestic telephone system. In short, in the face of unresponsive systems, some of the biggest and most important users may well by-pass the public network, leaving it without some of its most lucrative customers.

On the supply side, sources of telecommunications services that represent alternatives to the offerings of PTTs are increasingly available. Aggressive suppliers of equipment, systems and services are proliferating and are actively seeking new customers, especially, but not solely, among large, internationally active firms. Examples of alternative service providers, licit or otherwise, abound (Nulty, 1989). Customers apparently need more and better

telecommunications *and* have more alternatives for acquiring them.

In the changing telecommunications environment, it is argued, no monopoly enterprise can provide efficiently and at reasonable cost all the services that all its customers may demand. Nor are the sunk costs so high that duplicate facilities cannot be maintained. Therefore, Saunders, et. al., argue:

The concept of a natural monopoly producing well defined service outputs and achieving lower unit costs because of economies of scale may no longer be the dominant factor in dictating sector organization...the introduction of private enterprise and competitive stimulus may be the option to consider (1983, p. 283).

This analysis of the impact of the so-called information revolution on the condition of natural monopoly may well be based on a misunderstanding on the ways in which technological developments impact upon economic conditions. As Hall and Preston (1988) have argued in their book *The Carrier Wave: New Information Technology and the Geography of Innovation*, it is the swarming of innovations across the economy that lead to upswings in economic cycles, not isolated technological applications in any one sector. Secondly, the lowering of sunk costs may not be enough to warrant the duplication of infrastructure, given the low levels of capital formation and limited foreign exchange situations that characterize most developing countries.



Finally, there is little evidence to suggest that the introduction of private competition will result in improvement in sector performance. Indeed, the United States, which is often held up as the exemplar of the advantages of a competitive market structure, in fact provides evidence of the benefits of a regulated monopoly. By the time the Bell System was broken up telephone service was available to over 90% of all households in the country. This was made possible through cross-subsidization within the monopoly system. Businesses subsidized residences, long distance subsidized local, urban subsidized rural and large users subsidized small users. The monopoly system may still be the best way of achieving affordable universal service.

It appears probable that the main lesson to be learned from the U.S. experience is that if there are advantages to be realized by introducing private competition they may be achieved only after a certain level of development has been reached. That is, the impact of policies on performance may be conditioned by the general level of economic development and the composition of economic activity. The high correlations between per capita GNP and telephone density have been well established by a number of studies that have analyzed aggregate national data to identify the relationship between key development indicators and telecommunications performance, suggesting that perhaps a

certain level of growth is a necessary condition for expansion of telecommunications.

Similarly, the input-output analyses of national income accounts cited earlier, have found that much of the intermediate and final demand for telecommunication services goes to the service and manufacturing sectors and very little to the agriculture sector, suggesting that the composition of economic activity may be an important factor in the growth of telecommunications.

### ***The Benefits of Cost Based Pricing***

The second plank of the restructuring argument rests on the much wanted social welfare benefits of cost based pricing. According to economic theory resources are allocated efficiently when markets are permitted to operate free of distortions. When prices are aligned with costs, there are fewer distortions in the information received by markets and greater overall efficiency is achieved because decisions are made on a rational basis. When prices are not determined by costs, i.e., when subsidies are in play, there is no assurance that demand is being met efficiently. In the first instance, if prices are higher than cost (as they are for most domestic long-distance and international services in developing countries) then lowering prices to cost will

result in an increase of demand the value of which is more than the cost of the increase in production of the service. This expansion is socially beneficial to the extent that the value of the incremental demand is greater than the value of the incremental cost.

Second, if prices are set below cost, as they are for most local, residential and rural services,<sup>14</sup> then raising prices to cost will lower demand whose value to consumers is less than the decrease in cost now not incurred because the service is no longer being provided. Again society gains. In short, the gains to social welfare from moving telecommunication rates to cost consist of the net increase in value associated with increased demand for those services currently priced higher than cost combined with the savings in cost associated with the reduction of those services currently priced lower than cost.

Economic theory, therefore, suggests that social welfare is maximized when prices equal marginal costs and any deviation from marginal cost-based pricing results in a net loss in social welfare. And the best mechanism for achieving this situation is competitive market. Thus, Saunders, et. al., maintain that:

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14. Usually through subsidies from excess profits made from tariffs for long-distance and business service.

"...in a developing country, a primary objective of deregulating the [telecommunications] sector and allowing competition and private enterprise to develop would be to mobilize financial resources ... and achieve both short- and long-run allocative efficiency by allowing prices to equal the marginal cost of further expanding the services..." (p. 283)

Most discussions of the social benefits of cost base pricing usually omit the most important assumption on which its effectiveness is based, i.e., that demand matches supply. This is not the case with respect to telecommunication services in developing countries where demand clearly outstrips supply. This study, for instance, found the following means for waiting lists for telephone lines expressed as a percentage of total installed telephone lines in 64 developing countries (Table I). Clearly, the demand meets supply assumption is being violated here.

TABLE I

SIZE OF WAITING LIST AS A PROPORTION OF SIZE OF SYSTEM  
MEANS BY GNP/CAPITA

LOW	MIDDLE	HIGH
55.84	40.49	32.34

Source: Appendix IV

Even if there are gains to be had from cost based pricing in particular and liberalization in general then to whom do these gains accrue? Lewis Perl (1986) in his prospective analysis of the consequences of cost-based pricing in the United States shows that while the average gains in consumer welfare would be about \$77 per year per household, the gains for households with incomes over \$25,000 would be as much as \$182 while for households with incomes less than \$6000 there would be a net loss in consumer welfare of about \$68 per year. The distributional consequences for countries in which income and telephone use patterns are even more skewed and demand for telephone services, particularly among lower income households, is extremely elastic, could be even more deleterious.

Certainly one of the consequences would be to reduce the number of subscribers and, consequently, the network externality associated with telecommunications. Network externality may be described as a condition in which the social value of a service for any subscriber increases as the number of total subscribers increases. In the case of telecommunications, network externality dictates that there is a direct relationship between allocative efficiency and the number of consumers. If the goal of telecommunication policies is maximizing social welfare through increasing allocative efficiency then policies which reduce the number

of actual or potential subscribers may be deemed inefficient, even by the economist. Clearly, a critical dimension of telecommunication policy evaluation is its impact on price, particularly the price of basic residential service. If prices are too high (thereby reducing the number of potential subscribers) then the policies have reduced allocative efficiency in addition to worsening the distributional situation.

### **Telecommunications Policies: Constraints and Options**

Telecommunications entities in developing countries find themselves in a serious bind. On the one hand, technical degradation of the network from overload and inadequate maintenance, potential diseconomies from proliferating and fragmented systems and loss of revenue to cross-subsidize the extension of the basic network are particularly acute problems. Loss of revenue from large customers looms even larger as a potential problem for these countries than it does for industrialized countries because the proportion of total traffic concentrated in such customers is greater (Nulty, 1989). On the other hand, it is becoming increasingly difficult for PTTs to provide the services large customers need and demand. Proponents of sector restructuring (usually considered synonymous with

liberalization, i.e., movement toward privatization and the introduction of competition) identify three factors, partly interrelated and endogenous to the sector that, they claim, are inhibiting the growth of telecommunications in developing countries (see for example Wellenius, 1989).

The first factor relates to sector policies. The argument runs that telecommunications enterprises are usually viewed as traditional public sector utilities without regard to their business character or resource mobilization potential. In particular, they often lack financial and administrative autonomy, have little incentive to improve performance, are not allowed to remunerate and promote staff as necessary to attract and retain specialized personnel, are denied tariffs that reflect costs, cannot access capital markets despite being profitable businesses and suffer from government interference in management.

Second, telecommunications investment is constrained by countries' limited capital resources, especially in foreign exchange. On average, about US\$2,000 is needed to provide one additional telephone line, of which 50-80 percent is in foreign exchange in most countries (Wellenius, 1989).

Furthermore, like other public or para-public entities, telecommunications enterprises are subject to investment ceilings related to broader efforts to contain public sector spending. From this perspective a major policy objective

needs to be improving the profitability of telecommunication entities and this is employed as an important criteria in evaluating telecommunication policies.

Third, weaknesses in the organization and management of telecommunications enterprises result in high expansion and operating costs, poor maintenance and limited capability for project preparation and implementation. As a result, telecommunications development often cannot be accelerated even when more funds are made available. Consequently, improvements in network capabilities is another major goal for sector policies. This includes not only increasing telephone and line densities but also increasing traffic densities.

The pressure on telecommunication entities to improve and expand basic services and provide new, more advanced services, comes precisely as governments find themselves increasingly strapped for funds. The inability of governments and PTTs to react to these pressures is causing real political difficulty. Dissatisfaction with telecommunications is becoming front page news in many developing countries. Governments are beginning to feel that failure to deal with this discontent threatens not only development in general but even, at times, their own political survival.



Though developing countries are looking closely at the reforms initiated in industrialized nations, movement toward a market-driven system is not altogether easy. Access to telecommunications services is, and will always be, a politically sensitive issue because it confers differential commercial and political advantages on those who have it. A purely market-driven system of development and allocation could tend to produce a system that concentrates disproportionately in the main cities and on the wealthiest and largest customers. This concentration not only can cause political problems, but can also impede the realization of important socioeconomic goals, such as the decentralization of economic activity and the development of rural areas. But the commercial pressures that are reflected by concentration on high-density, high-income customers, sectors and regions can not also be ignored. Goals of distributional equity and commercial efficiency are difficult to reconcile and developing countries will have to look toward policy mechanisms that will, at the least, minimize the conflict between the two and thereby simplify the political choices.

Finally, there is the issue of the policy options available to most governments. There are three major policy areas where decisions are likely to be made in the near future: physical components including manufacture and supply of equipment; structure of communication facilities; and,

services offered, including terms and conditions of use of facilities.

*Telecommunications equipment manufacturing* is attractive to many of the larger or more advanced developing countries because it is the one high-technology electronics-based subsector for which there is a large, stable and assured domestic market. It is thus seen as both a good investment in itself and a good springboard into advanced technology in general. Policies to promote telecommunications manufacturing vary from direct public sector investment (India), private domestic manufacturing (Brazil) and private domestic and foreign competition (Mexico). But direct competition from imports (until recently) has seldom been allowed.

In this respect, developing countries are largely following the examples set by most advanced countries at a similar stage of development. However, this situation has been changing over the past decade or so as more and more countries turn toward importing equipment as well permitting foreign collaborations in an effort to overcome technological backwardness. *Developing World Communications* (1989) estimates that by the year 2000 over 50% of the new demand for telecommunications equipment would be from developing countries.

In principle, domestic manufacturing can benefit the PTT in terms of delivery coordination, after-sales support, tailor-made products, and joint research, development and engineering. Additional benefits of domestic manufacture include savings on foreign exchange through import substitution and protection of an infant industry. A fully protected manufacturing industry can become a major constraint on telecommunications development, however, if the domestic industry (a) produces outmoded products; (b) does not meet international quality standards; (c) is a high cost producer; or (d) is unable to meet delivery schedules (Wellenius, 1989).

Alternatives to a fully protected industry include subjecting domestic equipment manufacturers to full international competition. Another option could be to provide sufficient protection to encourage investment by guaranteeing that a certain portion of the domestic output would be purchased by the PTT (provided it met standards of price and quality), while subjecting the remainder to open competition.

The issue of *facilities sector* restructuring is probably at the core of the policy decisions that governments will have to make in relation to the development of telecommunications. The available options fall along a continuum ranging from minor loosening of bureaucratic

constraints on the state-owned PTT to open competition and private ownership. Real or potential competition creates a number of policy dilemmas. On the one hand, if no competition is permitted, increased autonomy for the PTT may simply lead to greater exploitation of monopoly power. On the other hand, if unrestrained competition is permitted, either (a) the PTT may destroy the competition by abusing its dominant market position and its control over bottlenecks or (b) competitors may succeed in selecting only highly profitable customers, i.e., engage in cream skimming, so that the PTT retains the loss makers.

There are also other options in facilities restructuring. National monopolies can be divided into separate regional operations. Another way could be to set up separate entities for local, national and international facilities. However, most of the options now being contemplated by policy makers, generally occupy some point on a continuum of compromises between absolute monopoly for the traditional enterprise and completely open competition. This seems to be true also for the third area of policy interest -- the provision of services.

Aronson and Cowhey (1988) have provided a useful typology of *telecommunication services*. They differentiate between basic and enhanced services. Basic services can be local or

long-distance. Enhanced services can be further divided into value-added and information services (Table II).

TABLE II

## Classification of Telecommunication Services

Basic	Value-added	Information (a)
Telephone	Videotex	Data-base
Telex/	Telex/Teletext	Services
Teletext (without	(with store	On-line
store and forward)	and forward)	computer
Telegraph	Electronic mail (b)	services
Facsimile	Voice Mail (b)	
Centrex (b)	Centrex (b)	E-mail (b)
	Protocol Conversion	V-mail (b)
	Packet Switching	
	Video conferencing	Information
		brokers

Source: Aronson and Cowhey (1988)

(a) Value-added services require basic services to function. Information services require both value-added and basic services to operate

(b) Classification in dispute

*Basic services* are telephone, telex and telegraph services in which messages transmitted by the carrier are not altered in any way by the carrier. Value added and information services are gradually being provided by telecommunication entities in developing countries. Enhanced services are differentiated from basic services when the information provided by the sender is changed, stored, manipulated or otherwise acted upon in the network, before the recipient receives it.

In the changing telecommunications environment it is argued that no monopoly PTT can provide efficiently and at reasonable cost all the services that all its customers may want. Too much attention given to special (mostly large business) customers will detract from the delivery of basic service. But if too little attention is given to special services, large users will either obtain them elsewhere or will not get them at all. Governments appear to have little choice but to seek a balanced regime consisting of some combination of monopoly and other providers of services. How such a system should be structured requires findings answers to a number of questions.

Which services should remain, on economic or political grounds, the exclusive preserve of the telecommunications entity? Which should be open to other providers rather than, or in addition to, the existing entity? What rules should govern interaction within the competitive sphere and between the monopoly and competitive spheres (e.g., rules regarding conditions for entry, interconnection standards and prices, and permissible competitive practices) so as to create a level playing field and promote efficiency.

For most developing countries there are four main ways of restructuring the supply of services: (a) establishing separate business networks; (b) allowing dedicated networks to offer services to others; (c) diversifying the provision

of value-added services; and (d) subcontracting services. The final shape of the telecommunications environment in developing countries will be a product of the choices governments make in these three areas over the coming years.

### **Summary**

Despite the economic arguments being put forward for the liberalization of telecommunication sector policies in developing countries, it is not altogether clear that liberalization alone will lead to improved sector performance. The main areas in which policy changes are being made in pursuit of significant improvements are in the expansion of the public network, operational efficiency, and demand and financial performance. This study examines the impact of policy developments over the past decade in each of these areas. No matter what the nature of this relationship, there is considerable evidence that the impact of policies on performance is conditioned by the level of development and composition of national economies. The effect of these economic conditions and their interaction with policy choices needs also to be examined.

## Chapter 4

### POLITICAL COMMITMENT AND TELECOMMUNICATIONS

As detailed in Chapter 2, part of the reason that little attention was paid to the development of telecommunications during the earlier phase of developmental efforts in the Third World was due to the lack of theoretical perspectives on the relationship between telecommunications and development. This resulted in the relative absence of studies in this area and consequently a dearth of evidence on the social and economic benefits to be derived from telecommunications. Consequently, telecommunications was a low priority investment area for both national governments and international lending agencies. But in recent years, as discussed in Chapter 3, responsibility for the relatively backward state of telecommunications in developing countries has been increasingly laid at the door-step of the state monopoly structure that characterized the sector for a number of years.

The state-owned monopoly structure is held responsible for the many ills that plague the telecommunications sector in developing countries. It is held responsible for the unmet registered demand for services, for being unable to improve and expand basic services, for excessive concentration of



services in urban areas, for the sector's inability to meet the needs of large commercial users through the provision of enhanced and value-added services and for failing to raise investment capital. The solution now being suggested to this problem is nothing short of the removal of telecommunications from the public sphere. Thus Nulty maintains

"...Before telecommunication entities can improve their performance...they must be permitted - and required - to behave like commercial businesses under conditions of competitive market discipline..."(1989, p. 56)

And Wellenius argues

"...Merely increasing the share of public funds and external aid will not nearly suffice to redress these shortfalls. Improving the efficiency with which existing telecommunications enterprises use scarce resources is at best a slow process - and more importantly is unlikely to produce significant results....alternatives to the traditional state telecommunications monopoly must include private participation, competitive discipline and the autonomy and commercial discipline of the enterprise..."(1989, p. 23)

This ascription of blame for the present ills of the sector on the public enterprises, is based in part on a selective reading of the history of telecommunications development. Heather Hudson in her book *When Telephones Reach the Village* (1984) argues that a major part of the reason why basic services could not be expanded, registered demand not met, and facilities concentrated in urban areas was because

national planners and international lending agencies considered telecommunications an urban luxury utilized mainly by large businesses and corporations. Telephone utilities, whether privately or publicly owned, were generally required to set rates that covered their costs and allowed for an additional fixed rate of return. Much of the excess revenues over costs were reinvested in expanding and upgrading the system; the rest became profits for private companies, or revenues that could be used to subsidize other sectors, such as postal services, for government-owned entities. As revenues easily exceeded costs by a comfortable margin, there was little incentive to look for benefits beyond those which turned up on the balance sheets (Hudson, 1984).

In developed countries like the United States, there was an implicit assumption about the benefits of telecommunications. Most countries, until recently, had policies designed to provide universal and affordable services. Consequently, regulatory policy in these countries ensured that high revenue areas and services cross subsidized high cost users and services.

In developing countries, however, both national planners and international lending agencies took the position that telecommunications should be generally self-supporting in the short-term and loans were approved only if there was a

high likelihood of a healthy internal financial rate of return (Hudson, 1984). For instance, World Bank policy was, for a long time, that utilities should be financially viable and recover the full cost of service from their tariffs (Saunders, 1982). In practice, these requirements led to financial support primarily for installing and upgrading urban facilities and interurban trunk routes with less support for rural service. As Chasia (1976) points out, the effects of domestic policy and foreign finance, so far, have been to widen the "cleavage between the rural and urban areas in the field of telecommunications" (p. 15).

The lack of a well developed rural economic sector seems to suggest that there is little need, in developing countries, for the types of telecommunications seen in more industrialized nations. While this argument may reflect the actual distribution of telecommunications among and within nations, it is important to note that the technology of telecommunications has primarily been oriented toward urban usage and telecommunications were considered more important for urban rather than rural areas. It is not certain, given these circumstances, whether the low level of rural telecommunications reflects actual differences between rural and urban areas in their needs for certain types of communication systems or whether it reflects a series of self-fulfilling prophecies which have systematically oriented policy makers in developing countries toward

concentrating on telecommunications development in urban rather than rural areas. Policy evaluation requires the systematic analysis of the impact of different choices on the distribution of telecommunications in rural as compared to urban areas.

It appears that the slow growth and skewed development of telecommunications in developing countries is more a condition of deliberate domestic policy supported (if not directed) by international development agencies. If this is case, the solution to the problems that ail the sector may lie in the exercise of political commitment in increasing the growth rate of telecommunication investments rather than in the economic solution of liberalizing the sector. In fact, it is increasingly being recognized that political factors play an important role in shaping information and communications in developing countries and the state plays a pivotal role in this process.

Katz maintains that the growth of "telecommunications technology [in developing countries] is strongly determined by government policy" (1988, p. 58). Similarly, Jonscher argues that improvements in the information sector "may not be realizable without active intervention by governments and other policy makers" (1983, p. 27). In short, states may be the active drivers of growth in telecommunications, apart from and/or in addition to economic variables like market

structure. Katz (1988) cites related examples of the computer industries in Brazil and India where government intervention had significant results. Conversely, states can play a restraining role by denying sectors resources and investment opportunities. In short the extent of state commitment to growth of a sector may be critical in determining the extent of its growth.

This argument is in keeping with the emerging body of literature on the role of the state in development. For instance, Evans (1985) has argued that the state may act as a relatively autonomous actor which helps shape the development of local productive forces. Indeed, the importance of the state in the development of the industrial sector in Asian countries like India, Pakistan, Malaysia and Sri Lanka (Pattnayak, 1990) and in Latin America (Cardoso and Faletto, 1978) cannot be overestimated. Moran (1974) has studied the evolution of the state's role in the extractive industries in Peru. He argues that even modest attempts by the government to shift resources to the sector resulted in rapid growth and the formation of a trained pool of workers. Similarly, in South Korea, an aggressive state helped rapidly increase industrial production (Sen, 1981; Frieden 1987).

In fact, if we compare the performance of the industrial sector in Brazil and South Korea to that of Argentina and

Chile, the importance of state commitment becomes all the more apparent. During the 1970s highly active governments committed to stepping up industrial production in Brazil and South Korea fared better than those in Argentina and Chile where the intent was more to allow the unhindered operation on market forces (Diamond, 1983). Diamond (1983) argues that the productivity of the industrial sector in developing countries depends considerably upon government behavior. This behavior is manifest not just through sector policies but, even more importantly, through the amount of resources it allocates to different sectors.

The role of the state in economic development is neither new nor limited to developing countries. Since the depression of the 1930s there has been a steady growth of the state's role in countries across the globe. In the industrialized democracies, the emergence of the managerial state to combat the crises and resolve the contradictions of capitalism has been one of the significant developments of the present century (Dahrendorf, 1959; 1977). In addition, growing state regulative and welfare functions since World War II have contributed to an enormous expansion of the state apparatus and corresponding state activities in the industrial and related sectors.

This expansion is even clearer in the structuring of economic and social systems in Third World countries in

general (Skocpol, 1979; 1985), and in the process of industrialization in particular (Stepan, 1978; Evans, 1985). The role of states in the industrialization process can be multi-layered. In its most rudimentary form states set the legal and institutional environment for the operation of the rules of property and commerce. In its most usual form, states regulate markets since the effective operation of markets in developing countries often requires the presence of strong and interventionist states.

In their most powerful manifestation states assume to themselves the task of industrial development by establishing public sector enterprises. Reuschemeyer and Evans (1985) argue that through public enterprises the state becomes an active participant in production and market exchange and partially supersedes the way in which markets combine information, incentives and economic power. Through such enterprises the state itself becomes an agent of capital investment. This is justified by the need to overcome impediments to private investment created by high sunk costs, long gestation periods and large externalities.

For instance, Jones and Mason (1980) point out that state-owned enterprises tend to be located in sectors where high capital requirements and longer payback periods suggest the disciplines and incentives of competition cannot be counted upon to produce optimal behavior on the part of private

capital. The effectiveness of state participation in the market is further enhanced if such sectors have important forward or backward linkages. Typically, these sectors are usually part of the economic infrastructure like power, health, education, transport and communications.

Finally, state enterprises also permit states to most effectively control the growth and development of the sector, by keeping enabling them to control the allocation of the resources. In addition, it also enables them to pursue distributional outcomes by directly influencing the allocation priorities within the sector. As Reuschemeyer and Evans (1985) point out, states engaged in redistribution efforts cannot rely on the mechanism of the market but must seek the same results through administrative means. One way to overcome the problem is through the establishment of public sector enterprises.



## Chapter 5

### RESEARCH IMPLICATIONS

#### Towards a Telecommunication Typology

The technological and economic forces that are driving change in the telecommunications sector in the more advanced countries are also, clearly, having an important impact on developing countries. These forces are resulting in new opportunities, as well as new pressures, for developing countries to overcome protracted constraints on sector performance and distribution.

While the particular timing and nature of the solutions may vary, no country can afford to ignore the broader range of strategic options that are emerging. Unresponsive structures in the telecommunications sector may continue to hinder economic and social development. Responses to these changing conditions raise broad policy issues that were, until recently, thought to be relatively unimportant.

However, even if the appropriate responses in the forms of policies are identified, it is not all together clear whether these are easily generalizable throughout the

developing world. Critics argue that cross-national quantitative research is superficial and does not contribute to an accurate understanding of the complexity of the interaction of the variables involved (Walton, 1984). Some are in favor of choosing, at the very most, "a small number of nations that provide maximum leverage for testing theoretical issues" (Kuhn, 1987, p. 726).

On the other hand, country specific research provides insights that are little help in translating experiences and lessons across countries. Such studies, by focussing on individual country histories, highlight crossnational inconsistencies. But it is normal to find similar outcomes among countries. Slomaczynski (1981) argues that the most efficient way to explain and use such similarities is to focus on what is structurally similar in the countries under study and not on the often divergent historical processes that have resulted in the structural similarities.

These divergent positions are outlined by Ranis (1977) who points out that there were two major prevailing views about development across countries in the early years after the Second World War. One, that every developing country is *sui generis* and that only country-intensive studies are likely to contribute to the understanding of the development process; the other, that a general theory of underdevelopment applicable to all such countries existed

and that strategies based on such a theory could be as well applied in Afghanistan as in Argentina.

In more, recent years, there has been a marked convergence between these positions via the acceptance of the notion of halfway houses or subfamilies of developing countries. This convergence is not just the result of adopting a compromise position, nor are such typologies merely heuristic in nature. They are the consequence of the recognition that grouping countries according to certain characteristics not only aids in the identification of conditioning factors in development processes, the appropriate specification of development models, and evaluation of policy prescriptions, but can also assist in the transfer of relevant acquired knowledge, experiences and lessons from one country to another. As Adelman and Morris (1973) point out, "the solution of many theoretical problems in the social sciences requires the development of adequate typologies of societies or social traits" (p. 112).

In development economics, this trend toward typology construction is exemplified, on the one hand, by the work of Horace Chenery (1980) and Montek Singh Ahluwalia (1984), which has moved away from homogeneous 50-country samples and toward the attempt to differentiate empirically among different country types; on the other, traditional expositors of development typologies, for example, of the

land-surplus and labor-surplus school, have begun to open their models to other inputs like trade.

It is maintained, here, that cross-country studies of telecommunications need to do both of the above.<sup>15</sup> Consequently, this study will attempt to empirically construct a typology of the countries selected for analysis which differentiates these countries not only in terms of telecommunication policies but also on the basis of the economic and political factors that have been identified as both differentiating characteristics in their own right and as conditioners of the impact of telecommunication policies.

A major objective of this study, then, is to provide some basis upon which governments and policy makers can evaluate the potential consequences of pursuing different policy options in the context of the state of both their country's political and economic development and the state of its telecommunications systems. While it is obvious that the same choices may have different consequences for different types of countries it is hoped that the classification scheme developed here will permit for an evaluation of telecommunications performance at a more generalized level than would be possible through a country specific approach

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15. No study reviewed has so far used a typological approach to cross-comparison in telecommunications, and few of them have included other variables in differentiating between countries.

and at the same time more specifiabile than would be possible if the developing countries were treated as a single group or even as smaller groups differentiated on the basis of characteristics not directly related to their telecommunications systems.

### **Research Questions**

The main intention of this study is to evaluate the policies that governments in developing countries have pursued with regard to the ways in which their telecommunications sectors are structured and organized. These consequences relate to two sets of outcomes: the first to the performance of the sector in terms of network expansion and commercial efficiency; the second to the distributional consequences of policies in terms of access to, and availability of, basic services.

This evaluation is informed by the inclusion of the domestic economic and political factors that are thought to condition the relationship between telecommunication policies and telecommunication outcomes. However, before presenting the specific research questions examined in this study, it is perhaps appropriate at this stage to identify the main

related areas excluded from the study, and the rationale for their exclusion.

Though this study is concerned with the evaluation of national telecommunication policies, domestic policies are themselves conditioned and affected by the international environment within which they are, perforce, formulated. As Bruce (1989) points out, national telecommunication policies seldom evolve in isolation from the international economic, technological and political pressures. It has already been pointed out how technological changes have led to the integration of international economic activities to the extent that access to reliable worldwide communications is becoming an economic necessity for businesses as well as governments in many developing countries.

Moreover, multinational corporations (MNCs), seeking to expand into markets in the third world, and relying increasingly on telecommunications to control and coordinate their the global activities, are pressing national governments to provide new facilities, enhance flexibility in the use of those facilities, offer new services and lower prices. Many of these MNCs are prominently represented in organizations of telecommunications users such as the International Telecommunications Users Group (INTUG) from where they are in a position to apply considerable leverage.

These pressures are beginning to disrupt the traditional arrangement for providing telecommunications services in developing countries. For instance, the reduction of tariffs for many international services is eroding what was once a highly profitable business for many countries (Bruce, 1989). As revenues drop, administrations must find new ways for maintaining revenues. Most of the ways being considered involve the break-up of the state monopoly structure.

In summary, many governments in developing countries, in an effort to respond to global pressures are revamping their telecommunication policies. Naturally, these developments have an important bearing on domestic telecommunication outcomes. But whatever be the nature of the international pressures, it must not be forgotten that their effect on domestic telecommunications systems are channeled through the policies that national administrations adopt. An underlying premise of this study, therefore, is that while international developments constitute a context for the formulation of domestic policies, they do not determine them in any straight-forward manner. Policy-makers in developing countries have some degree of flexibility and leeway in defining the shape of their telecommunication sectors.

Moreover, the fact that global changes are taking place in the technology of communications, and that economic or political pressures are increasingly being felt by

governments to alter the arrangement through which they provide telecommunications services, does not mean that policy makers are forced to adopt any one set of options. The choice is not a simply between a monopoly environment and unrestrained competition in all areas in the telecommunications sector.

There are a host of options falling along a continuum between these two poles in each of the equipment, facilities and services sub-sectors. The effectiveness and consequences of these different arrangements for telecommunications performance and distribution could be considerable and need to be empirically determined -- which is the focus of this study. In short, while recognizing that international developments may have an important bearing on the formation of policies, it is the impact of the policies themselves, that is the central concern of this study.

If the impact of international developments on the evolution of domestic telecommunication policies is a major area excluded from the empirical analysis in this study, the other major area is the consequences of telecommunications outcomes for development within countries. It has been suggested in Chapter 2 that the equitable distribution of telecommunication services is an important criterion for the evaluation of telecommunication policies. This criterion



was developed through a review of theoretical developments in the two sub-fields of development economics and development communications.

In development economics, the capabilities approach put forward by Amartya Sen argues for the equitable distribution on the grounds that the availability of resources is essential to the enhancement of the capabilities of individuals, groups, regions, etc., and, by extension, to the process of national development. In development communications, the network-convergence theory (Kincaid, 1989) and Krippendorff's theory of autopoietic systems both suggest that access to telecommunications can increase both individual and societal potentialities, again contributing to the development process.

These theoretical propositions, however, are not directly analyzed in this study since the impact of telecommunication policies on the enhancement of capabilities or potentialities is not examined. The primary reason for this exclusion is that it is premature to address these issues when the relationship between policies and distributional outcomes has not even been established. If indeed, as theorized, the equitable distribution of telecommunications has important consequences for the development process, then the relationship between policies and distributional outcomes must be established before the impact of different

policies on development can be evaluated -- and that is what this study hopes to accomplish.

It is apparent that the study of the telecommunications sector involves a number of different dimensions and levels of analysis. Taken as a whole the national telecommunication systems consist of telecommunication policies which evolve under pressures from domestic and international political, economic and technological factors. These policies have consequences for telecommunications performance and distribution which in turn affect the development process as defined as the enhancement of capabilities and potentialities.

The inter-relationships between these different dimensions, as depicted in the figure, seem to suggest that they together comprise different components of a single dynamic system and research be conducted accordingly. However, as Ashby (1956) argues, research, more often than not, involves the "restriction of the study of a dynamic system to some homophism of the whole...[so as to] achieve a partial knowledge that, though partial over the whole, is more or less complete within itself" (p. 106).

A system, therefore, can be defined as a list of variables selected by the researcher that is relevant to his or her interests. In this case the issue of relevance is the

impact of national telecommunication policies on telecommunications performance and distribution as conditioned by national economic and political factors. This does not suggest that the international context of policy formulation or developmental impact of outcomes are unimportant, but rather that they are beyond the scope of the present effort. Consequently, the following set of specific research questions are addressed in this study:

1. What are the varieties of telecommunications policy with respect to the supply and manufacture of equipment, sector structure and supply of services that exist among these countries? How have these policies changed over past decade?
2. What has been the pattern of state commitment to telecommunication sector development?
3. What are the patterns of telecommunication performance and distribution that exist in developing countries?
4. Is there a relationship between policies and performance and policies and distribution?
5. Is there a relationship between commitment and performance and commitment and distribution?
6. Do these relationships hold after accounting for the level of economic growth and the composition of economic activity?
7. Are these relationships conditioned by the level of economic development and the composition of economic activity?
8. Are performance and distribution explainable by the interaction of policies with level of economic development and composition of economic activity?
9. Is it possible to construct a classification scheme which would differentiate between groups of countries in a manner that would aid the evaluation of telecommunications policy options?

## Chapter 6

### METHODOLOGY

#### Sample

A total of 81 developing countries were selected for analysis on the basis of the following criteria: they are described as developing or newly industrialized countries as defined by the World Bank (*World Development Report, 1990*); they all have had indigenously owned and operated domestic telecommunications systems continually between 1977 and 1988 (*Yearbook of Common Carrier Statistics, 1988*); and, they have had a significant market component to their economy.

The period selected for analysis was 1977 to 1988. 1977 was the earliest year for which reliable data were available and 1988, the latest. Ten years, though not ideal, will allow us to examine the consequences of policies over time. For reasons discussed in the analysis section, the dependent variables were measured in 1977 and 1988 and the independent variables in 1977 and 1987. Appendix I lists the countries in alphabetical order.

## **Variables**

The research questions posed in the preceding section suggest four sets of variables involved in the study. The first set, the dependent variables, relate to telecommunications outcomes. The second, third and fourth sets, the independent variables, relate to telecommunication policies, and the political and economic factors that are thought to condition the relationship between policies and outcomes.

### ***Telecommunication Outcome Variables***

Telecommunication outcome variables (relevant to this study) are of two kinds:

- 1) variables measuring commercial performance and national level indicators, together referred to as performance variables;
- 2) variables measuring the conditions of availability and access to services, together referred to as distributional variables.

**Performance Variables:** Wellenius (1989) identifies four main areas in which policy makers are seeking to make improvements in telecommunication performance: expansion of basic telephone service; improvement in network efficiency; reduction of outstanding demand for basic telephone service; and, improved financial performance. Five variables were selected that, given the constraints of data availability, best represent performance in these four areas.

*Basic Service:* Line density (*LinDen*) and telephone density (*TelDen*) are the two most commonly used measures of the availability of basic telephone service. Jipp (1963) used telephone densities in his pioneering analysis of the relationship between economic development and telecommunications. The I.T.U.'s Consultative Committee on Telecommunication and Telegraphs (CCITT) used line densities in its long-term study of telecommunications known as the *Gas-5* studies.

There is no indication in the literature why some researchers prefer line densities while others prefer telephone densities. Examination of studies that have used one or the other suggest that the two variables are probably highly correlated and relationships between them and other variables could be very similar. This study used both variables partly in order to ensure comparability with studies that have used either one, and partly to discover

whether there are any systematic differences between telephone and lines densities.

*Line density (LinDen)* was measured as the number of main lines per 100 persons. A main line is defined by the ITU as a connection line linking a local telephone exchange and a subscriber telephone with a distinct calling number (including public call offices). *Telephone density (TelDen)* was measured as the number of telephones per 100 persons.

*Network efficiency (TraDen)*: There are two major ways in which network efficiency could be measured: the extent of call congestion or the extent of traffic density, i.e., call completion rates. While declines in call congestion would perhaps be the best indication of improved performance, the lack of reliable data for a significant number of countries generally prevents the use of this measure. Researchers usually use some measure of traffic density to operationalize network efficiency. For example, Bebee and Gilling (1976) used average annual number of telephone calls per telephone lines; similar measures were used in the GAS-5 studies in 1965 and 1972. Consequently *Traffic density (TraDen)* was used in this study to measure operational efficiency and was measured as the average number of telephone calls completed per line per year.

*Demand Performance (DemPer)*: In developing countries there is typically a large gap between the supply and demand for

telephone services, with the number of potential subscribers for telephone lines on waiting lists representing a high proportion of lines already in service (Saunders, et. al., 1983). Also the amount of waiting time for a new line can run into years. Finding ways to overcome these chronic deficiencies in performance is a high priority of sector policies (Stern, 1989). The extent to which countries have reduced this outstanding demand is referred to in this study as *Demand Performance (DemPer)*.

Okundi (1974) and Saunders, et. al. (1983) use the size of the waiting list for new basic telephone service as an indicator of outstanding demand. However, it may not be a good idea to compare absolute measures like size of the waiting list because this may vary according to the size of the existing network. Therefore, *demand performance* was measured as the size of the waiting list for a telephone line as a proportion of the total number of existing telephone lines.

*Financial Performance (FinPer)*: The inability of telecommunication entities in developing countries to raise internal revenues for investment in sector expansion is causing great concern in a number of countries (Wellenius, 1989). Responsibility for this failure is usually placed at three different levels: sector structure or, more specifically, the public monopoly system; management and operational inadequacies; and, tariff policies. Wellenius



(1989) maintains that liberalization may be the only way to remedy the problem of financial performance at all three levels. Even if we do not agree with this contention, financial performance is certainly an important indicator of sector performance.

The most commonly used measure of *financial performance* (*FinPer*) are annual sector profits, measured as the current annual revenue from telecommunications minus the current annual expenditure on telecommunications (not including capital investment). However, it is possible that this measure is effected by the size of the sector which can result in significant differences between countries not related to actual performance. There are two ways in which this measure could be standardized so as to make cross-national comparisons more meaningful: return on investment (ROI) or return on expenditure (ROE). While measuring profits as a proportion of investments in the sector, i.e., the ROI method, is perhaps the most straight forward method of standardizing the financial performance measure, this procedure would be inappropriate in this study because annual investments are one of the predictor variables, thus resulting in a clear part-whole problem. Therefore, a simple return on expenditure (ROE) formula was employed to measure financial performance:  $P = (R - E)/E$  where:

P = financial performance

R = current revenue

E = current expenditure.

**Distributional Variables:** The selection of distributional variables was circumscribed by the availability of data. One of the major objectives was to explore differences in the availability of, and access to, services between rural and urban areas. But the only area in which reliable urban/rural data could be collected was network expansion, i.e., rural and urban line densities. The other main area of concern was price, i.e., the affordability of basic residential service. In addition, two other variables were used to measure different aspects of distribution: the extent to which telecommunications are owned by residences as opposed to business, i.e., the extent of residential density; and, the extent of public access.

*Urban/Rural Densities (UrbDen & RurDen):* Differences between rural and urban areas in distribution and access to infrastructural resources is a major area of concern in a number of areas. Both national governments and international lending agencies have launched programs to attempt to rectify regional imbalances in a number of areas including education, health services, power and transportation (*World Development Report, 1990; Human Development Report 1990*). Despite earlier perceptions of telecommunications as mainly an urban-oriented service, the importance of rural telecommunications is being increasingly recognized.

There are three major approaches that argue for increasing rural telecommunications. The first approach, based on the work of Innis (1950) and Deutsch (1956) maintains that the extension of communication facilities is essential for the process of nation building and political integration and participation (Katz, 1988). The second argues that telecommunications are essential for the effective and efficient delivery of other essential basic services in rural areas (Hudson, 1983). The third, based on the work of economists and regional scientists maintains that reliable communications is a significant predictor of the location of economic activity and, therefore, of regional development (Christaller, 1966; Dakin, 1973; Kilgour, 1982;)

As a consequence of this emerging recognition of the importance of rural telecommunications, a major policy objective in many developing countries has been to not only improve both rural and urban line densities, but also to bring rural densities closer to those that exist in urban areas. Therefore, both *Urban line density (UrbDen)* (measured as the average number of telephone lines per 100 persons in urban areas) and *Rural line density (RurDen)* (measured as the average number of telephone lines per 100 persons in rural areas) were used in the study as indicators of regional distribution.

*Residential density:* Saunders, et. al., (1983) point out that for tariff purposes some telephone entities divide

subscribers into business and residential subscribers. The practice of charging lower rates for residential service has existed in most developed countries for some time. In fact, businesses often subsidized residential users. Quite apart from considerations of equity, the economic rationale for cross-subsidization stemmed from the assumption that the demand for business telephone service was relatively inelastic compared to that for residential service (Taylor, 1980). Therefore, businesses could absorb higher tariffs more easily than residential users. Lower residential rates would enable more users to subscribe to the service, thereby increasing network externality and moving toward the goal of affordable universal service.

In developing countries too, residential service has traditionally been priced lower than business service. But there is concern that with liberalization leading to the aligning of tariffs to cost and the elimination of cross-subsidy mechanisms, there may be an increase in residential tariffs. Some evidence of this has already been found in the United States after deregulation (Perl, 1986). The distributional consequences of such an increase in countries where the demand for residential services is extremely price sensitive could be severe and lead to a situation where only very high income households or organized groups could afford the service.

This is not only a distributional issue but also an efficiency issue, since slowing the rate of the expansion of telephone service through the elimination of a large number of potential subscribers could also lower network externality. Clearly, the extent of *residential density* (*ResDen*) is an important indicator of the distributional impact of policies. It was measured as the number of residential lines as a proportion of the total number of main lines.

*Public access* (*PubAcc*): For the vast majority of people in developing countries, the only access to telephone service is through the local public call office (PCO). The provision of PCOs is taking place with high frequency in many developing countries and the effort to do so is generally supported by international development agencies (Saunders and Warford, 1979; Saunders and Dickenson, 1979).

Availability of PCOs has been positively correlated with relatively higher levels of local development (NCAER, 1978; Chung, 1979). There is also some evidence that PCO use is more evenly distributed in terms of the economic and social characteristics of users when compared with characteristics of household subscribers (Saunders and Warford, 1979).

However, other studies maintain that PCO user characteristics may not be that different from household subscriber characteristics (Nicolis, 1979; McDowell, 1991).

In any case, the volume of PCO use, both in terms of number of calls and number of callers, is higher than the corresponding figures for household telephones in almost all countries (Saunders, et. al., 1983). On the whole, it appears that expanding PCO availability leads to improved conditions of public access to telephone service.

Consequently, *Public Access (PubAcc)* was measured as the number of public call offices per 100,000 persons.

*Average Price (AvgPri)*: The price of basic residential telephone service to consumers is perhaps the most telling indicator of the conditions of access to the service. Despite the unmet registered demand for phone service in many countries, there is considerable evidence that demand is extremely price elastic in most of the developing world, particularly among lower income households. Setting tariffs is an extremely complex and sensitive issue and needs to satisfy a number of objectives including maintaining the financial viability of the telecommunication entity, contributing to government revenues and promoting an equitable allocation of resources.

A number of different pricing practices can be found within the public sector monopoly system, the choice of any one usually reflecting the particular compromise worked out with respect to these varying objectives. However, with the introduction of private competition, one of the most difficult problems has become the choice of pricing

practices. It is clear that new mechanisms have to be put into place when sector structure policies are revamped. What is not clear is whether or not such restructuring will affect the price of telephone service.

There are no studies of the relationship between liberalization and price in developing countries. What evidence there is comes mostly from the United States where the break-up of the Bell system appears to have led to higher prices for local service and lower prices for long distance service. Taken together it appears that the average residential phone bill (in the U.S.) has gone up significantly after deregulation (Aufderheide, 1987). A major contribution of this study is the use of average price to evaluate the impact of policies in developing countries.

Cross-country comparisons of the real price of telephone service need to be expressed in a common metric and one that will not be affected by variations in purchasing power. The calculation of *Average Price (AvgPri)*, therefore, involved a multi-step process. First, the average price for basic residential service (rental and local and long-distance toll) was obtained at current prices in the local currency by dividing the annual revenue from residential service by the number of residential subscribers. This amount was then converted to U.S. Dollars using the conversion factor developed by the World Bank for converting GNP figures estimated in local currencies using the *Atlas*

method. The *Atlas* conversion factor for any year is the average of the exchange rate for that year and the exchange rates for the preceding two years, after adjusting them for differences in relative inflation between the reporting country and the United States (*World Development Report 1990*). This three year average smooths fluctuations in prices while expressing the result in constant values.

The obtained values were then multiplied by the U.N. International Comparisons Project's (ICP) purchasing power parity (PPP) conversion factor which is the number of units of a country's currency required to buy the same amount of goods and services in the domestic market as one dollar would buy in the U.S. The final amount is expressed in International Dollars.<sup>16</sup> The stepwise procedure and formulae used are provided in Appendix II.

### ***Telecommunication Policy Variables***

As outlined in Chapter 2 the three main areas in which telecommunication policy needs to be examined are: telecommunications equipment; telecommunication facilities; and, telecommunication services. The measurement of these

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16. Technical details of the PPP method can be found in *World Comparisons of Purchasing Power and Real Product for 1980*. New York: United Nations, 1986.



variables involved the coding of policies, regulations and rules governing the extent of privatization and competition in each of these areas. Each variable measured the extent of competition and privatization permissible in each of the three areas on a ten point scale with 1 representing state owned and controlled monopolies and 10 representing open competition, both domestic and foreign. Complete coding schemes for the three policy variables are presented in Appendix III.

Because the operationalization and measurement of the three policy variables involved a considerable amount of individual judgement, there could be problems of reliability involved in the measurements. To make some attempt to overcome this problem both the coding schemes and the final coded variables were referred to two experts at the World Bank. An attempt was made to reach a consensus for all measurements. If a consensus could not be reached a majority rule was applied. This happened in the codification of the services sub-sector in the Philippines and the rules for the procurement of equipment in the Ivory Coast.

Due to the exploratory nature of this study and the rudimentary state of *a priori* knowledge about ways to define and evaluate telecommunication policies, the exact operationalization of variables could take place only after

a detailed examination of the available data. These variables, measured as far as possible on the basis of theory and previous research, were examined in order to judge how well country situations fit the *a priori* formulations. If there were inadequacies in the initial match within any sub-sector, these measures were reformulated to fit better the actual characteristics of the countries under study. This process of confronting successive reformulations with information on actual country situations was maintained until the variables could be said to have been operationalized with reasonable confidence.

The process of successive definitions is a procedure well tried in the history of scientific inquiry. In *The Conduct of Inquiry*, Abraham Kaplan (1964, pp. 77-78) says:

In short, the process of specifying meaning is part of inquiry itself. In every context of inquiry we begin with terms that are undefined -- not indefinables, but terms for which that context does not provide a specification. As we proceed, empirical findings are taken up into our conceptual structure by way of new specifications of meaning, and former indications and references in turn become matters of empirical fact....What I have tried to sketch here is how such a process of "successive definition" can be understood so as to take account of the openness of meaning of scientific terms. *For the closure that strict definition consists in is not a precondition of scientific inquiry but its culmination.* To start with we do not know just what we mean by our terms, much as we do not know just what to think about our subject-matter. We can, indeed, begin with precise meanings, as we choose; but so long as we are in ignorance, we cannot choose wisely. It is this ignorance that makes the closure premature. [emphasis added]

An example of this process of conceptualization and definition was the measurement of the facilities policy variable. The initial scheme allowed for three types of ownership patterns: a government department; a state-owned company; and, a wholly or mostly private company. However, these three categories could not cover the case of Morocco where facilities were owned by a government board. The scheme had to be expanded to include this type of ownership. Similar situations arose in Pakistan, where facilities are owned by a parastatal enterprise and, in the case of Sri Lanka and Jordan, where there are mixed private-public ownership companies. The initial three categories were thus expanded to six during the process of examining the data.

This is not to suggest that the entire process of operationalization and measurement was *post hoc*, but only to emphasize that at the exploratory stage in the development of new measures of institutional phenomena, the method of successive definition can be applied in order to obtain operational definitions consistent with observable phenomena and therefore suitable for classifying them.

*Telecommunications equipment policies (EqPol)*: The arrangements for manufacturing and acquiring telecommunication equipment play an important part in determining the nature of the system for providing telecommunication services. Equipment manufacture is

important in its own right as well, because its production and sale, both home and abroad, are significant for economic growth, employment and trade.

Telecommunications equipment policies were operationalized along two dimensions: policies regulating the structure of the industry and rules governing procurement arrangements. Policies regulating industry structure were measured along two axes: a) the extent of permissible competition (e.g., monopolistic, oligopolistic or competitive; and, b) the extent of privatization allowed. Procurement arrangements could be singular (from a single entity), domestic multiple or competitive (including foreign competition). The two variables were then combined into a single scale.<sup>17</sup>

*Telecommunications facilities policies (FacPol):* Until recently, telecommunications facilities in developing countries were owned and operated by partly or wholly owned government monopolies organized in ways ranging from government departments (Pakistan, Sri Lanka) to a semi-independent branch or board within a department (Bangladesh, Fiji, India) to a regulated public sector corporation (Nepal, Kenya, Costa Rica).

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17. Results of the reliability and factor analysis for the scale as well as results of the tests for assumptions of interval measurement of all three policy variables are presented in Appendix III.

However, in recent years, this picture has been altered by moves toward privatization or, at the very least, movement toward greater autonomy from government control. This has introduced two additional entities in the facilities picture: the mixed ownership company (Nigeria, Malaysia) and the mostly or wholly private company (Mexico, Chile). One final option relates to splitting national monopolies into regional entities including dividing them along urban-rural lines. This variable was measured through determining the extent of private ownership and the number of independent owners of facilities permitted.

*Telecommunication services policy (SerPol)*: Provision of services by entities independent of the PTTs is one of the main policy changes being recommended to developing countries, particularly for the provision of enhanced services. The options in this area include provision of all services by the PTT; splitting-up the provision of services between basic and enhanced services and letting the latter be provided by either another public enterprise or by the private sector and permitting independent use of the public network by large users.

Other options relate to establishing independent or separate business networks, allowing dedicated networks to offer services to third parties and sub-contracting services. Another set of choices include splitting supply between

local, national and international services and/or urban and rural services. This variable too was measured along the permissible privatization/competition dimensions.

### ***Commitment Variables***

In Chapter 3, the main political factor in the growth of telecommunications was identified as government commitment to the expansion of the sector. Commitment can be operationalized as state activism in fostering the growth of telecommunications.

Though states play a leading role in fostering industrial development in developing societies the presence of the state within the industrial sector can vary (Stepan, 1978; Evans, 1986). States therefore, need to display a certain amount of activism in fostering the growth of a sector before it can be concluded that it is committed to the growth of the sector (Supple, 1976). The amount of resources states can commit to industrialization are limited and therefore careful prioritization is often necessary.

Researchers have used a number of different measures of state commitment. Delacroix and Ragin (1981) use per capita government investment in a sector as a measure of

commitment. The problem with this measure is that it provides no indication of the relative priority of a sector. Rao (1983) used total governmental expenditure in a sector to measure Commitment. Again, this is an isolated measure. Moreover, expenditure measures are more subject to annual budgetary constraints than investment measures. To provide a comparative estimate, *state commitment (Invest)* was operationalized as total annual government investment in telecommunications as a proportion of total annual government investment. The growth rate of this variable is called *Commit* in the tables.

### ***Economic Variables***

*Income Characteristics:* GNP and GNP/capita, are the most commonly used indicators of economic development in both economic and telecommunication studies. As already indicated, measures of telecommunication density are generally highly correlated with GNP and GNP/capita. GNP measures the total domestic and foreign value added claimed by residents. It comprises the total output of goods and services for final use produced by residents and non-residents plus net factor income from abroad, which is the income residents receive from abroad for factor services (labor and capital) less similar payments made to non-

residents who contributed to the domestic economy. GNP figures (*GnpCap*) used here are those reported by the World Bank (*World Tables*, 1990) using the *Atlas* method.<sup>18</sup>

*Structural Characteristics:* The relationship between the structural characteristics of national economies and telecommunication development was established in Chapter 3. There are two ways in which the structural characteristics of the composition of economic activity can be described: an industry approach and an occupational approach. The occupational approach involves describing the composition of economic activity in terms of the number of employed persons in industry, agriculture and services while the industry approach focuses on the value-added by each sector to the national product.

The occupational approach, while useful for describing the relative size of different sectors of the economy may not be very useful in this study. The objective of this study is to evaluate the impact of telecommunication policies on the growth and development of the sector. The structural characteristics of economies are being included because there is considerable evidence in the literature that they condition the relationships between policies and outcomes in the sector. But those characteristics pertain more to the capacity of different sectors to generate demand for

18. Details of the method are provided in Appendix II.



telecommunications (because of the differential importance of telecommunications as inputs into the production process) than to the extent of employment in different sectors. In other words, sector structures are important because of the value-added by telecommunications to different sectors and, in turn, the value-added by different sectors to the national product.<sup>19</sup> Consequently the structural characteristics of national economies were described in terms of the composition of economic activity with respect to the share of agriculture, industry and services in the GNP.

*Agriculture* covers forestry, hunting, and fishing as well as cultivation. In developing countries with high levels of subsistence farming, much of agricultural production is either not exchanged or not exchanged for money. This increases the difficulty of measuring the contribution of agriculture to GNP and reduces the reliability and comparability of such numbers. *Industry* comprises values added in mining, manufacturing, construction, and electricity, water and gas. Value-added in all other branches of economic activity are categorized as *Services*.

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19. For more detailed discussion of the suggestion that the development, use and potential benefits of telecommunications are sector specific see the discussions of input-output analyses on pp. 55-56.

## Data

The study involved the analysis of secondary data which was collected from a number of different sources.

Telecommunications outcome data were gathered from two primary sources: the ITU's *Yearbook of Common Carrier Statistics* and AT&T's *World Telephones*, which have annual coverage for the years 1977 to 1988. Telecommunications policy related data were obtained mostly through country reports maintained by the CCITT. These were cross-checked and supplemented by country profiles maintained by the International Bank for Reconstruction and Development.

Data on economic and political characteristics were obtained mainly from the World Bank's *World Development Report* and the U.N.'s *Yearbook of National Account Statistics*. In addition, the *Compendium of Data for World System Analyses* provided a useful sourcebook for cross-checking and supplementing the main sources for cross-country comparability.

As might be expected, it was not possible to collect data on all the variables for all the countries under analysis from the above sources alone. However, a careful examination of the descriptive statistics did manage to rule out the possibility that there exist systematic trends related to

the type of variable or kind of country for which the data were missing. This enabled the use of a listwise deletion of missing cases in all the analyses without fear that missing cases would introduce biases in the estimations.

## Research Design

A review of cross-national studies in social science research reveals that there are seven major research designs utilized in these kinds of studies: cross-sectional; pooled cross-sectional; cross-sectional with a percentage growth rate as the dependent variable; cross-sectional with a lagged dependent variable; pooled cross-sectional with a percentage growth rate as the dependent variable; panel regression; and, time-series analysis.

A simple cross-sectional design compares measures of variables at one point in time without attempting to measure change overtime in any of the variables (Jipp, 1963; ITU, 1968; Marsh, 1976; Shapiro, 1976). The ITU's CCITT used cross section data from thirty industrial and developing countries in its *Gas-5* studies to examine the relationship between telephone densities and per capita GDP. Correlation coefficients, computed separately for the years 1955, 1960 and 1965 were 0.91, 0.91 and 0.92 respectively.

A pooled cross-sectional design combines cross-sections for different years, but again no measure of change is used for any of the variables (ITU, 1972). The 1972 edition of the *Gas-5* handbook reports the results of several pooled cross-sectional studies of telephone densities and GNP/capita for both developed and developing countries. Despite the

variation in design, the correlations in these studies were very similar to those found in the earlier cross-sectional studies.

The third and fourth designs are used most frequently in studies of the impact of foreign investments on domestic industrial growth. One uses cross-sectional data with a percentage growth rate as the dependent variable (Kaufman, et. al., 1975; Szymanski, 1976). The other also uses cross-sectional data but introduces a lagged dependent variable (measured at  $t-1$ ) into a least-squares regression in order to control for the prior levels of the dependent variable (Ballmer-Cao, 1978; McGowan and Smith, 1975).

The fifth design involves the pooling of cross-sections with the dependent variable being a percentage growth rate. In an attempt to uncover the comparative impact of telecommunications growth and development support on GNP growth Bebee and Gilling (1976) pooled data for three years for 29 countries (including 13 developing countries) in a regression equation. The dependent variable was the percentage growth rate of GNP/capita over the period.

The sixth design is a panel regression, used with some variation in this study and discussed in detail later. The final design is a time series analysis. Hardy (1980, 1981) used a cross-sectional, time-series regression to analyze data for 37 developing countries over a 14 year period

(1960-1973). Using GDP as the dependent variable and telephone densities as the independent variable, he found that a 1 percent rise in the number of telephones per 100 persons between 1950 and 1955 contributed to a 3 percent rise in GDP/capita between 1955 and 1962.

Except for Hardy's study none of the above designs attempts to measure change in the *independent* variables. Such a measure is essential in a study attempting to evaluate the consequences of changes in policies and investments. The different analyses conducted in the present study are discussed in the following paragraphs.

The empirical analysis performed in this study is in three parts. First, *descriptive*, showing the state of the telecommunications sector in terms of policies, outcomes (performance and distribution) and commitment in 1977 and 1988. In the case of policies simple comparisons between measures at these two points in time would not be very useful in evaluating what is essentially a dynamic phenomenon. It is arguable that the effectiveness of policies depends on both the number of years the policies have been in place and the extent of changes in the policies. Therefore, using measures in 1977 and 1987 (since it is not reasonable to expect that policies instituted in 1988 would be able to impact on outcomes in the same year) a policy change variable was constructed for each of the three policy areas (equipment, facilities and services) measuring

both the recency and magnitude of policy changes through the following formula:

$$C = (M * T) / 10$$

where C = average annual rate of change

M = extent of change from 1977 to 1987 (Pol87-Pol77)

T = number of years policy has been in place

Growth rates were also calculated for commitment, GNP/capita and the share of agriculture, industry and services in the GNP, in addition to comparing the state of the variables in 1977 and 1987. These growth rates were calculated using the least-squares method employed by the World Bank. The least squares growth rate,  $r$ , is estimated by fitting a least-squares linear regression trend line to the logarithmic annual values of the relevant variable during the entire time period. More specifically, the regression equation takes the form:

$$\text{Log } X_t = a + bt + e_t$$

where:  $X_t$  = variable

$a$  = constant

$t$  = time

$e_t$  = error term

$b$  = slope coefficient

Then  $r = (\text{antilog } b - 1) * 100$  provides the least squares estimate of the percentage growth rate. By using the least-squares method, all observations within the time period were

taken into account, and the resulting growth rates reflect general trends without being unduly influenced by cyclical factors or exceptional variations in a particular year (*World Development Report*, 1990).

However, one of the problems associated with using a least squares regression is the assumption that the regression of Y on X is linear. In most countries, the growth of the national product as well as sectoral growth is rarely linear, even though the estimated growth rates are. A regression model estimating these growth rates can be characterized as an "intrinsically linear model" i.e., one which is "linear in its parameters but nonlinear in the variables" (Pedhazur, 1982, pg. 404)

Pedhazur (1982) argues that by using a logarithmic transformation of the variables, such a model can be reduced to a linear model.<sup>20</sup> The World Bank and the U.N. also commonly use logarithmic transformations to overcome the problem of nonlinearity in the estimation of international economic growth rates,<sup>21</sup> therefore, to ensure international comparability, logarithmic transformations were used in the regression model estimating the growth rates in this study.

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20. It is important to note that the linear transformation does not affect the proportion of variance accounted for in the dependent variables but results in a better fitting regression line.

21. See for instance *World Development Report*, 1990 and *U.N. Yearbook of National Accounts*, 1989.



The second set of analyses are *bivariate*, exploring the relationships between policies and performance and policies and distribution. The correlational analysis in this section is designed to reveal whether or not changes in policies are significantly associated with changes in telecommunication outcomes between 1977 and 1988.

Clearly, outcome variables in 1988 will be significantly affected by the level of these variables in 1977.

Therefore, in order to control for the prior level of the dependent variables the measures in 1988 were regressed on the measures of 1977. The residuals of that regression, i.e., the proportion of variance in the dependent variables not accounted for by the 1977 levels, were used in the analyses. The use of the residuals in the regression analyses is described below.

The correlational analysis is further detailed by comparing the relationships between policies and performance and policies and distribution at different levels of national income: low, middle and high. Following the practice of the World Bank (*World Development Report, 1990*) low income countries are defined as those countries with mean per capita incomes from 1977 to 1988 of less than \$500; middle income countries as those with GNP/capita between \$500 and \$5,000 and high income countries as those with GNP/capita over \$5,000.

The third set of analyses are *multivariate*, estimating parameters of a regression model including both policy and economic variables. The regression model used in the study is a variation of the panel design. In its usual form, the dependent variable at time  $t$  is regressed on its value at time  $t-1$  (the lagged dependent variable) and other independent variables also measured at  $t-1$ . For example, in this study, the measures of change in telecommunication performance and distribution variables from 1977 to 1988 (i.e., the residuals of the regression of 1988 measures on the 1977 measures) would be regressed on the telecommunication policy and economic variables measured in 1977.

However, to capture the dynamic nature of policy developments as well as the impact of changes in economic variables, growth rates of policies, GNP/capita and composition of economic activity from 1977 to 1988 are used instead of static variables measured in 1977. The final model is in the following form:

$$Y_t = a + b_1 Y_{t-1} + b_2 X_{ri} \dots + b_n X_{rn} + e$$

where:

$Y_t$	= dependent variable at time t
$Y_{t-1}$	= lagged dependent variable
a	= constant
b	= unstandardized regression coefficient
$X_{ri} \dots X_{rn}$	= growth rates of independent variable
e	= error term

In addition to a regression model in which all the independent variables are entered simultaneously, a hierarchical design was also employed in order to determine the increment in the proportion of variance accounted for by different sets of variables. Details of the procedure are discussed in Chapter 9.

## Chapter 7

## THE STATE OF TELECOMMUNICATIONS 1977-1988

Telecommunication sectors have undergone considerable changes during the eleven years spanned by this study. Despite financial and technical bottlenecks and rapid population increases, developing countries, as a whole, have shown improvements in most telecommunication outcome indicators. Table III compares summary statistics for telecommunication outcome variables for 1977 and 1988.

TABLE III

Summary Statistics of Telecommunication  
Performance Variables 1977 and 1988

Variable	Mean	S.D.	Min	Max	N
TelDen77	3.51	2.13	0.87	27.80	65
TelDen88	5.18	3.12	1.12	43.97	67
LinDen77	2.44	2.12	0.57	21.02	65
LinDen88	4.07	2.89	0.82	32.36	67
TraDen77	2,122	1,017	107	6,138	65
TraDen88	3,145	1,417	143	10,319	67
DemPer77	51.98	23.41	0.68	329.66	63
DemPer88	42.10	19.21	0.31	243.69	67
FinPer77	34.51	89.17	-30.72	94.35	65
FinPer88	-8.96	37.49	-173.80	83.55	65

Source: Appendices IV and V

Telephone and line densities have increased significantly over the period and traffic densities have also gone up. What is perhaps surprising is that demand performance has improved over the period with the registered demand for lines expressed as a proportion of existing number of lines being reduced by about ten percent. The inability to meet demand has been one of the main criticisms of telecommunication entities in developing countries (Wellenius, 1989).

What is not surprising is that financial performance has worsened over the period. Whereas in 1977 profits were on average about 35% of expenditures, by 1988 they were registering an average loss of about 8%. Clearly, what was a once relatively profitable sector is increasingly becoming a financial burden in a number of countries (Nulty, 1989).

Table IV presents a similar descriptive analysis for the five telecommunication distribution variables.

TABLE IV

Summary Statistics of Telecommunication  
Distribution Variables 1977 and 1988

Variable	Mean	S.D.	Min	Max	N
UrbDen77	4.51	2.01	1.87	35.92	61
UrbDen88	6.12	3.56	1.89	46.98	67
RurDen77	1.43	1.56	0.18	18.42	61
RurDen88	3.05	2.78	0.20	29.47	67
ResDen77	51.83	18.38	7.00	78.00	61
ResDen88	56.57	18.16	10.00	85.00	67
PubAcc77	726	189	23	11,790	65
PubAcc88	715	162	15	9,788	78
AvgPrice77	3.12*		1.50	17.18	61
AvgPrice88	4.98*		1.51	21.45	61

Source: Appendices VI and VII

Notes: Average Price figures are in constant International Dollars; \* = Median

In keeping with the increased national level line densities, both rural and urban line densities have shown improvements from 1977 to 1988. However, conditions of public access (expressed here as the number of public call offices per one million persons) have slightly worsened. In this case, increases in the number of PCOs have not been able to keep pace with the growth in population. What is even more worrying is the significant increase in the average price of basic residential service. The 1977 figure of about three international dollars per year represented from 8 to 12 percent of the average annual income of most people in developing countries, while the 1988 figure of almost five

international dollars amounts to between 15 and 18 percent of average annual income. It appears that basic telephone service may be increasingly unaffordable in many countries.

Perhaps the most important assumption on which this study is based is that there have been significant changes in telecommunication sector policies, specifically those relating to equipment, facilities and services, over the period under study. These changes have been characterized as a process of liberalization encompassing the two axes of increased competition and movement toward privatization. Table V presents summary statistics for the three policy scales in 1977 and 1987.

TABLE V

Summary Statistics of Telecommunication  
Sector Policy Variables 1977 and 1988

Variable	Mean	S.D.	Min	Max	N
EqPol77	2.65	1.01	1.00	8.00	65
EqPol87	4.44	2.15	1.00	10.00	78
FacPol77	1.80	1.27	1.00	7.00	65
FacPol87	3.74	2.89	1.00	9.00	78
SerPol77	1.94	1.17	1.00	7.00	65
SerPol87	4.01	2.12	1.00	10.00	78

Source: Appendices VIII and IX

Clearly, policies relating to all three areas, equipment, facilities and services, have undergone liberalization over

the period. Policies relating to the manufacture and procurement of telecommunications equipment were the most liberalized, even in 1977, and remained so in 1987. Service sector policies show a clear trend toward liberalization and there has also been movement toward liberalization in the facilities area. However, while Table V presents the extent of liberalization, it does not indicate how long the policies have been in place.

An important task, therefore, involved the construction of scales that would characterize the extent and recency of policy changes (or what may be called the rate of policy change) in each of the three policy sub-sectors.<sup>22</sup> Summary Statistics for these variables are provided in Table VI.

TABLE VI

Summary Statistics of Sector Policy  
Changes 1977-1987

Variable	Mean	S.D.	Min	Max	N
EqCha	4.69	2.01	1.0	9.0	65
FacCha	2.22	1.83	1.0	7.0	65
SerCha	3.46	2.14	1.0	8.5	65

Table VI shows that policies relating to the equipment sub-sector experienced the highest rate of change during the

22. The procedure for constructing the three change variables was described on pp. 139-140.



period. Not surprisingly, the rate of change of policies relating to telecommunication facilities has been the slowest. Though there are differences in the rate of change of policies in the three sub-sectors, it is quite probable that the three change variables are highly correlated. If this is the case it may be possible to construct a single policy change scale for use in multivariate analysis.

TABLE VII

Correlation Matrix of  
Policy Change Variables

	FacCha	SerCha	EqCha
FacCha	1.00		
SerCha	.59**	1.00	
EqCha	.45**	.70**	1.00

N = 65; sig. \* = .05 \*\* = .01

Source: Appendix XII;

Table VII presents the intercorrelations between the three policy variables. Clearly, the three coefficients are of a fairly high magnitude. It appears that countries that embark on a process of liberalization do it fairly uniformly in all three sub-sectors. Though once again we notice that the changes in facilities are not as highly correlated as those between services and equipment.

Even so, the correlations suggest that the three variables can be combined into a single scale measuring the extent of policy change in the telecommunications sector as a whole. Reliability and factor analysis found that the a policy change scale (PolCha) comprising EqCha, SerCha and FacCha had a Chronbach's Alpha of .81 and formed a single factor with an Eigenvalue of 2.17 explaining 72.4 percent of the variance. Clearly, a policy change scale is a reliable summary measure of the changes taking place in the telecommunications sector as a whole.

The picture of the state of telecommunications is completed by looking at how government commitment to the growth of the sector has changed over the period. Table VII presents the descriptive statistics for governmental investment in telecommunications as a proportion of total government investment in 1977 and 1987 (Invest77 and Invest88) and the average annual growth rate of investments (Commit).

TABLE VIII

Telecommunication Investment As a Proportion of  
Total Government Investment 1977 and 1987

Variable	Mean	S.D.	Min	Max	N
Invest77	2.66	1.11	1.12	7.89	65
Invest87	7.30	2.17	1.56	13.12	65
Commit	6.40	4.87	0.92	10.21	65

Source: Appendices VIII and IX

The almost five percentage point increase in investments in telecommunications from 1977 to 1988 provides clear evidence of the growing importance of the sector for developing countries. This represents an average annual growth rate of almost 6.4% percent (Commit), fairly impressive when compared to the 4.4% increase registered by GNP/capita over the same period (Table IX).

### Discussion

The rapid transformation of the telecommunications equipment sector, away from one characterized by state controlled manufacturing and rigid licensing and import schemes, is striking. One reason for this is that many developing countries, seeking to rapidly upgrade their systems, have looked more and more to foreign manufactures of

telecommunication equipment and have also permitted domestic competition, including granting permission to foreign manufacturers (e.g., Siemens, Bechtel) to set-up subsidiaries in their countries (*Developing World Communications*, 1989).

One area in which considerable changes have occurred is in the supply of customer premises equipment (CPE). A number of countries (India, South Korea, Brazil) have permitted private domestic companies to provide telephones, teletypewriters, fax machines and even PBXs on a competitive basis. Others have permitted private domestic companies to import, assemble and sell foreign-made equipment (Mexico, Argentina) and still other have permitted the establishment of subsidiaries of multinational manufacturers (Singapore, Hongkong, Oman, UAE). Procurement arrangements have also been considerably liberalized, characterized by a movement away from arrangements involving tied and/or single-entity procurement of equipment to procurement through domestic and international competitive bidding (DCB and ICB).

Perhaps the most remarkable development has been the liberalization of telecommunication facilities, though changes in this area have been less intense and slower in coming. Facilities could perhaps be identified as the pivotal area in the sector as a whole, since developments here have consequences for the other two areas. Part of the explanation for the higher score in this area in 1987 is, of

course, that governments have permitted other public sector entities (e.g., Indian Railways, Nigerian National Petroleum Corporation) to own and operate their own networks. In many countries where competition is still not permitted, there has been a fragmentation of the network through the break-up of national monopolies into regional monopolies (e.g., India).

But there is also movement to permit private enterprises to maintain their own facilities (Jamaica) in addition to the complete privatization of the facilities holding entity (e.g., Ivory Coast, the Philippines). Some countries have even sold all or part of their telecommunication enterprises to foreign investors (Argentina, Chile).

The liberalization of facilities would also seem to account for the liberalization of services. But this is not entirely correct. Much of the increase in liberalization of services has come through the leasing of facilities to private companies for providing value-added or enhanced services (India, Pakistan). In addition, some countries have permitted lessees to provide basic services to third-parties if they have excess capacities in the leased channels (the Philippines, Chile).

The low base from which many countries are launching sector expansion programs is part of the reason for the high growth rate of investments in telecommunications. Saunders and

Dickenson (1979) report that in the early 1970s, most developing countries were investing less than 1 percent of their GDPs in telecommunications. This had grown to almost 3 percent by 1985 (*Yearbook of Common Carrier Statistics*, 1988). A major factor for the increasing investment in the sector is that international development agencies are providing more funds than ever before for the growth of the sector (*World Development Report*, 1990).

This increase in international loans for sector expansion and the increase in government investment in general is derived from the changing perception of the role of telecommunications in developing countries. For years, Governments engaged in restrictive investment practices because of the lack of evidence of the developmental benefits of telecommunications, the perception of telecommunications as an urban luxury and because of the financial requirements of international lending institutions.

But, as detailed in previous chapters, these conditions have changed rapidly during the 1980s, leading to an impressive growth rate of telecommunication investments. This is not only true for the oil exporting countries (for example Kuwait and Venezuela) but also for countries with relatively lower levels of national income like Ecuador, Chile and Malaysia.

## Chapter 8

## ECONOMIC DEVELOPMENTS 1977-87

Economic developments during the period under review have not been as pronounced or as unidirectional during the period under study as have those relating to the telecommunications sector. Tables IX through XII provide summary statistics for the level of national income and the share of industry, services and agriculture in the GNP for 1977 and 1987 and their corresponding growth rates.

TABLE IX

GNP Per Capita 1977 and 1988  
(U.S. Dollars)

Variable	Median	Min	Max	N
GnpCap77	450	110	14,420	79
GnpCap87	810	100	15,770	78
GnpGro	4.43* (3.3)	-1.0	8.7	78

Source: Appendices X and XI; \* = Mean (S.D.)

The performance of developing countries with respect to per capita GNP has been mixed at best. Though the median per capita GNP has gone up from US\$ 450 to 810, a little over

half the countries (most of them in sub-Saharan Africa and South America) experienced negative, or close to zero, growth over the period. In contrast, some countries did fairly well, particularly those in South and East Asia. After experiencing relatively high growth rates during the early 1980s, the economies of the oil exporting countries of West Asia and North Africa stagnated toward the end of the decade.

Tables X, XI, and XII show that the percentage share of industry in the GNP has been steadily rising over the period, mostly at the expense of the agricultural sector, with the service sector being more or less stagnant. The industrial sector has also experienced the highest growth rate, while agriculture has experienced a negative rate of growth.

TABLE X

Percentage Share of Industry  
In GNP 1977 and 1988

Variable	Mean	S.D.	Min	Max	N
PerInd77	27.76	13.36	7.00	83.00	69
PerInd88	29.31	11.78	7.00	63.00	79
IndGro	5.28	4.91	3.35	9.82	69

Source: Appendices X and XI



TABLE XI

Percentage Share of Agriculture  
In GNP 1977 and 1988

Variable	Mean	S.D.	Min	Max	N
PerAgr77	28.90	17.26	1.00	72.00	69
PerAgr88	26.46	16.64	1.00	81.00	79
AgrGro	-8.40	7.34	1.21	15.21	69

Source: Appendices X and XI

TABLE XII

Percentage Share of Services  
In GNP 1977 and 1988

Variable	Mean	S.D.	Min	Max	N
PerSer77	43.68	11.97	12.00	77.00	69
PerSer88	44.91	10.56	18.00	73.00	79
SerGro	2.7	2.8	0.78	4.21	69

Source: Appendices X and XI

## Discussion

The growing share of industry in the GNP is an important finding because industrialization has long been considered synonymous with progress toward economic growth (Fisher, 1935; Clark, 1940; Rostow, 1960). Working with a three sector model, consisting of the primary (agriculture, fishing, forestry and mining) the secondary (manufacture, construction and utilities) and tertiary (commerce, transportation, communication and general services) both Fisher and Clark predicted that an increase in per capita income would lead to a movement of the composition of economic activity out of agriculture into industry and subsequently into the tertiary sector. This approach assumed that all societies would undergo this evolutionary process of sectoral development.

Like Fisher and Clark, Rostow viewed the process of development as a series of successive stages through which all countries must pass. His "stages of growth" approach identified all societies in terms of five stages.

It is possible to identify all societies in their economic dimensions, as lying within one of five categories: the traditional society, the preconditions for take-off into self-sustaining growth, the drive to maturity, and the age of high mass consumption....These stages are not merely descriptive. They are not merely a way of generalizing certain factual observations about the sequences of development of modern societies. They have an inner logic and continuity....They constitute, in the end, both a theory about economic growth and a more general, if partial, theory about modern history as a whole. (Rostow, 1960, pp. 3, 4, and 12)

Rostow argued that since at various times in history, the present day developed countries have passed the stage of "take-off" into "self-sustaining growth," it is possible to repeat those experiences in the third world provided that a certain set of rules were followed. An important one was the expansion of industry through mobilization of domestic and foreign savings for investment in the sector.

Developing these earlier models, researchers like Bell (1976) have argued that many industrialized countries have now entered a new stage of development called the post-industrial or, more popularly, the information society. This stage is characterized by an increasing share of the GNP being accounted for by services, particularly those services relating to information activities (Machlup, 1962, 1980; Porat, 1977).

With the growing evidence that a number of developing countries, while registering relatively steady increases in industrialization have not experienced corresponding

increases in national income (Morawetz, 1977) (let alone per capita income), scholars have begun suggesting that developing countries do not, and even should not, have to go through the "stages" of development (Gibbs, 1988). For instance, Jussawala (1982) and Gibbs (1988) suggest that developing countries can, and are, leapfrogging the industrial stage and moving toward becoming what Jussawala calls "Newly Informatics Societies." Similarly, Katz (1988), and Arriaga (1985) have surmised that the service sector in developing countries, fueled by the increase in government activity, can be expected to grow rapidly. Some of the reasoning for the growth of telecommunications stems from this anticipated expansion of services. However, as Table XII suggests, the expected growth of services does not appear to have materialized, at least during the period under review.

These findings on the trends in the share of industry, services and agriculture are important not only because they provide evidence of the composition of economic activity in developing countries, but also because they are expected to have a strong bearing on the development of telecommunications and condition the impact of policies on telecommunications performance and distribution. These issues are part of the detailed analysis of telecommunication outcomes dealt with in the next few chapters.

## Chapter 9

### POLICIES, COMMITMENT AND PERFORMANCE

The previous two chapters provided evidence of the changes in the telecommunications sector as well as in the composition of economic activity between 1977 and 1988. The next two chapters explore the reasons for the changes in telecommunications outcomes. The present chapter focuses on telecommunication performance, while the next looks at the changes in telecommunication distribution.

It has been established that telecommunications performance and telecommunications policies have undergone significant changes over the period under the review. But are these changes related? The bivariate analysis begins with Table XIII which presents the coefficients of the correlations between policy changes and the five performance variables. The table also presents the coefficients of the correlation between commitment (i.e., the growth rate of governmental investment) in the sector and the performance variables.<sup>23</sup>

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23. The outcome measures of the performance variables and the distribution variables in the next chapter are, of course, the changes in outcome from 1977 to 1988 after controlling for the 1977 levels.

TABLE XIII

Policies, Commitment and Performance  
(Correlation Coefficients)

	TelDen	LinDen	TraDen	DemPer	FinPer
EqCha	.25*	.25*	.11	-.13	.11
FacCha	.28*	.25*	.15	-.18*	.10
SerCha	.22*	.23*	.12	-.10	.15
Commit	.32*	.30*	.27*	-.24*	.16

N = 63; sig. \* = .05 \*\* = .01

Perhaps the most noticeable fact is the lack of a significant relationship between financial performance and any of the policy or commitment variables. It appears that if one of the objectives of policy reform is to improve the profitability of telecommunication undertakings then the solution may lie neither in sector liberalization nor in increasing sector investments.

But stepping up sector investments does seem to significantly improve telephone, line and traffic densities as well as reduce the outstanding demand for telephone service.<sup>24</sup> Nevertheless, to the extent that policies governing the ownership of telecommunication facilities have been liberalized, this liberalization is significantly

24. Since demand performance (DemPer) is measured as the size of the waiting list for telephones lines as a proportion of the total number of installed lines, the negative correlations signify a reduction in this proportion and, hence, improved demand performance.

related to higher telephone, line and traffic densities as well as better demand performance. In contrast, liberalization of equipment and service policies, though significantly related to higher telephone and line densities, do not appear to impact significantly on traffic densities or demand performance.

Table XIV presents the correlations between the four economic variables and telecommunication performance. As expected, growth rate of per capita GNP is highly correlated with both line and telephone densities, but not with the other three variables. That the growth of GNP is not significantly correlated with traffic densities is more or less in keeping with earlier studies. The 1968 and 1972 editions of the *Gas-5* studies reported that though long-distance call traffic was positively related to GNP, local traffic densities could not be shown to be effected by the course of economic growth.

TABLE XIV

Economic Development and Performance  
(Correlation Coefficients)

	TelDen	LinDen	TraDen	DemPer	FinPer
GnpGro	.75**	.74**	.10	-.14	.12
AgrGro	-.45**	-.46**	-.14	.19	-.10
IndGro	.48**	.48**	.19	-.21	.11
SerGro	.19	.18	.20	-.08	.07

N 63; sig.    \* = .05       \*\* = .01

Traffic densities, demand performance and financial performance are also not related to the growth of industry, agriculture or services. Industrial growth is fairly strongly related to high telephone and line densities and, expectedly, the growth of agriculture is negatively related with these two variables.

What is surprising is that service growth is not related to any of the performance variables. In developed countries, growth of the service sector has been closely related to the development of telecommunications, but this does not appear to be the case in developing countries. The lack of such a relationship may of course be a statistical artifact of the lack of significant variance of the service growth measure.



Possible substantive reasons are examined in the discussion section.

One of the important criticisms of telecommunications sector liberalization in developing countries is based on the argument that improvements sought to be achieved through restructuring may be realizable only at higher levels of national income. Tables XV through XVII provide support for this argument separately for the three policy variables. Each table presents the zero-order correlations between each of the policy variables and the five performance variables for low, middle and high income countries.

TABLE XV

Facilities Policy Change and Performance  
(correlation coefficients  
at different levels of GNP/capita)

	Low	Middle	High
TelDen	.01	.19*	.32*
LinDen	.02	.18*	.31*
TraDen	.07	.06	.22*
DemPer	-.04	-.03	-.21*
FinPer	.04	.12	.17

N = 63; sig. \* = .05      \*\* = .01

TABLE XVI

Equipment Policy Change and Performance  
(correlation coefficients  
at different levels of GNP/capita)

	Low	Middle	High
TelDen	.03	.17	.22*
LinDen	.05	.15	.21*
TraDen	.06	.09	.11
DemPer	-.09	-.04	-.13
FinPer	.09	.12	.08

N = 63; sig. \* = .05      \*\* = .01

TABLE XVII

Service Policy Change and Performance  
(correlation coefficients  
at different levels of GNP/capita)

	Low	Middle	High
TelDen	.07	.14	.28*
LinDen	.06	.13	.24*
TraDen	.10	.10	.13
DemPer	-.05	-.06	-.10
FinPer	.02	.09	.07

N = 63; sig. \* = .05      \*\* = .01

The relationship between liberalization of equipment and service policies and increases in telephone and line densities noticed in Table XIII is clearly conditioned by the level of national income. While the coefficients are not significant for low and middle income countries they are for higher income countries (Tables XVI and XVII). It appears that if there are advantages for sector performance to be had from liberalization in these two areas, they may be realizable only at high income levels and not, therefore for most developing countries.

On the other hand, liberalization of facilities policy is significantly related to increased telephone densities in both middle and high income countries. But the relationships between facilities liberalization and traffic density and demand performance observed in Table XIII is specified by the level of national income, remaining significant only for high income countries.

TABLE XVIII

Commitment and Performance  
(correlation coefficients  
at different levels of GNP/capita)

	Low	Middle	High
TelDen	.19*	.25*	.31*
LinDen	.18*	.26*	.35*
TraDen	.03	.07	.22*
DemPer	-.35*	-.19*	-.26*
FinPer	.10	.15	.08

N = 63; sig. \* = .05    \*\* = .01

In contrast, the relationship between commitment and performance is more consistent (Table XVIII). Both telephone and line densities are significantly related to commitment at all levels of GNP/capita. And even though the magnitude of the coefficient between demand performance and commitment is higher for low and high income countries than for middle income countries, it is apparent that the relationship holds across income levels.

Finally, the multivariate analysis attempts to determine the independent impact of policy changes on performance after accounting for the effect of the level of economic development and the composition of economic activity. Table XIX presents the standardized regression coefficients for

the independent regression of each of the telecommunication performance variables on the eight independent variables.

TABLE XIX

Regression Estimates of the Effects of Economic and Policy Variables on Telecommunication Performance

	GnpGro	IndGro	SerGro	AgrGro	EqCh	FacCh	SerCh	Comm	R <sup>2</sup>
Tel	.68**	.21*	.11	-.19	.14	.17	.12	.31*	.84**
Lin	.64**	.22*	.12	-.07	.13	.16	.11	.29*	.82**
Tra	.16	.10	.09	-.02	.01	.07	.06	.11	.21
Dem	-.11	-.07	-.01	.02	-.14	-.21*	-.17	-.23*	.37*
Fin	.10	.08	.04	.07	.18	.12	.11	.17	.12

Notes: standardized regression coefficients;  
N = 61; sig. \* = .05 \*\* = .01

The first thing to note is that there are virtually no significant coefficients for the three policy variables for any of the dependent variables. In other words, after we account for the effect of the growth of GNP, the composition of the GNP and the growth of government commitment, there are no significant independent effects of any of the policy variables on four of the five performance variables. The only exception to this is the effect of facilities liberalization on demand performance.

What is clear is that the growth of GNP/capita, increase in industrialization and government commitment together account

for almost the entire variance in telephone and line densities of many developing countries. That commitment maintains a significant independent effect on densities even with GNP and industrial growth rates in the equation, provides indication of the importance of governmental investment for the growth of the sector. In fact, commitment, along with facilities change, are the only two variables significantly related to improved demand performance. As expected the regression analysis provides little indication of what explains the financial performance of telecommunication sectors in developing countries.

Though the regression analysis indicates that there is little independent impact of the three policy variables, there is some suggestion in Tables XVI and XVII that there may be some impact of the interaction of policies and GNP, with policy liberalization having a significant effect at higher levels of national income. In fact the analysis conducted so far has ignored the possibility of the impact of, not only the interaction of policies and GNP, but also the interaction of policies and commitment and commitment and GNP.

The relationship between these three sets of interactions and the five performance variables are examined next within a hierarchical regression design. The hierarchical design enables us to assess the effect of each set of variables on the dependent variables after having controlled for the

previous set. In this design, the proportion of variance accounted for by all the independent variables (i.e., the  $R^2$  found in the preceding regression analysis) is partitioned incrementally by noting the "increment in the proportion of variance accounted for by each independent variable (or by a set of independent variables) at the point at which it is entered into a regression analysis" (Pedhazur, 1982 p. 177).

Critical in this process is the selection of the order of entry of the independent variables. In this study there are three main sets of variables and three interaction terms. The three main sets relate to: (1) the structure of economic activity, i.e., the growth rates of GNP/capita, industry, agriculture and services (GnpGro, IndGro, SerGro, AgrGro); (2) political commitment, i.e., the growth rate of governmental investment (Commit); (3) policy changes, i.e., rate of overall change of telecommunication policies (PolCha).<sup>25</sup> The three interaction terms were computed multiplicatively and comprised the interaction of: (1) policy change and commitment (PolCom = PolCha \* Commit); (2) GNP growth and commitment (GnpCom = GnpGro \* Commit); (3) Gnp growth and policy change (GnpPol = GnpGro \* PolCha).

The six variables were entered in two stages. In the first stage, the three sets of main effect variables were entered in the following order: first, the four economic variables (GnpGro, IndGro, SerGro, AgrGro); then the political

25. See Tables VI and VII, pp. 148-150.

commitment variable (Commit); third, the policy change scale (PolCha).

The selection of this order of entry was based on a number of considerations. First, the structure of national economies are, necessarily, the given environment within which policy makers have to make decisions, whether the decisions pertain to allocation of financial investment or changes in the policy structure. In other words, the level and composition of economic activity are both commitment and policy prior. The effect of the economic structure, therefore, needed to be controlled prior to examining the effect of the commitment and policy variables.

The decision to control for commitment before examining the effect of policies was based on two factors. Decisions pertaining to the relative investments in different industrial sectors are usually made at levels of government that decide on inter-sectoral priorities. Consequently, telecommunication policy makers usually find the investments allocated to the sector a given constraint within which they must make their decisions, suggesting that commitment is sector policy prior. Second, the main focus of this study is to attempt to evaluate the independent impact of changes in telecommunications policies on telecommunications outcomes. Both of these factors require that the effect of commitment be controlled before entering policy changes into the regression equation.



The second stage of building the regression equation, involved entering the interaction terms after the main effects had been determined. Whether or not an interaction term would be entered into the equation and the relative order of entry was determined statistically. The coefficients of the three interaction variables were examined while they were still not entered into the equation to determine whether they would contribute to a significant increase in  $R^2$ .

If only one of the coefficients was significant it was entered into the equation and the remaining two were again examined. If two, or all three, of the coefficients were significant at the first examination, then each was entered independent of the others into the equation. The one which resulted in the most increase in the  $R^2$  was entered in the equation and the remaining two were again examined. If none of the interaction terms was significant then none were entered. Table XX gives the results of the hierarchical regression analysis.

TABLE XX

## Hierarchical Regression of the Effect of Economic and Policy Variables on Telecommunication Performance

	TelDen		LinDen		TraDen		DemPer		FinPer	
	R <sup>2</sup>	R <sup>2</sup> C	R <sup>2</sup>	R <sup>2</sup> C	R <sup>2</sup>	R <sup>2</sup> C	R <sup>2</sup>	R <sup>2</sup> C	R <sup>2</sup>	R <sup>2</sup> C
(1)	.67	.67**	.66	.66**	.19	.19*	.10	.10	.13	.13
(2)	.83	.16*	.82	.16*	.24	.05	.25	.15*	.14	.01
(3)	.84	.01	.82	.00	.24	.00	.37	.12	.15	.02
(4)							.56	.19*		
(5)										
(6)										

Notes: N = 61; sig. \* = .05 \*\* = .01; R<sup>2</sup>C = R<sup>2</sup> Change  
 (1) = Economic Structure: GnpGro, IndGro, AgrGro SerGro  
 (2) = Political Commitment: Commit  
 (3) = Policy Liberalization: PolCha  
 (4) = Policy & Commitment Interaction: PolCom  
 (5) = GNP & Commitment Interaction: GnpCom  
 (6) = GNP & Policy Interaction: GnpPol

The results are very similar to the earlier findings. Policy liberalization provides no significant increment in the amount of variance in the dependent variables once the economic structure and commitment variables have been entered into the equation. Economic structure and commitment together explain over 80 percent of the variance in telephone and line densities, while only the set of economic structure variables explains a significant proportion of the variance in traffic densities. In line with previous analyses, no set of variables is significantly related to changes in financial performance.

Except for the demand performance variable, no interaction term was significant for any of the performance variables. In the case of demand performance, commitment and the

interaction of commitment and policies were the only two variables to account for a significant increase in the  $R^2$ .

### **Discussion**

Though the results of the bivariate analysis suggest that the liberalization of equipment, services and facilities policies lead to higher telephone and line densities and that the liberalization of facilities policies is additionally related to improved demand performance, these relationships are conditioned by the level of national income. In the case of equipment and services the liberalization of policies is associated with high telephone and line densities only for countries with high incomes.

In theory, liberalization of equipment manufacture and procurement practices should provide telecommunication entities access to improved switching and transmission capabilities leading to improved densities. However, the ability to make use of advanced technology also depends on the state of the existing infrastructure and its ability to absorb and incorporate the new technology. Low and middle income countries usually have more backward facilities than high income countries and cannot, therefore, translate liberalized equipment policies into network expansion.

For instance, in 1986 the Ivory Coast installed four electronic exchanges in Abidjan (procured through International Competitive Bidding) with 25% higher capacity than the existing cross-bar exchanges. However, due to the poor state of transmission facilities, these exchanges have not been able to operate at full capacity (Cowhey, 1991).

Liberalization of facilities is the one policy development that is associated with improvements in line and telephone densities as well demand performance for both middle and high income countries. A major reason for this is that increases in urban densities and reduction of outstanding demand in urban areas appear to go hand-in-hand with liberalization of facilities policies. A fuller treatment of why such liberalization is associated with differential performance in urban and rural areas is dealt with in the next chapter.

However, the results of the regression analysis show that when we examine the entire sample and include economic and commitment variables in the model, the three policy liberalization variables have no independent impact on four of the five performance variables, the only exception being demand performance. There is nothing in the literature which explains the relationship between the interaction of policy liberalization and commitment with lower outstanding demand for telephone service. It appears probable that, as in the case of telephone and line densities, this

relationship may be accounted for by improvements in urban areas, as discussed in the next chapter.

Clearly, the most significant finding is the importance of government commitment to improved sector performance.

Increasing levels of government investment are particularly important for telecommunication expansion because of the relatively high capital requirements (Chapius, 1975) and high capital-output ratios (Huntly, 1967) that characterize the sector.

Traditionally, sectors with such characteristics, for example power, have tended to attract private investment mainly in distribution or re-distribution activities and rarely in infrastructural activities. This accentuates the saliency of government investment for sector growth.

Unlike liberalization of policies, increases in the proportion of governmental investment in the sector is associated with higher telephone and line densities at all levels of national income. Clearly, if developing countries are seeking to rapidly expand basic services, then the solution appears to lie more in stepping-up governmental commitment to the sector, reflected in the growth of governmental investment in telecommunications, than in the neoclassical panacea of privatization and the operation of factor forces. Indeed, governmental commitment remains an important predictor of network expansion even after

accounting for the growth of GNP/capita, industry and services.

In keeping with the findings of previous research the growth of national income is an important predictor of network expansion, as is the growth of the share of industry in the GNP. As the results of several input-output analyses discussed earlier suggest, at their present state of economic development, developing countries find the most use for telecommunications in their industrial sector.

Examination of output coefficients of telecommunications reveals that most of the final demand for telecommunications comes from manufacturing. Hence, as the share of industry grows, there is often a corresponding growth in telecommunications.

What is unexpected is the lack of a relationship between service sector growth and telecommunications. In developed countries, growth of telecommunications has been associated with the growth of the service sector as the sector becomes increasingly characterized as consisting of information related activities (Nora and Minc, 1978). Katz (1988), Jussawala (1982) and others have surmised that the growth of the service sector in developing countries would also be associated with growth in telecommunications. But this does not appear to have happened.

One reason for the lack of this relationship may be the very different nature of the service sector in developing countries. In developed countries a large part of the growth of the service sector has been accounted for by the growth of information related activities that require improved telecommunications. In developing countries, on the other hand, a large part of the service sector is still accounted for by non-information related activities (e.g., domestic workers) that do not require telecommunication facilities.

## Chapter 10

## POLICIES, COMMITMENT AND DISTRIBUTION

This chapter presents the findings of the same step-by-step analysis for the five distribution variables. Table XXI presents the correlations between policies and distribution. Two sets of findings are fairly dramatic.

TABLE XXI

Policies and Distribution  
(Correlation Coefficients)

	UrbDen	RurDen	ResDen	PubAcc	AvgPri
EqCha	.23*	-.21*	.11	.11	.22*
FacCha	.61**	-.21*	.21*	.18*	.62**
SerCha	.32*	-.20*	.19*	.19*	.59**
Commit	.33*	.36*	.27*	.24*	.03

N = 61; sig. \* = .05 \*\* = .01

First, changes in facilities, services and equipment policies are highly correlated with average price. Increased liberalization of policies appears to lead to higher prices for basic residential service. The second is the difference in the direction of the relationships between



policy liberalization and urban and rural densities. While increases in liberalization are positively associated with higher urban densities, they are negatively associated with rural densities.

In contrast to policy changes, increases in commitment appears to improve both rural and urban densities.

Government investment in the sector, it appears, is related to a more balanced expansion of the telecommunications. At the same time it is not related to average price, i.e., increasing Commitment is not associated with higher prices for basic residential service.

TABLE XXII

Economic Development and Distribution  
(Correlation Coefficients)

	UrbDen	RurDen	ResDen	PubAcc	AvgPri
GnpCap	.67**	.51**	.29*	.21*	.32*
PerAgr	-.44**	.32*	-.26*	-.18	-.60**
PerInd	.46**	.36*	.29*	.22*	.51**
PerSer	.19	.11	.17	.13	.19

N = sig. \* = .05 \*\* = .01

Table XXII presents the bivariate relationship between the economic variables and distribution. Again we notice that growth of services is not significantly associated with any

of the variables. Also noteworthy are the reverse relationships for agriculture and industry. Indeed agricultural growth is the only economic variable related to lower average prices. Both GNP and industrial growth are related to higher average price.

Tables XXIII through XXVI present the bivariate relationships between policies, commitment and the five distribution variables at different levels of national income. Looking first at Tables XXIII, XXIV and XXV we notice that liberalization of policies is significantly related to high prices at all levels of income, with the coefficients being slightly higher for low income countries. This suggests that the adverse effect of liberalization on prices may be exacerbated as the level of income declines. This is also true for urban line densities.

The negative relationship between liberalization of policies and rural densities noticed in Table XXI is now seen to hold only for low income countries. These relationships are particularly true of facilities and services and slightly less so for equipment policies.

TABLE XXIII

Facility Policy Change and Distribution  
(correlation coefficients  
at different levels of GNP/capita)

	Low	Middle	High
UrbDen	.31*	.25*	.29*
RurDen	-.19*	-.13	.03
ResDen	-.03	.05	.07
PubAcc	.09	.10	.24*
AvgPri	.41**	.37**	.31**

N = 63 sig. \* = .05 \*\* = .01

TABLE XXIV

Equipment Policy Change and Distribution  
(correlation coefficients  
at different levels of GNP/capita)

	Low	Middle	High
UrbDen	.19	.21*	.24*
RurDen	-.21*	-.11	.01
ResDen	-.07	.03	.05
PubAcc	.05	.09	.16
AvgPri	.22*	.19*	.17

N = 63; sig. \* = .05 \*\* = .01

TABLE XXV

Service Policy Change and Distribution  
(correlation coefficients  
at different levels of GNP/capita)

	Low	Middle	High
UrbDen	.23*	.27*	.34*
RurDen	-.22*	-.11	.01
ResDen	-.19*	-.07	.05
PubAcc	-.07	.09	.23*
AvgPri	.27*	.21*	.32*

N = 63; sig. \* = .05 \*\* = .01

TABLE XXVI

Commitment and Distribution  
(correlation coefficients  
at different levels of GNP/capita)

	Low	Middle	High
UrbDen	.21*	.24*	.30*
RurDen	.17	.23*	.27*
ResDen	.12	.19	.15
PubAcc	.03	.05	.22*
AvgPri	.02	.09	.04

N = 63; sig. \* = .05 \*\* = .01

The relationship between Commitment and distribution is also conditioned by the level of income, but less significantly

than for the policy variables (Table XXVI). The relationships between urban and rural densities and commitment remain significant at all income levels. More importantly, it is apparent that low income countries benefit more than middle and high income countries as far as improvements in rural densities are concerned.

Table XXVII presents the results of the regression analysis for the five distribution variables. The most striking fact is that almost the entire variance in average price is accounted for by the three policy variables. That is, liberalization trends in all three policy areas are important determinants of increased price. While policy liberalization is associated with a worsening of the economic conditions of access to telecommunications, commitment is associated with significant improvements in access and availability.

TABLE XXVII

Regression Estimates of the Effects of Economic and Policy Variables on Telecommunication Distribution

	GnpGro	IndGr	SerGro	AgrGro	EqCh	FacCh	SerCh	Com	R <sup>2</sup>
Urb	.52*	.23*	.09	-.08	.07	.12	.09	.23*	.77**
Rur	.56*	.16	.02	.17	-.03	-.16	-.07	.21*	.71**
Res	.31*	.06	.05	-.03	.04	.11	.08	.25*	.39**
Pub	.34*	.05	.07	.02	.09	.10	.07	.23*	.29*
Avg	.16	.12	.09	.04	.21*	.28*	.24*	.09	.65**

Notes: standardized regression coefficients;

N = 61; sig. \* = .05 \*\* = .01

Table XXVIII presents the results of the hierarchical regression of the five distribution variables on the three main sets of independent variables and the three interaction terms.

TABLE XXVIII

Hierarchical Regression of the Effect of Economic and Policy Variables on Telecommunication Distribution

	UrbDen		RurDen		ResDen		PubAcc		AvgPri	
	R <sup>2</sup>	R <sup>2</sup> C	R <sup>2</sup>	R <sup>2</sup> C	R <sup>2</sup>	R <sup>2</sup> C	R <sup>2</sup>	R <sup>2</sup> C	R <sup>2</sup>	R <sup>2</sup> C
(1)	.69	.67**	.54	.54**	.21	.21*	.22	.22*	.33	.33*
(2)	.86	.17*	.82	.28*	.39	.18*	.38	.16*	.34	.01
(3)	.87	.01	.84	.02	.49	.10	.39	.01	.65	.21*
(4)										
(5)							.58	.19*		
(6)									.83	.18*

Notes: N = 61; sig. \* = .05 \*\* = .01; R<sup>2</sup>C = R<sup>2</sup> Change  
 (1) = Economic Structure: GnpGro, IndGro, AgrGro SerGro  
 (2) = Political Commitment: Commit  
 (3) = Policy Liberalization: PolCha  
 (4) = Policy & Commitment Interaction: PolCom  
 (5) = GNP & Commitment Interaction: GnpCom  
 (6) = GNP & Policy Interaction: GnpPol

Again we notice that the policy scale variable adds little additional predictive power to the regression equations except for the case of average price. In the case of average price the policy scale alone adds 21 percent to the predictive power of a model which contains the economic structure and commitment variables, and the interaction of policy liberalization and GNP growth contributes another 18 percent.

Contradistiguishingly, the commitment variable contributes to significant increases in R<sup>2</sup> for all the distribution variables except the average price of basic telephone service. In addition, the interaction of commitment and GNP

growth adds contributes to a significant increase in the growth of public access.

### **Discussion**

The most obvious reason for the strong and consistent relationship between policy liberalization and higher prices of basic residential service seems to be the increased emphasis on commercial norms that is introduced through privatization and competition. There appear three main ways through which this happens.

First, through the movement toward setting prices as close to cost as possible that is usually part of the liberalization process. This tends to eliminate the subsidies that are commonly in place for basic residential service and consequently tends to push up prices. In 1977, Argentina ranked 25th among the countries in this study in terms of the price of basic residential service. In 1985, the Argentine Government privatized the state owned telecommunications company, ENTEL, by permitting a Spanish telecommunications company to buy a majority share in the enterprise. At the same time, it introduced a competitive element by allowing the few small existing private networks to expand without prior government approval. Perhaps, more importantly, it also deregulated telephone prices.



Both ENTEL and its smaller companies removed the traditional subsidies for rural and residential service in order to lower long-distance and international rates and capture the lucrative market of business subscribers. By 1988 Argentina had the highest price of basic residential service of all the countries in this study.

Second, in a number of countries where sector policy liberalization involves the separation of urban and rural services, enterprises are able to take advantage of the outstanding demand for telephone service in urban areas by raising prices. In India, for instance, the establishment of a separate public sector corporation for Bombay and Delhi resulted in marked increases in telephone prices compared to the rest of the country.

Finally, as Saunders, et. al. (1983) point out, there could also be hidden costs incurred in sector liberalization in developing countries including inefficiencies associated with the loss of economies of scale through network fragmentation. It is quite probable that part of these costs are passed onto consumers.

Moreover, the significance of the GnpPol interaction variable suggests that the deleterious effects of policy liberalization on average price are compounded for countries with higher growth rates of national income. It is probable that these countries are already experiencing relatively

high inflation rates (since higher growth and higher inflation usually go hand-in-hand) and the effect of liberalization is correspondingly compounded.

Of equal concern is the opposite direction of the relationships between liberalization and rural and urban densities. There are three main ways in which facilities liberalization can translate into improvements in network expansion in urban areas at the cost of rural areas.

First, through the break-up of national monopolies into regional monopolies within the public sector. This enables those regional entities servicing urban areas to concentrate on network expansion and the reduction of outstanding demand without having to worry about transferring financial or technical resources to the more difficult to expand in rural areas. In India, for instance, the establishment of a separate public sector corporation for Bombay and Delhi resulted in marked increases in telephone densities in both cities.

Second, liberalized sectors are more sensitive to demand than traditional public sector monopolies. Though there is a large unmet demand for telephone service in many developing countries, this unmet demand is concentrated almost entirely in urban areas. Moreover, the demand for service is much more price inelastic in rural areas than in urban areas. Therefore, following these market signals,

liberalized sectors tend to concentrate on expanding urban facilities to the neglect of rural areas.

Third, it is probable that many services, particularly in rural areas may fail to attract private capital or suppliers. Liberalized sectors may be reluctant to invest in rural areas because sunk costs are high and returns low. For instance, in 12 World Bank financed projects in the 1980s, the average cost of installing an additional telephone line in urban areas was about US\$ 1,200; in rural areas the cost was about US\$ 4,000.

Thus Walsham (1979) suggests that the expansion of rural service is dependent on either direct government subsidies or financing from out of the financial surpluses generated from urban subscribers and long distance services. Walsham (1979) used data from three Latin American counties to simulate the possibility of generating extra revenue from urban services through price increases and using it to subsidize rural services. The results of the simulation showed that from 1978 to 1987 the extra revenue from urban services would be more than the projected loss from lower than cost prices for rural services. Also, by 1987, rural densities would be 30 percent higher than would have been without the increased cross-subsidy and without any adverse impact on the increase in urban densities.

Developing countries, it seems, need to be particularly concerned about the impact of liberalization especially if keeping prices down and increasing rural penetration are national priorities. Nor is liberalization associated with higher residential densities or conditions of public access.

In contrast, the growth rate of government investment is positively related to expansion of the basic network in both rural and urban areas as well as improvements in residential penetration and public access. The increase in densities of public call offices is important because PCO facilities are generally the least expensive way to provide wide telephone access to the most people. Furthermore, as Saunders, et. al. (1983) point out, the high market clearing prices charged in the short-run for subscriber's telephones may prohibit their acquisition by small businesses, agricultural establishments and residences who have occasional or even frequent use of telephones. Public telephones provide a means through which these entities can satisfy their needs.

However, PCOs in developing countries are loss making facilities, with the cost of installing and maintaining them, particularly in rural areas, far exceeding the revenues collected from their use. Here again expansion of the service depends upon direct government investments or cross subsidies. Liberalization tends to reduce the possibility of either. Not surprisingly, therefore, growth

of government commitment is related to higher PCO densities while policy liberalization is not.

Finally, the significance of the interaction of Gnp growth and commitment for increasing PCO densities suggests that increasing governmental investment in telecommunications leads to improved conditions of public access more so in countries that have experienced higher growth rates of national income. This is probably because on the one hand (as Saunders, et. al., 1983 point out) demand for PCOs and PCO use in general varies directly with the level of national income and, on the other hand, increasing levels of government commitment result in the ability to satisfy that demand. Consequently, countries with high growths of income and commitment perform relatively better on this measure.

## Chapter 11

### CLASSIFICATION SCHEME

As discussed in Chapter 5, the objective of the classification scheme was to attempt to construct a typology of countries based on their economic and policy characteristics. The eight independent variables, viz., growth rates of GNP/capita, growth rates of the share of industry, services and agriculture, growth rate of commitment and changes in facilities, services and equipment policies, were used to build the groups.

The classification scheme was constructed using a cluster analysis procedure. Cluster analysis examines similarities among countries rather than variables. Numerous cluster algorithms exist (Everitt, 1982; Lorr, 1985). Rather than select a single clustering algorithm, a two-step procedure was used. First, Ward's (1963) hierarchical clustering method was used to form clusters. Ward's procedure combines cases into clusters so as to minimize the total within cluster variance (i.e., the error sum of squares). "At each step in the analysis, union of every possible pair of clusters is considered and the two clusters whose fusion results in the minimum increase in the error sum of squares is combined" (Everitt, 1982, p. 31).

In the second step, the clusters obtained using Ward's method served as starting points for an iterative reallocation clustering. This procedure moves cases from cluster to cluster until a goodness-of-fit criterion, in this case the error sum of squares, is optimized.

This two-stage analysis has several advantages. First, the use of iterative partitioning overcomes a limitation of hierarchical algorithms, namely, that a case cannot be reassigned to a different and more suitable cluster at a late stage in the analysis (Fleishman, 1986). Second, using the results of the hierarchical clustering as input to the iterative algorithm avoids the drawback of forming a starting configuration of clusters on an arbitrary basis. A poor starting configuration can result in a local, rather than a global, minimum of the goodness-of-fit criterion. Making the starting configuration less arbitrary reduces the likelihood of a misleading result (Milligan, 1980).

Two criteria were used for determining the optimal solution for the final number of clusters or groups. The first criterion used was the increment in the dissimilarity of clusters merged at each step in the procedure. When the dissimilarity of the merged clusters increases sharply in magnitude, relative to the dissimilarity of clusters merged at prior steps, then a stopping point for the hierarchical fusion process is indicated (Lorr, 1983).

In the present analysis, the distances between least dissimilar clusters for the 10 through 2 cluster solutions were as follows:

10 cluster = 13.94  
9 cluster = 14.32  
8 cluster = 15.06  
7 cluster = 17.58  
6 cluster = 19.27  
5 cluster = 20.81  
4 cluster = 27.53  
3 cluster = 39.27  
2 cluster = 52.05.

The dissimilarity begins to rise sharply at four clusters suggesting a five cluster solution.

The second criterion for determining the number of clusters was proposed by Mojena (1977). Mojena standardizes the distance coefficients between clusters that were merged at each step in the hierarchical process. Results of Mojena's Monte Carlo study suggest that standardized scores in the range of 2.75 and 3.50 can be used to decide when to terminate hierarchical fusion. In the present analysis, a five cluster solution has a standardized score of 3.19 whereas a four cluster solution has a score of 4.09, indicating a five cluster solution. Thus, both criteria, the increment in the distance coefficient and Mojena's standardized coefficient, indicate a five cluster solution.



The ensuing grouping of countries from the cluster analysis are presented in Table XXIX. Table XXX presents summary statistics of group characteristics for the clustering variables.

TABLE XXIX  
Group Membership

Group1	Group2	Group3	Group4	Group5
Benin	Bolivia	Algeria	Brazil	Argentina
Burkina Faso	Botswana	Chile	Hongkong	Kuwait
Burundi	Colombia	Costa Rica	Israel	Oman
Cameroon	El Salvador	Ecuador	Singapore	UAE
Cent Af Rep	Ghana	Malaysia	T and T	Uruguay
Chad	Honduras	Mexico	Venezuela	
Egypt	Mauritius	Panama	Saudi Arabia	
Ethiopia	Morocco	Peru		
Guatemala	Nigeria	South Korea		
India	PNG	Syria		
Indonesia	Paraguay	Tunisia		
Kenya	Philippines			
Lesotho	Senegal			
Madagascar	Thailand			
Mauritania	Uganda			
Mozambique	Zambia			
Nepal	Zimbabwe			
Niger				
Pakistan				
Rwanda				
Sri Lanka				
Sudan				
Tanzania				
Togo				
Zaire				

TABLE XXX

## Group Characteristics

Group	GnpCap	PAgr	PInd	PSer	EqCha	FacCha	SerCha	Com
1 (N=27)	263 (120)	40 (16)	21 (11)	39 (09)	2.1 (1.6)	1.9 (1.7)	2.1 (1.6)	1.9 (1.1)
2 (N=15)	530 (132)	29 (10)	28 (09)	44 (05)	3.0 (1.8)	2.7 (1.7)	2.6 (1.7)	1.8 (1.7)
3 (N=11)	993 (153)	18 (07)	31 (10)	51 (12)	3.5 (1.6)	3.3 (1.7)	3.3 (1.9)	2.1 (1.9)
4 (N=7)	2,917 (1,460)	05 (04)	45 (24)	50 (22)	3.7 (0.9)	3.1 (1.3)	3.4 (1.0)	3.0 (0.7)
5 (N=5)	6,546 (2,227)	09 (06)	39 (06)	52 (11)	4.0 (1.6)	4.0 (1.7)	4.1 (1.5)	2.6 (0.9)

The five groups present distinct patterns and systematic differences. Clearly the five groups are distinguished straight away by their level of per capita GNP. Groups 1 and 2 are both low income groups, Group 3 is a middle income group and Groups 4 and 5 are high income groups. Groups 1 and 2 are distinguished from each other by the relatively higher levels of industrialization and lower levels of agriculture in Group 2. More importantly, the countries in Group 2 have markedly more liberalized policies than those in Group 1, but both groups have similar levels of commitment.

Group 3 countries have a fairly high proportion of GNP accounted for by services, have relatively liberalized

policies and relatively medium levels of commitment. Group 5 is distinguished from Group 4 by having more liberalized policies. However, government commitment to the growth of telecommunications and the composition of economic activity are very similar, though Group 5 countries do have higher national incomes.

The important question as far as the usefulness of the classification scheme was whether group membership could predict differences in telecommunication performance and distribution. Tables XXXI presents descriptive statistics for the performance variables by group.

TABLE XXXI

Group Membership and Performance  
(means and s.d.)

	TelDen	LinDen	TraDen	DemPer	FinPer
Group 1	1.56 (0.60)	1.41 (0.47)	1,602 (980)	35.11 (23.26)	-18.39 (12.36)
Group 2	2.09 (1.86)	1.44 (1.41)	1,825 (1,052)	43.84 (26.09)	17.44 (13.67)
Group 3	7.95 (5.67)	5.75 (4.60)	2,311 (2,769)	50.12 (79.48)	-232.59 (195.09)
Group 4	18.33 (17.31)	13.04 (12.42)	3,236 (1,443)	48.34 (45.34)	101.78 (93.25)
Group 5	17.34 (7.20)	15.64 (9.44)	3,114 (1,479)	32.63 (17.33)	130.69 (88.24)

The first thing to notice that there appear to be no systematic or significant differences among the groups as far as demand performance and financial performance are concerned and only slight differences in traffic densities. With respect to telephone and line densities, Groups 1 and 2 differ from each other only slightly, as is the case between Groups 4 and 5. Differences between the groups are seen in two leaps. First, Group 3 countries perform better on all three variables than countries in Groups 1 and 2. In the second leap, Group 4 and 5 countries have considerably higher densities than those in Group 3.

While the descriptive statistics seem to indicate that there are systematic differences between the groups on some of the performance variables, two additional analyses are performed to determine, first whether the groups are significant predictors of variance in the dependent variables and second, which of the groups are significantly different from each other on each of the variables.

Table XXXII presents the results of the regression analysis of the five performance variables on the four vectors representing the five groups coded for inclusion in the model. The vectors were created through a process of *effect coding* so named because "the regression coefficients yielded by its use reflect the effects of the treatments of the analysis" (Pedhazur, 1982, p. 289). In this procedure four vectors were generated (number of groups minus one) and in

each vector, members of one group are assigned 1s; all others are assigned 0s except for the members of a selected group (in this case Group3) which are always assigned -1s. The regression coefficients represents the deviation of the group mean with which it is associated from the overall mean, i.e., it represents the effect of that particular group membership.<sup>26</sup>

TABLE XXXII

Regression Estimates of the Effects of  
Group Membership on Telecommunication Performance

	Group1	Group2	Group4	Group5	R <sup>2</sup>
TelDen	-.66**	-.47**	.61**	.28**	.49**
LinDen	-.69**	-.52**	.43**	.58**	.53**
TraDen	-.22	-.12	.04	.06	.13
DemPer	-.09	.09	.03	-.25	.06
FinPer	.01	.02	.10	.12	.05

Notes: standardized regression coefficients;  
N = 61; sig. \* = .05 \*\* = .01

In keeping with the descriptive analysis we see that group membership accounts for a significant amount of variance only in telephone and line densities: 49% and 53% respectively. The coefficients also reflect the findings of the descriptive analysis: Groups 1 and 2 have significantly lower group means than the overall sample mean while Groups

26. For a complete treatment of categorical regression analysis, the coding of vectors and interpretation of coefficients, see Pedhazur (1982) Chapter 9, pp. 271-333.

4 and 5 have significantly higher means for both variables. There are no significant differences between the groups for traffic densities, demand performance and financial performance.

While the significant of the  $F$  ratio for the  $R^2$  of the regression of line and telephone densities on group membership leads to rejection of the null hypothesis that there is no relation between group membership and the extent of telephone and line densities, the analysis does not tell us which of the groups are significantly different from each other. Table XXXIII presents the results of the Scheffe's test for multiple comparisons of means. Scheffe's test performs comparisons between every combination of groups, is applicable to situations where group sizes are unequal and is also the most conservative test of multiple comparisons of means (Pedhazur, 1982, p. 296).

TABLE XXXIII

Multiple Comparisons of Group Means for  
Telecommunication Performance Variables  
(Scheffe's Test)

	Significantly Different Groups					
TelDen	1 & 3	1 & 4	1 & 5	2 & 4	2 & 5	3 & 5
LinDen	1 & 4	2 & 4	1 & 5	2 & 5	3 & 5	
TraDen	no significantly different groups					
DemPer	no significantly different groups					
FinPer	no significantly different groups					

Notes: Significant at the .05 level

As the regression analysis has already indicated, there are no significant differences between the groups for demand and financial performance or traffic densities. There are six pairs of differences for telephone density and five for line density. In the case of both variables, the low GNP groups, 1 and 2, are significantly different from both the high GNP groups, 4 and 5 and the middle income group, 3, is significantly different from the highest income group, 5. In addition, in the case of telephone density, Group1 is significantly different from Group3. The differences are clearly related to the income levels of the groups and not to the extent of policy liberalization, the other main differentiating characteristic of the classification scheme.

Tables XXXIV through XXXVI present the same three step analysis (descriptive statistics, regression analysis and multiple comparisons of means) for the five distribution variables.

TABLE XXXIV

Group Membership and Distribution  
(means and s.d.)

	UrbDen	RurDen	ResDen	PubAcc	AvgPrice
Group 1	2.44 (2.60)	1.02 (1.23)	51 (12)	2,852 (1,076)	2.25 (2.00)
Group 2	3.19 (1.17)	0.54 (0.19)	49 (17)	1,247 (916)	3.13 (2.78)
Group 3	6.45 (4.79)	3.00 (1.25)	51 (20)	4,101 (3,333)	4.41 (3.63)
Group 4	17.30 (14.08)	13.24 (11.23)	69 (13)	22,022 (7,565)	6.22 (5.59)
Group 5	25.82 (9.81)	10.09 (9.34)	68 (5)	14,409 (12,101)	7.85 (7.81)

Looking first at Groups 1 and 2, we notice that Group 1 countries have higher rural densities, more public call offices and lower average prices for basic residential service. Though Group 2 countries do have higher urban densities, the gap between rural and urban densities in these countries is also higher than the gap for Group 1 countries.



As in the case of the performance variables, there are marked improvements in distributional variables from Group 2 to Group 3 and Group 3 to Group 4. But comparing Groups 4 and 5 we notice similar patterns of differences as those between Groups 1 and 2. Group 4 countries have higher rural densities, conditions of public access and lower prices. The difference between rural and urban densities is also lower in Group 4 countries than in Group 5 countries.

TABLE XXXV

Regression Estimates of the Effects of  
Group Membership on Telecommunication Distribution

	Group1	Group2	Group4	Group5	R <sup>2</sup>
UrbDen	-.68**	-.50**	.57**	.44**	.52**
RurDen	-.59**	-.48**	.52**	.43**	.66**
ResDen	-.22	-.13	.21	.16	.16
PubAcc	-.25*	-.36*	.31*	.25*	.27*
AvgPri	-.66**	-.33	.27*	.43**	.61**

Notes: standardized regression coefficients;  
N = 61; sig. \* = .05 \*\* = .01

In contrast to the performance variables, group membership explains a significant amount of the variance in four of the five distribution variables, the only exception being residential density. Moreover, almost all pairs of group means were significantly different from each other for the four variables. The following pairs were significant for all four variables and, for the sake of brevity, are

reported here rather than in Table XXXVI

Groups: 1 & 3; 1 & 4; 1 & 5; 2 & 4; 2 & 5; 3 & 5.

These groups are those that are differentiated on the basis of national income.

TABLE XXXVI

Multiple Comparisons of Group Means for  
Telecommunication Distribution Variables  
(Scheffe's Test)

	Significantly Different Groups			
UrbDen	2 & 3	3 & 4	4 & 5	
RurDen	1 & 2	2 & 3	3 & 4	4 & 5
ResDen	no significantly different groups			
PubAcc	1 & 2	2 & 3	3 & 4	4 & 5
AvgPri	1 & 2	2 & 3	4 & 5	

Notes: Significant at the .05 level

Without doubt, differences between Groups 2 and 3 and Groups 3 and 4 are related to differences in national income. But, unlike the situation with the performance variables, the significant differences between Groups 1 and 2 and Groups 4 and 5 provide evidence of the importance of the extent of liberalization in distinguishing between the groups with respect to the distribution variables.

## Discussion

The five groups constructed through the cluster analysis present distinctive patterns. Most obviously they are differentiated on the basis of national income. But while GNP differentiates Groups 1 and 2 from 3 and 3 from 4 and 5, it does not differentiate between Groups 1 and 2 or between 4 and 5. Nor are there significant differences between these pairs of groups in terms of the composition of economic activity or the level of government commitment to telecommunications. The critical difference between these groups relates to the extent of liberalization of their telecommunication policies with Group 2 and Group 5 countries having more liberalized policies than Groups 1 and 4 respectively.

The classification scheme predicts differences in telecommunication performance only moderately well. While the five groups together account for a significant amount of the variance in telephone and line densities, they do not do so for traffic densities, demand performance or financial performance. In keeping with the findings in Chapter 9, differences relating to the telephone and line densities are clearly related to national income. As GNP/capita increases from Group 1 to Group 5 so does the extent of the telephone network. However, there are only very slight differences between Groups 1 and 2 and Groups 4 and 5 with respect to

performance. This suggests that policy liberalization has very little impact on improving performance when we compare groups of countries that are similar in terms of national income.

In contrast, policy liberalization does have significant adverse effects on access to and availability of telecommunication service, particularly with respect to rural densities, public access and average price of basic residential service. Groups 2 and 5, which have more liberalized policies than Groups 1 and 4 do not fare as well as the latter on these distribution measures. In short, while policy liberalization is not associated with significant differences in performance between different groups of countries, it is associated with adverse conditions of access and availability of services. Overall, the classification scheme is more useful for predicting differences related to telecommunications distribution than performance, accounting for significant differences with respect to four out of the five variables.

## Chapter 12

### CONCLUSIONS

This study has been motivated by the fact that profound changes are affecting the telecommunications sector in developing countries, fueled by technological changes coupled with the emergence of world markets. These changes are affecting the developed and developing countries alike. There appears to be widespread agreement that the provision of adequate telecommunications services is now central to the economic success of developmental efforts the world over. The successes or mistakes that are made in telecommunication policy and, through it, telecommunications structure and organization, may affect the growth of national economies.

However, telecommunications policies, in most countries, are rarely analyzed in terms of their impact on sector performance. And in no case has there been a study of the impact of sector policies on telecommunication distribution. The experiences of developed countries suggest that liberalization, injection of competition and governance of market forces may be the best prescriptions for restructuring telecommunications. But there is little evidence to suggest that these solutions are equally

applicable to developing countries. Nevertheless governments all over the developing world are revamping their telecommunication policies with the purpose of injecting some degree of liberalization in telecommunication sectors.

Dallas Smythe once wrote "Governments always, everywhere, intervene in the actions of their populations. The immediately relevant question lies in the answers their policies and actions give to the question: for whose benefit are they intervening?" (1986, p. 21 ) The findings of this study suggest that the liberalization of telecommunication policies in developing countries leads to a systematic worsening of conditions of access and availability of telephone service with little corresponding gains in improved sector performance. If there are gains to be had from sector restructuring they may be realizable only under conditions of relatively high economic growth and in countries with predominantly industrial economies. Perhaps more importantly, this study found clear evidence that government commitment (as reflected in increasing government investment) to stepping up the growth of the sector is the most important single factor in improving both performance and distribution at all levels of development and under all economic conditions.

There is, therefore, clear indication that if sector growth and development are important priorities for governments than attention should be turned more toward stepping-up investments rather than sector restructuring. If sector liberalization is to be considered, then perhaps it may be effective only after certain levels of development have been achieved.

These findings are in keeping with an emerging body of literature which suggests that equitable development of many sectors in the developing world, including health and education, has been fostered mainly through the commitment of governments to sector growth and expansion. Many countries that have relied on market mechanism to foster growth have performed indifferently with respect to growth and worse still in terms of equitable growth (Sen, 1990).

Part of this problem arises from the fact that in developing countries, the market mechanism is inadequate for generating and equitably distributing a number of goods and services, particularly those that economists describe as public goods.<sup>27</sup> Telecommunications, characterized by network externalities and the fact that use of the service does not exclude the use of it by another person, is, in many ways, a quintessential public good. Subjecting it to imperfect

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27. Not to say that markets are any more equitable in developed countries, only that many more of the imperfections that vitiate market efficiencies are present in developing countries.

markets could prevent any possibility of equitable access to telecommunications in the majority of developing countries.

This is not to suggest that sector liberalization in developing countries is associated with poor distribution efforts because of some intrinsic and irremediable characteristics of private competition. The experience of developed countries like Finland suggests that open competition can be a powerful mechanism for raising resources, expanding the reach of basic service and lowering prices (Nulty and Schneidewind, 1989). But a major reason for the success of the Finnish policy reform initiative was the strong regulatory control and oversight exercised over competing entities by the government. Similarly in France, as well as in the U.K. and the Netherlands, sector liberalization has required the establishment of strong regulatory bodies to oversee the competitive environment.

A significant problem in developing countries is the lack of strong regulatory mechanisms to exercise control and oversight over the newly liberalized sectors. Noll (1986) suggests that the ability of governments to regulate telecommunication providers depends partly on "the resources governments officials allocate to monitoring performance of supply organizations" (p. 46). The required "resources" being not only financial, but also in terms of the expertise of the regulators.



Most developing countries have virtually no experience with regulating telecommunications sectors and hence, whatever regulatory mechanisms that are set up in the wake of liberalization are usually woefully inadequate. As Stern (1989) points out, in many countries ministries and other agencies are not staffed to deal with regulatory issues. They often lack the interdisciplinary expertise to analyze complex issues like tariff practices under different conditions of supply and demand. In fact, in many countries, it is difficult to determine where lies the responsibility for sector regulation. Liberalization in the absence of strong regulatory mechanisms can adversely effect both sector performance and distribution through a number of ways.

Roger Noll (1986) in his analysis of the liberalization of telecommunication sectors in developed countries argues that as the separation of suppliers from political control increases, the industry becomes more difficult to regulate because of the magnitude of the informational and enforcement problems. In developing countries this can take on two dimensions.

On the one hand, if the monopoly provider is privatized or granted some form of significant autonomy without the introduction of competition, the increased autonomy can lead to greater exploitation of monopoly power. In this case, the purposes of reform -- efficiency, growth, affordability

-- may be vitiated. For instance the privatization of the telecommunication monopoly in the Ivory Coast, through its sale to a French multinational (without the introduction of competitive pressures) resulted in the doubling of the price of basic residential service in the two years from 1988 to 1990, without any corresponding lowering of the price of business service or any additional tax revenues flowing to governments coffers.

On the other hand, if unrestrained competition is permitted, either (a) the dominant telecommunications entity may destroy the competition by abusing its dominant market position and its control over key bottlenecks (so that the first situation cited above is recreated) or (b) competitors may succeed in selecting only highly profitable customers, so that the main telecommunication entity retains the loss makers. This situation will lead to uneven development, undermine economies of scale available in an integrated system, and prevent growth of a nationwide infrastructure. The Philippines, for instance, has had telecommunication services provided by multiple suppliers for a number of years. Growth of the country's telephone network over the period reviewed has been considerably slow and services have been largely concentrated in a few urban areas.<sup>28</sup>

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28. Recently, a high level commission has been set up to formulate a plan to restructure the sector, improve sector regulation and overcome these shortfalls.

It appears that liberalization, in the first instance, can lead to a situation in which the reformed telecommunications entity can defeat the very purpose of the reforms that created it and, in the second instance, a telecommunication system that relies solely on private competitive firms may tend to be both inadequate overall and too unevenly distributed to meet the needs of the country as a whole.

Efforts to improve sector performance through liberalization can often lead to difficulties in striking a balance between considerations of commercial efficiency and social equity. Nulty and Schneidewind (1989) argue that in order to respond to growing technical and economic pressures governments:

"give their telecommunication systems greater autonomy and commercial orientation. But important national, social and economic interests will be jeopardized by the move to more commercial modes of providing telecommunications services" (p. 30).

In the traditional organization of telecommunications systems, these contradictions were reconciled directly within the single political body that both operated the telecommunications system and made social, national and economic policy: the government. But in the separation of telecommunications from government control and in the absence of effective regulatory bodies, the mechanisms through which the balance between equity and efficiency were maintained are sundered.

States thus play a two-fold role in the development of telecommunications in developing countries. On the one hand they, are the prime sources of finances for investment in telecommunications. The extent of governmental commitment to the sector is the main predictor of the extent of sector expansion. In the second instance, governments provide the only existing effective domain within which competing interests can be reconciled and goals of balanced sector growth and equitable access and availability of services can be maintained.

This study has attempted to evaluate the impact of telecommunication policies with an emphasis on the process of privatization and the introduction of competition that is underway in a number of developing countries. While much of the research attention has been focussed on the changes in the telecommunications sector in developed countries, this study has shown that a slow, quiet, but significant revolution in telecommunications policies is taking place in much of the developing world.

Virtually all reforms being considered by governments involve reduction in the monopoly control of the traditional telecommunications entity and some increase in the influence of market forces over operations and investments in the sector. The reasons behind these changes are manifold. It is believed that liberalization can overcome chronic deficiencies in investments in the sector, cope with the

unmet demand for basic services, meet the needs of large users and expand the reach of the basic network. In short, liberalization is perceived to be the panacea for the many performance ills that plague the telecommunications sector in developing countries.

But, as the findings of this study show, liberalization of telecommunications have not been associated with significant improvements in telecommunications performance in the decade under review. As the global economy becomes increasingly integrated developing countries are looking increasingly for new ways to effectively participate in the global electronic marketplace. Telecommunications are now seen as electronic commodities essential to the expansion of national economies (Aronson and Cowhey, 1988). If this perception of the vital importance of telecommunications is to be translated into significant sector improvements, then liberalization may not be the solution. Instead, as already discussed, increased government investment may be the most effective means for significantly improving sector performance.

While the focus of policy reform has been on improving commercial efficiency and sector performance, it must not be forgotten that telecommunications are important public goods with powerful consequences for the process of development. Distributional consequences are, therefore, an important component of policy evaluation. The negative impact of policy liberalization on the conditions of access to, and

availability of services, could have grave consequences for national development plans and programs. Inability to access or afford services may result in the systematic deprivation of the potential to increase their capabilities (and, consequently, the conditions of their lives) for large sections of the populations of developing countries.

However, it must be acknowledged that the actual or real consequences of these distributional outcomes are not directly examined in this study. Micro-level studies are required before we can determine with any degree of certainty what the relative consequences of the availability -- or non-availability -- of telecommunication services are for the enhancement of capabilities and, by extension, the role of telecommunications in the development process. Along with this micro-level analysis, the other major area of research not examined in this study, is the process of telecommunication policy evolution. How are international and domestic pressures and development translated into specific national telecommunication policies and how do specific telecommunication outcomes affect the process of national development. Studies in these two areas will greatly enhance our understanding of telecommunications developments in the Third World.

The contribution of this study has been add to our knowledge on the critical middle ground between these two areas: the impact of telecommunications policies on telecommunication

outcomes. It is hoped that its findings will provide evidence that will help in the evaluation of the policies that developing countries have pursued in the recent past -- the impact of liberalization and government commitment on performance and distribution. And, on the basis of this evaluation, also provide guidance to policy-makers in these countries in selecting between the options available to them for reforming their telecommunication sectors in the context of their national economies and overall developmental objectives.

**Appendix I****COUNTRIES INCLUDED IN THE STUDY**

ALGERIA	MALAYSIA
ARGENTINA	MALI
BANGLADESH	MAURITANIA
BENIN	MAURITIUS
BOLIVIA	MEXICO
BOTSWANA	MOROCCO
BRAZIL	MOZAMBIQUE
BURKINA FASO	NEPAL
BURUNDI	NIGER
CAMEROON	NIGERIA
CENT AFRICAN REP	OMAN
CHAD	PAKISTAN
CHILE	PANAMA
COLOMBIA	PAPUA NEW GUINEA
COSTA RICA	PARAGUAY
DOMINICAN REP	PERU
ECUADOR	PHILIPPINES
EGYPT	RWANDA
EL SALVADOR	SAUDI ARABIA
ETHIOPIA	SENEGAL
GABON	SIERRA LEONE
GHANA	SINGAPORE
GUATEMALA	SOMALIA
GUINEA	SOUTH KOREA
HAITI	SRI LANKA
HONDURAS	SUDAN
HONG KONG	SYRIA
INDIA	TANZANIA
INDONESIA	THAILAND
ISRAEL	TOGO
IVORY COAST	TRINIDAD AND TOBAGO
JAMAICA	TUNISIA
JORDAN	TURKEY
KENYA	UAE
KUWAIT	UGANDA
LESOTHO	URUGUAY
LIBERIA	VENEZUELA
LIBYA	YEMEN
MADAGASCAR	ZAIRE
MALAWI	ZAMBIA
	ZIMBABWE



## Appendix II

### PROCEDURE FOR CALCULATION OF AVERAGE PRICE

The average annual price of basic residential service was calculated through the following formula:

$$P_t = (R_t / R_s) (e^{-2,t}) (P_p)$$

where:

- $P_t$  = average annual price of basic residential service for year t in international dollars;
- $R_t$  = total average annual revenue from basic residential service for year t;
- $R_s$  = total number of basic residential subscribers for year t;
- $(e^{-2,t})$  = Atlas conversion factor for converting price in domestic currencies to U.S.\$ for year t;
- $P_p$  = international comparisons project's purchasing power parity conversion factor.

Where  $(e^{-2,t})$  is calculated as follows:

$$(e^{-2,t}) = 1/3 [ e_{t-2} (P_t/P_{t-2}) / (P\$t/P\$t-2) + e_{t-1} (P_t/P_{t-1}) / (P_t/P_{t-1}) (P\$t/P\$t-1) + e_t ]$$

where:

- $e_t$  = annual average exchange rate (local currency/U.S.\$) for year t;
- $P_t$  = GNP deflator for year t for GNP measured in the local currency;
- $P\$t$  = U.S. GNP deflator for year t.

### Appendix III

#### CODING SCHEME FOR TELECOMMUNICATION POLICY VARIABLES

<b><i>Equipment Manufacturing Policy Characteristics</i></b> (permissible industry structure)	<b>Score</b>
Public Sector Monopoly	1
Autonomous Public Sector Monopoly	2
Public Sector Duopoly	3
Public Sector Oligopoly	4
Mixed Public- Private- Duopoly	5
Mixed Public- Private- Oligopoly	6
Private Monopoly	7
Private Oligopoly	8
Open Domestic Competition	9
Open Competition with Multinational Participation	10

<b><i>Equipment Procurement Policy Characteristics</i></b> (permissible suppliers)	<b>Score</b>
Single Public Sector Supplier	1
Multiple Public Sector Suppliers	2
Mixed Public- Private- Suppliers	3
Multiple Private Domestic Suppliers	4
Multiple Private International Suppliers	5

The two measures were combined into a single 10 point scale. Cronbach's alpha for the scale was .78 and it measured a single factor with eigenvalue of 1.64. To test whether or not the scale could be assumed to be a continuous measure, correlations between it and other variables were computed using different scores with different distances. Differences in the coefficients were minor, indicating that the scale could be considered a continuous measure. Similar

tests were carried out for the facilities policy and services policy scales. Both of them could also be treated as continuous measures.

<b>Facilities Policy Characteristics</b>	<b>Score</b>
Government Department	1
Government Board or Office	2
State of Parastatal Enterprise	3
Public Sector Monopoly	4
Public Sector Oligopoly	5
Mixed Public- Private- Ownership Monopoly	6
Private Sector Monopoly	7
Private Sector Oligopoly	8
Open Domestic Competition	9
Open Competition with Multinational Participation	10

<b>Services Policy Characteristics</b>	<b>Score</b>
Public Sector PTT Monopoly	1
Public Sector Telecommunications Monopoly	2
Public Sector Oligopoly	3
Public Sector Monopoly with Dedicated Private Networks	4
Public Sector Monopoly with Third Party Resale	5
Mixed Public- Private- Oligopoly	6
Private Sector Monopoly	7
Private Sector Oligopoly	8
Open Domestic Competition	9
Open Competition with Multinational Participation	10

## Appendix IV

## PERFORMANCE VARIABLES 1977

COUNTRY	TelDen77	LinDen77	TraDen77	DemPer77	FinPer77
ALGERIA	1.75	1.01	1986.66	34.59	-15.95
ARGENTINA	9.01	6.51	2200.35	41.25	41.19
BANGLADESH	.	.	.	.	.
BENIN	.46	.22	1292.61	8.80	-10.30
BOLIVIA	2.41	2.08	11.36	87.88	47.51
BOTSWANA	1.34	.79	2369.45	24.02	18.79
BRAZIL	4.01	2.58	2002.00	163.13	5.15
BURKINA FASO	.13	.07	2000.00	25.53	9.43
BURUNDI	.08	.13	1517.37	57.74	4.82
CAMEROON	.41	.27	1419.06	2.24	9.77
CENT AFRICAN REP	.29	.10	1581.82	37.66	8.99
CHAD	.15	.06	1750.00	38.38	56.61
CHILE	4.41	3.07	2240.00	45.54	93.17
COLOMBIA	5.82	3.81	1318.07	51.71	-7.51
COSTA RICA	7.60	5.06	3606.03	3.20	43.25
DOMINICAN REP	.	.	.	.	.
ECUADOR	3.03	2.53	1637.84	152.43	-4.04
EGYPT	1.25	.96	1682.32	14.98	18.67
EL SALVADOR	1.85	.48	2833.35	15.50	46.23
ETHIOPIA	.25	.19	1446.41	91.26	18.15
GABON	.	.	.	.	.
GHANA	.30	.32	1906.16	94.50	28.90
GUATEMALA	1.80	1.60	1124.98	5.30	88.77
GUINEA	.	.	.	.	.
HAITI	.	.	.	.	.
HONDURAS	.65	.61	1992.94	.85	13.60
HONG KONG	27.80	21.09	1106.43	.43	66.76
INDIA	.33	.26	90.58	10.88	26.35
INDONESIA	.26	.18	1663.90	20.21	47.52
ISRAEL	27.22	19.06	4460.64	25.51	84.67
IVORY COAST	.	.	.	.	.
JAMAICA	.	.	.	.	.
JORDAN	.	.	.	.	.
KENYA	.90	.43	1482.37	34.18	31.24
KUWAIT	14.09	10.36	.	292.11	71.43
LESOTHO	.75	.25	.	59.03	75.91
LIBERIA	.	.	.	.	.
LIBYA	.	.	.	.	.
MADAGASCAR	.40	.19	2271.06	1.40	82.58
MALAWI	.	.	.	.	.
MALAYSIA	2.89	1.75	.33	.51	43.25
MALI	.	.	.	.	.

COUNTRY	TelDen77	LinDen77	TraDen77	DemPer77	FinPer77
MAURITANIA	.14	.14	1471.00	118.34	4.58
MAURITIUS	3.23	1.97	2401.13	70.62	-3.44
MEXICO	5.86	3.28	4168.51	10.54	-92.02
MOROCCO	1.50	.74	.	.	-1.62
MOZAMBIQUE	.45	.29	3257.80	49.21	-18.68
NEPAL	.09	.06	39.53	329.66	-7.25
NIGER	.14	.10	53.88	8.51	-20.75
NIGERIA	.26	.16	4869.62	8.25	-36.24
OMAN	1.63	1.20	2708.33	43.85	-55.48
PAKISTAN	.70	.32	338.72	77.81	-2.26
PANAMA	8.43	6.15	4251.13	7.86	30.36
PAPUA NEW GUINEA	1.30	.63	2066.85	7.07	13.56
PARAGUAY	1.54	1.26	2795.16	.	-21.68
PERU	2.46	1.63	3007.86	38.58	.14
PHILIPPINES	1.27	.82	26.31	16.15	31.56
RWANDA	.09	.06	3560.00	39.24	5.72
SAUDI ARABIA	1.24	.20	2954.25	159.03	-35.84
SENEGAL	.56	.24	4700.13	33.26	8.69
SIERRA LEONE	.	.	.	.	.
SINGAPORE	19.79	14.03	5131.43	.84	20.07
SOMALIA	.	.	.	.	.
SOUTH KOREA	5.49	4.27	.	12.80	-121.33
SRI LANKA	.48	.32	4939.68	45.14	71.25
SUDAN	.31	.26	61.84	31.36	9.54
SYRIA	2.71	1.94	2331.13	182.12	6.24
TANZANIA	.45	.23	1664.02	29.37	-62.27
THAILAND	.88	.60	2593.87	14.94	45.23
TOGO	.42	.21	180.00	51.60	5.52
TRINIDAD & TOBAGO	6.65	4.04	1858.11	212.18	-40.59
TUNISIA	2.44	1.33	1755.73	32.62	82.53
TURKEY	.	.	.	.	.
UAE	17.76	11.76	244.12	21.15	-89.93
UGANDA	.41	.18	6138.10	76.67	.
URUGUAY	9.24	6.97	2479.70	19.31	26.91
VENEZUELA	4.70	4.57	1974.07	.06	7.10
YEMEN	.	.	.	.	.
ZAIRE	.12	.98	1.24	.87	-1.04
ZAMBIA	1.06	.55	2425.53	42.06	13.00
ZIMBABWE	2.87	1.29	1926.91	9.51	5.79

Notes: For measurement of variables see text.

## Appendix V

## PERFORMANCE VARIABLES 1988

COUNTRY	TelDen88	LinDen88	TraDen88	DemPer88	FinPer88
ALGERIA	3.46	2.43	4236.89	71.02	-90.61
ARGENTINA	10.18	9.08	3115.07	39.00	-145.00
BANGLADESH	.	.	.	.	.
BENIN	.35	.29	5825.46	15.53	-74.55
BOLIVIA	2.64	2.30	14.38	27.11	-21.56
BOTSWANA	1.78	.91	8279.60	37.08	-8.29
BRAZIL	8.44	5.02	2708.52	26.57	1.20
BURKINA FASO	.20	.11	169.17	28.98	5.22
BURUNDI	.16	.13	343.24	65.22	-13.35
CAMEROON	.44	.28	5719.34	2.22	-28.02
CENT AFRICAN REP	.24	.09	3757.31	43.80	-.01
CHAD	.07	.04	672.32	13.18	-10.58
CHILE	6.22	4.36	8399.71	40.94	44.76
COLOMBIA	7.22	5.67	820.61	31.37	-9.23
COSTA RICA	12.72	7.95	5823.88	1.51	43.41
DOMINICAN REP	.	.	.	.	.
ECUADOR	3.48	3.03	684.82	184.42	-3.63
EGYPT	2.78	2.14	430.42	6.83	-18.96
EL SALVADOR	2.58	1.91	3016.56	11.71	42.93
ETHIOPIA	.03	.22	115.88	65.06	-8.47
GABON	.	.	.	.	.
GHANA	.52	.27	10319.19	72.87	-61.49
GUATEMALA	1.47	1.24	216.06	10.41	83.55
GUINEA	.	.	.	.	.
HAITI	.	.	.	.	.
HONDURAS	1.04	28.46	.75	.	12.93
HONG KONG	43.18	32.36	2714.45	.11	32.88
INDIA	.50	.39	85.63	30.84	26.80
INDONESIA	.38	.27	814.40	35.75	10.91
ISRAEL	3.98	29.84	3127.60	8.23	2.59
IVORY COAST	.	.	.	.	.
JAMAICA	.	.	.	.	.
JORDAN	.	.	.	.	.
KENYA	1.30	.58	109.79	37.47	4.69
KUWAIT	15.50	11.81	600.11	1.70	-173.80
LESOTHO	.81	.43	9589.70	51.28	-.10
LIBERIA	.	.	.	.	.
LIBYA	.	.	.	.	.
MADAGASCAR	.40	.22	1225.56	3.46	-1.52
MALAWI	.56	.27	305.82	19.24	-8.75
MALAYSIA	8.17	6.17	840.12	12.26	-11.44
MALI	.	.	.	.	.

COUNTRY	TelDen88	LinDen88	TraDen88	DemPer88	FinPer88
MAURITANIA	.25	.20	282.98	6.81	4.58
MAURITIUS	5.87	3.63	3316.58	62.51	-3.44
MEXICO	9.10	4.56	948.02	19.81	-92.02
MOROCCO	1.36	1.05	251.71	69.17	-1.62
MOZAMBIQUE	.42	.27	1800.94	69.75	-18.68
NEPAL	1.26	1.15	87.53	194.92	-7.25
NIGER	.16	.11	117.18	44.13	-20.75
NIGERIA	.24	.18	73.32	7.88	-36.24
OMAN	5.31	4.25	141.86	15.80	-55.48
PAKISTAN	.59	.49	235.44	70.61	-2.26
PANAMA	10.08	7.68	5018.84	10.52	30.36
PAPUA NEW GUINEA	.71	.80	1925.35	5.01	13.56
PARAGUAY	2.32	2.03	2463.48	.48	-21.68
PERU	2.90	2.12	4531.45	46.41	.14
PHILIPPINES	1.37	.80	45.70	36.19	31.56
RWANDA	.14	.08	1978.14	45.00	5.72
SAUDI ARABIA	.88	7.73	3515.47	24.54	-35.84
SENEGAL	.82	.35	94.73	32.99	8.69
SIERRA LEONE	.	.	.	.	.
SINGAPORE	4.29	31.94	3933.65	.01	20.07
SOMALIA	.	.	.	.	.
SOUTH KOREA	22.11	18.24	3251.94	2.09	-121.33
SRI LANKA	.75	.55	3866.83	11.66	71.25
SUDAN	.33	.24	55.17	37.92	9.54
SYRIA	5.49	3.92	8667.08	243.69	6.24
TANZANIA	.47	.22	186.39	122.51	-62.27
THAILAND	1.83	1.61	188.07	32.71	45.23
TOGO	.44	.26	2196.56	25.21	5.52
TRINIDAD & TOBAGO	9.08	5.03	189.81	239.14	-40.59
TUNISIA	3.73	2.78	5027.70	46.16	82.53
TURKEY	7.85	5.17	1034.86	76.10	.
UAE	23.87	15.46	654.41	.96	-89.93
UGANDA	.34	.15	51.98	81.76	.
URUGUAY	12.87	9.90	2271.36	21.06	26.91
VENEZUELA	8.41	7.03	3258.26	24.03	7.10
YEMEN	.	.	.	.	.
ZAIRE	.17	.12	189.52	14.11	-1.04
ZAMBIA	1.12	.61	62.92	59.15	13.00
ZIMBABWE	2.76	1.20	76.38	23.62	5.79

Notes: For measurement of variables see text.

## Appendix VI

## DISTRIBUTION VARIABLES 1977

COUNTRY	UrbDen77	RurDen77	ResDen77	PubAcc77	AvgPri77
ALGERIA	1.28	.71	48	2400	2.45
ARGENTINA	5.62	10.28	71	25031	1.34
BANGLADESH	.	.	.	.	.
BENIN	.39	.16	20	23	4.76
BOLIVIA	4.79	.92	70	1400	1.56
BOTSWANA	.	.	36	100	2.76
BRAZIL	2.75	2.32	61	171500	1.34
BURKINA FASO	.56	.03	61	50	6.29
BURUNDI	3.87	.05	50	150	5.70
CAMEROON	.55	.17	30	17	9.57
CENT AFRICAN REP	.11	.09	20	200	10.97
CHAD	.16	.04	62	175	4.75
CHILE	2.72	4.38	64	500	9.91
COLOMBIA	4.61	2.24	59	10215	8.89
COSTA RICA	8.63	2.57	73	4023	6.86
DOMINICAN REP	.	.	.	.	.
ECUADOR	4.16	1.35	64	321	3.45
EGYPT	1.13	.82	48	3121	4.01
EL SALVADOR	.73	.31	54	1432	4.95
ETHIOPIA	1.07	.07	60	720	1.78
GABON	.	.	.	.	.
GHANA	.95	.13	56	125	1.42
GUATEMALA	4.80	.99	40	325	6.20
GUINEA	.	.	.	.	.
HAITI	.	.	.	.	.
HONDURAS	1.05	.40	65	235	1.37
HONG KONG	22.26	10.54	77	5421	3.90
INDIA	.63	.16	37	3252	4.85
INDONESIA	.65	.08	62	3251	6.23
ISRAEL	19.71	14.66	75	10211	3.75
IVORY COAST	.	.	.	.	.
JAMAICA	.	.	.	.	.
JORDAN	.	.	.	.	.
KENYA	2.14	.19	40	721	1.04
KUWAIT	11.72	3.24	69	631	4.72
LESOTHO	4.38	.08	32	50	1.35
LIBERIA	.	.	.	.	.
LIBYA	.	.	.	.	.
MADAGASCAR	.70	.09	10	125	7.47
MALAWI	.	.	.	.	.
MALAYSIA	3.22	1.13	49	20186	3.09
MALI	.	.	.	.	.



COUNTRY	UrbDen77	RurDen77	ResDen77	PubAcc77	AvgPri77
MAURITANIA	.30	.10	40	125	3.67
MAURITIUS	.	.61	.	250	1.64
MEXICO	3.18	3.46	68	80125	3.56
MOROCCO	1.27	.44	40	1301	2.87
MOZAMBIQUE	2.70	.11	70	421	4.34
NEPAL	1.18	.02	37	212	2.30
NIGER	.33	.07	45	505	1.67
NIGERIA	.57	.07	50	712	1.84
OMAN	.	.	29	175	4.54
PAKISTAN	.75	.17	55	402	3.56
PANAMA	7.72	4.52	77	8271	2.94
PAPUA NEW GUINEA	2.78	.31	8	75	4.84
PARAGUAY	2.19	.69	63	675	2.83
PERU	2.02	.97	60	3012	3.47
PHILIPPINES	1.64	.40	64	3075	1.45
RWANDA	.92	.02	76	221	5.49
SAUDI ARABIA	.27	.11	7	4125	3.38
SENEGAL	.65	.11	30	160	3.27
SIERRA LEONE	.	.	.	.	.
SINGAPORE	13.46	70.13	71	17425	4.56
SOMALIA	.	.	.	.	.
SOUTH KOREA	6.27	2.34	55	140732	7.56
SRI LANKA	1.01	.11	33	415	2.43
SUDAN	.97	.08	36	345	2.45
SYRIA	2.68	1.28	70	212	1.86
TANZANIA	1.10	.14	71	210	1.61
THAILAND	2.55	.28	45	13212	4.54
TOGO	1.01	.07	50	111	3.56
TRINIDAD & TOBAGO	13.45	1.53	77	431	6.40
TUNISIA	1.92	.79	40	1031	3.65
TURKEY	.	.	.	.	.
UAE	.	.	78	9432	3.45
UGANDA	1.22	.06	20	165	2.84
URUGUAY	5.87	12.29	64	2443	4.47
VENEZUELA	4.17	6.17	63	21291	3.54
YEMEN	.	.	.	.	.
ZAIRE	1.46	.73	40	190	1.53
ZAMBIA	.80	.43	46	343	3.69
ZIMBABWE	3.67	.69	67	621	4.34

Notes: For measurement of variables see text.

## Appendix VII

## DISTRIBUTION VARIABLES 1988

COUNTRY	UrbDen88	RurDen88	ResDen88	PubAcc88	AvgPri88
ALGERIA	3.98	1.22	52	3900	5.23
ARGENTINA	8.34	13.62	75	28209	10.43
BANGLADESH	.	.	.	721	6.56
BENIN	.31	.28	24	100	2.23
BOLIVIA	2.94	1.66	78	2700	2.45
BOTSWANA	2.82	.37	38	167	4.57
BRAZIL	4.69	6.02	71	211500	7.12
BURKINA FASO	.78	.05	58	100	2.45
BURUNDI	1.11	.06	55	300	1.56
CAMEROON	.31	.26	35	17	1.21
CENT AFRICAN REP	.08	.10	26	300	3.69
CHAD	.10	.02	62	672	2.26
CHILE	4.36	4.36	70	12618	10.25
COLOMBIA	5.92	5.13	21	30334	5.26
COSTA RICA	12.02	4.63	77	8507	3.14
DOMINICAN REP	.	.	.	1880	7.29
ECUADOR	3.49	2.36	70	668	5.46
EGYPT	2.32	1.98	72	4281	3.28
EL SALVADOR	2.65	1.33	61	2826	3.25
ETHIOPIA	1.06	.10	68	1013	1.85
GABON	.	.	.	291	2.49
GHANA	.57	.13	45	250	1.87
GUATEMALA	2.45	.65	70	212	4.26
GUINEA	.	.	.	670	4.24
HAITI	.	.	.	500	2.28
HONDURAS	1.34	.83	67	468	3.64
HONG KONG	31.66	41.60	73	12421	8.29
INDIA	.78	.24	40	10987	2.24
INDONESIA	.70	.12	70	5774	4.36
ISRAEL	28.53	43.10	78	14581	3.14
IVORY COAST	.	.	.	211	9.90
JAMAICA	.	.	.	1037	2.89
JORDAN	.	.	.	284	6.14
KENYA	1.79	.24	43	982	5.28
KUWAIT	12.06	7.09	65	1270	7.16
LESOTHO	1.59	.16	40	100	2.15
LIBERIA	.	.	.	.	.
LIBYA	.	.	.	451	4.24
MADAGASCAR	.58	.10	18	290	1.28
MALAWI	1.18	.12	42	525	2.69
MALAYSIA	9.48	3.87	69	36186	7.38
MALI	.	.	.	420	1.48

COUNTRY	UrbDen88	RurDen88	ResDen88	PubAcc88	AvgPri88
MAURITANIA	.26	.15	40	250	5.67
MAURITIUS	5.27	2.44	66	400	2.49
MEXICO	4.50	4.72	59	110370	7.65
MOROCCO	1.41	.73	50	3040	2.48
MOZAMBIQUE	.68	.14	74	982	1.14
NEPAL	8.94	.38	42	687	2.16
NIGER	.26	.08	50	621	4.86
NIGERIA	.35	.09	46	1089	2.49
OMAN	36.16	.71	40	366	6.79
PAKISTAN	1.06	.23	44	525	7.58
PANAMA	9.25	5.84	76	12273	4.14
PAPUA NEW GUINEA	4.55	.14	10	100	9.49
PARAGUAY	2.69	1.46	67	983	4.78
PERU	2.52	1.23	67	4450	8.68
PHILIPPINES	1.46	.34	62	4725	7.79
RWANDA	.71	.03	39	521	5.92
SAUDI ARABIA	8.24	6.12	79	6281	6.56
SENEGAL	.63	.18	37	260	5.49
SIERRA LEONE	.	.	.	.	.
SINGAPORE	31.94	31.94	73	25450	9.38
SOMALIA	.	.	.	400	2.93
SOUTH KOREA	17.71	19.41	80	160732	7.49
SRI LANKA	1.98	.18	34	520	7.95
SUDAN	.74	.11	41	594	2.46
SYRIA	4.23	3.60	77	503	2.89
TANZANIA	.37	.16	85	784	1.54
THAILAND	4.99	.71	62	20636	5.79
TOGO	.74	.11	55	241	7.25
TRINIDAD & TOBAGO	5.63	3.81	73	691	8.49
TUNISIA	3.45	1.99	50	2038	3.31
TURKEY	7.69	2.92	59	29692	6.02
UAE	18.03	6.32	69	12573	6.30
UGANDA	1.04	.05	24	334	2.54
URUGUAY	8.74	16.50	77	4543	6.76
VENEZUELA	6.18	11.17	70	30291	9.49
YEMEN	.	.	.	.	.
ZAIRE	.17	.10	43	320	1.28
ZAMBIA	.56	.68	52	414	3.46
ZIMBABWE	2.44	.74	85	989	6.85

Notes: For measurement of variables see text.

## Appendix VIII

## POLICY AND INVESTMENT VARIABLES 1977

COUNTRY	EqPol77	FacPol77	SerPol77	Invest77
ALGERIA	2	1	1	1.21
ARGENTINA	2	2	2	1.41
BANGLADESH	.	.	.	.
BENIN	5	1	2	3.85
BOLIVIA	2	1	1	2.62
BOTSWANA	1	1	1	3.76
BRAZIL	2	1	1	4.01
BURKINA FASO	3	1	1	3.93
BURUNDI	2	2	2	2.51
CAMEROON	2	1	1	1.76
CENT AFRICAN REP	2	1	1	.23
CHAD	2	1	1	1.21
CHILE	2	1	1	.87
COLOMBIA	5	1	2	1.05
COSTA RICA	2	1	1	4.23
DOMINICAN REP	.	.	.	.
ECUADOR	3	1	1	2.20
EGYPT	2	1	1	3.31
EL SALVADOR	2	1	3	2.60
ETHIOPIA	1	1	1	1.39
GABON	.	.	.	.
GHANA	1	1	1	1.22
GUATEMALA	1	2	4	6.46
GUINEA	.	.	.	.
HAITI	.	.	.	.
HONDURAS	1	1	1	5.96
HONG KONG	8	9	7	1.47
INDIA	2	1	1	1.85
INDONESIA	4	2	1	2.46
ISRAEL	5	1	1	1.73
IVORY COAST	.	.	.	.
JAMAICA	.	.	.	.
JORDAN	.	.	.	.
KENYA	1	4	3	2.59
KUWAIT	4	4	2	2.32
LESOTHO	1	1	1	3.58
LIBERIA	.	.	.	.
LIBYA	.	.	.	.
MADAGASCAR	1	1	1	2.38
MALAWI	.	.	.	.
MALAYSIA	4	2	2	4.41
MALI	.	.	.	.

COUNTRY	EqPol77	FacPol77	SerPol77	Invest77
MAURITANIA	2	2	2	3.06
MAURITIUS	3	2	1	1.28
MEXICO	4	1	2	2.05
MOROCCO	3	1	1	2.37
MOZAMBIQUE	2	1	1	.81
NEPAL	3	1	1	4.64
NIGER	3	2	2	1.14
NIGERIA	2	2	2	3.46
OMAN	2	2	2	4.61
PAKISTAN	3	2	2	1.53
PANAMA	2	2	2	1.06
PAPUA NEW GUINEA	4	3	3	2.37
PARAGUAY	2	2	2	2.78
PERU	4	3	3	2.17
PHILIPPINES	3	2	2	1.13
RWANDA	2	2	4	1.99
SAUDI ARABIA	4	1	1	3.04
SENEGAL	3	3	3	1.87
SIERRA LEONE	.	.	.	.
SINGAPORE	4	1	4	6.35
SOMALIA	.	.	.	.
SOUTH KOREA	3	2	2	6.56
SRI LANKA	2	2	2	2.28
SUDAN	3	2	2	2.02
SYRIA	2	1	1	2.70
TANZANIA	2	1	1	3.65
THAILAND	3	1	2	1.26
TOGO	2	2	2	3.44
TRINIDAD AND TOBAGO	3	3	4	1.78
TUNISIA	4	2	3	4.20
TURKEY	.	.	.	.
UAE	5	5	5	3.66
UGANDA	3	1	2	.47
URUGUAY	2	1	1	5.48
VENEZUELA	2	3	3	2.55
YEMEN	.	.	.	.
ZAIRE	2	1	1	.11
ZAMBIA	2	2	3	2.83
ZIMBABWE	2	3	3	3.41

Notes: For measurement of variables see text and Appendix III

## Appendix IX

## POLICY AND INVESTMENT VARIABLES 1987

COUNTRY	EqPol87	FacPol87	SerPol87	Invest87
ALGERIA	7	4	5	5.64
ARGENTINA	10	8	10	7.87
BANGLADESH	1	1	8	.
BENIN	5	1	2	6.84
BOLIVIA	3	2	1	6.83
BOTSWANA	2	2	3	6.20
BRAZIL	5	4	5	9.59
BURKINA FASO	3	1	1	5.97
BURUNDI	2	2	2	5.83
CAMEROON	2	1	1	5.69
CENT AFRICAN REP	2	1	1	5.88
CHAD	2	1	1	6.91
CHILE	10	5	10	6.50
COLOMBIA	3	2	2	6.72
COSTA RICA	4	1	2	8.73
DOMINICAN REP	3	10	6	.
ECUADOR	6	1	4	6.88
EGYPT	2	1	1	8.89
EL SALVADOR	2	1	3	7.60
ETHIOPIA	1	1	1	5.98
GABON	5	6	3	.
GHANA	1	1	1	5.95
GUATEMALA	3	9	5	8.35
GUINEA	2	7	9	.
HAITI	2	2	3	.
HONDURAS	2	1	2	9.79
HONG KONG	10	10	7	10.53
INDIA	5	2	5	5.92
INDONESIA	8	4	2	8.92
ISRAEL	7	1	1	9.81
IVORY COAST	7	10	8	.
JAMAICA	3	1	3	.
JORDAN	7	5	5	.
KENYA	8	8	7	5.70
KUWAIT	8	8	5	10.94
LESOTHO	2	1	2	5.65
LIBERIA	.	.	.	.
LIBYA	5	1	1	.
MADAGASCAR	2	2	1	7.98
MALAWI	2	1	1	.
MALAYSIA	6	7	8	8.92
MALI	4	2	2	.

COUNTRY	EqPol87	FacPol87	SerPol87	Invest87
MAURITANIA	1	2	5	6.99
MAURITIUS	3	2	1	6.81
MEXICO	8	6	6	8.68
MOROCCO	3	1	1	7.78
MOZAMBIQUE	1	2	1	4.92
NEPAL	3	1	1	6.56
NIGER	3	10	3	6.69
NIGERIA	2	2	2	8.63
OMAN	6	3	3	11.59
PAKISTAN	7	2	5	5.87
PANAMA	4	3	3	4.37
PAPUA NEW GUINEA	8	10	9	7.66
PARAGUAY	4	2	3	5.24
PERU	8	5	7	6.73
PHILIPPINES	6	9	10	5.71
RWANDA	2	2	4	4.34
SAUDI ARABIA	7	2	2	8.56
SENEGAL	7	7	7	5.97
SIERRA LEONE	.	.	.	.
SINGAPORE	10	1	8	12.91
SOMALIA	3	2	1	.
SOUTH KOREA	7	2	6	9.78
SRI LANKA	6	5	8	5.87
SUDAN	3	2	2	4.58
SYRIA	2	1	1	7.56
TANZANIA	2	1	1	6.98
THAILAND	3	5	5	7.83
TOGO	3	6	6	6.80
TRINIDAD AND TOBAGO	8	8	4	6.37
TUNISIA	4	2	3	10.57
TURKEY	6	5	6	.
UAE	7	10	5	9.98
UGANDA	3	1	2	4.32
URUGUAY	6	6	5	8.92
VENEZUELA	7	8	5	6.88
YEMEN	.	.	.	.
ZAIRE	2	1	1	3.89
ZAMBIA	2	10	7	6.68
ZIMBABWE	5	6	5	7.89

Notes: For measurement of variables see text and Appendix III

## Appendix X

## ECONOMIC VARIABLES 1977

COUNTRY	GnpCap77	PerAgr77	PerInd77	PerSer77
ALGERIA	1100	8	57	35
ARGENTINA	1730	13	45	42
BANGLADESH	.	.	.	.
BENIN	200	38	15	47
BOLIVIA	630	17	29	54
BOTSWANA	410	0	0	0
BRAZIL	1360	12	37	51
BURKINA FASO	130	37	14	49
BURUNDI	130	64	14	22
CAMEROON	340	32	21	47
CENT AFRICAN REP	250	37	36	27
CHAD	130	52	14	34
CHILE	1160	10	29	61
COLOMBIA	720	26	29	45
COSTA RICA	1240	21	25	54
DOMINICAN REP	.	.	.	.
ECUADOR	790	20	36	44
EGYPT	320	28	30	42
EL SALVADOR	550	30	21	49
ETHIOPIA	110	52	15	33
GABON	.	.	.	.
GHANA	380	39	22	39
GUATEMALA	220	0	0	0
GUINEA	.	.	.	.
HAITI	.	.	.	.
HONDURAS	410	32	27	41
HONG KONG	2590	2	31	67
INDIA	150	37	25	38
INDONESIA	300	31	34	35
ISRAEL	2850	7	40	53
IVORY COAST	.	.	.	.
JAMAICA	.	.	.	.
JORDAN	.	.	.	.
KENYA	270	35	20	45
KUWAIT	12270	0	0	0
LESOTHO	240	30	15	55
LIBERIA	.	.	.	.
LIBYA	.	.	.	.
MADAGASCAR	240	40	19	41
MALAWI	.	.	.	.
MALAYSIA	930	26	29	45
MALI	.	.	.	.



COUNTRY	GnpCap77	PerAgr77	PerInd77	PerSer77
MAURITANIA	270	26	37	37
MAURITIUS	760	0	0	0
MEXICO	1120	10	36	54
MOROCCO	550	21	31	48
MOZAMBIQUE	150	56	12	32
NEPAL	110	68	9	23
NIGER	160	47	17	36
NIGERIA	420	34	43	33
OMAN	2540	0	0	0
PAKISTAN	190	33	23	44
PANAMA	1120	23	21	56
PAPUA NEW GUINEA	490	33	26	41
PARAGUAY	730	35	22	43
PERU	840	16	31	53
PHILIPPINES	450	29	35	46
RWANDA	130	81	7	12
SAUDI ARABIA	6040	1	83	16
SENEGAL	420	28	24	48
SIERRA LEONE	.	.	.	.
SINGAPORE	2880	2	35	63
SOMALIA	.	.	.	.
SOUTH KOREA	820	27	35	38
SRI LANKA	200	39	21	40
SUDAN	290	58	15	27
SYRIA	910	17	14	69
TANZANIA	190	45	16	39
THAILAND	420	27	29	44
TOGO	300	23	31	46
TRINIDAD AND TOBAGO	2380	3	62	35
TUNISIA	860	17	32	51
TURKEY	.	.	.	.
UAE	14420	0	0	0
UGANDA	720	55	8	37
URUGUAY	1430	12	36	52
VENEZUELA	2660	6	17	77
YEMEN	.	.	.	.
ZAIRE	130	25	25	50
ZAMBIA	450	14	41	45
ZIMBABWE	500	18	35	47

Notes: For measurement of variables see text.

## Appendix XI

## ECONOMIC VARIABLES 1987

COUNTRY	GnpCap87	PerAgr87	PerInd87	PerSer87
ALGERIA	2360	13	43	44
ARGENTINA	2520	13	44	43
BANGLADESH	170	46	14	40
BENIN	390	40	13	47
BOLIVIA	570	24	27	49
BOTSWANA	1010	3	55	42
BRAZIL	2160	9	43	49
BURKINA FASO	210	39	23	38
BURUNDI	240	56	15	29
CAMEROON	1010	26	30	44
CENT AFRICAN REP	380	44	12	44
CHAD	160	47	18	35
CHILE	1510	6	38	56
COLOMBIA	1180	19	34	47
COSTA RICA	1690	18	28	54
DOMINICAN REP	720	23	34	43
ECUADOR	1120	15	36	49
EGYPT	660	21	25	54
EL SALVADOR	940	14	22	65
ETHIOPIA	100	42	17	40
GABON	2970	11	51	38
GHANA	400	49	16	34
GUATEMALA	900	33	35	32
GUINEA	430	36	32	38
HAITI	380	31	38	31
HONDURAS	860	25	21	54
HONG KONG	9220	0	30	70
INDIA	340	32	30	38
INDONESIA	440	24	36	40
ISRAEL	8650	22	43	35
IVORY COAST	770	36	25	39
JAMAICA	1070	6	42	52
JORDAN	1500	10	25	65
KENYA	370	31	20	49
KUWAIT	13400	1	51	48
LESOTHO	420	21	28	52
LIBERIA	990	37	28	35
LIBYA	5420	5	63	32
MADAGASCAR	190	41	16	43
MALAWI	170	37	18	44
MALAYSIA	1940	23	25	52
MALI	230	49	12	39

COUNTRY	GnpCap87	PerAgr87	PerInd87	PerSer87
MAURITANIA	480	38	21	41
MAURITIUS	1800	13	33	54
MEXICO	1760	9	35	56
MOROCCO	830	17	34	49
MOZAMBIQUE	100	62	20	18
NEPAL	180	56	17	27
NIGER	300	36	23	41
NIGERIA	290	34	36	29
OMAN	5000	3	43	54
PAKISTAN	350	26	24	49
PANAMA	2120	9	18	73
PAPUA NEW GUINEA	810	34	31	35
PARAGUAY	1180	30	25	46
PERU	1300	12	36	52
PHILIPPINES	630	23	34	44
RWANDA	320	38	22	40
SAUDI ARABIA	6200	8	43	49
SENEGAL	650	22	29	49
SIERRA LEONE	1270	46	12	42
SINGAPORE	9070	0	38	62
SOMALIA	170	65	9	25
SOUTH KOREA	3600	11	43	46
SRI LANKA	420	26	27	47
SUDAN	480	33	15	52
SYRIA	1680	38	16	46
TANZANIA	160	66	7	27
THAILAND	1000	17	35	48
TOGO	370	34	21	45
TRINIDAD AND TOBAGO	3350	5	31	64
TUNISIA	1230	14	32	54
TURKEY	1280	17	36	46
UAE	15770	2	54	44
UGANDA	280	72	7	20
URUGUAY	2470	11	29	60
VENEZUELA	3250	6	36	58
YEMEN	640	23	26	50
ZAIRE	170	31	34	35
ZAMBIA	290	14	43	43
ZIMBABWE	650	11	43	46

Notes: For measurement of variables see text.

## Appendix XII

## CORRELATION MATRICES

	INDGRO	SERGRO	AGRGRO	FACCHA	SERCHA	EQCHA	COMMIT
GNPGRO	.67**	.10	.19*	.22*	.28*	.32*	.22*
INDGRO		.09	-.13	.27*	.12	.21*	.16
SERGRO			.08	.05	.09	.11	.03
AGRGRO				.03	.04	.07	.04
FACCHA					.59**	.45**	.12
SERCHA						.70**	.14
EQCHA							.09

	TEL DEN	LIN DEN	TRA DEN	DEM PER	FIN PER
GNPGRO	.75**	.74**	.10	-.14	.05
INDGRO	.48**	.48**	.19	-.21	.06
SERGRO	.19	.18	.20*	-.08	.05
AGRGRO	-.45**	-.46**	-.14	.19	.03
FACCHA	.28*	.25*	.15	-.18	.13
SERCHA	.22*	.23*	.12	-.10	.09
EQCHA	.25*	.25*	.11	-.13	.17
COMMIT	.32*	.30*	.27*	-.24*	.10

	URBDEN	RURDEN	RESDEN	PUBACC	AVGPRI
GNPGRO	.67**	.51**	.29*	.21*	.32*
INDGRO	.46**	.36*	.29*	.22*	.51**
SERGRO	.19	.11	.17	.13	.19
AGRGRO	-.44**	.32**	-.26*	-.18	-.60**
FACCHA	.61**	-.21*	.21*	.18*	.62**
SERCHA	.32*	-.20	.19*	.19*	.59*
EQCHA	.23*	-.21*	.11	.11	.22*
COMMIT	.33*	.36*	.27*	.24*	.03

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