Urban and Spatial Development in Mexico

Ian Scott

A World Bank Publication

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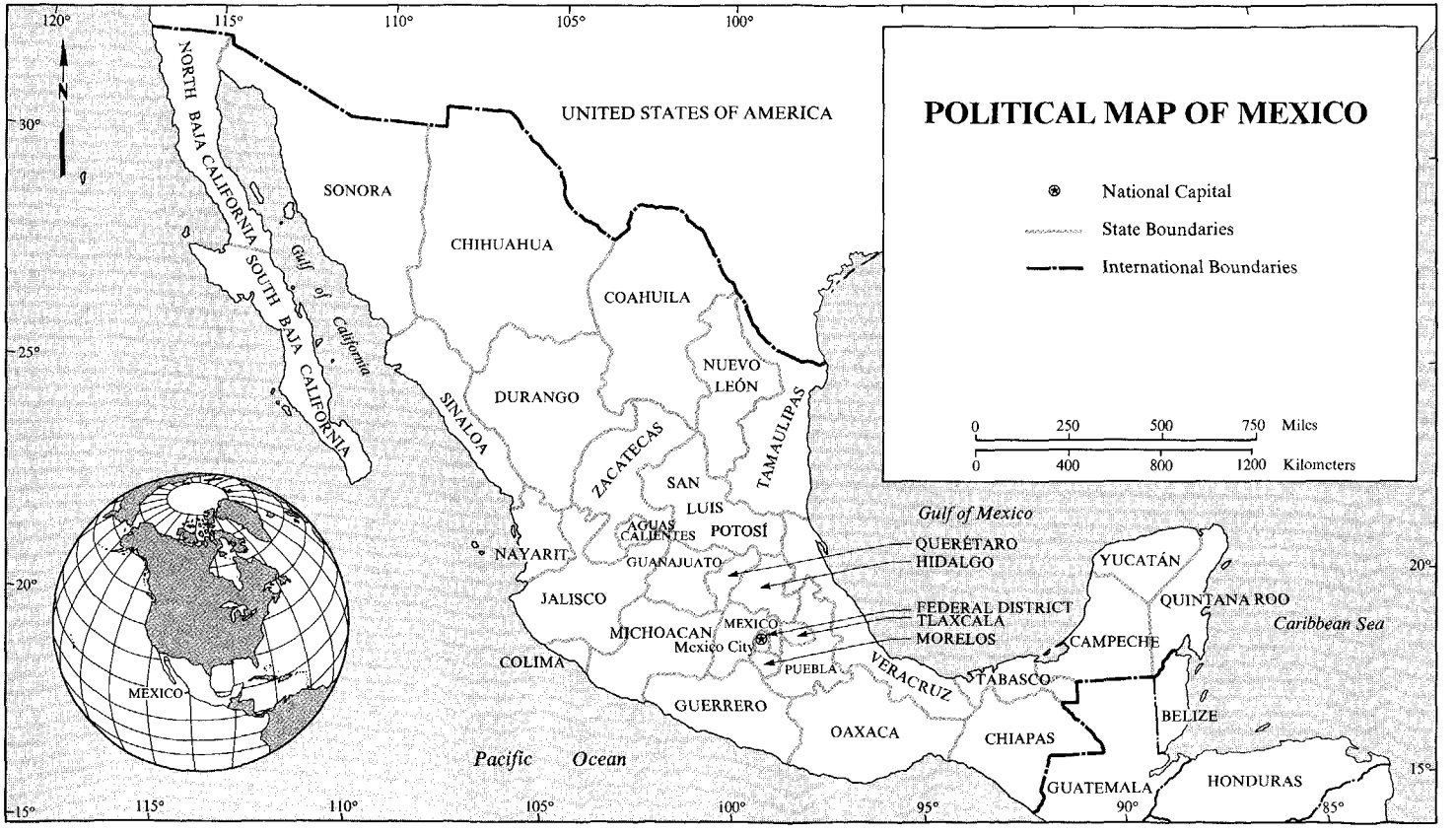
POLITICAL MAP OF MEXICO
National Capital
State Boundaries
International Boundaries
0 250 500 750 Miles
0 400 800 1200 Kilometers
UNITED STATES OF AMERICA
SONORA
CHIHUAHUA
COAHUILA
NUEVO LEÓN
DURANGO
SINALOA
ZACATECAS
SAN LUIS POTOSÍ
TAMAULIPAS
AGUAS CALIENTES
NAYARIT
GUANAJUATO
QUERÉTARO
HIDALGO
JALISCO
MICHOACAN
MEXICO
Mexico City
FEDERAL DISTRICT
TLAXCALA
MORELOS
COLIMA
PUEBLA
VERACRUZ
TABASCO
CAMPECHE
YUCATÁN
QUINTANA ROO
GUERRERO
OAXACA
CHIAPAS
BELIZE
GUATEMALA
HONDURAS
Gulf of California
NORTH BAJA CALIFORNIA
SOUTH BAJA CALIFORNIA
Gulf of Mexico
Caribbean Sea
Pacific Ocean
MEXICO
120°
115°
110°
105°
100°
95°
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Preface

IN ANY COUNTRY THE OPTIONS for national urban and spatial development must be reviewed in light of the present urban system and spatial structure. Such a review must be based on an understanding of how this system and structure have evolved; a historical approach is therefore not only useful but essential. In the belief that a realistic approach to planning for the future must be rooted in an objective assessment of the past, this book aims to interpret urban and spatial development in Mexico from the pre-industrial era into the third quarter of the twentieth century.

The most recent data sets used—for the sake of consistency and comparability—are those for 1970, and the interpretation of explicit and implicit policy does not go beyond 1975. This book does not therefore assess the urban and spatial changes of the past decade which will, in due course, be reflected in the 1980 census. Nor does it review the important changes in urban and spatial policy in Mexico that have occurred since 1976.

The book is divided into three parts, with an introductory chapter on the conceptual framework of the study. Part One describes the development of the modern urban system. The evolution of the urban system is traced up to about 1940, taking account of both structure and dynamics. The story of urban development is then carried forward to 1970, to identify and explain the underlying causes of rapid urban growth between 1940 and 1970 and to set it in the context of national economic development. Part Two describes the structure of the modern urban system. It contains an analysis of the demographic and economic contrasts within the system and of the contemporary regional structure, and it also completes the background to the discussion of policy issues that follows. Part Three discusses the issues arising from the urban and spatial structure and reviews some of the options that might be considered in formulating a future urban and spatial strategy.

This book has grown out of two reports, which were based on the findings of a World Bank mission that visited Mexico in January and February 1974. The mission was led by Douglas Keare and myself and included Roberto Cuca, Sadasumi Hara, Y. J. Hwang, and Anna Sant'Anna

of the Bank staff, together with John Friedmann of the University of California at Los Angeles (senior consultant) and Jaime Bidermann (research assistant).

My first acknowledgment must be to the many people in Mexico who provided our mission with information and statistical data and gave generously of their time. It would be impossible to mention all those who helped, but I would particularly like to thank officials at many levels in the Ministry of Finance and Public Credit, the former Ministry of the Presidency, the former Ministry of Public Works, the former Ministry of Water Resources, the Ministry of Transport and Communications, the Ministry of National Patrimony, the Bank of Mexico S.A., and Nacional Financiera, S.A. Without their hospitality and cooperation, there would have been no mission and no book.

Among those who, in various ways, have made it possible to put the book together and prepare it for publication, John Friedmann contributed significantly to the content of Chapters 1, 6 and 7, while Roberto Cuca (Chapter 4), Y. J. Hwang (Chapters 3 and 4), Anna Sant'Anna (Chapter 4), and Jaime Bidermann (Chapter 4) provided some of the substance of various parts of the text. Carlos Noble helped with research, and Virginia Baker, Margo Kirk, MaryAnn Heraud, and Anita Economides put in long hours typing different versions of the manuscript. Anthony Churchill and John Friedmann read successive drafts. To all of them I am immensely grateful.

Two other individuals played particularly important roles in helping me see the project to conclusion. One is Douglas Keare, co-leader of the original mission to Mexico and chief of the Urban and Regional Economics Division of the Bank, whose encouragement, criticism, guidance, and support over a long period can only be measured by the fact that, without him, this book would not have been completed. The second is my wife. My debt to them is immeasurable.

Virginia deHaven Hitchcock edited the manuscript for publication. Brian Svikhart directed production of the book; Marie Hergt read and corrected proofs, Raphael Blow prepared the charts, and Ralph Ward and James Silvan indexed the text. The maps were compiled by Julio Ruiz and drawn by Larry A. Bowring under the supervision of the World Bank's Cartography Division.

IAN SCOTT

Urban and Spatial Development in Mexico

CHAPTER 1

Introduction and Summary

THE EVOLUTION OF AN URBAN SYSTEM and the resulting implications are both interesting and important subjects. Yet spatial development issues have been accorded less attention by policymakers in most countries than they seem to merit. True, regional development has been given some importance in economic strategies in Europe, the United States, and elsewhere, including Mexico. But regional development programs have rarely been conceived as coherently formulated spatial policies that start by identifying issues arising from the existing spatial structure of a national economy and the underlying urban system, that go on to identify spatial development objectives and priorities, and that end by designing appropriate policy instruments. Most often, regional development schemes have been justified in regional rather than national terms, and the question of how a particular regional strategy fits into a national one is scarcely ever addressed.

In this introductory chapter the general nature of spatial processes and the policy issues arising from them are described first. Then, against that background, the main content of the study is summarized, with special emphasis on the contemporary issues of spatial policy in Mexico.

Spatial Policies and Processes

There are some countries that are so small, so compact, and so physically integrated that spatial differences in development may have no real importance as a policy issue. In nations that can support only one principal city and in which city and hinterland are highly integrated, spatial policy does not and cannot loom large because there is not, in effect, enough space to matter. But in countries such as Mexico, which have significant non-agricultural sectors and large populated areas, the spatial dimensions of national economic development will eventually become important.

Levels of policy issues

The concerns of national development policy may be related to spatial and urban development by means of a hierarchy of policy issues arranged in descending order of concreteness. National development policy represents the most encompassing, but also the most abstract, level; it emphasizes economic growth, monetary and balance-of-payments management, and employment and incomes policies.

The next level is spatial development policy, embracing both regional and urban concerns in a systemwide perspective. This emphasizes the geographic distribution of economic activities, population, income, and conditions of individual and social welfare.

The third level, regional development policy, is concerned with specific subsystems of the national economy and their unique potentialities for contributing to national economic development through the better use of their natural resources and improved links with other subsystems—as well as with their relative levels of economic welfare.

The fourth level, urban development policy, can have two interpretations. In the first, for reasons that derive from the relation between the national, spatial, regional, and urban development processes described above, urban development policy is an instrument of regional, spatial, and national development. In the second, urban development policy refers to the physical forms of cities, and is thus concerned with the internal characteristics of the urban economy, the physical arrangement of the city, the conditions of its environment, and its management.

Each level of policy is linked to the other levels through investment projects (such as a road or water system). This link emphasizes the often forgotten fact that all investments have specific locations within regions and are either in or near cities. Because of this, national economic policy, especially as regards investment, may produce seemingly capricious and often negative results at local levels and may tend to distort the spatial organization of the economy in ways that were neither intended nor desired.

Fiscal and even monetary policies may have similarly unwanted spatial effects. Local economies may respond differently to the same set of incentives or constraints, or, if they respond alike, their needs may be poorly served by the policy. A case in point would be a restriction on credit that, however rational it might seem in a national perspective, may effectively dry up the trickle of credit available to industries in medium-size cities in the periphery. This failure to take account of the spatially and sectorally differentiated nature of the national economy, as well as of the cumulative negative effects of policies applied without regard to their spatial effect, is one of the main reasons why many countries are now beginning to incor-

porate a spatial dimension into their thinking on national policy and planning.

Each of the four policy levels is also essentially cross-sectoral in nature, and they share a common basic purpose. This is a well-established fact at the level of national planning, at which different organizational arrangements have been instituted to ensure the internal consistency of projects and programs and their general conformity with the macro constraints of economic policy. But unless the spatial dimension of economic policy and planning is explicitly taken into account, the consistency that is so carefully devised at the national level tends to fall apart at the level of individual cities and regions.

Spatial disequilibrium

If the assumptions of classical economic theory were to hold, the constant search for profits and high wages would keep the spatial system in equilibrium as capital and labor shifted freely from areas of low returns to areas of high returns. But except in highly integrated industrial and postindustrial economies, the facts tend to contradict the theory. Self-reinforcing growth at one or only a few central locations tends to aggravate existing disequilibrium among regions and cities; countervailing trends, if they appear at all, tend to be relatively weak.

These dynamics provide the underlying explanation not only of differences in urban growth but also of differences in regional growth. In the early stages of development, cumulative advantages accrue to regions that already have the greatest comparative advantages (Hirschman 1958). These advantages derive from agglomeration economies, differential patterns of saving and investment, and selective migratory movements. All these patterns are closely associated with the spatial distribution of urban growth.

Less urbanized regions are, in general, less developed, because industrial growth, particularly of large-scale production, does not occur in them; saving and investment are lower than in advanced and more urbanized regions, and capital is lost to high-growth regions; selective emigration from backward regions robs them of their most productive workers.

Economic considerations thus affect social behavior. Migrants from other parts of the country are attracted to developed regions in growing numbers, and this helps to keep the cost of local labor relatively low. Unable to find jobs in manufacturing, the migrants tend to be absorbed by the unofficial sector in a variety of licit and illicit employments. Still more migrants are attracted for as long as real incomes remain above subsistence. Their arrival creates certain social problems related to housing, education, health services, and public security, which the government must deal with. As a result, the developed areas absorb more and more public social investment, whereas

other regions receive only a trickle. Moreover, the bureaucratic and economic elite in the cities of more developed regions are able to divert resources to build up an infrastructure that attends to their expensive needs, such as water for irrigated lawns, parking garages in the center of the city, museums, and the like. And as the developed regions expand, so do the networks of internal and external contact, channeling consumer and entrepreneurial innovation from abroad toward the developed core areas in which a cosmopolitan life style evolves that is disproportionate to the real abilities of the economy to sustain it.

With further growth, the business elite in the core areas begins to organize the periphery for their own purposes: sources of raw materials, primarily for export, are secured; new distribution networks are created; and the banking system proliferates to capture local savings and transfer them to the center.

These relations are in many ways unbalanced. The internal terms of trade are generally unfavorable to the periphery, since prices of primary products rise more slowly than the prices that farmers and others living in the periphery pay for manufactured goods. Inflation is generated in the core and spreads to the periphery. Credit for local investment in the periphery is controlled by core institutions and is available only in restricted quantities. Migration into the core assures continued economic (and often political) dominance over the spatial system—a dominance that is extremely difficult to restrain through the usual instruments of public policy.

Writing on regional economic development, Myrdal (1957) concluded, "In the normal case, a change does not call forth contradicting forces, but instead supports changes which move the system in the same direction, but much further. Because of such circular causation, a social process tends to become cumulative and often to gather speed at an accelerated rate." Myrdal and Hirschman both draw attention to a second stage of spatial development, in which new forces eventually intervene to reduce the divergence between core and periphery until the balance is reversed. Both argue that these forces are likely to be initiated by the government, although others have claimed that they are natural rather than artificial. (See, for example, Borts and Stein 1964.) Hirschman maintains that the concentration of activity and population with concomitant spatial inequalities is a necessary condition of the early stages of economic development, but that, as development continues, economic disparities will generate political tensions. Given this, the existence of localized underdevelopment inhibits the realization of national economic growth until the need to reduce spatial inequalities and to foster more rapid growth causes the periphery to develop.

Myrdal and Hirschman concede that autonomous market forces will eventually tend to reduce interregional differences because of the demand for larger markets and new materials in the growth cores, leading to the development (albeit dependent development) of the lagging periphery. They argue,

however, that public investment usually plays an important role in the second stage of the process. In the earliest phase of development, political pressures and a general lack of planning and engineering skills for large projects cause resources to be dispersed widely among many projects and areas, but as the core area develops, investment will tend to concentrate there to provide necessary infrastructure for rapid growth. The need for new investment becomes obvious, and, if the core is also politically important, approval is readily obtained. In the second stage of development, when the periphery finds a coherent voice with which to express its discontent, the spatial allocation of investment tends to change.

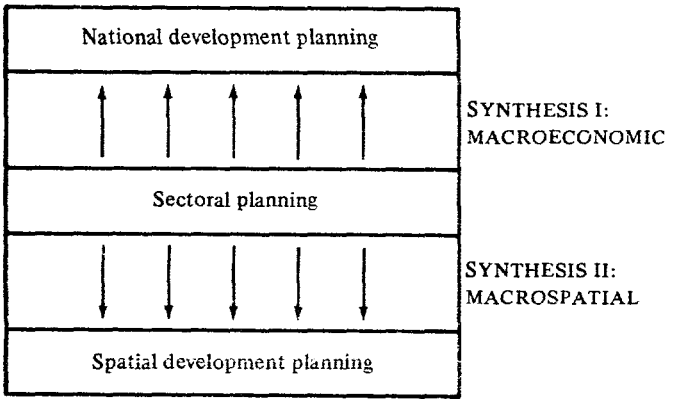
It is sometimes claimed that the operation of unchecked economic forces is advantageous to a country's economy and leads to an efficient geographic pattern of resource allocation that maximizes growth. This claim has been neither substantiated nor refuted. The essential question, however, is whether the resulting disequilibrium should be maintained or even encouraged by a policy that supports the further accumulation of economic power in core regions.

Apart from those arguments concerning welfare, there are two further arguments against the theory that further unregulated growth in the principal core areas of a country tends to maximize national economic growth. First, the social cost of core-region growth may exceed the corresponding increase in social benefit, whereas the redistribution of future growth among selected centers in the periphery might lower the ratio of public cost to benefit. Second, with public attention focused on core areas, opportunities for productive investments in the periphery may be neglected. The principal interests of spatial policy do not necessarily, however, relate to either of these arguments, but often derive from the social inequities created by the excessive geographic concentration of production and economic power.

Synthesis of spatial and development policies

The process of spatial policy, appropriately integrated with overall national development policy, would involve a complicated set of procedures for coordinating sectoral planning. Figure 1-1 shows two levels of policy synthesis, one concerned with macroeconomic, the other with macrospatial, considerations. The two are closely related because spatial policy must be considered in the context of the constraints and objectives of national development. If this is so, the objectives of spatial policy will partly reflect traditional economic concerns with growth and distribution. A possible set of such objectives would be the achievement of an efficient spatial organization of the national economy and a more equal distribution (as revealed by the indexes) of economic growth and individual welfare between core and periphery. Beyond this, the goals of growth and distribution could be

Figure 1-1. *Two Levels of Policy Synthesis in Sectoral Planning*



subsumed under a more general criterion of spatial integration, because the tradeoffs between them cannot be assessed except in the context of a systematic spatial analysis of the economy.

Spatial integration refers not only to the extent of the physical connections among areas of the nation, but also to the extent that their economies complement and interact with each other. This implies the existence of a nationwide system of markets for products, labor, and capital that is organized to respond to changes in prices.

A sensitive price-quantity response is not the only standard by which to measure spatial economic integration. The latter may be achieved on a basis of dependency or interdependency. In the first case, powerful core regions influence the possibilities for growth in peripheral areas, and the flow of resources tends to favor the core. But under conditions of interdependence, resource flows as well as factor and product prices tend to be equal at the margin in the relevant areas, and each unit of production retains some autonomy in management decisions. Thus, the periphery ceases to be a passive object of other people's interests and begins to function as an integral part of the nation.

Altering spatial patterns

Although the objectives of spatial development policy are usually stated rather abstractly, policies must be applied in order to influence both the spatial forces and the pace of major spatial processes. There are four such processes (Figure 1-2), and each helps either to maintain or alter a major spatial pattern.

To produce change in an existing pattern of spatial organization, there must be policy interventions in the decisions that underlie the pattern and in

Figure 1-2. *Spatial Policies and Patterns*

SPATIAL PROCESS	SPATIAL PATTERN
Migration	Human elements
Capital flows	Location of economic activity
Political and economic control	Territorial organization of power
Diffusion of innovation	New artifacts, behavior, and values

the forces currently at work on it. Policy, in short, must file away at the relevant margins, for the past cannot be undone at a single stroke. But what are the relevant decisions and who makes them?

MIGRATION. First, decisions affecting migration are made by individuals and families. Migrants tend to follow opportunities for economic and social betterment. Those from rural areas may be forced out by problems resulting from long-standing neglect, by population pressures on shrinking resources, by the absence of employment opportunities, and by primitive social facilities. They may be attracted to cities by the more favorable outlook for steady employment; higher incomes; better housing, education, and health services; and perhaps also by the exciting image the city projects as a place of adventure and personal fulfillment.

Migrants tend to move to those cities in which they have family and friends who may help to house them, find them a first job, or otherwise assist in their transition to an urban way of life. Thus, they tend to move to places of earlier migration streams, as modified by distance and intervening opportunities. These conditions often result in a process of stepwise migration from smaller to larger cities. By the time the migrant arrives at the core city, he is often well adjusted to urban life and is not easily distinguishable from the general population already there.

Migration decisions are extremely difficult to influence through public policy. Some governments have attempted to forbid migration to core cities unless a potential immigrant can show he already has a job. But such a policy is nearly impossible to enforce with any rigor, and alternative policies designed to improve rural conditions are often costly and difficult to implement quickly and on a large scale. Furthermore, they may have uncertain effects and may not overcome the magnetic pull of the city.

FLOW OF CAPITAL. Decisions affecting the flow of capital are made by both the private and the public sector. The political system of each country determines the relative importance of both sets of decisions, but in most countries both are important and interact with one another. The private decisionmakers are the owners or executives of private enterprises in search

of profitable investment opportunities that, as has been shown, are frequently perceived to lie primarily in the dynamic core region(s) of the country. Because private investors generally need to rely on business and political contacts for starting a new enterprise or expanding an old one, they often find that a location in a core city is advantageous. In any event, given relatively poor communications between core and periphery, the existence of a large domestic market at the core, a lack of trust in impersonal methods of business management, and the commodious living arrangements that are possible in a large city (and most frequently absent elsewhere), they tend to prefer a core location. Moreover, locating in core regions helps to reduce uncertainty and to assure high profits. Thus, the economic advantages of potential locations in the periphery, such as low average wages, tend to be heavily discounted.

Private investment decisions may nevertheless be easier to influence through policy than migration decisions. Opportunities in the periphery may be identified by the government: public investment in infrastructure to improve access to the periphery, to facilitate production there by the private sector, and to improve living conditions may be increased; and such financial inducements as tax, credit, and tariff advantages may enhance the perceived economic opportunities of a peripheral location. Finally, governments may invest in directly productive facilities to entice private investors to seize opportunities for backward and forward linkages in the same location.

POLITICAL AND ECONOMIC CONTROL. Decisions affecting political and economic control are made by those who have substantial power to affect the lives of others: government in the first instance, but also large business interests, and especially financial institutions. Typically, in newly industrializing countries these decisions are highly concentrated, not only at the very top of public and private sector hierarchies but also horizontally—in space—causing the effective power to be heavily concentrated in core regions and, within these regions, in a small but tightly interlocked and cosmopolitan elite that exercises a fairly complete control over development decisions throughout the country. The result of this situation is a sense of relative powerlessness among most of the population, as well as among the members of the traditional elite in the provinces whose opportunities for choice are reduced to relatively inconsequential matters as far as development is concerned. It is therefore common to find local officials in peripheral municipalities who are skilled (and selected for these skills) in the arts of political and personal persuasion and who hope to draw the attention of those in power at the core to problems that affect their own localities. This arrangement tends to leave the periphery with little autonomy over its own affairs and with its future dependent on the accidents of friendship and po-

litical connection. Those with abilities above the norm tend therefore to abandon the periphery.

The political, administrative, and economic organizational structures that make possible and support this process of decisionmaking and control can, of course, be changed in the direction of greater decentralization, devolution, and participation. But these trends tend to be strongly resisted with the argument that local officials, businessmen, and entrepreneurs in the periphery are short on developmental wisdom and lack technical ability and overview, and hence then are not to be trusted with effective power. Such arguments, of course, are self-fulfilling prophecies, as well as inherently self-serving. They tend to leave peripheral communities in a condition of passive dependency and to ensure the continued flow of capital, talent, and cheap labor to the core. Central power has been relinquished usually only because of enlightened statesmanship at the very top of the government or because of political or social pressure.

DIFFUSION OF INNOVATION. Finally, decisions affecting the diffusion of innovation are made by those who are able and willing to adopt innovation. In the case of consumer innovation, they tend to be individual households who are influenced by the mass media, as well as by personal contacts with those who had already adopted a specific innovation, such as a new product. In the case of entrepreneurial innovation, the relevant decisionmaker is a private firm or government agency.

Both kinds of innovation normally arrive in a newly industrializing country from foreign sources, and what is being diffused may be of doubtful value for economic and social development. Since the point of entry tends to be the principal core region of the country, where the conditions for acceptance are also the most favorable, the process of diffusion tends to be hierarchical—moving gradually from larger to smaller cities in a regular sequence. And since the acceptance of many entrepreneurial innovations tends to require urban populations (and incomes) of significant size, the process of spatial diffusion is frequently cut off at a point only a few levels down from the largest city and initial point of entry.

To the extent that development is conceived as a process of generating and absorbing innovation, this is a serious matter that tends to leave most of the periphery steeped in traditional ways and technologies, while the core adopts living standards and production methods that have more in common with those prevailing in the foreign countries in which the innovations originate than with those in its own periphery. The ideal solution would be to shift from imitative behavior to behavior that would generate appropriate invention within the developing country itself; to promote innovation capable of filtering down the urban hierarchy to even the lowest levels; to encourage

the diffusion of innovations particularly in the agricultural and agricultural support sectors; and, more generally, to shift to lines of production, such as wage goods, that were accessible at even low individual incomes and would permit the widest possible sharing of output among the population.

Implementing Spatial Policies

None of these interventions are easy to bring about. Furthermore, some of them go substantially beyond questions of spatial development to the very heart of the process of development itself. In this connection, three closely interdependent issues call for special attention: the time frame for the policy, the organizational arrangements, and the choice of policy instruments.

Spatial development policies are extremely difficult to carry out, more so perhaps than most other policies. This may be ascribed in part to the inherent stability of spatial systems and to the fact that policies designed to change them can only operate slowly. An important aspect of this problem is that implicit spatial policies may impose serious constraints on the ability to carry out a countervailing spatial policy.[1] The combined effects of existing policies may be sufficiently powerful to overwhelm the countereffects of policies designed with specific spatial objectives in mind.

Existing spatial arrangements reflect the overall organization of the economy, its policy framework, and its economic incentives. Without a change in some of these basic underlying factors, it is hard to imagine that spatial planning will achieve more than very limited and partial results. Thus, to bring about significant changes in spatial systems, consistent policies must be pursued with single-minded attention and over long periods. Frequent changes in the objectives of such policies, such as periodic redesignation of growth centers or repeated changes in the combination of incentive instruments aimed at private investors, tend to cancel each other and to prevent long-range commitments to regional or urban development in the periphery. The long-run nature of spatial development policy also implies that the objectives selected must receive the continuing support of successive government administrations. Objectives should therefore be few in number, easily communicated, and widely supported.

The institutionalization of spatial development in organizations capable of outliving several successive governments—assuming periodic change—is one of the best solutions in the longer run. Such organizations will generally

1. Policies that are nonspatial or aspatial in intent, having been designed with other ends in mind, may nevertheless have important, unintended spatial consequences. A few examples—tariff and other trade policies, fiscal systems, credit policies and other industrialization incentives, and tariff structures for large utilities and public services—illustrate the point.

have more than an advisory function: they will have resources and the power to commit them. Longevity in organizational arrangements permits continuous learning on the basis of actual experience.

Yet even if the political and organizational environment is favorable, technical problems abound. The ability to predict actual outcomes of specific policy instruments is still quite limited and nowhere more so than in this field. An unusually heavy burden will therefore be placed on information systems for collecting, interpreting, and evaluating data on local development and performance throughout the system. Given the inadequacies of present analytical models and data bases, normal statistical procedures are insufficiently sensitive to provide an accurate picture of what is happening in the cities and regions of a country. It is therefore especially important that planning agencies engage in frequent dialogue with the people who are directly affected by their policies.

Finally, spatial policies should be relatively simple to administer. Apart from the question of coordinating sectoral investment programs on an area-wide basis—which probably cannot be simplified—it may be advantageous for the policy instruments chosen to favor indirect over direct control.

The contributions to policy implementation of direct subsidies are difficult to assess. Furthermore, their long-term value may be questioned, given the high private profits that are typical for many countries and the relative footlooseness of most consumer industries. Equally relevant, the supply-led approach implicit in many infrastructure investment programs—for example, in the building of industrial parks—may tie up huge amounts of capital without yielding immediate or even early public benefits. Although economic infrastructure is necessary for local industrial development, it may, in many instances, be preferable to allow demand to build up for particular items of infrastructure and then to respond quickly and efficiently, than to attempt to provide such items in advance of anticipated or hoped for demand. Moreover, both subsidies and investment programs require the creation of an extensive bureaucracy; this will exacerbate the already difficult problems of coordination and management, and will encourage a project-by-project approach that a spatial development policy is designed to avoid.

Indirect inducement may thus be preferable, although for any spatial policy to succeed, it may need to make use of the entire range of instruments; and it must be remembered that these are all instruments which have been designed, and traditionally used, for other purposes. No single measure is likely to be enough by itself to have more than a small effect on spatial organization and structure.

The kinds of decision that are required to find new solutions are manifold and are by no means responsive to the same set of policy controls. Although any single policy may seem to be limited—a program for the betterment of rural conditions, tax inducements for private entrepreneurs, the con-

struction of regional airports, the creation of decentralized regional commissions, and programs for the development of appropriate small-scale technology—they may all be necessary. And together, they may produce a more balanced spatial, regional, and urban structure.

The Mexican Case

As used in this book the term "spatial development" refers to the nature and causes of spatial variations in economic development within countries, as illustrated by the case of Mexico, which in 1940 was a predominantly rural nation. Seventy percent of its people lived in communities of less than 2,500 inhabitants, depended on agriculture, and had rural ways of life. By 1970 the situation had changed completely, and nearly two-thirds of the population lived in urban communities and were part of an urban economy. That period thus saw extensive changes, and the future seems to promise even more. In all likelihood, Mexico's population will grow from 60 million in 1970 to between 120 million and 150 million by the year 2000. Three-quarters of that population (90 million to 110 million persons) will live in towns and cities.

The basic relation between urbanization and economic growth derives from the growth of incomes and the related shift of consumer preferences toward nonagricultural goods. Whereas demand for foodstuffs becomes increasingly income inelastic, demand for manufactured goods and services tends to increase, particularly for products that can be most feasibly produced in urban agglomerations, in which economies of scale, transfer cost reductions, intersectoral links, and a wide array of externalities are uniquely available. The city provides a natural environment for innovation and technological progress, whether original or adaptive. Industrialization and urbanization are thus linked by necessity and logic, and this link is supported by both theoretical and empirical explanations.

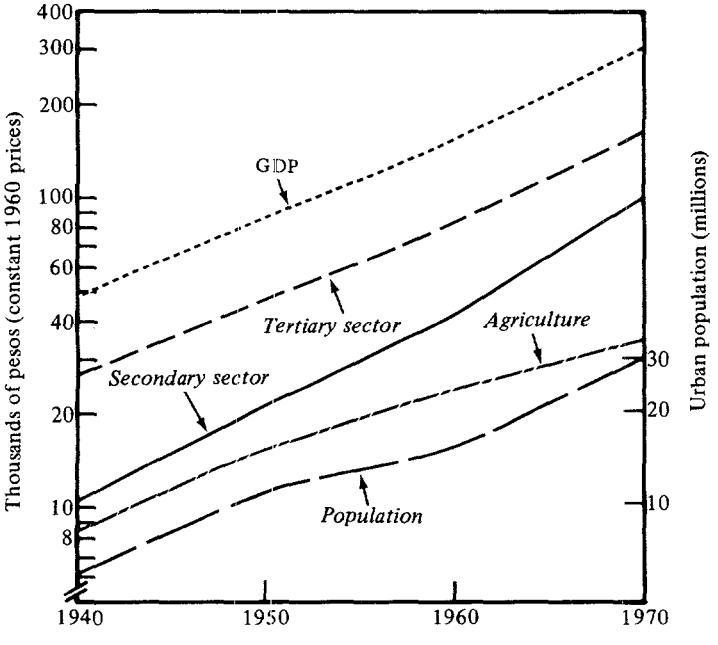
Urban and industrial development in the United States and Europe was initially characterized by relatively labor-intensive methods of production, by the antecedent or parallel growth of output and employment in agriculture, and by only moderate rates of population increase. Urbanization in Mexico, as in most parts of Latin America, occurred under different conditions, particularly because of the inability of the economy to absorb the growth of the labor force arising from rapid population increase, partly because agricultural growth did not keep pace with population growth, and partly because industrial development was increasingly capital intensive. The Mexican case, like that of most developing countries, thus differs from the

experience of countries in which urbanization occurred under less advanced technological conditions (Figure 1-3).

In Mexico, as elsewhere, any analysis of the spatial aspects of economic development must be undertaken in reference both to a communications and transport network and to a system of cities linked by branches of that network. Cities are the central points of the spatial system: they are political and administrative centers; they facilitate the diffusion of social, economic, and political ideas; they offer both periodic and permanent marketplaces for their hinterlands; and above all they are the centers of industrial development and economic growth.

This last role implies the physical integration of factor and product markets and of functional specialization—an essentially modern situation which has been realized only in technologically advanced societies. Until horses and carriages and carts began to be replaced by locomotives and automobiles and trucks, modern industrial growth, large-scale urban development, and the

Figure 1-3. *Growth of the Urban Population, GDP, and Economic Sectors, 1940 to 1970*



Note: The secondary sector includes the mining, manufacturing, power, and construction industries; the tertiary sector includes commerce and services.

evolution of an integrated system of cities could not begin. In Europe and the United States these conditions began to exist in the late eighteenth century, whereas in Mexico the modern urban system and the process of spatial integration originated about a century later. Until then, the territory of what is now Mexico was functionally divided into largely self-contained agrarian systems in which towns and cities served the limited commercial needs of their own rural areas and the needs of political and administrative control under successive forms of government. The spatial structure of economy and society in Mexico, like that of most countries outside Europe, has thus changed much more over the past 100 years than during several preceding centuries. This is concomitant with the interdependent nature of urban and economic development.

The pattern of urbanization in Mexico has paralleled the development of the country's economy, and there is an implicit but very important difference between what may be termed the nonsystemic urban structure of Mexico up to about 1940 and the more systemic urban structure of the period thereafter.

Although large-scale urban growth did not begin in Mexico until the twentieth century, the roots of urban development can be traced to the pre-Columbian settlements of the Mayas and Aztecs, which culminated in the Aztec capital of Tenochtitlán, the site of which later became Mexico City. During the colonial period, from 1520 to 1819, Mexico was part of the Spanish Viceroyalty of Nueva España. Cities were developed to serve political and administrative functions and to provide trading links with Spain, but there were few economic links between the colonial cities.

Independence, in 1819, severed the colonial ties, but for several decades the framework of urban development remained essentially unchanged; the dominant centers of spatial economic organization through much of the nineteenth century were rural haciendas and ejidos, both of which were largely self-sufficient settlements meeting their own limited commercial and manufacturing requirements.[2]

The regime of Porfirio Díaz (1870-1910) saw the growth of exports, particularly from mining and agriculture, and the related development of a railroad network to distribute them. With the development of the railroads came the growth of towns at rail junctions. The development of agriculture brought subtle changes in the spatial structure of the economy, as haciendas began to develop as quasi-cities, performing an increasing variety of urban functions. But despite the improvements in transport, towns and haciendas alike continued to function as economic enclaves, serving their limited export or manufacturing functions and providing commercial services to narrowly defined hinterlands.

2. The ejido is a form of collective land tenure based on usufruct. It was effectively recreated by the Revolution, although its antecedents stem from pre-Columbian times.

The expansion of infrastructure during the Porfirian era was interrupted by the revolution of 1910, and economic growth virtually halted during the next two decades. Recovery began in 1933, with slow and unsteady growth in investment in infrastructure and manufacturing. By 1940 the preconditions for industrial urban growth had been satisfied, and World War II provided the opportunity for successful protectionist policies that fostered the growth of the Mexican economy for the next thirty years.

The rapid growth of the Mexican economy after 1940 was accompanied by rapid urbanization and by the development of a systemic urban structure. In contrast with the prewar pattern, postwar urbanization involved both large-scale population movements and the development of large cities with national and regional hinterlands.

The evidence suggests that in most cities capital investment in manufacturing generated growth after 1940, although the development of tourism provided the economic base in a few instances. Irrespective of its sectoral origin, once underway, growth fostered growth, through the process of the urban multiplier in a dynamic and circular process. As new market thresholds were reached, the expansion of specialized firms led to more construction activity, more demand for inputs, more population growth, more household consumption, and the achievement of even greater market thresholds. The urban multiplier resulted in the concentration of economic activity, because the few cities with the largest internal markets became the most attractive ones for economic expansion and established positions of supremacy in the urban system. This illustrates the application of a cumulative and circular process in which cities that had been relatively large and wealthy in 1940—and in many cases long before 1940—retained their relative size and wealth as they developed. The evolution of states and regions followed a similar pattern, with those which were historically well-off generally retaining their comparative status.

Between 1910 and 1940 the growth of cities emphasized the continued expansion of places that were already relatively large by 1910; after 1940 the cities that had already become relatively large and economically important became even larger and more important, demonstrating the force of inertia in spatial development. Moreover, whereas Mexico City reigned unchallenged as the primate city, Guadalajara and Monterrey continued to rank as the second and third largest in the urban system in 1970, having done so for almost a century. Nonetheless, Mexico City continued to dominate the country in such a way that the urban system conformed to a core-periphery structure, in which the capital city was cast as the core and the rest of the country as the periphery. Although the set of largest cities remained rather stable, the rank order of population size of the cities in the set continued to fluctuate even after 1940—an indication that the urban system was not yet mature.

Issues of Spatial Development

It may be true that during the 1970s Mexico approached a point at which the spatial order was about to pass spontaneously from the first to the second stage of development identified earlier. However, recent years have witnessed a significant shift in governmental attitudes toward spatial development. Because of interest in achieving sustained economic growth and in distributing it equitably, recent administrations have paid greater attention than their predecessors to the spatial distribution of the benefits of economic development. By the mid-1970s the absolute and relative size of Mexico City had given rise to three major issues for spatial development policy in Mexico. The first was whether the concentration of people, prosperity, and production in Mexico City was, from a national point of view, desirable. The other two issues concerned the enormous differences that existed between urban and rural areas and the manifestly unbalanced nature of development among regions.

Concentration

It is widely believed that the overwhelming concentration of the Mexican space economy in one city is both inequitable and inconsistent with the nation's social and economic progress. But is this view justifiable? Despite the fact that there is no way to accurately measure the negative economic effects of concentration and centralization, it is often argued that important opportunities for economic growth are forgone as a result. The data do not permit a definitive conclusion but it is evident that the resources of such well-endowed parts of the periphery as the Gulf Coast have not been developed and that this can be represented as an opportunity cost of concentration. It is also true that the cost of providing many kinds of social overhead in Mexico City—especially water, sewerage, and electric power—is now higher than in other parts of the country. It appears too that the economic disadvantages of concentration include the highly concentrated structure of the national transport network, the congestion of interegional traffic which arises from the fact that so much of it passes through one place, the congestion generated within Mexico City, and the fact that the centralization of the transport system denies efficient access to many parts of the periphery.

Not all the adverse consequences of concentration are economic. Among the social issues are several whose analysis lies beyond the scope of this book, although there is a strong relation between urbanization and social progress,

since the most urbanized states are the best off in terms of general socioeconomic welfare. One such issue concerns the maintenance of a manageable social order as Mexico City increases in size and the number of underemployed continues to grow. Another is whether an urban mass of more than 20 million people can be efficiently governed. Political consequences arise from the fact that the centralization of decisionmaking in Mexico City has caused some parts of the periphery to feel that their needs and circumstances are misunderstood. Another (unrelated) consequence is that private firms often behave in such a way as to suggest that access to the federal government has an important bearing on commercial and industrial location. Finally, environmental pollution in Mexico City has become a serious problem and will almost certainly become a larger one as the city grows.

Most of the economic benefits of concentration are derived from the effects of agglomeration and refer, above all, to benefits for individual firms and industries, although some are external to both. This is most obviously true in Mexico City and seems likely to hold true for some time to come. As other cities grow, they will also offer an increasing range of competitive agglomeration economies, although the truly external economies of Mexico City—such as those arising from the location of the federal government, the uniquely varied supply of labor skills, and the concentration of specialized financial and commercial services—are unlikely to wane in the near future. Not all the advantages of concentration are economic, although the significance of some of them—such as the political advantages of a primate urban system—may belong to the past rather than to the present or future. Yet the unique cultural, political, social, and economic characteristics of the nation's capital are powerful attractive forces and are likely to remain so. Many Mexicans will, for personal reasons, continue to want to live in Mexico City.

There is no way to reach a conclusive and quantified judgment about the costs and benefits of concentration. The evidence nevertheless suggests that even if Mexico City has not yet reached an unmanageable or uneconomic size, it may well do so at some time in the not far distant future. It will become more difficult to govern, it will become a less attractive place in which to live and work, it will cause increasing distortions in the allocation of public expenditure on social welfare, and its growth may be increasingly incompatible with the pursuit of national economic efficiency and development.

Integration

Discontinuities between town and country represent an important issue in spatial relations because they represent a spatial dimension of social justice. In the northwestern states urbanization and agricultural development based on exports went hand in hand, but elsewhere in Mexico the urban sector has enjoyed a privileged and somewhat predatory status relative to the rural

PART ONE

Development of the Modern Urban System

CHAPTER 2

Origins of the Modern Urban System

ALTHOUGH LARGE-SCALE URBAN GROWTH did not begin in Mexico until the twentieth century, the area has had a long urban history. Urban development began with the construction of pre-Columbian cities, notably Tenochtitlán, the capital of the Aztec emperor Montezuma. The Aztecs were the last of the Nahua tribes to settle in the Valle de México, and they established Tenochtitlán on an island in the middle of a lake. When Hernán Cortés arrived in 1519, it was a city of perhaps 300,000 people.[1]

Urban Development before circa 1875

Although Tenochtitlán was the greatest urban achievement of pre-Columbian cultures in Mexico, it was by no means the only one. To the east, in the Yucatán peninsula, the Mayas and Toltecs built several important urban settlements, notably Uxmal and Chichen Itzá. To the south the Zapotecs and the Aztecs achieved high levels of urban civilization in what is now Oaxaca.

There are certain similarities between the spatial order of the pre-Columbian period and that which developed after the arrival of the Spaniards. In pre-Columbian society the area that later became the viceroyalty of New Spain was divided into several political territories, each controlled by a distinctive culture. Each territory had enough internal ties to maintain political control, but there was little if any economic interaction between them.

The colonial period

The pre-Columbian cities in Mexico differed from those of other parts of Latin America, but the later colonial cities did not. Throughout Latin Amer-

1. Cortés later wrote of it, "When we saw so many cities and villages built in the water and other great towns on dry land . . . we were amazed and said, it was like the enchantments they tell of the legend of Amadis, on account of the great towers and cues [temples] and buildings rising from the water, and all built of masonry" (cited in Barkin and King 1970).

ica the initial colonial settlements were enclaves with little interaction between them. The early distribution of towns and cities across the viceroyalty of New Spain largely coincided with the distribution of earlier Indian settlements, although there was more emphasis on exploiting mineral resources. Tenochtitlán was rebuilt and eventually renamed Mexico City and became the center of the colonial system as the seat of government and ecclesiastical authority.

During the next 300 years the pattern of settlement of the sixteenth century was generally reinforced, although it was modified in two ways: many new towns were established as colonial settlement intensified, and some of the new towns were short-lived because judgments about the resources on which they were based proved wrong.

Throughout the colonial period in Mexico techniques of production and communication remained largely unchanged. The Spaniards introduced the wheel and the horse, but through the end of the eighteenth century there were few major technological developments compared with those which came later. Similarly, the economic, social, political, and ethical values which tied the colonial society to Spain, and its various parts to each other, remained essentially unaltered. The continuity of spatial patterns in the colony was therefore consistent with continuity in technology and in the value system.

The preeminent colonial status of Mexico City resulted from its role as the political, administrative, and financial center of a major portion of Spain's colonial territory. Many other colonial cities, including Guanajuato, Taxco, Pachuca, Saltillo, Zacatecas, San Luis Potosí, and Durango, were mining centers; some, such as Salamanca, were agricultural centers; Veracruz was the chief Gulf port; and Guadalajara, Mérida, Oaxaca, and Aguascalientes were administrative, military, and commercial outposts.

The Mexican colonial city was, above all, an instrument of the colonial economic and social orders. Except in political and administrative terms, cities were not integrated into a system, but were autonomous centers, each providing certain services. They were linked to some extent with the agricultural areas around them but not, in general, with other cities. Because of the colonial purpose, however, many of them had direct links with Spain.

Early independence, from circa 1820 to circa 1875

Changes in values precipitated the collapse of the colonial order. The new values were, however, largely confined to attitudes toward an overseas government and were similar to those which developed elsewhere in Hispanic America at about the same time—and which not long before had affected the Anglo-Saxon colonies to the north.

The absence of any other changes in values and the continued absence of important changes in technology caused the pattern of urban development

for some time after independence to be similar to that of the colonial period. The development of specialized urban functions was impeded by persistent difficulties of communications that largely reflected the topography that separated Mexico's population into numerous small, isolated, and distinct communities.

Many of Mexico's major geographic features are related to those of the United States (Map 2-1). The Rocky Mountains continue across the Rio Grande to become the Sierra Madre Oriental, terminating near Tampico, midway down the Gulf coast, whereas the Sierra Nevada of California and the Basin Ranges of Arizona merge and almost disappear in the deserts around Mojave and Yuma but gain magnitude once more south of the border, where they become the Sierra Madre Occidental.

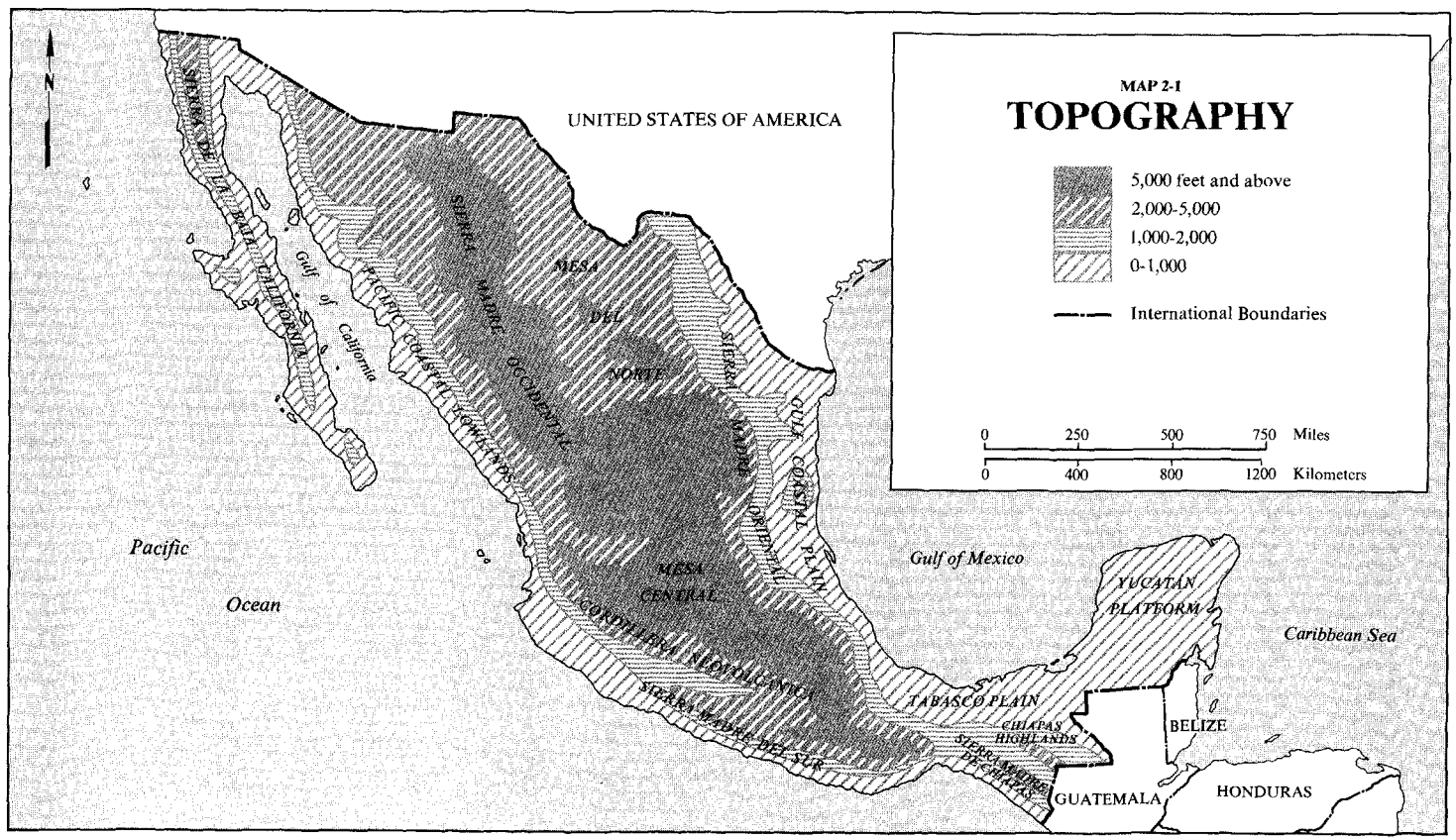
The highest northern summit of the Sierra Madre Occidental reaches barely 1,800 meters. But farther south its hills mass together in an irregular and confused manner, increasing in height and number, until in northern Durango and Sinaloa they become higher and more extensive and, east of Culiacán, rise to more than 3,400 meters. As they increase in height, the crests of the Sierra Madre gradually approach the coast, and, near San Blas, rugged mountain faces stand between 610 and 2,100 meters above the ocean. South of the Rio Balsas a narrow and precipitous range reaches altitudes of 3,000 to 3,700 meters and separates the Balsas Valley from the Pacific Coast.

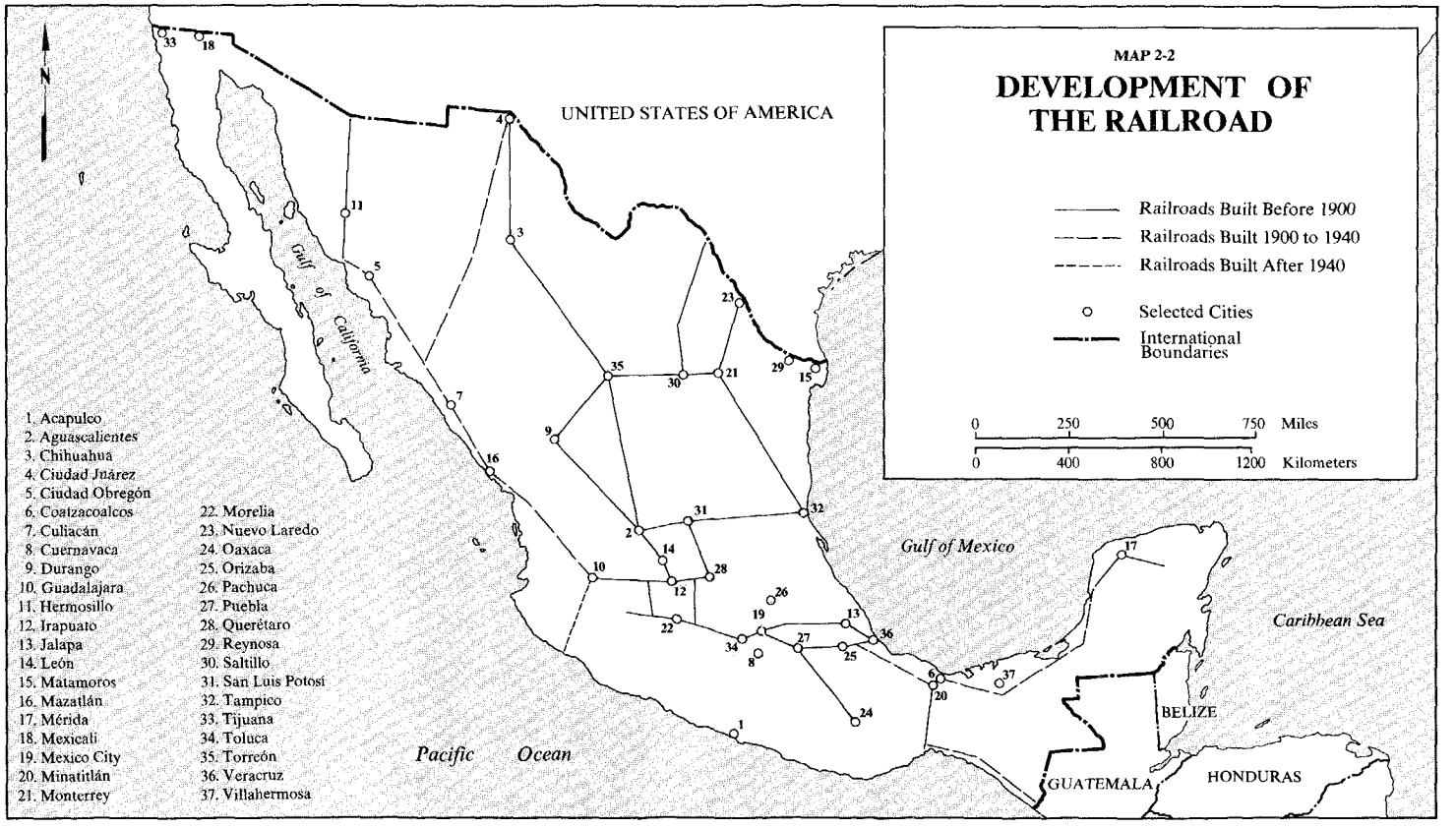
The plains of southern Texas stretch south to form the great central basin of Chihuahua and Coahuila in northern Mexico, which is between 120 and 180 meters high. The central basin contains many irregular and disconnected mountain ranges, bluffs, and ridges separated by broad valleys and plains, features that are accentuated by the barrier of the Sierra Madre Occidental which towers above it to the west, by giant volcanoes to the south, and by the lesser and more disconnected Sierra Madre Oriental to the east, which features an extensive and rugged decline to the coastal plain of the Gulf of Mexico more than a mile below.

This rugged landscape has had a fundamental influence on communications and urban development. Because of the topography of the interior, Mexico during most of the nineteenth century remained a country of trails and primitive roads. The main means of transport were Indian porters, pack animals, and two-wheeled carts until stagecoach service began in 1849, when the first line was established between Mexico City and Puebla; other services were subsequently started between Mexico City, Veracruz, Tepic, and Tampico.

The principal roads in prerailroad Mexico took advantage of the mountain passes around the central tableland, and most of the railroad lines later followed these routes (Map 2-2).

Before the railroad, the significance of ports was determined by the convenience of their location to these passes and to traffic routes to the


MAP 2-I
TOPOGRAPHY
5,000 feet and above
2,000-5,000
1,000-2,000
0-1,000
International Boundaries
0 250 500 750 Miles
0 400 800 1200 Kilometers
N
UNITED STATES OF AMERICA
SIERRA DE LA BAJA CALIFORNIA
Gulf of California
SIERRA MADRE OCCIDENTAL
PACIFIC COASTAL LOWLANDS
MESA DEL NORTE
SIERRA MADRE ORIENTAL
GULF COASTAL PLAIN
MESA CENTRAL
CORDILLERA NEOVOLCANICA
SIERRA MADRE DEL SUR
Pacific Ocean
Gulf of Mexico
YUCATAN PLATFORM
Caribbean Sea
TABASCO PLAIN
CHIAPAS HIGHLANDS
SIERRA MADRE DE CHIAPAS
BELIZE
GUATEMALA
HONDURAS


MAP 2-2
DEVELOPMENT OF THE RAILROAD
Railroads Built Before 1900
Railroads Built 1900 to 1940
Railroads Built After 1940
Selected Cities
International Boundaries
0 250 500 750 Miles
0 400 800 1200 Kilometers
N
UNITED STATES OF AMERICA
Gulf of California
Gulf of Mexico
Caribbean Sea
Pacific Ocean
BELIZE
GUATEMALA
HONDURAS
1. Acapulco
2. Aguascalientes
3. Chihuahua
4. Ciudad Juárez
5. Ciudad Obregón
6. Coatzacoalcos
7. Culiacán
8. Cuernavaca
9. Durango
10. Guadalajara
11. Hermosillo
12. Irapuato
13. Jalapa
14. León
15. Matamoros
16. Mazatlán
17. Mérida
18. Mexicali
19. Mexico City
20. Minatitlán
21. Monterrey
22. Morelia
23. Nuevo Laredo
24. Oaxaca
25. Orizaba
26. Pachuca
27. Puebla
28. Querétaro
29. Reynosa
30. Saltillo
31. San Luis Potosí
32. Tampico
33. Tijuana
34. Toluca
35. Torreón
36. Veracruz
37. Villahermosa

interior. Besides Veracruz, which was a commercial center long before it had a railroad connection with Mexico City, the main ports were Bagdad, La Perla, Tampico, Tuxpan, Tecohitla, Alvarado, Frontera, Coatzacoalcos, Carmen, Champotón, Campeche, Progreso, and Chetumal on the east coast, and Guaymas, Topolobampo, Altata, Mazatlán, Tacapan, San Blas, Barra de Navidad, Manzanillo, Zihuatanejo, Acapulco, Puerto Ángel, Salina Cruz, and Tonalá on the west coast.

Towns and cities continued to be relatively unimportant up to the late nineteenth century, serving primarily as administrative centers with some trading functions. Most manufacturing was directly tied to primary production. Nevertheless, independence brought a fundamental change in economic organization. The exploitative and externally oriented economic order of the colonial system had replaced a pre-Columbian agricultural society, which had been sufficiently productive and inventive to yield a surplus to support urban civilization. Independence replaced this external orientation with an internal one. Many of the old mining towns lost their dynamism when their mineral wealth was exhausted, and the era following independence was marked by the attempt to stimulate other industries. In this environment, towns such as Puebla, Querétaro, Orizaba, Guadalajara, and Mexico City benefited from the establishment of textile plants, and the port of Veracruz served as a point of entry for imports of cotton, wool, and textile machinery from Europe.

For most of the nineteenth century, the most important units of social and spatial organization thus continued to be those of the rural areas—haciendas and ejido villages, both relatively autarkic. The hacienda was particularly self-sufficient and fulfilled many functions normally attributed to towns. There was little contact between the rural and urban areas, and, as in the colonial period, spatial organization continued to feature separate and essentially autonomous economic enclaves, although Mexico City had already achieved a unique status.

Urban Development from circa 1875 to circa 1910

The administration of Porfirio Díaz (1876-1910), called the Porfiriato, marked the end of the civil wars and foreign interventions that had impeded economic progress for fifty years after independence. But the economic system of this period had special and ultimately self-destructive characteristics. Superficially, the records show that Mexico's population increased at an average annual rate of about 1.4 percent, from 9.0 million in 1870 to 15.1 million in 1910, but that the gross domestic product (GDP) grew faster, at an average annual rate of 2.7 percent. Foreign investment facilitated this moderate expansion as well as the development of the transport network, in an economy in which the importance of the domestic market was, at least initially, almost incidental.

The dynamics of urban development

Urban development in the Porfiriato was consistent with the characteristics of the economy, which meant that urban development in general and the selective growth of specific cities depended largely on the location of industries producing for foreign markets and on the associated development of the railroad network. To some extent—but to a marked extent only in Mexico City—urban development was also the product of agglomeration economies arising from earlier demographic and economic development and from the growth of internal demand.

DEVELOPMENT OF THE EXPORT SECTOR. Although the largest share (one-third) of foreign investment before the revolution was in railroads, another quarter was in extractive industries, and smaller proportions were in manufacturing and public utilities. The following figures show foreign investment in Mexico in 1911 as a percentage of total investment (Hansen 1971):

Railroads	*Mining and metallurgy*	*Public debt*	*Other*	*Public services*	*Real estate*	*Banks*
33.2	24.1	14.6	10.7	6.9	5.7	4.8

In the early part of the Porfiriato most Mexican capital was concentrated in agriculture and mining. When it was realized that large profits could be made in manufacturing, however, increasing numbers of Mexican landowners invested in urban areas, acting alone or in conjunction with foreign entrepreneurs.

New investments, coupled with the development of the railroads, facilitated a dramatic growth of exports (Table 2-1). This expansion was led by an increasingly diversified mining sector, where output grew at an average annual real rate of 7.0 percent between 1900 and 1910, and by agriculture.

There was an intimate relation between the development of cities and developments in mining, agriculture, manufacturing, and transport. Different

Table 2-1. *Exports, 1877 to 1911*
(percent)

	Consumer goods		*Producer goods*		*Precious*		
Year	*Nondurable*	*Durable*	*Nondurable*	*Durable*	*metals*	*Other*	*Total*
1877-78	6.3	0.1	14.6	0.3	79.0	0.1	100.0
1890-91	12.0	0.1	24.0	0.1	63.0	0.3	100.0
1900-01	10.5	0.1	31.0	0.4	58.0	0.5	100.0
1910-11	8.8	0.1	43.0	0.3	46.0	1.0	100.0

Source: Hansen (1971) p. 15; based on El Colegio de México (1960).

cities in different parts of the country developed because of growth in one of these sectors, but most often because of growth in two or more.

Mexico's mining industry expanded quickly between 1900 and 1910, when metal production almost doubled. The location of the mining developments that were established by foreign entrepreneurs in the Porfiriato influenced the subsequent structure of the urban system.

Most of the larger cities of the north and center were associated with the development of mining for gold, silver, zinc, lead, coal, and mercury, whereas there was iron in the northeast and oil near the coast of southern Tamaulipas. Mining expansion stimulated the rapid growth of the capital cities of the northern states, as production shifted from gold and silver to industrial minerals such as iron, coal, lead, and copper. The old mining centers of the central states of Guanajuato and Hidalgo and the northern states of Zacatecas and San Luis Potosí, which had produced large quantities of precious metals for many centuries, now gave way to newer centers in Coahuila and Durango, where industrial minerals rapidly gained importance. In many of the older centers stagnation or decline of the mines affected other economic activities as well. In contrast, mining in the newer centers led to secondary growth, particularly in manufacturing, which provided mining supplies such as dynamite and metal tools or which processed part of the output of the mines.

The best examples of export multipliers based on mineral development were in the northern cities, especially in Monterrey (Derossi 1971).[2] A lead foundry was established there in 1892 and a steel plant in 1901. Because of the link between the production of primary minerals and the development of industries to process metal and nonmetal minerals, heavy industry in Mexico by 1910 was mainly concentrated in Monterrey.[3] Agglomeration economies were important in Monterrey's development because of their rapid but sustained growth, which can be attributed to a favorable export base and the development of transport facilities to exploit it.

Foundries and foundry-associated industries were established in other mining centers between 1890 and 1910. Among these the lead and copper plants of Cananea (Sonora), Concepción del Oro (Zacatecas), Torreón, and Chihuahua were particularly important. Most new subsectors had agglomerative effects and were inevitably located in urban areas. The sequence of

2. The notion of export multipliers is based on the concept that cities grow by producing more than they can absorb, and that in sectors which generate these surpluses there are sequences similar to that described in Chapter 1.

3. Considerably before the turn of the century cotton textiles and brewing, using locally grown cotton and grains, became important in Nuevo León. The beer industry's need for bottles, metal caps, and cardboard boxes stimulated the growth of glass, metalworking, and paper industries. The steel industry also got its early start in Monterrey because of its favorable location relative to the necessary raw materials: coal and iron ore. Finally, railroad connections improved Monterrey's access to raw materials and external markets.

development corresponded to that of the classical models of urban growth based on exports.

Where urban development was based on exploiting regional agricultural resources, there was (as with mining) a close link between urban growth and railroad growth. This was either a consequence of prior railroad development associated with mining in the same area; prior railroad development associated with mining in other areas, but which passed through agriculturally productive regions en route to the U.S. frontier or coastal ports; or the growth of railroads specifically built in association with the development of agriculture.

Most urban growth resulting from agricultural development was based on the growth of external demand for agricultural products, mainly in the United States. At the same time, however, there was a shortage of labor on haciendas that could not be fully offset by mechanical innovation in agriculture. As a result, the growth of agricultural exports was closely associated with a dramatic deterioration in the living conditions of the rural population, because the means chosen to increase the labor supply of the haciendas involved the progressive destruction of the long-established tenurial rights of rural communities. This intervention was based on the land reform laws of 1855-57 and 1894 and the colonization laws of 1883.

The collective effect of Porfirian intervention in the rural system was such that by 1910 some 90 percent of Indian villages in the central plateau had no common lands. In the country as a whole, 85 percent of communal villages and 90 percent of rural families were landless, and fully 50 percent of the rural population was tied to the hacienda system. Agricultural exports expanded rapidly (at an average annual rate of 2.5 percent in the same period), but agricultural production grew at an average annual rate of only 0.65 percent—barely half the rate of population increase. This reflected the most important social consequence of Porfirian change: foodcrop production declined an average 0.5 percent a year for approximately twenty years.

The welfare implications of this trend were disastrous. Expansion of income in the leading sectors was captured by the owners of capital, land, and subsoil resources. In addition, income was redistributed toward profits, interest, and rent (given the ownership of these resources) and increasingly accrued to foreigners. Porfirian intervention in agriculture thus led to a progressive deterioration in material conditions, to increased social and political tension, and, eventually to the Revolution of 1910. It also had a direct effect on the urban system, because worsening conditions in the countryside provided ever stronger reasons for migration to the shelter of the towns. The towns were also becoming central points for collecting and processing agricultural products and for providing inputs for commercial agriculture.

GROWTH OF INTERNAL DEMAND. Even before 1910 factors other than the growth of the export market had begun to be important in the

development of a few towns and cities. Some of these places had become centers in the evolving railroad network, although they were not located near regional resources; others had already achieved sufficient momentum to sustain continued growth and to attract railroad linkages and did not depend on exports.

The best example of the first kind of city not dependent on exports was probably San Luis Potosí, which, along with Tampico, Monterrey, and Torreón, became a major center of regional growth after the opening of new railroads. Several lines passed through the city, which gradually developed into an important center, although the surrounding area offered no significant natural resources. The development of the railroad network itself was thus the source of new industrial and commercial activity and was a principal source of new employment in the urban economy. By 1910, San Luis Potosí had the largest engine repair shops and rail equipment plants in the country.

The best example of the second kind of city not dependent on exports was Mexico City. Although it was located in a region that produced some mineral and agricultural exports, its traditional roles as the national capital and the center of political, ecclesiastical, and administrative authority and as the principal center of commerce and industry were more significant factors in its growth.

Thus, whereas the exploitation of agricultural and mineral resources generally outweighed urban concentration as a factor in the development of a manufacturing base during the Porfiriato, agglomeration economies had already become important in Mexico City by 1877. The large market of the capital permitted many of the factories located there—which operated on steam power or animal traction—to compete effectively with factories in other states using cheaper hydraulic power. The introduction of electricity, which proved to be a more efficient and more readily accessible source of power, increased the advantages of location in the capital. The broadening of geographic markets through the expanding railroad network, for which Mexico City served as a primary hub, further enhanced the status of its manufacturing sector and brought about considerable diversification. Because of these cumulative advantages, the Federal District had already begun to outdistance its rivals in total manufacturing employment by 1902, when there were thirty-five industries in the Federal District, compared with twenty-nine in Jalisco and twenty-four in Puebla, the next two most highly diversified areas (Peñafiel 1902).

DEVELOPMENT OF THE TRANSPORT NETWORK. Irrespective of the origins of demand, urban development during the Porfiriato was intimately related to the evolution of the transport and communications system. In general, the growth of towns and cities was either stymied by the absence

of effective communications or stimulated by their presence. The late nineteenth century was Mexico's railway age, and the importance of railroad development between 1870 and 1910 is reflected in many aspects of the country's subsequent development.[4] But decisions made by independent groups of railroad investors to facilitate commodity exports often had unforeseen and unintended consequences.

During this period one-third of all foreign investment, which accounted in turn for more than two-thirds of total investment, was devoted to the construction of railroads, thereby facilitating massive export growth and providing a major cause of growth in some cities and of relative decline in others.

The railroad era in Mexico began when a 16 kilometer line was built between Veracruz and Tijeria in 1854; this was extended to Mexico City in 1873. From 1877 to 1892 more than 4,500 kilometers of track were laid; by 1905 another 12,000 kilometers had been added; and by 1910 the total network extended over 24,000 kilometers. Few new lines were built thereafter.

Before 1900 railroads were not built in a systematic network, but to transport mineral and agricultural products of individual developers outside the country (Map 2-2). Most of the lines therefore connected mining areas with seaports (Tampico, Veracruz, Coatzacoalcos, Campeche, and Progreso) to provide easy access to international markets (New York, Havana, and Europe), or with inland ports on the U.S. border (Nogales, Ciudad Juárez, Piedras Negras, Nuevo Laredo, and El Paso) to provide access to markets in the United States.

Land and sea ports were more important in Mexico's economic development before 1900 than after. The two mountain ranges that run the length of the country prevent easy access to the coast from the interior, and the railroad network thus concentrated on north-south rather than east-west connections. In 1900 two-thirds of the country's imports by volume were shipped across the U.S. border, and about 75 percent of the remainder was brought in to Gulf coast ports. These ports were more important than those on the Pacific seaboard because of Mexico's traditional ties with the United States, Europe, and the eastern seaboard of Central and South America. The land ports were less important for export trade, however, since two-thirds of the total volume of exports in 1900 was shipped out by sea.[5]

4. The only railroad built entirely after 1910 was the Baja California line, which was the longest in the country (540 kilometers). It connected Tijuana and Mexicali with Sonora and, when completed in 1947, provided the first direct transport from the northwest peninsula to Mexico City by land.

5. This amounted, however, to less than 50 percent of the total value of commodity exports, since it consisted for the most part of products such as sugar, sulfur, minerals, cotton, corn, and petroleum with low value-weight ratios.

Table 2-2. *Population Growth in the Twenty-five Largest Cities, 1877 and 1900*
(percent)

Rank	*City*	*Average growth rate (1877-1900)*	*Growth rate relative to growth rate for all cities in the group*
Among the twenty-five largest cities in both 1877 and 1900			
1	Mexico City	3.2	0.89
2	Guadalajara	4.8	1.33
3	Puebla	2.8	0.77
4	Guanajuato	−2.2	−0.61
5	San Felipe	−1.5	−0.41
6	Allende	−0.4	−0.11
7	Dolores Hidalgo	−0.2	−0.05
8	San Luis Potosí	4.6	1.28
9	Aguascalientes	0.7	0.19
10	Mérida	2.9	0.80
11	Querétaro	1.4	0.38
12	Oaxaca	2.2	0.61
13	Morelia	3.1	0.86
14	Salamanca	3.8	1.05
15	Puruándiro	2.5	0.69
Among the twenty-five largest cities only in 1877			
1	Silao	−3.0	−0.83
2	Ameca	4.0	−1.11
3	Teocaltiche	−2.6	−0.72
4	Fresnillo	−1.8	−0.50
5	Autlán	−2.2	−0.61
6	Arandas	−0.4	−0.11
7	Río Verde	−1.6	−0.44
8	Jerez	−0.1	−0.02
9	Santa María del Río	−1.0	−0.27
10	Ciudad del Maíz	1.3	0.36
Among the twenty-five largest cities only in 1900			
1	Monterrey	12.2	3.39
2	Sinaloa	8.2	2.28
3	Ciudad Lerdo	12.8	3.56
4	Mazatlán	6.2	1.72
5	Pachuca	12.4	3.45
6	San Pedro de la Colina	18.3	5.09
7	Matehuala	3.8	1.05
8	Orizaba	21.0	5.84
9	Zacatecas	5.7	1.58
10	El Fuerte	12.8	3.56

Source: Estadísticas Sociales del Porfiriato, 1877-1910.

Just as some internal towns, such as San Luis Potosí, developed almost entirely because of their role as railroad centers, the port cities also depended on transport functions for much of their development. But the growth of towns and cities everywhere depended to some extent on adequate transport facilities.

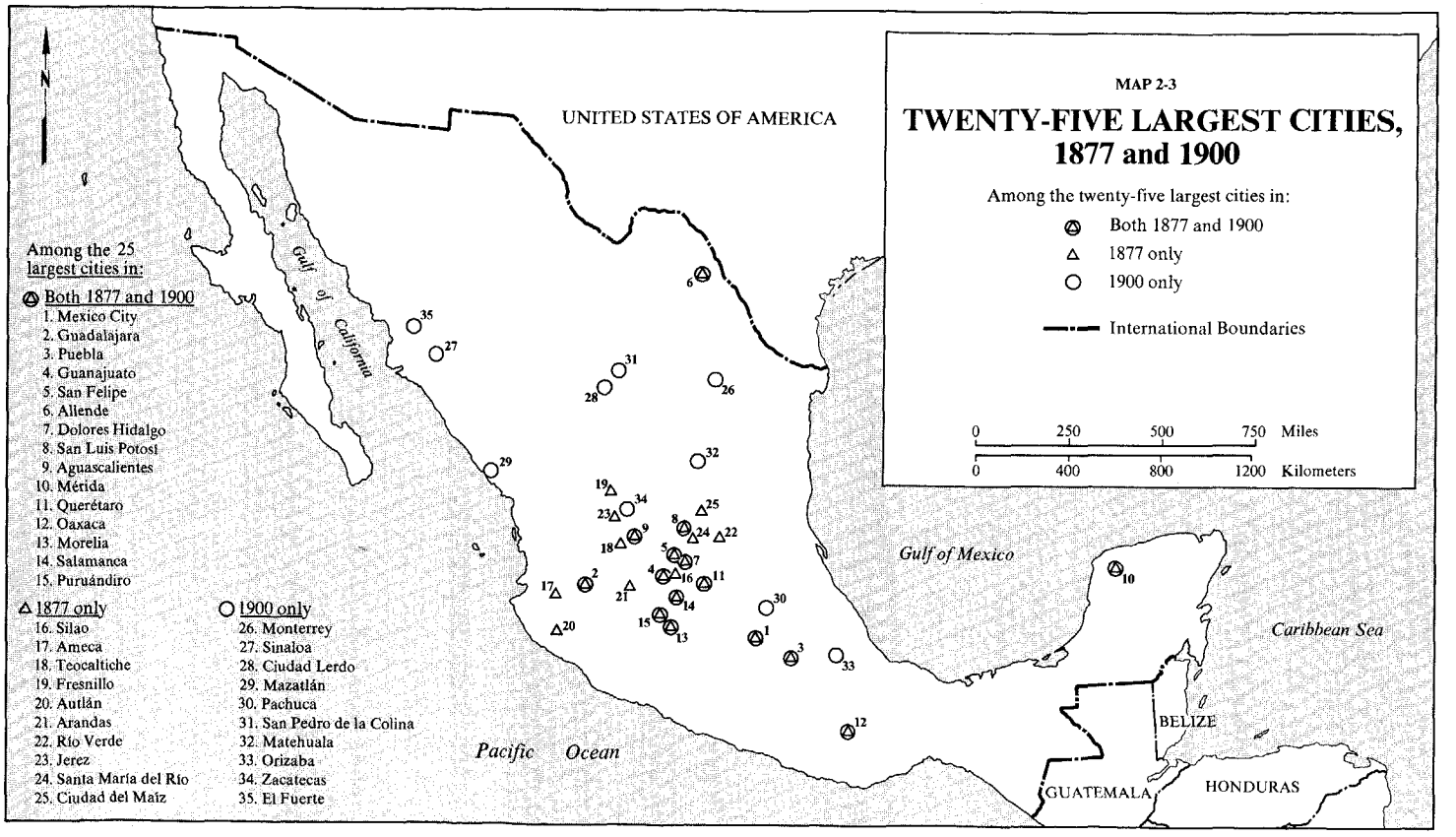
Structure of urban development

By the early twentieth century a number of cities were beginning to develop specialized functions, and the existing transport network facilitated the integration of some of them, despite the fact that this network had been built for other purposes.

The macroeconomic and spatial changes that occurred during the Porfiriato had a lasting effect on the structure of the Mexican urban system. Whereas the largest cities at the beginning of the period were quite different from those at the end, the largest cities in 1900 were to retain their prominence thereafter. Thus, among the cities that were among the country's twenty-five largest in both 1877 and 1900 and that had positive growth rates, all but two (Salamanca and Puruándino) were among the thirty-seven cities that in 1970 had more than 100,000 inhabitants (Table 2-2). Moreover, some of the largest cities in the 1970s were already large in relative terms in 1877—notably Mexico City and Guadalajara, which then, as in 1970, ranked first and second in the urban hierarchy.

The spatial structure of Mexico's twenty-five largest cities in 1877-1900 is shown in Map 2-3. All of the cities that were important in both years were in the center of the country, and all the cities that declined in importance were in a belt stretching west-east from Jalisco to San Luis Potosí. Except for Pachuca and Orizaba, all the cities that first achieved prominence between 1877 and 1900 were in northern Mexico.[6] By contrast, all the cities that declined in importance in this period were in the vicinity of other cities that grew in importance. In the state of Jalisco, for example, there was a heavy concentration of declining cities, but Guadalajara, the second largest city in Mexico, was also there. In the state of Zacatecas, were the city of Zacatecas and two declining cities. In the state of San Luis Potosí, the state capital was a growth center, whereas three other cities declined. All of the growth cities in these states had good railroad connections, but the declining centers did not. Competition between the cities of a region had begun, and was facilitated by

6. The growth of Pachuca in the late 1800s was a consequence of a mining boom in the silver-rich areas around the city. The growth of Orizaba was attributable to its development as a textile town because of the availability of water power and because of its location midway between the port of Veracruz, through which cotton for processing was imported, and the principal market of Mexico City. Most of the capital investment in Orizaba was of French origin.


MAP 2-3
TWENTY-FIVE LARGEST CITIES, 1877 and 1900
Among the twenty-five largest cities in:
Both 1877 and 1900
1877 only
1900 only
International Boundaries
0 250 500 750 Miles
0 400 800 1200 Kilometers
UNITED STATES OF AMERICA
Gulf of California
Gulf of Mexico
Caribbean Sea
Pacific Ocean
BELIZE
GUATEMALA
HONDURAS
Among the 25 largest cities in:
Both 1877 and 1900
1. Mexico City
2. Guadalajara
3. Puebla
4. Guanajuato
5. San Felipe
6. Allende
7. Dolores Hidalgo
8. San Luis Potosí
9. Aguascalientes
10. Mérida
11. Querétaro
12. Oaxaca
13. Morelia
14. Salamanca
15. Puruándiro
1877 only
16. Silao
17. Ameca
18. Teocaltiche
19. Fresnillo
20. Autlán
21. Arandas
22. Río Verde
23. Jerez
24. Santa María del Río
25. Ciudad del Maíz
1900 only
26. Monterrey
27. Sinaloa
28. Ciudad Lerdo
29. Mazatlán
30. Pachuca
31. San Pedro de la Colina
32. Matehuala
33. Orizaba
34. Zacatecas
35. El Fuerte

the discriminatory factor of the railroad network. Cities which lost out at this stage did not recover, whereas most of those which succeeded continued to succeed after the revolution.

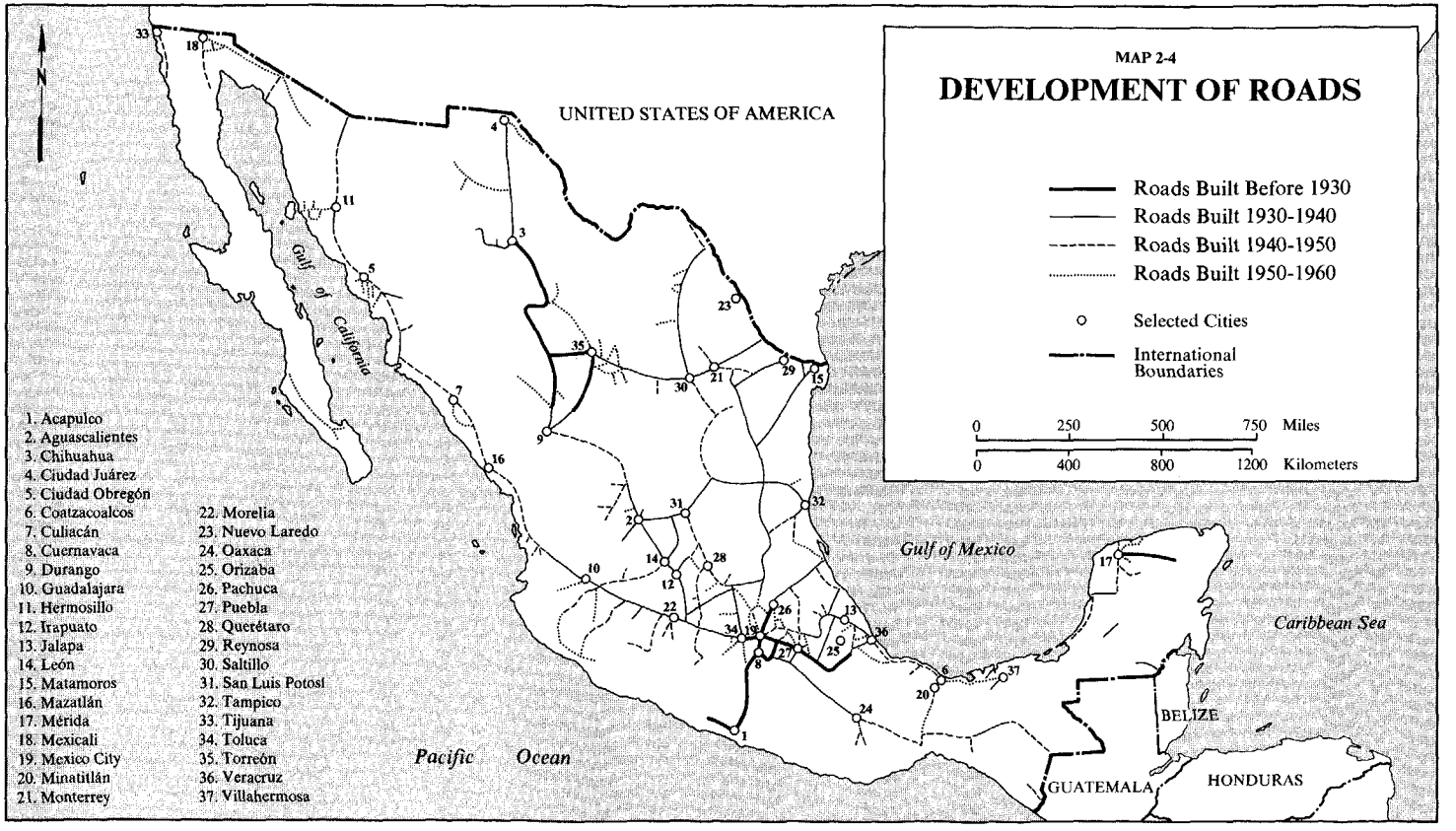
Urban Development from 1910 to 1940

Urban development between 1910 and 1940 was not characterized by the kind of radical changes that occurred during the Porfiriato, and from many points of view this period was one of consolidation and institution building rather than one of new trends. To a large extent, therefore, urban growth consisted of the continued expansion of places that were already relatively large in 1910. The differing rates of development of the transport sector and of the industrial and agricultural sectors were again the crucial determinants in accounting for this pattern.

Dynamics of urban development

Evidence from many countries suggests that, up to a certain stage in the evolution of an urban system, transport developments are the principal stimulants to urban growth and that thereafter other factors become relatively more important. The evidence for Mexico suggests that by 1940 this critical stage had not yet been reached and that transport improvements continued to be the single most important influence on urban demographic and economic growth. But whereas during the Porfiriato, transport developments referred almost exclusively to the railroads, after the revolution other modes, particularly road transport, also began to be important, although the railroads continued to dominate the national transport system.

IMPROVEMENTS IN THE TRANSPORT NETWORK. During the first half of the twentieth century the railroad system remained roughly the same size (see Map 2-2). Railroad operations declined during the revolution, but expanded thereafter as the availability of services continued to exert a large influence on the growth of certain cities. As interregional transport improvements encouraged the growth of large-scale manufacturing, specialized production in a limited number of cities began, and rate competition and freight volume economies became important agglomerating forces. These attracted new manufacturing establishments to favorably located cities and stimulated the expansion of existing plants, thereby diminishing the importance of less favorable locations not on the network. By and large, however, relative advantages and disadvantages conferred by accessibility to the railroad did not alter much after 1910.


MAP 2-4
DEVELOPMENT OF ROADS
Roads Built Before 1930
Roads Built 1930-1940
Roads Built 1940-1950
Roads Built 1950-1960
Selected Cities
International Boundaries
0 250 500 750 Miles
0 400 800 1200 Kilometers
N
UNITED STATES OF AMERICA
Gulf of California
Gulf of Mexico
Caribbean Sea
Pacific Ocean
BELIZE
GUATEMALA
HONDURAS
1. Acapulco
2. Aguascalientes
3. Chihuahua
4. Ciudad Juárez
5. Ciudad Obregón
6. Coatzacoalcos
7. Culiacán
8. Cuernavaca
9. Durango
10. Guadalajara
11. Hermosillo
12. Irapuato
13. Jalapa
14. León
15. Matamoros
16. Mazatlán
17. Mérida
18. Mexicali
19. Mexico City
20. Minatitlán
21. Monterrey
22. Morelia
23. Nuevo Laredo
24. Oaxaca
25. Orizaba
26. Pachuca
27. Puebla
28. Querétaro
29. Reynosa
30. Saltillo
31. San Luis Potosí
32. Tampico
33. Tijuana
34. Toluca
35. Torreón
36. Veracruz
37. Villahermosa

During the Porfiriato the development of railroads and ports was closely related because the railroad network was partly designed to provide access to foreign export markets through the seaports of either coast. Similarly, in the early phases of the development of the road network, there was a close relation between roads and railroads, and the configurations of the national road and railroad networks were similar. The major railroad lines, which by 1910 stretched north and south-west from Mexico City, were complemented after 1920 by the construction of new roads. There was, however, no road from Mexico City to the southeast until the late 1950s, nor were there major east-west connections in either northern or southern Mexico until after 1940. Progress in general was impressive only compared with that before 1910.

Before the revolution there was no such thing as a national highway policy, but during the 1920s a road construction strategy began to emerge. At this time the federal government also established the National Roads Commission to construct and maintain roads and introduced a gas tax system to generate revenue. The road network strategy was meant to develop regional roads between major urban centers and Mexico City. In the 1920s and 1930s road construction was slow because resources were limited, and demand grew slowly. Only 700 kilometers of all-weather roads, most of them in the vicinity of Mexico City, were in service in 1928. But during the next six years the federal government extended the network more than sixfold to 4,260 kilometers (Map 2-4). By 1934, 1,186 kilometers (about 30 percent) of the total system were paved, 1,291 kilometers were surface treated, and 1,768 kilometers were gravel. The first interregional road connected the main ports of the Pacific with the Gulf of Mexico through Mexico City, the road between Mexico City and Acapulco was completed in 1930, and the Veracruz road was finished three years later. Road connections were also built from other regional cities to the nearest ports, such as those from Monterrey to Nuevo Laredo and from Mérida to Progreso.

By 1940 the road network extended almost 10,000 kilometers and connected Mexico City with most of the country's urban centers. A major road had been built from the capital to Nuevo Laredo, and other highways had been extended between Mexico City and Guadalajara and Tepic, Aguascalientes and Zacatecas, and Oaxaca. Even so, only thirty-three of the fifty largest cities in 1940 were linked by the national road network, and the northwest and the southeast had far fewer roads than other areas. Most of the large cities that lacked connections with the national road network by 1940 were located in these regions.

Data on total arrivals in and departures from Mexico's ports show that from 1900 to 1929 the Gulf coast handled almost 70 percent of the country's shipping traffic, and the Pacific coast ports the other third. But by 1940 about a quarter of all cabotage traffic was handled through Veracruz and

another quarter through Coatzacoalcos, where two-thirds of the total volume consisted of exports; Tampico also was used primarily as a port for exports, mostly of oil and related products. Passenger services were relatively unimportant except in Veracruz.

Data for 1940, available for only two Pacific ports, show that Manzanillo handled less than 5 percent of the nation's cargo traffic, that imports made up 80 percent of the total traffic, and that passenger movements were negligible. Mazatlán handled an even smaller share, two-thirds of its total volume consisting of imports.

Domestically, although ports were less significant than railroads or highways in the transport system, they provided the principal mode of transport to such important centers as Acapulco, La Paz, Ensenada, Campeche, and Progreso (Mérida), and maritime transport continued to be the only means of communication to certain areas, notably the Yucatán peninsula.

Compared with the massive changes in the transport system during the Porfiriato, the essential characteristics of the transport system from 1910 to 1940 remained unchanged. Modes of transport on roads, particularly for long-distance movements, were not seriously developed until after 1940. The primary road network was similar to the railroad network, and it added little to the basic land transport network. The railroad and road network in 1940 thus continued to emphasize the relative ease of north-south movement and the difficulties of east-west movement, reflecting both physical geography and the inertia resulting from the pattern of railroad construction during the Porfiriato.

By 1940 three main transport network zones were clearly distinguishable. First, there was the zone comprising the north-central, north-east, and central regions, in which there was a fairly comprehensive network of north-south and east-west routes, with a strong focus on Mexico City. Second, there were the northwest states of Baja California and Sonora, which remained isolated from the rest of the country by the Sierra Madre Occidental. Third, there was the southeast, in particular the Yucatán peninsula, which was also isolated until 1938, when the Yucatán railroad system was linked with the Mexico Central network.[7]

During the Porfiriato, railroad development played an important role in selective urban growth, contributing to the rise of some cities and to the relative decline of others. The evidence concerning changes in relative urban accessibility between 1910 and 1940 strongly suggests that cities which lacked railroad connections at the beginning of the period suffered compared with those located on rail networks. Before the revolution, when most cities were commercial centers, differing accessibility gave those which were relatively well-off in this respect a decisive edge over others. This helps to explain

7. The Sonora-Baja California system was not linked until 1942.

contrasts in urban size and urban growth in 1910 and also to explain the increasing concentration of the urban population through 1940. Mexico City (in particular), Guadalajara, Puebla, Monterrey, and such smaller cities as Aguascalientes were thus all relatively accessible, and all of them grew relatively faster than cities that did not enjoy easy accessibility and that tended to decline in relative size and even in absolute size. For example, Oaxaca and Villahermosa both had about 38,000 inhabitants and a thriving urban economy in 1900. By 1940, Oaxaca had a population of only 29,000, whereas that of Villahermosa had increased to 62,000. There were, of course, other factors—for the most part local—that influenced the growth of these cities, but differences in accessibility were undoubtedly crucial.

Comparison of the sets of the twenty-five largest cities in 1910 and 1940 (Table 2-3) shows that those cities which were in the 1910 list but not in the

Table 2-3. *Population of the Twenty-five Largest Cities, 1910 and 1940*

	1910		*1940*	
Rank	*City*	*Population*	*City*	*Population*
1	Mexico City	629,272	Mexico City	1,827,587
2	Guadalajara	151,376	Guadalajara	274,733
3	Puebla	101,518	Monterrey	206,152
4	Monterrey	98,982	Torreón	160,379
5	León	89,510	Puebla	148,701
6	San Luis Potosí	84,019	Mérida	115,244
7	Morelia	79,679	Tampico	112,428
8	Toluca	76,971	Aguascalientes	104,268
9	Mérida	76,088	León	103,305
10	Aguascalientes	69,319	Toluca	97,962
11	Durango	60,213	San Luis Potosí	97,762
12	Chihuahua	54,000	Culiacán	93,346
13	Saltillo	53,980	Orizaba	83,183
14	Pachuca	53,558	Chihuahua	78,850
15	Irapuato	53,294	Morelia	77,622
16	Veracruz	53,115	Veracruz	75,786
17	Orizaba	52,487	Saltillo	75,721
18	Culiacán	52,668	Querétaro	72,951
19	Querétaro	45,775	Mazatlán	63,298
20	Mazatlán	43,385	Durango	62,170
21	Torreón	43,082	Villahermosa	61,950
22	Villahermosa	39,990	Irapuato	60,646
23	Oaxaca	38,011	Fresnillo	60,088
24	Jalapa	25,433	Pachuca	59,351
25	Cuernavaca	24,398	Ciudad Juárez	55,024

Note: Oaxaca, Jalapa, and Cuernavaca were among the twenty-five largest cities in 1910, but were not among the twenty-five largest in 1940. Fresnillo, Ciudad Juárez, and Tampico were among the twenty-five largest cities in 1940, but not among the twenty-five largest in 1910.

Source: VI Censo General de la Población, 1940 (1942).

later one (Oaxaca, Jalapa, Cuernavaca) either lacked railroad connections (Cuernavaca), were located on relatively unimportant railroads (Oaxaca), or were close to other cities with which they could not successfully compete (Jalapa with respect to Puebla).

Other cities that were easily accessible in 1910 (such as Monterrey, Torreón, Chihuahua, Tampico, Culiacán, and Mazatlán) experienced rapid growth between 1910 and 1940 as economic policies began to affect levels of activity in areas that were fairly distant from the large markets of central Mexico but were well connected with them by the railroads.

Transport improvements and the momentum derived from earlier improvements during the Porfiriato thus had an important effect on urban development between 1910 and 1940. And as the system improved, cities located at strategic intersections began to exploit their comparative advantages and to become major regional centers.

INDUSTRIAL DEVELOPMENT. Economic growth inevitably halted during the revolutionary period, particularly during 1915-16, when armed intervention from abroad was designed to frustrate the revolution. From 1910 to 1921 evidence suggests that GDP rose only slightly (there are no data for intervening years), that manufacturing output probably declined less steeply than before, and that the mining industry suffered a precipitate collapse.[8] Only the petroleum industry, operating in heavily armed, foreign-owned enclaves, appears to have grown in response to the surge of external demand created by World War I. Because the profits of the petroleum industry were spent outside Mexico, this was of little benefit to the economy; indeed, the main domestic effect of the growth of the petroleum industry was that resistance to the revolution was partly financed from its profits.

Because of vigorous foreign antipathy to the revolution and the consequent unavailability of foreign loans, lack of physical security, and the collapse of the banking system, there was virtually no new industrial investment before 1921. In terms of production and investment, the revolutionary period was therefore characterized by economic stagnation and rapid inflation.

Manufacturing expanded during the second half of the 1920s because of the search for higher profits that stimulated the transfer of Mexican capital from the rural to the urban sector. External trade was hampered by strained relations with some of the main industrialized countries, but since Mexico was not unduly dependent on the external sector, the effects of the world economic depression of the early 1930s were relatively short-lived. The

8. The sectoral product fell from 1,537 million pesos to 917 million pesos between 1910 and 1921 (Solís 1970). Gold output declined from 41,400 kilograms to 7,300 kilograms, silver output from 2,400 metric tons to 1,200 metric tons, and lead output from 124 metric tons to 5.7 tons during the period.

collapse of many export markets nevertheless induced a recession in mining, petroleum, and commercial agriculture and an associated decline in domestic income and demand.

Recovery began in 1933, and the 1930s were generally associated with expansion. By 1939 the manufacturing sector was set on a course of steady growth, and other sectors had more than recovered their predepression status. A comparison of real GDP in 1933 and in 1939 shows an average annual growth rate of 5.6 percent. By 1939 the economy in general and the industrial sector in particular were poised to take advantage of the fortuitous conditions that would soon arise in a world at war and to begin a period of sustained growth that had few parallels in the developing world.

Foreign antipathy to postrevolutionary Mexico was one factor that accounted for the diminished size of the external sector. The reversal of the Porfirian emphasis on external trade was another, and the drive to develop a domestic market large enough to absorb the output of domestic industry was yet another. All three factors had a significant effect on the character of industrial and urban development.

The internalization of the development process necessarily affected the existing urban structure. The continued development of a large market in the center of the country, focusing on Mexico City, was one key to this process, and growth in secondary markets was another. The diminished significance of external trade was paralleled by a decline in the relative importance of coastal cities such as Veracruz.

The improved transport system that developed after 1910 facilitated better access to internal markets. This, in turn, favored the location of new manufacturing activities in cities with large market potentials.[9] A more open economic policy that permitted more imports might have slowed the growth of domestic manufacturing and thus slowed the economic growth of certain towns and cities, particularly in the central section of the country. Had this happened, there would probably have been fewer differences between urban growth rates in the center and the periphery, and a less direct relation between market potentials, urban population growth, and urban industrial development.

AGRICULTURAL DEVELOPMENT. The revolution had a large and lasting effect on agriculture. For several years foraging armies seized cattle and crops, and the general mobilization of the countryside made agricultural labor scarce. As a result, the production of some staple foodstuffs declined from the already inadequate levels of the late Porfiriato. The hacienda system was not at first destroyed, only badly damaged, but this fact nevertheless caused the transfer of both labor and capital from rural to urban areas.

9. "Market potential" is a statistical measure of the size of the market that can be served by a given city; it includes market areas both inside and outside the city.

The movement of labor and capital to towns and cities in the 1920s and 1930s was offset by the strengthening of the ejido system, particularly in the Cárdenas administration (1934-40), when a massive program of land reform was carried out. This program was based on Villa's Land Reform Law of 1915 and on Article 127 of the Querétaro Constitution of 1917, which dealt among other things with land tenure. In 1930 the rural communities that had been systematically dispossessed during the Porfiriato held only 13 percent of the total cropland. A decade later their share had risen to 47 percent, and the ejidos contained almost half the rural population (Wilkie 1967). Within six years more than 10 percent of the country's continental area had been designated for eventual redistribution, and the latifundia system was thus destroyed twice as quickly as it had been created under Porfirio Díaz. Although available evidence is inconclusive, the process of accelerated redistribution does not seem to have caused a decline in agricultural output.

One important aspect of the resurgence of the ejido system was that it helped slow migration from rural to urban areas, if only temporarily, and it caused many of those who had already migrated to cities to return to the countryside. The development of large-scale commercial agriculture in the northwest in the 1930s also encouraged a movement back to the countryside, as government policies after the revolution stressed the development of both the rural and urban areas. The drive toward industrialization that began in the 1920s inevitably was focused on the cities, whereas the drive toward agricultural development, particularly after 1930, was both a response to demand and a device to redistribute wealth and welfare. These efforts had the additional, unintended effect of linking the rural and urban areas to a greater extent than ever before.

Structure of urban development

Mexico's population in 1940 was 20.2 million; this compared with 13.6 million in 1900 and implies an average annual rate of increase of 1.0 percent (Table 2-4). On a decennial basis, the growth rate varied from 1.08 percent in 1900-10 to 1.75 percent in 1930-40, with a negative rate—associated with the fact that the revolution claimed about 2.3 million lives—between 1910 and 1920. The overall mortality rate from 1900 through 1940 declined from 34 per 1,000 in 1900 to 23 per 1,000 in 1940. The birthrate from 1900 to 1920 was roughly stable at 31 per 1,000, but had risen to 48 per 1,000 by 1940.

URBAN POPULATION GROWTH. The measurement of urban population growth is complicated by conceptual and methodological problems.[10] If a

10. See Appendix A.

Table 2-4. *Demographic Trends, 1900 to 1940*

Item	*1900*	*1910*	*1921*	*1930*	*1940*
Population (thousands)[a]	13,607	15,160	14,385	17,063	20,244
Birthrate (per thousand of population)[b]	30.5	32.0	31.4	50.8	48.1
Death rate (per thousand of population)[c]	34.5	33.2	25.1	26.6	23.2
Rate of natural increase (percent)	1.60	−0.12	0.63	2.42	2.49
Growth rate (percent) (between census)		1.08	−0.51	1.70	1.75
Life expectancy at birth (years)[d]	n.a.	n.a.	n.a.	36.9	41.5
Gross reproduction rate[e]	n.a.	n.a.	n.a.	3.11	3.06
Age groups (percentage of population)[d]					
0-14	n.a.	n.a.	n.a.	40.9	42.6
15-64	n.a.	n.a.	n.a.	56.2	54.5
65+	n.a.	n.a.	n.a.	2.9	2.9
Dependency ratio	n.a.	n.a.	n.a.	0.78	0.83

n.a. Not available.

a. 1900-21, census results; 1930-40, include corrections made in Colegio de México.

b. 1900-40 Colegio de México estimates.

c. 1900, 1910, and 1921, official figures for 1900-04, 1905-10, and 1921-24; 1930-40, official figures.

d. Population census results.

e. Colegio de México estimates.

Source: El Colegio de México (1970); Cabrera (1966); Colver (1965).

population of 2,500 or more inhabitants is defined as an urban population, Mexico's recorded urban population increased from 4.3 million in 1910 to 6.9 million in 1940. Thus defined, urbanization increased only slightly between 1910 and 1940 relative to total population growth. Alternative definitions of the size of an urban population show, however, that urbanization began to accelerate well before 1940 (Table 2-5). This is most conspicuously true of cities of more than 50,000 inhabitants, but even on the basis of cities of 10,000 or 20,000 the level of urbanization was clearly greater in 1940 than in 1910.

URBAN SIZE DISTRIBUTION. The pattern of urban agglomeration showed clear contrasts in relative growth rates between larger and smaller cities. At the beginning of the 1900s Mexico had only two cities with more than 100,000 inhabitants and only seven with more than 50,000. The total number of urban places—those with 2,000 or more inhabitants—was less than 600, and fewer than 7 percent of the total population lived in cities of more than 50,000 inhabitants (Table 2-6).

Table 2-5. *Size of Urban Population for Different Definitions of the Urban Population, 1910 and 1940*

Size of settlement used to define urban population	*Urban population as percentage of total population*	
	1910	*1940*
2,500	28.70	35.09
5,000	20.00	27.50
10,000	14.42	22.92
20,000	11.00	18.24
50,000	6.29	13.61
100,000	3.90	10.19

Source: VI Censo General de la Población, 1940 (1942).

Table 2-6. *Urban Population as Defined by Urban Size Groups, 1910 and 1940*

Size of settlement used to define urban population	*Number of urban places*		*Population of urban places*		*Percentage of total population*	
	1910	*1940*	*1910*	*1940*	*1910*	*1940*
2,001 -2,500	396	n.a.	1,313,794	n.a.	8.67	n.a.
2,501 -5,000	n.a.	438	n.a.	1,486,648	n.a.	7.56
5,001-10,000	123	165	848,124	1,101,778	5.59	5.61
10,001-20,000	40	55	518,124	757,170	3.42	3.85
20,001-50,000	22	29	714,786	876,281	4.71	4.46
50,001-100,000	5	9	362,845	672,552	2.39	3.42
100,000+	2	4	590,534	2,002,240	3.90	10.19
Total	588	700	4,348,341	6,896,669	28.68	35.09

n.a. Not available.
Source: Iturriaga (1951).

Table 2-7. *Indexes of Urban Primacy, 1900, 1920, and 1940*

Item	*1900*	*1920*	*1940*
Population of Mexico City (P_1)	419,304	755,902	1,827,587
P_1/P_2	4.14	5.12	6.65
P_1/P_2 to P_5	1.31	1.64	2.31
P_1/P_2 to P_{10}	0.78	0.87	1.38
P_1/P_2 to P_{25}	0.44	0.42	0.76

Note: P = place (city); subscript = the number of places (cities).
Source: Based on data from *VI Censo General de la Población, 1940* (1942).

Table 2-8. *Comparison of the Twenty-five Largest Cities, 1900 to 1940*

Initial year	*Number of cities in set*			
	1900	*1920*	*1930*	*1940*
1900	(25)	15	20	18
1920	15	(25)	19	19
1930	20	19	(25)	23
1940	18	19	23	(25)

Source: VI Censo General de la Población, 1940 (1942).

By 1940 there were four cities with more than 100,000 people and thirteen with more than 50,000; these seventeen cities contained almost 14 percent of the national population. The average size of cities with more than 100,000 inhabitants increased from 295,000 in 1910 to 500,000 in 1940.

The population had thus started to become more urbanized and increasingly concentrated in large cities. Table 2-7 illustrates the increasing importance of Mexico City and the increasing primacy of the urban structure. The size distribution of the largest cities in 1900 was such that the index of primacy ranged from 4.14 (for two cities) to 0.44 (for twenty-five cities). By 1940 these indexes had increased to 6.65 (for two cities) and 0.76 (for twenty-five cities), resulting in an increasingly large gap between Mexico City and other cities.

HIERARCHICAL STABILITY. The character of urban growth from 1900 to 1940 suggests that the hierarchy of cities was rather unstable. Although there was a trend toward increased concentration, which meant that many of the same cities became larger over time, a comparison of the membership in the set of the twenty-five largest cities nevertheless reveals a changing composition, as shown in Table 2-8.[11]

When assessed for the ten largest cities in each year, the set was relatively more consistent. This was true to an even greater extent for the five largest cities.

The rank order correlations of the sets of largest cities were low. Consistent with increasing concentration in the largest cities, however, the coefficients of rank-order correlation for the sets of the ten and five largest

11. There was, however, a curious pattern in 1920 and 1930, when fewer of the twenty-five largest places were included in the corresponding sets for these years than in 1940. One possible explanation is that some places grew with unusual speed during and after the revolution but did not sustain rapid growth rates after 1930, whereas other cities, which had been relatively larger in 1900, grew more steadily throughout the period.

Table 2-9. *Growth Rates of Different Cities, 1900 to 1940*

Base year and size of population	*Population in base year*	*Population ten years from base year*	*Compound growth from base year to ten years from base year (percent)*
1900			
20,000-39,999	450,475	667,144[a]	2.0
40,000-59,999	85,116	91,458[b]	0.4
60,000+	381,007	515,290	1.5
Mexico City	419,304	755,902	3.0
1920			
40,000-59,999	431,508	466,062[c]	0.8
60,000-89,999	797,123	511,627[d]	3.5
90,000-150,000	553,469	694,396	2.3
Mexico City	755,902	1,284,957	5.4
1930			
40,000-59,999	343,130	347,316[e]	0.1
60,000-89,999	657,838	759,659	1.5
90,000-149,999	810,315	943,971	1.5
150,000+	214,883	274,733	2.5
Mexico City	1,284,957	1,827,587	3.6
1940			
50,000-99,999	1,175,680	1,549,297	2.8
100,000-249,999	950,477	1,442,683	4.3
250,000+	274,733	440,472	4.8
Mexico City	1,827,587	3,166,933	5.7

n.a. Not available.

a. Population data not available for Celaya, Colima, and Zacatecas in 1920.

b. Population data not available for Guanajuato in 1920.

c. Population data not available for Cholula and San Pedro in 1930.

d. Population data not available for Teluacan, Zacatlán, Huachinango, and Chaletucorunda in 1930.

e. Population data not available for Celaya in 1940.

Source: VI Censo General de la Población, 1940 (1942).

cities in 1910-40 were much higher than those for the sets of the twenty-five largest cities.[12]

Although most of the largest cities at the beginning of the period (Mexico City, Guadalajara, Monterrey, Puebla, and León) were also among the largest cities in 1940, some of the relatively smaller cities failed to grow, and even some of those which were relatively large failed to maintain their relative

12. The coefficients ranged between 0.14 for the sets of the twenty-five largest cities in 1900 and 1940, to 0.5 for the sets of the ten largest cities, to 0.6 for the sets of the five largest cities in the same years. Comparison of the sets of the twenty-five, ten, and five largest cities in 1920 and 1940 yielded higher coefficients: 0.7, 0.8, and 0.9, respectively.

importance (see Table 2-3). There was not, therefore, a close correlation between initial size and subsequent growth through 1940 among the twenty-five largest cities of 1910. The largest places grew faster than the others, however, and Mexico City grew fastest of all (Table 2-9). The coefficient of correlation between the ranks of the largest cities in 1900 and compound average growth rates for the same cities in 1900-40 was relatively low, whereas the coefficient of correlation between the size of the twenty-five largest cities in 1940 and their compound growth rates in 1900-40 was higher. This reflected the dynamism of the existing cities that began to grow after the revolution.

CHAPTER 3

Dynamics of the Modern Urban System

A DECLINING MORTALITY RATE was the underlying reason that Mexico's population grew from 20.2 million in 1940 to 50.4 million in 1970. The average annual growth rate increased from 2.8 percent in 1940-50 to 3.3 percent in 1960-70.[1]

In terms of an urban size threshold of 2,500 inhabitants, the level of urbanization rose from 35 percent in 1940 to about 59 percent in 1970 as shown in Table 3-1. During this period Mexico changed from a predominantly rural society to a predominantly urban one.

The rate of urbanization accelerated rapidly after 1940, but slowed after 1950, although the average rate from 1940 to 1970 was higher than that for any period before 1940. As a result, the growth rates of the national and urban populations gradually began to converge, the acceleration of the national rate coinciding with the deceleration of the urban rate during 1950-70. Although the rate of urban population growth continued to exceed that of national population growth by a substantial margin—4.8 as compared with 3.3 percent in 1960-70 (Table 3-2)—the share of urban population in the increment in the national population declined (72 percent in 1960-70 as compared with 85 percent in 1940-50).

The dynamics of urban growth after 1940 may be analyzed in terms of developments in transport and in the primary, secondary, and tertiary sectors.[2] The conclusions suggest that the relative importance of these factors in determining the course of urban growth differed significantly from earlier periods.

1. The deathrate fell from 23.2 per 1,000 in 1940 to 7.8 per 1,000 in 1970. The birthrate also fell, but more slowly, from 48.1 per 1,000 in 1940 to 43.1 per 1,000 in 1970.

2. The term "primary sector" refers to agriculture; "secondary sector" to the mining, manufacturing, power, and construction industries; and "tertiary sector" to commerce and services.

Table 3-1. *Urbanization, Based on Various Population Thresholds*
(thousands of persons and percent)

Item	*Threshold*			
	2,500	*10,000*	*15,000*	*20,000*
1940				
Population of all cities above threshold	6,896	4,308	3,900	3,551
Percentage of national population above threshold	35.09	22.12	19.50	18.24
1950				
Population of all cities above threshold	10,983	7,452	6,700	6,200
Percentage of national population above threshold	42.59	28.89	25.90	24.04
1960				
Population of all cities above threshold	17,705	12,379	11,200	10,352
Percentage of national population above threshold	50.70	35.45	32.16	29.64
1970				
Population of all cities above threshold	28,309	20,414	18,928	17,005
Percentage of national population above threshold	58.70	42.33	39.25	35.26

Source: 1940, Iturriaga (1951); 1950, *Anuario Estadístico* (1950); 1960, *VIII Censo General de la Población, 1960* (1962); 1970, *IX Censo General de la Población, 1970* (1972); and 15,000 threshold data, El Colegio de México (1970).

Transport and Urban Development

The links between transport development and urban development after 1940 can best be understood against the background of physical and technological changes in the transport system. This section reviews the evolution of each of the principal transport subsectors and assesses their importance for urban change.

Railroads

The size of the railway system was reduced from 23,000 kilometers in 1940 to 19,900 in 1970, although both its equipment and its operations were significantly improved. Steam locomotives were phased out in favor of diesels, all tracks were laid to a standard gauge, telecommunications systems were modernized, and the number of freightcars was substantially increased.

The most important change was the unification of all the railroad companies (except those of the Sonora-Baja California and Southern railroads)

Table 3-2. *National and Urban Population, Absolute Growth, and Average Annual Growth Rates, 1940 to 1970*

Item	*Year or decade*			
	1940	*1950*	*1960*	*1970*
Population (thousands)				
Mexico, total	19,654	25,791	34,923	50,417
Urban, 2,500+	6,896	10,983	17,705	28,309
Urban, 10,000+	4,308	7,452	12,379	20,414
Urban, 15,000+	3,900	6,700	11,200	18,928
Urban, 20,000+	3,551	6,200	10,352	17,005
Absolute population growth (thousands)	*1940-50*	*1950-60*	*1960-70*	
Mexico, total	6,138	8,952	13,302	
Urban, 2,500+	4,087	6,722	10,604	
Urban, 10,000+	3,144	4,927	8,035	
Urban, 15,000+	2,800	4,500	7,728	
Urban, 20,000+	2,649	4,152	7,052	
Average annual rate of population growth (percent)	*1940-50*	*1950-60*	*1960-70*	
Mexico, total	2.8	3.1	3.3	
Urban, 2,500+	4.8	4.9	4.8	
Urban, 10,000+	5.6	5.2	5.1	
Urban, 15,000+	5.6	5.3	5.4	
Urban, 20,000+	5.7	5.3	5.3	

Source: VI Censo General de la Población, 1940 (1942); *VII, 1950* (1952); *VIII, 1960* (1962), and *IX, 1970* (1972).

into the National Railway of Mexico in 1960. The new entity thus became responsible for more than 80 percent of the total railroad network. Because no new lines were constructed after 1940, there were no significant changes in the spatial distribution of railroad facilities (see Map 2-2).

Between 1940 and 1960 freight traffic increased an average of 3.3 percent a year. It reached over 9.5 billion ton-kilometers in 1959 and was increasingly confined to bulk commodities such as agricultural, mineral, and forest products. Passenger traffic increased only 2.3 percent a year, rising to a total of 7 billion passenger-kilometers in 1960.

After 1940 there was a decline in demand for rail freight and passenger services that was closely linked to the development of highways and commercial aviation, since the railroad system did not have a clearly defined function in relation to these competing modes of transport. For freight traffic, for example, the status of the railroads was diminished by highway and pipeline development. An Eximbank survey reported in 1951 that, in all but one instance where an all-weather highway had been built parallel to a railway after 1946, railroad freight traffic had either leveled off or diminished the year the highway was put into service. During the five years from 1946

to 1950 railroad freight activity grew by only 15 percent—a much lower rate of growth than in the previous five-year period, when freight traffic had risen by 25 percent.

After 1960, however, the rail system became more important in the transport system. Freight traffic increased from 13 million ton-kilometers in 1961 to 18 million in 1966, and by 1970 the railroads were carrying more than 20 million ton-kilometers a year, although passenger services increased by only 35 percent, from 30 million passenger-kilometers in 1966 to 46 million in 1971.

There are no data on interregional railroad traffic patterns before 1970, but interregional origin and destination data for 1970 (Table 3-3) reveal that railroad traffic (unlike road or air traffic) was rather evenly distributed throughout the country and was not concentrated around and between the large metropolitan centers. In 1970 the entire system carried over 49 million tons of freight, of which only 7.7 percent (3.8 million freight tons) terminated in the Federal District. Monterrey received 1.8 million tons and Guadalajara about 0.9 million tons, less than 2 percent of the national total.

The pattern also suggests that by 1970 railroads were mainly used to ship bulky commodities over long distances. Most freight coming into large urban centers such as the Federal District originated in remote industrial towns or in major ports.[3] Ten of the forty-nine cities shown in the matrix in Table 3-3 generated more than 77 percent of the total traffic, 2.9 million tons out of a total of 3.8 million tons. There was heavy traffic between medium-size industrial cities such as Monclova, Ciudad Obregón, Tampico, Torreón, and Toluca, some of which were located close to metropolitan cities and thus served as centers in which bulky commodities were broken down before being transported to the main urban markets.

Roads

During the 1940s and 1950s the largest portions of road investment were allocated to new intercity roads and to physical improvements, such as pavement, realignment, and safety (see Map 2-4). Improvements in the original system built in the early 1930s were needed because of the increased volume of traffic and the improvement of vehicles after 1950. By the 1950s there were more than 25,000 kilometers of all-weather roads in Mexico, about 15,000 kilometers of which were equipped with two paved lanes. There were 23,000 kilometers of roads with some kind of surface treatment (Table 3-4).

3. The Federal District received the largest amounts of freight from Veracruz (800,000 metric tons), Nuevo Laredo (580,000 metric tons), Monclova (350,000 metric tons), Ciudad Obregón (241,000 metric tons), Matamoros (205,000 metric tons), Progreso (175,000 metric tons), and Ciudad Juárez (135,000 metric tons).

Table 3-3. *Origin and Destination of Railroad Cargo Traffic between Principal Cities, 1970*
(number of trips)

Origin and destination	*Aguas-calientes*	*Campe-che*	*Ciudad Hidalgo*	*Ciudad Juárez*	*Ciudad Obregón*
Aguascalientes	–	60	–	29	5
Campeche	–	–	–	–	–
Ciudad Hidalgo	–	–	–	–	–
Ciudad Juárez	750	423	384	42	1,863
Ciudad Obregón	8,229	2,488	–	11,666	280
Ciudad Victoria	52	–	–	–	–
Coatzacoalcos	1,791	135	–	203	1,727
Colima	3,196	–	–	–	–
Cuernavaca	–	–	249	14	53
Culiacán	101	–	–	661	3,942
Chihuahua	366	32	–	29,808	4,020
Durango	93	–	–	4,452	25
Federal District	1,042	2,591	1,757	5,153	6,416
Guadalajara	462	–	202	2,300	8,658
Guanajuato	–	–	–	–	–
Guaymas	2	–	–	–	45,553
Hermosillo	2,033	562	–	768	1,457
Irapuato	3,934	–	–	502	1
Jalapa	–	–	–	–	–
León	447	–	–	11	119
Manzanillo	3,449	50	–	208	846
Matamoros	4,782	–	2,290	5,311	823
Mazatlán	1	30	–	958	1,704
Mérida	–	–	–	1,595	–
Mexicali	1,175	709	15	538	1,285
Monclova	2,218	–	1,405	1,719	5,812
Monterrey	254	734	2,083	3,292	1,683
Morelia	20	–	–	2,869	–
Naco	–	–	–	–	–
Nogales	–	–	–	27	9,377
Nuevo Laredo	3,019	–	1,682	2,091	76
Oaxaca	–	–	–	1,077	–
Ojinaga	105	–	–	25	2,912
Pachuca	–	–	–	1,017	–
Piedras Negras	1,137	–	2,425	1,826	–
Progreso	–	–	–	–	–
Puebla	46	–	335	43	34
Querétaro	130	–	396	290	342
Reynosa	98	–	–	446	–
Salamanca	21,557	70	278	167	–
Salina Cruz	–	–	–	100	–
Saltillo	187	43	1,665	79	15
San Luis Potosí	5,008	117	–	412	555
Tampico	362	–	–	3,570	6,951
Tepic	–	–	–	–	11
Toluca	106	–	–	–	–
Torreón	773	–	82	5,823	925
Veracruz	362	18	52	314	123
Zacatecas	101	–	–	4	–

Ciudad Victoria	*Coatza-coalcos*	*Colima*	*Cuerna-vaca*	*Culia-cán*	*Chihua-hua*	*Durango*	*Federal District*
1	1	2	–	13	18	130	2,569
–	–	–	–	–	20	–	879
–	–	–	–	–	–	–	–
31	–	129	507	7,830	56,743	114	135,064
101	–	–	3,008	1,865	6,954	787	241,576
–	–	–	–	493	–	46	129
20	9,416	105	–	4,380	22	31	104,786
111	4,981	–	–	–	–	–	15,732
–	–	–	–	18	30	–	2,173
–	552	15	–	191	15,403	124	31,072
6,344	16	–	–	2,593	30,499	85	3,683
–	32	–	–	48	130	87	2,684
399	4,966	133	35,513	4,225	1,865	773	296,717
188	181	16,473	41	7,887	4,502	–	45,466
–	–	–	38	–	–	–	1,044
71	–	–	–	12,013	10	–	3,649
–	20	12	1,271	302	2,915	690	136,977
–	25	–	544	–	141	171	16,348
–	2	–	–	–	–	–	133
–	–	–	–	132	–	2	843
51	62	23,895	4,386	274	75	1,221	33,830
1,856	96	–	1,502	1,149	8,186	1,110	205,960
36	159	528	–	32,235	4,639	2,485	2,519
947	40	–	–	618	–	–	9,376
55	–	–	1,117	5,012	15,133	316	47,332
191	213	2,018	78	10,758	347	2,731	347,262
569	7,977	18	3,277	1,674	2,703	828	186,318
–	–	–	–	1,486	73	1	1,016
–	–	–	–	–	–	–	1
–	–	–	–	452	–	–	29
160	14,493	26	2,294	–	8,331	4,286	579,771
–	–	–	71	–	18	–	4,534
–	–	11	–	1,967	19,991	71	2,620
–	–	–	–	–	–	–	29,523
–	–	–	–	–	4,445	501	175,743
–	–	–	–	–	–	–	992
–	1	41	–	202	7	6	2,469
–	347	1	16	239	60	–	73,122
–	169	106	787	–	209	59	4,308
210	50	12,626	2,162	5,664	24,442	11,065	105,779
–	682	–	353	–	–	–	9,766
97	–	2	6	28	68	31	8,569
30	1	–	53	9	72	169	6,272
2,748	279	89	1,268	1,924	34,439	20,561	50,397
–	–	–	1	–	–	–	5,081
–	–	–	–	5	–	–	10,793
246	458	–	–	285	3,756	45,765	17,246
504	1,887	304	6,266	52	226	31	801,546
–	–	–	–	100	75	3	942

(Table continues on the following pages)

Table 3-3 (*continued*)

Origin and destination	*Guadalajara*	*Guanajuato*	*Guaymas*	*Hermosillo*	*Irapuato*
Aguascalientes	–	5	3	19	18
Campeche	49	–	–	–	–
Ciudad Hidalgo	–	–	–	–	–
Ciudad Juárez	65,183	27	502	17	373
Ciudad Obregón	49,271	–	5,312	645	2,402
Ciudad Victoria	55	–	–	–	–
Coatzacoalcos	28,443	–	–	604	3,157
Colima	2,041	–	–	–	89
Cuernavaca	640	–	99	122	–
Culiacán	76,364	–	993	5,695	431
Chihuahua	371	–	457	1,988	23
Durango	179	–	15	114	4
Federal District	36,064	72	1,189	6,970	5,146
Guadalajara	48,000	253	3,161	10,258	1,540
Guanajuato	–	–	–	–	–
Guaymas	33,520	–	1	26,762	–
Hermosillo	52,357	–	6,388	356	1,081
Irapuato	1,937	26	–	–	1,310
Jalapa	–	–	–	–	–
León	29	1,437	40	250	65
Manzanillo	93,396	–	–	–	4,654
Matamoros	17,842	–	–	1,618	2,114
Mazatlán	6,539	–	475	558	–
Mérida	1,765	–	–	–	–
Mexicali	24,877	–	51,494	11,278	1,037
Monclova	17,457	–	252	550	3,823
Monterrey	21,091	93	579	2,651	133
Morelia	723	–	1	–	8
Naco	5	–	1	–	–
Nogales	15,073	–	5,055	16,908	–
Nuevo Laredo	47,134	–	658	25	1,027
Oaxaca	982	–	1	–	114
Ojinaga	34	–	64	276	75
Pachuca	–	–	–	–	–
Piedras Negras	1,680	–	–	–	183
Progreso	–	–	–	–	–
Puebla	802	22	32	57	54
Querétaro	36,207	–	94	218	71
Reynosa	18,505	–	–	–	221
Salamanca	166,058	156	398	615	3,059
Salina Cruz	–	–	–	–	–
Saltillo	8,417	35	2	22	25
San Luis Potosí	1,323	10	58	215	1,973
Tampico	3,590	–	212	8,323	27
Tepic	15,556	–	83	28	4,497
Toluca	1	–	1	2	26
Torreón	4,233	–	624	564	2,530
Veracruz	72,107	–	25	592	589
Zacatecas	128	–	–	–	321

Jalapa	*León*	*Manzanillo*	*Matamoros*	*Mazatlán*	*Mérida*	*Mexicali*
–	4,722	122	1,766	9	1,622	15
–	–	–	–	–	–	–
–	–	–	13,946	–	–	–
–	10	–	–	1,182	143	46
–	4,764	–	201	4,248	316	1,287
–	51	–	–	–	–	–
95	270	50	125	78	104	151
–	104	36,218	–	–	–	100
–	–	16	12	1	–	25
–	219	–	91	55,765	–	2,281
–	1	85	45	192	338	6,939
–	4,296	–	569	592	23	42
1,551	3,448	3,329	710	8,433	17,091	16,550
38	1,947	10,300	58	8,341	287	15,950
–	–	–	–	–	–	–
–	–	–	–	1,955	–	85
–	1,900	–	45	2,097	2,276	12,016
–	5,899	121	318	1	485	674
–	–	–	–	–	–	–
52	120	–	–	62	–	112
–	721	15	–	–	275	416
–	5,786	–	–	–	711	–
–	–	197	151	60	170	3,981
–	–	–	704	–	–	3,493
–	1,068	–	20	106	–	–
–	302	–	19,747	237	243	2,523
432	394	9,676	1,532	273	3,008	13,596
–	3	768	1	103	60	74
–	–	–	–	–	–	–
–	–	–	–	233	–	39
–	5,268	123	645	18	1,616	15
103	–	–	130	–	119	392
–	32	–	95	36	–	41
–	–	–	–	–	172	–
–	2,126	–	–	–	–	–
–	–	–	–	–	–	–
–	184	1,982	76	71	5,210	58
–	105	44	–	105	43	649
–	428	175	468	1,395	53	–
–	5,086	34,046	40	1,415	551	819
26	–	–	–	–	10,078	–
11	102	1,698	238	27	109	1,027
–	436	128	66,905	20	3,050	269
–	25	168	517	752	–	101
–	–	53	–	10,850	–	235
–	1	37	73	3	–	602
–	286	–	7,600	85	261	782
51,079	704	118	865	367	2,430	219
1	–	–	13,762	–	–	–

(Table continues on the following pages)

Table 3-3 (*continued*)

Origin and destination	*Monclova*	*Monterrey*	*Morelia*	*Naco*	*Nogales*
Aguascalientes	–	45	–	–	–
Campeche	–	–	–	–	–
Ciudad Hidalgo	–	–	–	–	–
Ciudad Juárez	1	89	605	–	68
Ciudad Obregón	42,495	10,943	5,551	–	714
Ciudad Victoria	–	878	–	–	–
Coatzacoalcos	1,875	8,927	1,771	–	–
Colima	150	107	54	–	–
Cuernavaca	23	774	–	–	–
Culiacán	–	190	484	3	54,322
Chihuahua	31	528	40	–	16
Durango	11, 726	579,092	–	–	–
Federal District	6,480	14,676	7,507	15	14
Guadalajara	10,165	1,939	251	10	4,270
Guanajuato	–	52	–	–	–
Guaymas	1,830	2	2,010	276	45
Hermosillo	1,356	7,574	2,506	263	5,387
Irapuato	126	3,613	1,385	–	–
Jalapa	–	1	–	–	–
Léon	–	1	73	–	4
Manzanillo	–	39,630	7,783	–	–
Matamoros	3,455	150,665	1,015	–	–
Mazatlán	–	1	492	–	584
Mérida	–	380	–	–	–
Mexicali	1,054	4,069	1,333	–	462
Monclova	90,158	71,193	1,066	–	–
Monterrey	24,176	122,684	542	1	5
Morelia	1	1,101	–	–	1
Naco	–	–	–	–	238
Nogales	–	–	–	–	3,059
Nuevo Laredo	85	665,065	1,746	–	–
Oaxaca	–	6	–	–	2
Ojinaga	–	1,679	47	–	–
Pachuca	97	–	–	–	–
Piedras Negras	544,276	30,808	–	–	–
Progreso	–	–	–	–	–
Puebla	277	4	39	–	1
Querétaro	–	3,260	–	–	–
Reynosa	24,027	17,899	–	–	–
Salamanca	197	5,968	16,171	–	–
Salina Cruz	–	–	–	–	–
Saltillo	32,196	124	57	–	13
San Luis Potosí	336	407	2,030	–	1
Tampico	38,447	62,238	433	–	–
Tepic	–	457	1	–	2
Toluca	–	657	119	–	–
Torreón	885	3,522	484	–	–
Veracruz	25	12,323	207	–	–
Zacatecas	–	804	–	–	–

Nuevo Laredo	*Oaxaca*	*Ojinaga*	*Pachuca*	*Piedras Negras*	*Progreso*	*Puebla*
599	–	–	4	363	–	31
–	–	–	–	–	–	–
3,386	–	–	–	–	–	–
4,960	–	45	1	–	–	3,869
6,239	3,424	20	6,411	809	–	76,182
52	–	–	–	–	–	–
850	10,069	–	131	–	–	2,842
217	–	–	–	293	–	–
1,248	–	–	–	–	–	152
906	–	2,358	–	152	–	20
320	435	–	–	175	–	–
662	–	–	–	4,550	–	–
22,183	8,271	45	95,873	2,121	–	79,971
1,039	83	23	–	7	–	299
–	–	–	760	–	–	–
–	–	–	50	–	–	1,113
116	1,581	–	1,906	–	–	29,971
6,399	–	–	4	46	–	6,819
–	–	–	–	–	–	4
5	–	–	–	–	–	–
–	1,116	–	616	–	–	546
2,076	–	–	106	562	–	4,863
53	–	–	–	–	–	23
6,980	105	–	–	–	–	100
1,707	–	22	7,722	18	–	35,225
354	–	147	227	242,336	–	1,433
53,652	303	1,724	303	6,124	–	5,868
3,587	–	–	–	–	–	43
–	–	–	–	–	–	–
–	–	–	–	–	–	–
351	49	–	96	208	–	6,435
270	5	–	–	1	–	2,136
–	19	–	54	–	–	554
–	–	–	–	3,801	–	–
32	–	–	–	1,619	–	123
46	–	–	–	–	–	–
1,364	4,253	–	315	69	–	320
5	–	46	–	–	–	742
87	–	–	–	162	–	25
1,188	362	–	2,964	49	–	3,993
–	–	–	–	–	–	81
1,521	6	–	10	226	–	1,962
10,805	–	20	1	78,554	–	1
155	3,377	–	498	8,599	–	738
337	–	–	–	–	–	–
5,808	313	–	–	–	–	164
775	1,251	840	303	603	–	1,607
1,477	20,029	–	6,955	3,540	–	124,765
40	–	–	–	2,167	–	–

(Table continues on the following pages)

Table 3-3 (*continued*)

Origin and destination	*Queré-taro*	*Reynosa*	*Sala-manca*	*Salina Cruz*	*Sal-tillo*
Aguascalientes	14	1	96	–	142
Campeche	–	–	–	220	–
Ciudad Hidalgo	–	–	–	–	–
Ciudad Juárez	28	19	9,099	–	–
Ciudad Obregón	21,713	94	20	–	15,659
Ciudad Victoria	–	–	65	–	–
Coatzacoalcos	2,042	1,180	7,698	1,960	50
Colima	–	8,499	–	526	372
Cuernavaca	–	–	–	–	–
Culiacán	–	–	13	–	–
Chihuahua	1	63	–	–	2
Durango	39	252	233	–	8
Federal District	22,451	3,124	27,673	217	472
Guadalajara	8,650	6	5,764	–	12
Guanajuato	–	–	–	–	–
Guaymas	–	–	7	–	–
Hermosillo	2,779	109	100	–	6,548
Irapuato	2,727	1	1,023	–	139
Jalapa	–	–	–	–	–
León	2,676	–	46	–	–
Manzanillo	5,390	–	1,430	–	1,710
Matamoros	7,507	22,867	847	325	8,793
Mazatlán	231	–	30	37	–
Mérida	–	–	123	311	–
Mexicali	1,963	–	12	–	5,304
Monclova	3,353	11	13,478	–	1,440
Monterrey	12,459	3,119	324	–	57,589
Morelia	334	–	199	–	18
Naco	–	–	–	–	–
Nogales	–	–	–	–	–
Nuevo Laredo	7,266	2,244	35,010	215	25,327
Oaxaca	–	1	–	–	4
Ojinaga	30	–	–	–	96
Pachuca	61	–	–	–	–
Piedras Negras	193	–	5	–	24,412
Progreso	1	–	–	–	–
Puebla	–	62	7	1	28
Querétaro	15,995	1	1,768	–	49
Reynosa	–	–	261	–	13,127
Salamanca	29,877	–	4,312	41	40
Salina Cruz	–	–	–	–	–
Saltillo	34	5	92	–	416
San Luis Potosí	130	–	860	–	13,910
Tampico	321	677	1,171	–	1,929
Tepic	–	–	–	–	–
Toluca	74	3	–	–	–
Torreón	7	5,299	136	49	558
Veracruz	2,661	10,573	1,273	3,495	1,014
Zacatecas	–	–	–	–	1

Source: National Railroads of Mexico, "Informe E-2" (1970) and Pacific Railroad, "Informe 92Y" (1970).

San Luis Potosí	*Tampico*	*Tepic*	*Toluca*	*Torreón*	*Vera-cruz*	*Zaca-tecas*
124	6	4	1	289	–	288
8	–	–	–	–	–	–
–	–	–	–	618	–	–
2,814	837	2,667	1,536	2,514	1,146	260
592	–	1,131	25,519	14,936	1,020	1,873
1	82	–	–	–	–	–
716	2,511	1,603	822	2,169	1,227	416
1,109	961	–	–	110	–	–
–	–	1	13	52	116	–
115	–	89	100	3,055	897	–
245	9,000	2	–	2,154	–	52
156	672	–	–	570	15	386
9,390	5,475	1,702	198,843	3,961	15,915	640
3,025	459	13,855	183	4,880	2,631	648
–	–	–	–	–	–	–
112	–	–	–	349	–	–
193	–	2,716	15,560	5,144	300	531
439	106	236	1,823	214	73	133
5	–	–	–	–	8,849	–
46	–	41	18	–	–	7
3,469	184	–	2,765	1,537	35	253
4,043	3,454	1,780	8,853	23,423	1,477	–
5	–	12,094	–	–	2	–
–	1	–	38	1,612	–	–
729	205	–	8,550	3,656	1,909	412
2,817	2,969	342	52	12,813	3,871	1,218
14,895	8,835	84	14,126	22,509	1,008	–
70	1,766	1	9	47	–	5
–	–	–	–	–	–	–
–	–	1	1	–	–	–
11,164	9,118	61	23,921	21,407	26,421	74
320	–	–	–	3,640	1,061	–
19	–	–	–	11,187	–	–
15	–	–	–	33	172	1
–	549	–	209	7,774	13,315	–
–	–	–	–	–	–	–
116	329	75	888	3	9,622	1
147	1,026	21	28	311	275	–
303	2,449	–	107	2,178	264	483
45,181	417	3,542	35,676	34,572	113	19,927
–	–	–	–	–	972	–
8,911	240	17	–	772	30	–
10,324	138,337	33	31	126	215	2,946
66,085	7,552	–	470	52,353	18,998	6
–	–	31	216	–	29	–
48	–	1	–	1,479	64	–
6,661	24,172	57	76	68,327	–	42,345
21	685	101	16,803	3,198	287,776	–
–	3,488	–	–	49	45	–

Table 3-4. *Road Inventory, Classified by State and Region, 1934 to 1970*
(kilometers)

Region and state	1934-38 Total length	1934-38 Surfaced	1934-38 Dirt
Northwest			
Baja California	461	127	334
Baja California (Territory)	126	114	12
Sonora	870	370	500
Sinaloa	279	56	223
Regional total	1,736	667	1,069
North-central			
Chihuahua	536	404	132
Durango	590	217	373
Zacatecas	1,426	1,207	219
San Luis Potosí	756	316	440
Aguascalientes	18	16	2
Regional total	3,326	2,160	1,166
Northeast			
Coahuila	807	409	398
Nuevo León	918	690	228
Tamaulipas	1,168	564	604
Regional total	2,893	1,663	1,230
Southwest			
Nayarit	76	28	48
Jalisco	644	403	241
Colima	79	11	68
Michoacán	2,775	270	2,505
Guerrero	547	194	353
Regional total	4,121	106	3,215
Central			
Guanajuato	401	51	350
Querétaro	525	80	445
Hidalgo	653	292	361
México	1,182	250	932
Federal District	304	282	22
Morelos	304	230	74
Puebla	687	348	339
Tlaxcala	322	52	270
Regional total	4,378	1,585	2,793
Southeast			
Oaxaca	1,043	3	1,040
Chiapas	551	24	527
Veracruz	387	204	183
Tabasco	529	15	514
Campeche	24	15	9
Yucatán	365	306	59
Quintana Roo	n.a.	n.a.	n.a.
Regional total	2,899	567	2,332
National total	19,353	7,548	11,805

1940			*1953*		
Total length	*Surfaced*	*Dirt*	*Total length*	*Surfaced*	*Dirt*
634	283	351	832	832	0
269	135	134	757	413	344
1,893	772	1,121	1,129	1,011	118
775	321	454	902	851	51
3,571	1,511	2,060	3,620	3,107	513
958	840	118	1,209	1,153	56
1,432	761	671	1,205	1,189	16
1,532	1,203	329	584	572	12
1,190	572	618	1,218	1,154	69
63	63	0	282	282	0
5,175	3,439	1,736	4,498	4,350	148
1,150	826	324	1,442	1,354	88
1,094	787	307	818	884	14
1,333	904	429	1,193	1,023	170
3,577	2,517	1,060	3,533	3,261	272
318	125	193	575	519	76
1,143	805	338	1,730	1,626	104
171	74	97	215	212	3
3,093	717	2,376	1,161	1,096	65
730	489	241	632	475	157
5,455	2,210	3,245	4,333	3,928	405
717	308	409	741	622	119
579	226	353	230	221	9
830	576	254	1,058	985	73
1,869	366	1,503	797	715	82
334	310	24	63	63	0
431	357	74	512	476	36
1,041	617	424	1,080	1,008	72
398	80	318	401	401	0
6,199	2,840	3,359	4,852	4,491	391
1,126	24	1,102	1,009	918	91
559	247	312	798	766	32
688	433	255	1,560	1,443	117
591	33	558	239	200	79
82	54	28	310	292	18
482	363	119	352	324	28
28	28	0	112	82	30
3,556	1,182	2,374	4,420	4,025	395
27,533	13,699	13,834	25,286	23,162	2,124

(Table continues on the following page)

Table 3-4 (*continued*)

Region and state	1960 Total length	1960 Surfaced	1960 Dirt	1969 Total length	1969 Surfaced	1969 Dirt
Northwest						
Baja California	1,222	1,201	21	1,366	1,313	53
Baja California (Territory)	1,561	338	1,223	922	794	128
Sonora	2,733	2,638	95	3,579	3,399	180
Sinaloa	1,924	1,593	331	2,331	1,753	578
Regional total	7,440	5,770	1,670	8,198	7,259	939
North-central						
Chihuahua	1,889	1,677	212	2,789	2,511	278
Durango	1,759	1,736	23	2,144	2,063	81
Zacatecas	1,115	1,100	15	2,471	2,370	101
San Luis Potosí	1,592	1,288	304	2,160	1,874	286
Aguascalientes	534	484	50	673	633	40
Regional total	6,889	6,285	604	10,237	9,451	786
Northeast						
Coahuila	2,544	2,248	296	2,907	2,828	79
Nuevo León	1,788	1,676	112	2,487	2,298	189
Tamaulipas	1,960	1,646	314	2,586	2,530	56
Regional total	6,292	5,570	722	7,980	7,656	324
Southwest						
Nayarit	921	898	23	1,224	1,164	60
Jalisco	2,173	1,706	467	3,256	3,031	225
Colima	363	309	54	493	473	20
Michoacán	2,486	1,995	491	3,449	3,045	404
Guerrero	1,625	840	785	2,478	2,004	474
Regional total	7,568	5,748	1,820	10,900	9,717	1,183
Central						
Guanajuato	1,435	1,155	280	2,527	2,443	84
Querétaro	427	401	26	1,006	940	66
Hidalgo	1,526	1,406	120	2,381	2,010	371
México	2,068	1,736	332	3,069	2,674	395
Federal District	50	50	0	51	51	0
Morelos	595	541	54	843	819	24
Puebla	1,428	1,257	171	2,329	2,127	202
Tlaxcala	366	311	55	679	465	214
Regional total	7,895	6,857	1,038	12,885	11,529	1,356
Southeast						
Oaxaca	1,752	1,495	257	4,138	3,049	1,089
Chiapas	1,824	1,315	509	2,952	2,651	301
Veracruz	2,406	2,143	263	5,041	4,705	336
Tabasco	829	682	147	2,536	2,243	293
Campeche	837	671	166	1,189	1,085	104
Yucatán	1,008	936	72	1,628	1,471	157
Quintana Roo	349	219	130	813	577	236
Regional total	9,005	7,461	1,544	18,297	15,781	2,516
National total	45,089	37,691	7,398	68,497	61,393	7,104

n.a. Not available.

Source: Ministry of Public Works; *VI Censo General de la Población, 1940* (1942); *VII, 1950* (1952); *VIII, 1960* (1962); and *IX, 1970* (1972).

Table 3-5. *Road Density Index, by Region, 1930 to 1970*

Region	*Area (thousands of kilometers)*	*Road density (thousands of kilometers per thousand square kilometers)*				
		1930	*1940*	*1950*	*1960*	*1970*
Northwest	385	4.5	9.2	9.4	19.3	21.3
North-central	511	6.5	10.0	8.8	17.5	20.0
Northeast	292	9.9	12.2	12.1	21.5	27.3
Southwest	237	17.3	23.0	18.2	31.9	45.9
Central	128	34.2	48.4	38.1	61.6	100.6
Southeast	366	7.9	9.7	12.0	24.6	49.9

Source: Anuario Estadístico (1930) and Ministry of Public Works.

The main developments in the network generally emphasized the existing pattern. The three largest highways from Mexico City to the northern border, the principal transverse roads, and many local branch roads followed the routes of existing railroads, despite the fact that national highway policy was supposed to stress roads to locations that were served inadequately or not at all by the railroad network. As a result, a number of large towns were still not integrated into the road or railroad networks in 1950.

During this period, however, new north-south roads were built from Ciudad Juárez to Mexico City, from Nogales to Mexico City, and from Mexico City to the Guatemalan border through Tuxtla Gutiérrez, linking the northern and southern borders for the first time. Another important achievement was the completion of a new highway between Villahermosa and the Yucatán, completing the link between Mexico City and the southeast, and a new road from Saltillo to Zacatecas, significantly reducing the mileage between these cities and facilitating movement between the three largest metropolitan centers. In the north an east-west route was developed from Matamoros to Durango, through Reynosa, Monterrey, and Torreón, and was extended to Mazatlán on the Pacific coast. In the south another transverse route across the Isthmus of Tehuantepec was completed in 1960.

Expansion continued, and by 1960, 45,000 kilometers of roads were in service; by 1970 this figure had risen to 70,000 kilometers, of which 7,000 kilometers were dirt, 21,000 kilometers were tarred, and 42,000 kilometers were paved. The road density in the central region increased from 61.6 kilometers per 1,000 square kilometers in 1960 to 100 kilometers per 1,000 square kilometers in 1970, the latter figure being five times greater than that for the north-central and northwest regions at that date (Table 3-5). During the 1960s the largest increase in road density was in the southeast, where it rose from 24.6 kilometers per 1,000 square kilometers in 1960 to 49.9 kilometers per 1,000 square kilometers.

Toll roads were introduced around Mexico City in the 1960s in response to the rapid growth of traffic in the metropolitan region. More than 1,000 kilometers of toll roads had been built in this area by 1970.

Table 3-6. *Average Travel Times by Road between Selected Cities, 1966 and 1973*

Origin and destination	*Distance (kilometers)*	*Time (hours, minutes)*		*Time difference (hours, minutes)*
		1966	*1973*	
From México City to				
Tijuana	2,889	49.27	44.43	4.44
Mexicali	2,696	44.28	41.29	2.59
Nogales	2,246	37.43	34.03	3.40
Hermosillo	2,007	32.38	29.44	2.54
Culiacán	1,316	21.41	19.46	1.55
Mazatlán	1,092	18.12	16.11	2.01
Tepic	799	12.46	11.33	1.13
Guadalajara	572	8.22	7.47	0.35
Morelia	311	6.33	5.39	0.54
Toluca	64	1.12	1.02	0.10
Colima	738	15.09	13.35	1.34
Cuidad Juárez	1,815	28.03	25.49	2.14
Chihuahua	1,440	22.46	20.42	2.04
Hidalgo del Parral		20.33	18.48	1.45
Torreón	987	16.02	14.20	1.42
Zacatecas	602	9.08	8.25	0.43
León	383	5.02	4.56	0.06
Querétaro	211	2.53	2.30	0.23
Durango	892	14.19	12.54	1.25
Monclova		19.32	17.20	2.12
Nuevo Laredo	1,179	19.13	17.03	2.10
Saltillo	864	13.28	12.07	1.21
Monterrey	949	14.58	13.26	1.32
San Luis Potosí	415	6.20	5.27	1.03
Matamoros	1,008	17.22	15.29	1.53
Cuidad Victoria	699	12.23	11.12	1.11
Tampico	478	6.08	5.16	0.52
Pachuca	94	1.28	1.16	0.12
Puebla	127	2.31	2.10	0.21
Jalapa	302	6.36	5.42	0.54
Veracruz	424	7.04	6.40	0.24
Acapulco	411	9.32	8.11	1.21
Mérida	1,493	28.55	24.00	4.55
Tuxtla	1,057	23.12	21.02	2.10
Oaxaca	507	11.02	10.02	1.00
From Mazatlán to				
Durango	318	7.06	6.06	1.00
Torreón	571	10.53	9.58	1.05
Saltillo	857	15.25	13.50	1.35
Monterrey	936	17.00	15.09	1.51
Reynosa	1,160	19.39	17.26	2.13
Matamoros	1,260	20.30	18.45	1.45
Tepic	293	5.22	4.38	0.56
Guadalajara	520	9.06	8.24	0.42
San Luis Potosí	796	15.06	13.33	1.33
Tampico	1,196	22.54	20.49	2.05

Table 3-6 (*continued*)

Origin and destination	*Distance (kilometers)*	*Time (hours, minutes)*		*Time difference (hours, minutes)*
		1966	*1973*	
From Colimas to				
Guadalajara	265	6.03	5.48	0.15
San Luis Potosí	616	14.36	13.05	1.31
Tampico	1,016	20.34	18.49	1.45
Morelia	427	12.49	11.35	1.14
Puebla	865	17.40	15.45	1.55
Veracruz	1,162	22.17	20.15	2.02
From Mérida to				
Campeche	192	4.15	3.41	0.34
Villahermosa	636	15.25	10.09	5.16
Veracruz	1,114	22.37	16.20	6.17
From Guadalajara to				
Monterrey	758	14.16	12.51	1.25
From Monterrey to				
Torreón	365	6.02	5.11	0.51

Source: Ministry of Public Works surveys (1966, 1973).

The government continued its efforts to improve interregional highway conditions during the 1960s, and between 1966 and 1973 automobile journey times were reduced by up to 25 percent. Significant improvements were achieved in the corridor routes to Mexico City, and transverse movement across the north-central region was greatly improved. On the road between Tijuana and Mexico City average travel time was reduced from 45 to 40 hours, the average travel time for routes between Mexico City and Ciudad Juárez and between Mexico City and Nuevo Laredo routes decreased by more than two hours, and the average travel time from Mexico City to Mérida fell from twenty-nine hours in 1960 to twenty-four hours in 1970 (Table 3-6).

Air transport

The development of an air transport network was inevitably important for urban integration in a country of the size and having the physical conditions of Mexico, and by 1970 air services extended throughout the nation. The system was serviced by two trunk carriers—Aeromexico and Mexicana de Aviación—and by several feeder lines.[4]

4. Most of the feeder lines were under the control of Aeromexico, as were the two secondary lines, Aerocarga, S.A. and Servicios Aereos Especiales, S.A. de C.V. (S.A.E.). As of 1975, Aerocarga was destined to become the country's national air cargo carrier, whereas S.A.E., which provided secondary scheduled services within Mexico, was intended to become the principal Mexican charter line.

In the early 1940s the air transport system consisted entirely of private airlines providing services between Mexico City and other cities. By 1946 five airports had been built by the federal government (Mexico City, Guadalajara, Tijuana, Acapulco, and Mazatlán) and eleven by private enterprises (including those at Mérida, Tampico, Monterrey, and Nuevo Laredo). To meet the rapid growth of demand, however, and to provide equitable accessibility throughout the country, the government adopted a civil air transport policy in 1947. Several new airports were built in the early 1950s, and a number of large improvement and rehabilitation projects were carried out. By 1951 fifteen airports were equipped with navigational aids, ground support, and weather service facilities. In addition, there were some 365 landing fields with less elaborate facilities.

Air passenger kilometers increased almost seven times, from 39 million in 1940 to 308 million in 1950, and more than doubled to 625 million by 1960. By 1965 passenger traffic had risen to 2.8 billion passenger-kilometers. Air cargo traffic rose from less than 0.5 million metric tons in 1960 to more than 0.75 million metric tons in 1965.

After the mid-1960s, air transport became even more important. In 1969 more than 4 million passengers were carried, the number of passenger-kilometers rose to about 6.8 billion, and the average flight length increased from 570 kilometers in 1965 to 840 kilometers in 1969.

Regional and interregional air traffic flows show that Mexico City clearly dominated domestic traffic in 1967, receiving and generating more than half of all passengers, and that there were few interregional routes, despite a well-developed schedule of intercity services. By 1973 the dominance of Mexico City in the air transport system had been somewhat reduced, and a number of important interregional routes that did not pass through Mexico City had been developed (Tables 3-7 and 3-8).

Accessibility and urban growth

A partial measure of the changing relations between the development of the transport network and of urban areas can be based on a comparative nearest-neighbor analysis of the urban system.[5] Between 1900 and 1940 there was a marked change in the transport system that increased the average distance between each major city in the system and its nearest neighbor from 163 to 196 kilometers (Tables 3-9 and 3-10). The subsequent increase to 202 kilometers in 1970 was marginal.

Given the size of Mexico in 1940, 1.9 million square kilometers, the hypothetical mean distance separating twenty-five cities would be 280 kilo-

5. This is based on measuring the straight line distance separating a city and its nearest neighbor city and comparing these distances with those which would be expected if the cities were distributed randomly in the same area. See Appendix F for further explanation.

meters. Thus, in 1900 the actual mean separation distance was only 57 percent of the hypothetical distance. By 1940 the percentage had risen to 69.8; by 1970 it was 71.9. This suggests that changes in the transport network had a much smaller effect on the urban system after 1940 than before, a finding that reinforces the theory that there is strong resistance to change in an established spatial structure. For despite the increased efficiency of the existing modes of transport and the intensive development of the air transport network, their combined effect on the urban system between 1940 and 1970 was slight. Graph theory analysis also suggests that there was little change in connectivity in the transport network after 1940 and that cities at or near the center of the network had better access to the whole country.[6]

A practical refinement of network analysis considers the efficiency of transport services and the conditions of transport routes. This may be analyzed by comparing physical with travel distances, given that accessibility between two points is not necessarily a direct function of physical separation and that interregional connections do not depend on the mere existence of a network link.

In a study published by CEPAL in 1974, coefficients were obtained between travel and physical distances. Physical distance was given the value of 1.0 and was used as a base to which time and cost elements were added. Thus, for example, a value of 1.20 implied that travel distance was 20 percent greater than physical distance; that is, if physical distance was 100 kilometers, the travel distance was 120 kilometers. On this basis travel distances were computed between large urban centers along routes or between junctions on roads near large cities.

Some actual examples of the differences between physical and travel distances are shown below.

	Physical distance (kilometers)	*Travel distance (kilometers)*	*Coefficient*
Acapulco-Mexico City	419	611	1.46
San Luis Potosí-Mexico City	417	433	1.04
Oaxaca-Mexico City	534	754	1.41
Guadalajara-Mexico City	581	609	1.05

In the first example the physical distance between Acapulco and Mexico City and between San Luis Potosí and Mexico City is virtually the same. Taking road conditions into account, the travel distances from Mexico City are very different. In the second example, although Oaxaca is 47 kilometers closer to Mexico City than Guadalajara, in travel distance it is 145 kilometers farther away.

6. See Appendix F for an explanation.

Table 3-7. *Origin and Destination of Air Passenger Traffic, 1967*
(Number of passengers; percentages in parentheses)

Origin	*Destination*							*Percentage distribution*[a]
	North-west	*North-central*	*North-east*	*South-west*	*Central*	*South-east*	*Total*	
Northwest	17,947	3,873	4,062	20,706	62,278	23	108,889	8.73
	(16.48)	(3.55)	(3.73)	(19.01)	(57.19)	(0.02)	(100.00)	
North-central	3,994	12,890	2,177	94	28,775	0	47,930	3.84
	(8.33)	(26.89)	(4.54)	(0.19)	(60.03)	(0)	(100.00)	
Northeast	3,547	2,539	6,081	4,569	124,638	0	141,374	11.34
	(2.51)	(1.80)	(4.31)	(3.24)	(88.16)	(0)	(100.00)	
Southwest	19,970	101	3,713	3,556	272,838	0	300,178	24.07
	(6.65)	(0.03)	(1.23)	(1.18)	(90.89)	(0)	(100.00)	
Central	63,971	28,863	131,403	265,184	2,900	87,265	582,509	46.71
	(10.98)	(4.95)	(22.56)	(45.52)	(0.50)	(14.98)	(100.00)	
Southeast	0	0	0	0	48,420	17,856	66,276	5.31
	(0)	(0)	(0)	(0)	(73.06)	(26.94)	(100.00)	
Total	109.429	48,289	147,436	294,109	542,772	105,121	1,247,156	
	(8.77)	(3.87)	(11.82)	(23.58)	(43.52)	(8.43)	(100.00)	100.00

a. Regional percentage distribution in relation to national passenger totals.
Source: Ministry of Transport and Communication.

Table 3-8. *Origin and Destination of Air Passenger Traffic, 1973*
(Number of passengers; percentages in parentheses)

Origin	*Destination*							*Percentage distribution*[a]
	North-west	*North-central*	*North-east*	*South-west*	*Central*	*South-east*	*Total*	
Northwest	48,482	13,054	10,165	44,818	140,582	5	257,106	9.98
	(18.86)	(5.08)	(3.95)	(17.43)	(54.68)	(0)	(100.00)	
North-central	10,712	25,329	7,775	1,951	63,838	714	110,319	4.28
	(9.71)	(22.96)	(7.05)	(1.77)	(57.87)	(0.65)	(100.00)	
Northeast	9,734	8,148	936	15,124	228,554	4,016	269,512	10.46
	(3.61)	(3.02)	(1.46)	(5.61)	(84.80)	(1.49)	(100.00)	
Southwest	39,515	1,673	16,375	12,938	467,643	7,270	545,414	21.17
	(7.24)	(0.30)	(3.00)	(2.37)	(85.74)	(1.33)	(100.00)	
Central	143,904	63,345	233,775	481,165	8,710	216,550	1,147,449	44.53
	(12.54)	(5.52)	(20.37)	(41.93)	(0.75)	(18.87)	(100.00)	
Southeast	59	379	2,879	6,728	219,651	17,584	247,280	9.60
	(0.02)	(0.15)	(1.16)	(2.72)	(88.83)	(7.11)	(100.00)	
Total	252,406	111,928	274,905	562,724	1,128,978	246,139	2,577,080	
	(9.79)	(4.34)	(10.67)	(21.84)	(43.81)	(9.55)	(100.00)	100.00

a. Regional percentage distribution in relation to national passenger total.
Source: Ministry of Transport and Communication.

Table 3-9. *Nearest Neighbor Analysis for the Twenty-five Largest Cities in 1900*

City	*Population rank*	*Distance to nearest neighbor*[a] *(kilometers)*	*Deviation from national mean (kilometers)*
Mexico City	1	74	89
Guadalajara	2	258	95
Puebla	3	200	37
León	4	16	147
Monterrey	5	102	61
San Luis Potosí	6	225	62
Mérida	7	687	524
Guanajuato	8	54	109
Pachuca	9	98	65
Morelia	10	156	7
Aguascalientes	11	121	42
Oaxaca	12	366	203
Querétaro	13	45	118
Zacatecas	14	121	42
Orizaba	15	127	36
Durango	16	253	90
Chihuahua	17	339	195
Veracruz	18	132	31
Toluca	19	74	82
Celaya	20	95	118
Saltillo	21	102	61
Colima	22	259	96
Jalapa	23	132	31
Irapuato	24	62	101
San Francisco del Rincon	25	16	147
Total		4,083	2,596
Average		163	104

Note: See Appendix F for definition. Area of Mexico, 2,017,198 square kilometers; number of observations, 25; actual mean separation, 163 kilometers; hypothetical mean separation, 284.05 kilometers; and actual mean separation as a percentage of hypothetical mean separation, 57.4 percent.

a. All distances are railroad kilometers in 1973.

Source: Population data from population census and distances from the Mexican National Railways.

Accessibility to the Federal District, in travel versus physical distance, was found to be fair to excellent in most cases in 1970. The Federal District had low coefficients with cities north of it such as Querétaro, San Luis Potosí, Guanajuato, Pachuca, and León and with Guadalajara (1.05) and with the cities of the northwest (an average coefficient of 1.10) and the northeast (an average coefficient of 1.09 except in coastal areas). Accessibility between

Table 3-10. *Nearest Neighbor Analysis for the Twenty-five Largest Cities in 1940*

City	*Population rank*	*Distance to nearest neighbor (kilometers)*	*Deviation from national mean (kilometers)*
Mexico City	1	64[a]	132
Guadalajara	2	258[b]	62
Monterrey	3	85[a]	111
Torreón	4	280[a]	84
Puebla	5	127[a]	69
Mérida	6	468[a]	272
Tampico	7	400[a]	204
Aguascalientes	8	127[a]	69
León	9	127[a]	69
Toluca	10	64[a]	132
San Luis Potosí	11	169[a]	27
Culiacán	12	200[b]	4
Orizaba	13	152[a]	44
Chihuahua	14	375[a]	179
Morelia	15	109[a]	87
Veracruz	16	152[a]	44
Saltillo	17	85[a]	111
Querétaro	18	107[b]	89
Mazatlán	19	200[b]	4
Durango	20	259[b]	63
Villahermosa	21	351[c]	155
Irapuato	22	89[a]	107
Fresnillo	23	179[a]	17
Pachuca	24	94[a]	102
Ciudad Juárez	25	375[a]	179
Total		4,896	2,416
Average		196	97

Note: See Appendix F for definition of nearest neighbor analysis. Area of Mexico, 1,969,367 square kilometers; number of observations, 25; actual mean separation, 195.84 kilometers; hypothetical mean separation, 280.50 kilometers; and actual mean separation as a percentage of hypothetical mean separation, 69.82 percent.

a. Road distance.

b. Railroad distance.

c. Straight distance signifies air link.

Source: VI Censo General de la Población, 1940 (1942); Ministry of Transport and Communications; Mexican National Railways; and Ministry of Public Works.

the Federal District and the southeast was less good (1.19 to Veracruz and 1.15 to Mérida), but was better than with the southwest (Acapulco, 1.46, and Oaxaca, 1.41).

Monterrey had fair to good accessibility with most other places. Travel distances between Monterrey and such neighboring towns as Saltillo, Torreón, and Nuevo Laredo were only slightly longer than physical distances as were

travel distances between Monterrey and cities in the northwest such as Ciudad Obregón and Tijuana (1.17 and 1.15, respectively). Connections between Monterrey and Guadalajara were poor (1.28), however, which implies that conditions had not favored the development of heavy traffic flows between these important cities. The coefficients between Monterrey and points south of Guadalajara along the Pacific coast were not recorded, but because road conditions were poor, accessibility was presumably low.

By comparison with Monterrey and Mexico City, Guadalajara had a lower level of accessibility to other places in travel versus physical distance. The coefficients were consistently poor to fair except to points in the east, such as Mexico City, which was consistent with the fact that the southwest had large traffic flows with the central region.

Differences in transport conditions were clearly associated with different rates of urban growth, particularly with the growth of the three largest cities. This conclusion is further supported by an analysis of the relative accessibility between large cities, which provides a direct measure of the relation between changes in relative accessibility and urban development between 1940 and 1970. An analysis of relative accessibility between twenty-five of the cities that dominated the urban system in both 1940 and 1970 shows that cities with the highest levels of accessibility in 1940 grew more rapidly than others in 1940-70.[7] Thus, within an area in which spatial connections were greatly improved, the places that achieved the greatest relative as well as absolute improvements in accessibility were those with the greatest transport advantages in 1940. The analysis also shows that there was a close relation between relative accessibility and relative urban size and economic growth. This does not, however, alter the earlier conclusion that transport advantages and disadvantages were less crucial determinants of urban growth than they had been in earlier periods.

Agriculture and Urban Development

During 1940-70 urbanization was closely linked with changes in the rural areas to a much greater extent than in any earlier period. Urban growth during the Porfiriato (1876-1910) had been partly based on the development of agricultural exports, and in 1910-40 the rhythm of urban development had been responsive to rural change and in particular to the effects of land reform policies. After 1940 rural conditions had a great effect on the process of urban development, because they made up the environment from which much of the urban population originated, given a communications and transport system that facilitated the dissemination of information about the

7. Only twenty-five, rather than thirty-seven, cities are used because some of the thirty-seven cities (Mexico City and Toluca, for example) were in almost the same location in relation to the whole country. See Appendix C for further explanation.

differences between rural and urban living conditions as well as facilitating movement between rural and urban areas.

After 1940 government agricultural strategy (at least for the growth of output) was remarkably successful for more than a decade. It enabled Mexico to become self-sufficient in basic foodstuffs, to produce raw materials for the manufacturing sector, and to increase agricultural exports. It facilitated the transfer of savings to urban areas, and it resulted in growing rural markets for Mexican manufacturers. Less than half of the threefold increase in agricultural output between 1940 and 1950 was attributable to the expansion of the cultivated area. The main cause was increased productivity, with a large contribution from public investment.

But agricultural progress was not sustained, and a decrease in agricultural investment by the government after 1950 coincided with a decline in the overall annual rate of agricultural growth from more than 7.5 percent between 1940 and 1950 to less than 4.0 percent between 1956 and 1970; the rate between 1965 and 1970 dropped to 2.0 percent. Although agriculture had provided substantial export surpluses in the 1940s and early 1950s, its share of exports between 1956 and 1970 was greatly reduced, growing only 1.4 percent a year. This was partly because the domestic demand for agricultural products increased an average of 5.5 percent a year from the mid-1950s through 1970. It also reflected the fact that the output of the modern sector (commercial growers) did not expand sufficiently to meet domestic demand (restricting export growth and thus the capacity to import) and the fact that the traditional sector (small farmers) could not expand production because they continued to use inefficient techniques. Moreover (and of particular importance to urbanization) it became increasingly difficult for the agricultural sector to absorb the rural labor force.

Land use and tenurial structure

Two structural characteristics of Mexican agriculture account for this decrease in agricultural growth. The first was the relatively small size of the cultivated area relative to the total area of farmland. The 1960 agricultural census classified the 169 million hectares of farmland as follows:[8]

Classification	*Millions of hectares*	*Percent*
Cultivated area	23.8	14.1
Range and pastureland	79.1	46.8
Forests	43.6	25.8
Unproductive land	11.2	6.6
Productive reserve	11.3	6.7

8. The classification "cultivated area" refers to land cultivated at least once in the previous five years. Only about two-thirds of this area is cultivated in a given year.

In 1970 the cultivated area had declined to 16.4 million hectares, of which nearly 3 million were under irrigation. The high proportion of fallow land resulted from insufficient rainfall or fertilization to produce crops in successive years, and from the high proportion of crop failures, which were estimated to be an average of 15 percent of the value of output.

The second structural characteristic was the distribution of land ownership. The process of land reform that had been so vigorously pursued by Cardenas in the 1930s was followed less vigorously after 1940. Moreover, although the tenurial system continued to be modified by redistribution of land, these reforms were counteracted by certificates of inaffectability for livestock farms (which guaranteed that farms would not be affected by further land reform) and certificates of ownership for holdings of up to 100 hectares of irrigated equivalent. As a result, there were opposing trends in the tenurial system, resulting in both the growth of relatively large commercial farms and the development of smallholdings through agrarian reform.

Thus, although the resurgence of the small private farm and the ejido were important characteristics of the period, the concentration of control over land (not in terms of ownership as much as of usufruct) actually increased after 1940. By 1960 only 1.3 percent of all farms occupied more than 50 percent of private cropland. Despite the statutory size maximum of 100 hectares of irrigated equivalent, the 1960 census recorded more than 2,000 private farms with more than 2,300 hectares of cropland. At the bottom of the land distribution scale, 77 percent of private landowners controlled only 11 percent of private cropland, the average farm being 1.6 hectares. About 900,000 smallholders had less than 5 hectares each. The situation of the ejidos was better since fewer than 700 ejidatarios had farms of less than 4 hectares of cropland.

Aggregating private farms and ejidos, 1.4 percent of all farms occupied more than 36 percent of total cropland in 1960, whereas 50 percent of all farms occupied less than 12 percent of the cropland area. In light of this, the Gini coefficient for the distribution of cropland rose from 0.464 in 1940 to 0.535 in 1960, whereas average farm size increased from 6.2 to 8.7 hectares in this period.[9]

The distribution of cropland is not the most realistic index of land distribution in Mexico; the distribution of irrigated land is perhaps more significant. In 1965, 5 percent of farms in public irrigation districts occupied more than 40 percent of the irrigated area, and the average size of farms on irrigated land was 2.5 hectares. Because the productivity of irrigated land was approximately four times that of rainfed land, farmers with even small irrigated plots were relatively better off than most farmers in rainfed areas.

9. The Gini coefficient probably fell after 1960 because of further redistribution. See Appendix F for the definition of the coefficient.

Agricultural production

The skewness of land distribution was reflected in agricultural output. In 1960, 54.3 percent of total output came from 3.3 percent of all farms; the same 3.3 percent of farms produced 80 percent of the increase in output from 1950 to 1960. This highlighted the contrast between the traditional sector, which had backward technology and low productivity, and the modern (commercial) sector, which by international standards was technologically advanced and highly productive. The relative sizes of each of these categories may have changed somewhat over time, but one study (SRH 1970) suggests that some 53 percent of the 3 million farms in Mexico in 1970 were subsistence units producing negligible market surpluses, 40 percent were traditional units producing cash crops with traditional techniques, and only 7 percent (mostly in irrigated areas) were modern (commercial) operations.

The agricultural regions of Mexico have been described as follows (Bassoco and Rendon 1973):

a. The northwest—an arid zone of large-scale irrigation along a thousand mile coastal strip between the Gulf of California and the Sierra Madre Occidental, plus Baja California. Agriculture is more extensively mechanized here than anywhere else in the country.
b. The north—the rest of the northern part of the country; this region is also extremely arid and cultivable only with irrigation except for the eastern portions near the Gulf of Mexico.
c. The central plateau—an area of mixed rainfed and irrigated farms, concentrated along the course of the River Lerma; the farms are generally smaller than in the north and northwest; in the 1950s this was the most productive agricultural region in Mexico, but it was later surpassed by the northern regions.
d. The south—tropical agriculture with very few systems of water control; due to the mountainous terrain this region is the most remote from the major urban markets.

By 1970 the spatial structure of agricultural output was somewhat different than the spatial distribution of the population dependent on agriculture. In particular, the north and the Gulf Coast had become areas of highly developed agriculture, but the density of their rural populations had remained relatively low. By 1970 the Yucatán, the center, and the south (Morelos, Guerrero, and Oaxaca) had 42 percent of the agricultural labor force, but provided only 18 percent of agricultural production; the northwest and the Gulf Coast (Veracruz, Tabasco, and Chiapas), with 14 percent of the labor force, accounted for 10 percent of agricultural output; but the highest proportion of cropland actually harvested was in the center and

Table 3-11. *Agricultural Productivity and Income, 1970*

Region	Agricultural labor force		Cultivated area (hectares)		Value of crop production (thousands of pesos)	Value of output per worker (pesos)	Value of output per hectare (pesos)
	Total (1,000)	Percent of total labor force	Total (1,000)	Area per worker			
Northwest	436	42.1	532	1.22	7,238,620	16,603	3,425
North	351	38.6	4,525	12.89	2,051,332	5,863	1,709
Northeast	143	23.9	689	4.82	2,267,882	10,723	2,002
West-central	656	43.5	255	0.39	4,947,708	7,542	1,813
North-central	683	51.7	1,132	1.66	4,383,637	6,978	1,531
Central	1,423	33.0	183	0.13	2,702,766	2,778	1,436
South	759	68.0	713	0.94	2,283,612	3,199	1,518
Gulf and Southeast	940	58.8	477	0.51	2,259,212	5,594	1,944
Peninsula	157	52.7	2,687	17.11	660,574	4,201	1,397
Total	5,558	43.7	11,193	2.01	31,795,343	6,267	1,917

Note: Regional definitions. Northwest: Baja California (State), Baja California (Terr.), Sonora, Sinaloa, and Nayarit. North: Chihuahua, Durango, and Coahuila. Northeast: Nuevo León and Tamaulipas. West Central: Jalisco, Colima, and Michoacán. North Central: Zacatecas, Aguascalientes, Guanajuato, Querétaro, and San Luis Potosí. Central: Hidalgo, Mexico State, Federal District, Puebla, and Tlaxcala. South: Morelos, Guerrero, and Oaxaca. Gulf and Southeast: Veracruz, Tabasco, and Chiapas. Peninsula: Campeche, Yucatán, and Quintana Roo.

Source: Agricultural census, 1970.

west center (Jalisco, Colima, and Michoacán), where population pressure was strongest. When livestock production is taken into account, the contrast between the north and the rest of the country was accentuated.

The economic implications of these different patterns of agricultural activity and rural population are revealed in differing patterns of agricultural productivity and income (Table 3-11). But average labor productivity and income on the commercial farms of the northwest (Baja California, Sonora, Sinaloa, and Nayarit) in 1970 were some five times higher than in central Mexico (Hidalgo, State of Mexico, Puebla, and Tlaxcala), where agriculture was predominantly traditional and subsistence based. The fundamental distinction between large-scale and small-scale agriculture thus had a very strong effect on productivity and output, although regional values of output per hectare differed less than those for output per worker. Average output per hectare in the northwest surpassed that for the peninsula (Campeche, Yucatán, and Quintana Roo) by only 2.5 times, whereas differences in labor productivity between these regions were on the order of 4 to 1. Changes in relative productivity between 1940 and 1960 reveal that whereas Baja California was firmly established as a high productivity state in 1950, and even in 1940, it was not until 1960 that Sonora became an outstandingly productive area. There were also dramatic changes in the productivity of agricultural labor in Chihuahua, Durango, Sinaloa, and Colima between 1950 and 1960.

Government investment in irrigation

Interstate comparisons of capital investment per hectare in 1940-60 point to the outstanding position of the northern states, together with Jalisco (Table 3-12), the Federal District being disregarded in this respect because the cultivated area was very small. Much of the capital was invested in irrigation, and most of it was publicly financed. The importance of irrigation is best illustrated by the case of Sonora, in which by 1960 more than 70 percent of all agricultural land was under irrigation. Moreover, although the geographic distribution of irrigated land is largely explained by climatic conditions, the preponderant share of the northwestern states in irrigation stands out clearly (Map 3-1).

Given the importance of irrigation in explaining differences in productivity and given the importance of government expenditure in accounting for investment in irrigation, it is apparent that government agricultural policy, which emphasized such investment, had much to do with the emergence of spatial differences in agriculture after 1940. Detailed data on the geographic breakdown of government investment in irrigation are not available for before 1959. But between 1940 and 1960 an average of 13 percent of all government investment was for large-scale irrigation, most of which was concentrated in the north. Even after 1960 about 15 percent of all government

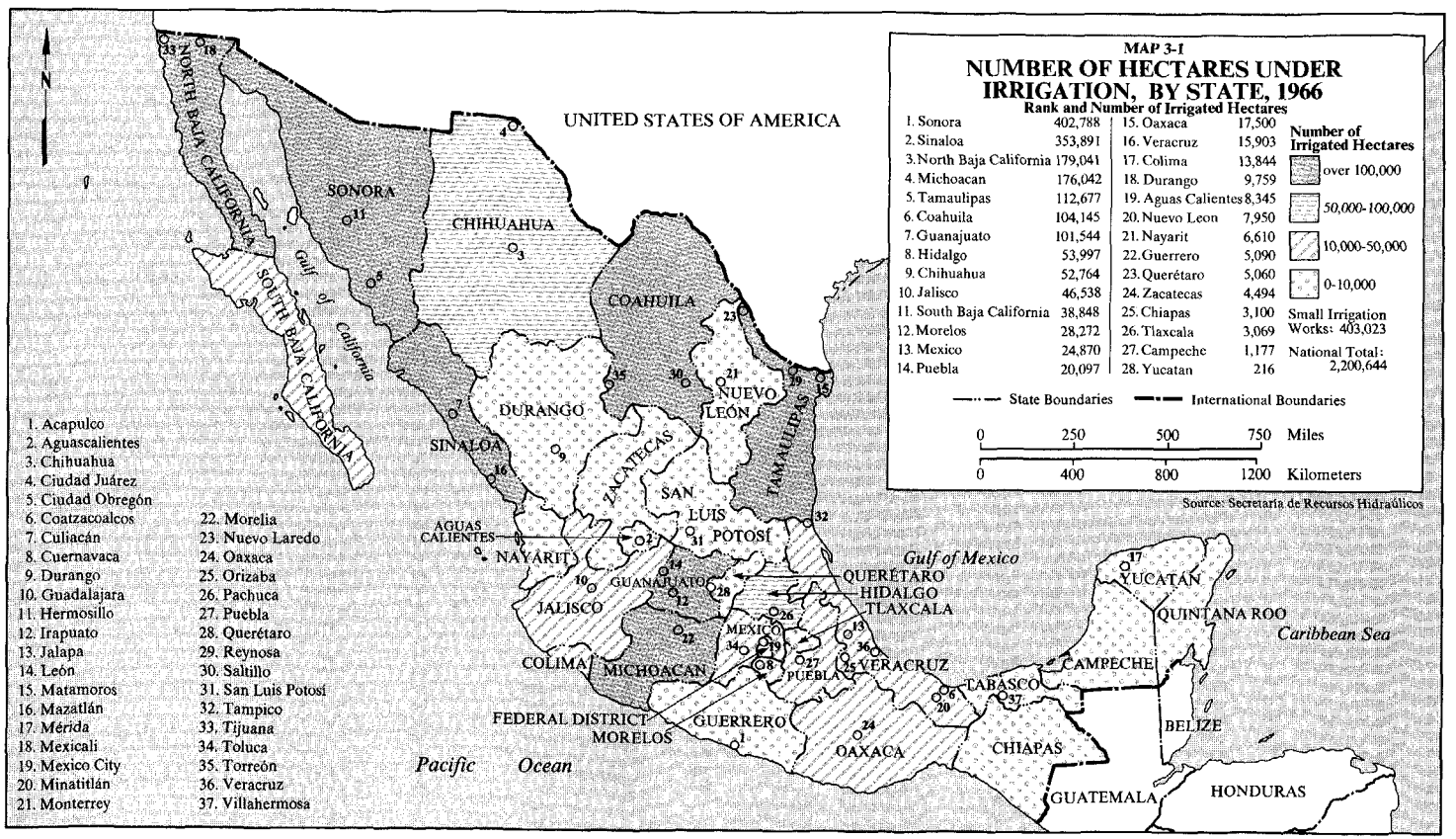

MAP 3-1
NUMBER OF HECTARES UNDER IRRIGATION, BY STATE, 1966
Rank and Number of Irrigated Hectares
1. Sonora 402,788
2. Sinaloa 353,891
3. North Baja California 179,041
4. Michoacan 176,042
5. Tamaulipas 112,677
6. Coahuila 104,145
7. Guanajuato 101,544
8. Hidalgo 53,997
9. Chihuahua 52,764
10. Jalisco 46,538
11. South Baja California 38,848
12. Morelos 28,272
13. Mexico 24,870
14. Puebla 20,097
15. Oaxaca 17,500
16. Veracruz 15,903
17. Colima 13,844
18. Durango 9,759
19. Aguas Calientes 8,345
20. Nuevo Leon 7,950
21. Nayarit 6,610
22. Guerrero 5,090
23. Querétaro 5,060
24. Zacatecas 4,494
25. Chiapas 3,100
26. Tlaxcala 3,069
27. Campeche 1,177
28. Yucatan 216
Number of Irrigated Hectares
over 100,000
50,000-100,000
10,000-50,000
0-10,000
Small Irrigation Works: 403,023
National Total: 2,200,644
State Boundaries
International Boundaries
0 250 500 750 Miles
0 400 800 1200 Kilometers
Source: Secretaría de Recursos Hidraúlicos
N
UNITED STATES OF AMERICA
NORTH BAJA CALIFORNIA
SOUTH BAJA CALIFORNIA
Gulf of California
SONORA
CHIHUAHUA
COAHUILA
DURANGO
NUEVO LEÓN
TAMAULIPAS
SINALOA
ZACATECAS
SAN LUIS POTOSÍ
AGUAS CALIENTES
NAYARIT
GUANAJUATO
QUERÉTARO
HIDALGO
TLAXCALA
JALISCO
MEXICO
COLIMA
MICHOACAN
PUEBLA
VERACRUZ
FEDERAL DISTRICT
MORELOS
GUERRERO
OAXACA
TABASCO
CHIAPAS
CAMPECHE
YUCATAN
QUINTANA ROO
BELIZE
GUATEMALA
HONDURAS
Gulf of Mexico
Caribbean Sea
Pacific Ocean
1. Acapulco
2. Aguascalientes
3. Chihuahua
4. Ciudad Juárez
5. Ciudad Obregón
6. Coatzacoalcos
7. Culiacán
8. Cuernavaca
9. Durango
10. Guadalajara
11. Hermosillo
12. Irapuato
13. Jalapa
14. León
15. Matamoros
16. Mazatlán
17. Mérida
18. Mexicali
19. Mexico City
20. Minatitlán
21. Monterrey
22. Morelia
23. Nuevo Laredo
24. Oaxaca
25. Orizaba
26. Pachuca
27. Puebla
28. Querétaro
29. Reynosa
30. Saltillo
31. San Luis Potosí
32. Tampico
33. Tijuana
34. Toluca
35. Torreón
36. Veracruz
37. Villahermosa

Table 3-12. *Index of Capital Investment per Hectare of Cultivated Land and Percent of Cultivated Land under Irrigation, by State, 1940 to 1960*

State	*Index of capital investment per hectare*			*Percentage of cultivated land under irrigation*		
	1940	*1950*	*1960*	*1940*	*1950*	*1960*
Federal District	1.04	3.01	4.87	100.00	100.00	100.00
México	0.27	0.91	1.17	4.89	15.95	16.60
Nuevo León	0.24	0.46	0.79	14.38	17.12	20.87
Coahuila	0.03	0.75	0.96	21.50	49.00	42.32
Chihuahua	0.30	0.70	1.06	12.83	20.51	19.72
Sonora	0.50	0.54	1.63	32.61	34.77	71.65
Tamaulipas	0.27	0.63	1.00	4.00	30.46	39.59
Morelos	0.26	0.73	0.94	3.63	24.68	25.68
Baja California	0.17	0.56	0.66	38.74	66.90	60.67
Quintana Roo	0.04	0.02	0.04	0.00	0.00	0.00
Puebla	0.18	0.51	0.60	2.76	9.12	16.28
Veracruz	0.21	0.58	0.89	0.26	1.42	1.31
San Luis Potosí	0.21	0.47	0.80	0.81	5.28	5.68
Yucatán	0.07	0.13	0.18	0.06	0.07	0.36
Durango	0.20	0.61	0.69	5.52	14.23	17.96
Jalisco	0.17	0.47	1.03	2.65	7.95	8.91
Oaxaca	0.11	0.23	0.24	2.57	3.60	3.78
Guanajuato	0.14	0.38	0.51	3.74	17.81	18.29
Chiapas	0.14	0.23	0.43	0.70	1.22	2.00
Michoacán	0.19	0.49	0.40	4.34	20.06	21.20
Zacatecas	0.18	0.32	0.80	0.79	2.62	5.36
Tlaxcala	0.22	0.44	0.66	0.96	3.94	3.14
Hidalgo	0.20	0.39	0.64	5.00	9.42	11.66
Querétaro	0.14	0.41	0.80	2.67	10.31	15.54
Sinaloa	0.22	0.42	0.43	4.47	28.96	32.02
Campeche	0.05	0.07	0.12	0.08	0.66	0.09
Aguascalientes	0.32	0.45	0.69	6.39	11.82	15.06
Nayarit	0.19	0.45	0.63	0.64	3.19	2.41
Guerrero	0.09	0.15	0.26	1.01	1.46	1.95
Colima	0.10	0.41	0.57	3.16	9.65	19.65
Tabasco	0.12	0.33	0.65	0.06	0.46	0.56
Baja California (Territory)	0.73	0.83	1.36	18.41	17.50	57.68

Source: Leimone (1971).

investment was allocated to irrigation. Irrigation investment in Sinaloa alone accounted in average years for more than 2.5 percent of government investment in all sectors.

For the national economy, this strategy was successful, because the massive increases in output from irrigated land satisfied domestic demand and permitted significant exports; by 1970 the irrigated areas produced 57 percent of agricultural and livestock exports. The strategy tended, however,

to aggravate existing differences within the rural economy (Barraza and Solis 1973). Moreover, its success was not sustained.

The same strategy that produced growing differences between large, commercial, irrigated, and efficient farms and small, rainfed, and less efficient farms also increased interregional differences. Tenurial structures and population densities developed that were different from those in earlier periods, when only areas with adequate rainfall could be used for intensive production. The technological changes that facilitated large-scale irrigation and the decision to invest large amounts of public resources in new irrigation works could only have led to a spatial emphasis on the northwest, because this was the only area in which irrigation was permitted by tenurial conditions and demanded by climatic conditions. This meant that the agricultural development of the north leaped ahead of that of other parts of the country. And in the absence of countervailing measures to stimulate the development of rainfed agriculture in the south and center, the regional differences in the agricultural sector were intensified.

Against this background, the failure of the agricultural sector, and thus the rural economy, to generate enough new jobs to absorb the growing labor force or even to retain that which already existed, given better apparent opportunities in the cities, is hardly remarkable. Clearly, the fact that agricultural employment in 1950-70 grew only 0.25 percent a year was an important factor contributing to the flow of population from rural to urban areas and thus contributing to rapid urbanization.

Industry and Urban Development

Industry—including manufacturing, mining, power, and construction—produced 26.8 percent of GDP in 1940 and 34.0 percent in 1970. Sectoral and subsectoral performance differed substantially from one decade to another. In particular, the manufacturing, construction, and power sectors experienced rapid and sustained growth, whereas mining grew less quickly. Industry expanded faster toward the end of the period than in earlier years, but industrial employment grew more slowly (4.1 percent) than either output (7.6 percent) or the urban labor force.

Growth and structure of industry

Economic policies after 1940 implied that industrial development and diversification were generally considered to be prerequisites to rapid economic expansion and the provision of jobs. Infrastructural and other development in the 1930s had already established a basis for rapid industrialization,

and World War II provided fortuitous advantages for industrial growth by stimulating import substitution.

Although "new and necessary" industries were clearly defined in legislative measures during the 1940s and 1950s, balance of payments difficulties necessitated the introduction of import permits, especially for luxury goods, in 1947. Thereafter, the proportion of imports requiring licenses rose from 28 percent in 1956 to 65 percent in 1964. Tariffs were also introduced, and the proportion of goods subject to them and the nominal amount of the average tariff were both gradually increased.

Because of this protectionist background as well as a growth in demand, industrial output increased 9.4 percent a year from 1940 to 1945. The subsectors that grew the most were food, textiles, iron and steel, cement, paper, pulp, and chemicals. Postwar growth was slower, however, the average annual growth rate from 1940 to the early 1950s being less than 6.0 percent. After 1950 the dominant subsectors changed because of rapid progress in the steel, metal products, and chemical subsectors and because of the general expansion of producer rather than consumer goods.

The increasing importance of producer goods industries is consistent with the pattern described by Hoffman (1958), who showed that producer goods tend to make up an increasing share of manufacturing products as a manufacturing sector develops. This conclusion is also supported by the findings of the United Nations (1954) relative to European experience and by Chenery (1960), who found that sectoral changes in the composition of manufacturing output were associated with rising per capita incomes and increasing national population.

The differing rates of growth and consequent changes in the subsectoral structure of manufacturing in 1940-70 are shown in Table 3-13. Seven subsectors grew slower than the average rate for the sector as a whole, and as a result their combined share of manufacturing output fell from more than 75 percent in 1940 to less than half in 1970. Among these subsectors, however, food and textiles still accounted for more than 50 percent of total manufacturing employment in 1970 and contributed more than any others to sectoral output, although their growth rates were below the average for the sector as a whole. Apparel ranked fourth among this group in its share of employment in 1970, but made the sixth-largest contribution to the total increase in manufacturing employment among all subsectors. The only absolute decline in employment was in the machinery subsector, and this was largely explained by decreased employment in artisan-type machine shops. Table 3-14 is based on the 1970 industrial census and shows the distribution of output and employment by subsector. It indicates that consumer goods accounted for more than half the total value of output in 1970, and that foodstuffs and apparel continued to be important for employment.

Table 3-13. *Structural Changes in National Manufacturing Employment, 1940 to 1970*

Sector	*Rate of growth (1940 = 100)*	*Increase in number of employees*	*Share, 1940 (percent)*	*Share, 1970 (percent)*	*Change in share, 1940-70*
Below average growth					
Machinery	87	2,356	5.8	1.6	- 4.2
Leather	122	1,365	2.1	0.8	- 1.3
Tobacco	135	1,632	1.5	0.7	- 0.8
Furniture	185	10,205	4.0	2.3	- 1.7
Textiles	197	74,993	25.4	16.0	- 8.6
Food	205	98,379	30.9	20.2	-10.7
Apparel	263	42,307	8.6	7.2	- 1.4
Subtotal	–	–	78.3	48.8	–
Above average growth					
Nonmetallic minerals	379	37,395	4.4	5.3	0.9
Printing	475	26,713	2.4	3.6	1.2
Beverages	477	36,858	3.2	4.9	1.7
Paper	605	18,955	1.2	2.4	1.2
Wood	619	21,047	1.3	2.6	1.3
Diverse	626	22,164	1.4	2.8	1.4
Petroleum and coal products	635	14,807	0.9	1.9	1.0
Chemicals	903	67,508	2.8	8.0	5.2
Primary metals	912	34,237	1.4	4.0	2.6
Fabricated metals	820	47,757	2.2	5.7	3.5
Rubber	2,167	11,228	0.2	1.2	1.0
Transport equipment	5,830	43,260	0.2	4.6	4.4
Electrical equipment	65,032	39,959	a/	4.1	4.1
Subtotal	–	–	21.6	51.1	–
Total	314	647,478	100.0	100.0	–

– Not applicable.
a. Less than 1 percent.
Source: Derived from Leimone (1971).

Some of the general factors underlying the relation between urban and industrial development in what may be broadly termed agglomeration economies have already been mentioned. The rest of this section expands and complements that discussion with an account of other aspects of urban-industrial linkages, including the roles of market potential, of general industrial policies, and of location factors such as natural resources and specific policy instruments.

Market potential

There is no absolute proof of the importance of the market relative to other factors in determining urban and industrial growth, but it certainly

Table 3-14. *Employment and Output in Industrial Subsectors, 1970*

Subsector (two-digit classification)	*Total employment in subsector*	*Aggregate value of production in subsector (thousands of current pesos)*
11 Ext. of carbon and graphite	2,650	84,611
12 Ext. of minerals	41,818	2,291,369
14 Ext. of calcium, etc.	4,512	162,812
15 Ext. of nonmetals minerals	7,999	584,934
16 Ext. of salt	3,607	118,559
20 Manufacturing of food	300,475	11,162,161
21 Manufacturing of beverages	67,851	4,865,933
22 Manufacturing of tobacco	10,688	1,848,398
23 Manufacturing of textiles	154,565	6,266,484
24 Manufacturing shoes, etc.	124,579	3,441,085
25 Wood and cork products	42,011	1,045,261
26 Manufacturing of wooden furniture	33,626	939,794
27 Paper products	37,563	2,633,425
28 Publishing and printing	56,872	2,633,540
29 Leather products	11,969	434,254
30 Oil cloth products	22,209	1,792,781
31 Chemical products	138,823	11,196,998
32 Petroleum etc.	4,499	500,444
33 Ceramics and glass	91,319	4,180,014
34 Manufacturing of metals	69,979	7,018,985
35 Hardware products	121,523	5,313,994
36 Manufacturing of machinery	45,213	2,432,233
37 Manufacturing of electrical equipment	88,530	5,009,721
38 Manufacturing of autos	70,173	5,239,771
39 Miscellaneous	28,194	1,113,440
Total	1,581,247	82,311,001

Source: IX Censo Industrial, 1970 (1974).

Table 3-15. *Population and Rank, by State, 1940 to 1970*

State	Population (thousands of persons)				Rank			
	1940	*1950*	*1960*	*1970*	*1940*	*1950*	*1960*	*1970*
Aguascalientes	162	188	243	358	27	28	28	28
Baja California	79	227	520	870	29	27	22	21
Baja California (Territory)	51	61	82	128	31	31	31	31
Campeche	90	122	168	252	28	29	29	29
Coahuila	551	721	908	1,115	15	15	16	17
Colima	79	112	164	241	30	30	30	30
Chiapas	680	907	1,211	1,569	11	10	10	12
Chihuahua	624	846	1,227	1,613	13	13	9	10
Durango	484	630	761	959	18	19	20	20
Federal District	1,758	3,050	4,871	6,874	1	1	1	1
Guanajuato	1,046	1,329	1,735	2,270	8	8	7	7
Guerrero	733	919	1,187	1,597	10	9	11	11
Hidalgo	772	850	995	1,199	9	12	15	16
Jalisco	1,418	1,747	2,443	3,297	3	3	3	4
México	1,146	1,393	1,898	3,855	7	7	5	2
Michoacán	1,182	1,423	1,852	2,324	6	5	6	6
Morelos	183	273	386	616	26	26	25	24
Nayarit	217	290	390	544	25	23	24	25
Nuevo León	541	740	1,079	1,695	16	13	12	9
Oaxaca	1,193	1,421	1,727	2,015	5	6	8	8
Puebla	1,295	1,626	1,974	2,508	4	4	4	5
Querétaro	245	286	355	486	23	24	26	26
Quintana Roo	19	27	50	88	32	32	32	32
San Luis Potosí	679	856	1,048	1,282	12	11	13	14
Sinaloa	493	636	838	1,266	17	18	17	15
Sonora	364	511	783	1,099	21	21	19	18
Tabasco	286	363	496	768	22	22	23	22
Tamaulipas	459	718	1,024	1,457	19	16	14	13
Tlaxaca	224	285	347	421	24	25	27	27
Veracruz	1,619	2,040	2,728	3,815	2	2	2	3
Yucatán	418	517	614	758	20	20	21	23
Zacatecas	565	666	818	951	14	17	18	19

Source: VI Censo General de la Población, 1940 (1942); *VII, 1950* (1952); *VIII, 1960* (1962); and *IX, 1970* (1972).

played a crucial role in influencing the course of such growth in Mexico after 1940. Apart from the development of new producer goods subsectors, the continued growth of consumer goods industries was a prominent feature of industrial growth. The relative cost of transporting material inputs and finished goods encouraged the location of many consumer goods industries near markets, and thus the potential size of the market for manufactured goods was an important factor in selecting a location. Two aspects were involved: access to population and access to incomes.

The distribution of the population among the states in 1940-70 shows the continued domination of the Federal District, Jalisco, and Veracruz, relative increases in Baja California and Chihuahua, and relative declines in Querétaro and Zacatecas. Population increased the most in the north and the least in the south. Differences in the distribution were greater in 1960-70 than in 1950-60, although the geographic emphases were similar in both periods (Table 3-15).

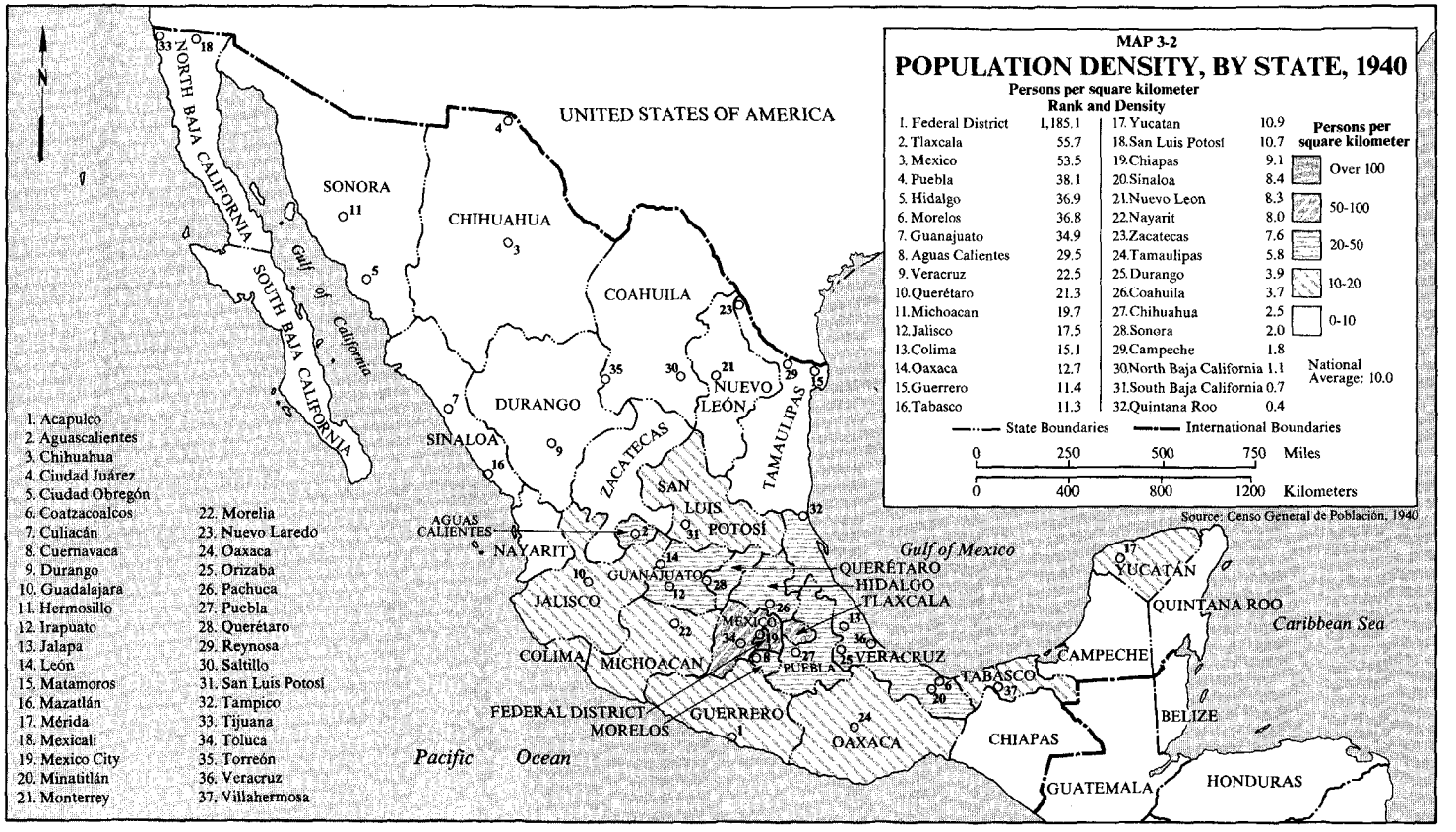
Map 3-2 ranks the population of each state according to the size and the density of its population. In 1940 the Federal District ranked highest in both absolute size and density; the states of central Mexico generally ranked higher in density than in size; and some of the largest states, in both the north and the south, ranked lower in density than in absolute size. This pattern persisted in 1970, as shown in Map 3-3, although the density of the southern states had by then notably increased, and there were high densities in the Gulf (Veracruz), in Jalisco and Guerrero, as well as in the states in the center.

In a country at Mexico's level of development, population potential cannot be assumed to coincide with potential demand. The latter is a product of population weighted by income. It is therefore necessary to refer to the spatial distribution of personal income as well as to the distribution of the population to get an idea of the geographic structure of potential demand.

For certain foodstuffs, differences in purchasing power between rural and urban areas may favor rural families, and this could reduce the apparent differences between rural and urban incomes shown in Tables 3-16 and 3-17. States with large rural populations are generally unlikely, however, to be large sources of demand for manufactured goods, given the low absolute level and the skewed distribution of rural incomes.

Except in a few states, particularly in the northwest, average family income in rural areas was low (Table 3-18). But there was a marked difference in 1970 between Baja California Territory, in which average rural monthly income was Mex$2,317 per family, and Oaxaca, in which the average was only Mex$376. Clearly, the market potentials of rural areas in the northwestern states exceeded those of the less developed but densely populated states of the south and center. There were also large differences within the urban areas (Table 3-19). Average monthly family incomes ranged from approximately Mex$3,000 in the urban areas of Baja California, the Federal District, San Luis Potosí, and Sinaloa, to Mex$925 in those of Oaxaca. But the difference between the highest and lowest urban incomes was smaller than the difference between the highest and lowest rural incomes.

Differences in rural and urban incomes and the distribution of population between rural and urban areas determine the pattern of average monthly incomes in each state (Table 3-20). The weight of urbanization in the Federal District is reflected in its high average family income level (Mex$3,133), compared with that of Oaxaca (Mex$537), which was predominantly rural.


MAP 3-2
POPULATION DENSITY, BY STATE, 1940
Persons per square kilometer
Rank and Density
1. Federal District 1,185.1
2. Tlaxcala 55.7
3. Mexico 53.5
4. Puebla 38.1
5. Hidalgo 36.9
6. Morelos 36.8
7. Guanajuato 34.9
8. Aguas Calientes 29.5
9. Veracruz 22.5
10. Querétaro 21.3
11. Michoacan 19.7
12. Jalisco 17.5
13. Colima 15.1
14. Oaxaca 12.7
15. Guerrero 11.4
16. Tabasco 11.3
17. Yucatan 10.9
18. San Luis Potosí 10.7
19. Chiapas 9.1
20. Sinaloa 8.4
21. Nuevo Leon 8.3
22. Nayarit 8.0
23. Zacatecas 7.6
24. Tamaulipas 5.8
25. Durango 3.9
26. Coahuila 3.7
27. Chihuahua 2.5
28. Sonora 2.0
29. Campeche 1.8
30. North Baja California 1.1
31. South Baja California 0.7
32. Quintana Roo 0.4
Persons per square kilometer
Over 100
50-100
20-50
10-20
0-10
National Average: 10.0
State Boundaries
International Boundaries
0 250 500 750 Miles
0 400 800 1200 Kilometers
Source: Censo General de Población, 1940
UNITED STATES OF AMERICA
NORTH BAJA CALIFORNIA
SOUTH BAJA CALIFORNIA
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COAHUILA
DURANGO
NUEVO LEÓN
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6. Coatzacoalcos
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9. Durango
10. Guadalajara
11. Hermosillo
12. Irapuato
13. Jalapa
14. León
15. Matamoros
16. Mazatlán
17. Mérida
18. Mexicali
19. Mexico City
20. Minatitlán
21. Monterrey
22. Morelia
23. Nuevo Laredo
24. Oaxaca
25. Orizaba
26. Pachuca
27. Puebla
28. Querétaro
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31. San Luis Potosí
32. Tampico
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35. Torreón
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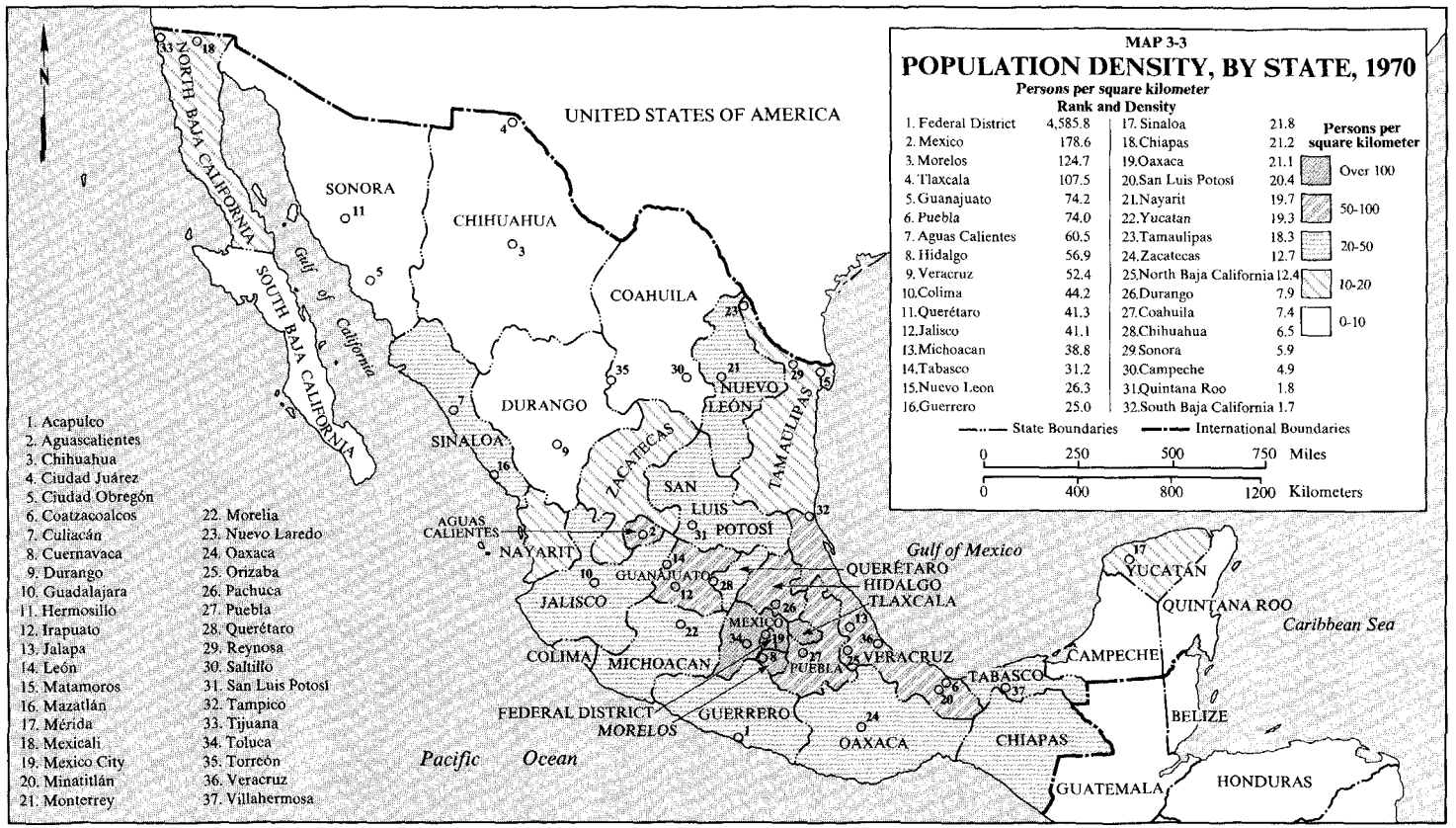
37. Villahermosa


MAP 3-3
POPULATION DENSITY, BY STATE, 1970
Persons per square kilometer
Rank and Density
1. Federal District 4,585.8
2. Mexico 178.6
3. Morelos 124.7
4. Tlaxcala 107.5
5. Guanajuato 74.2
6. Puebla 74.0
7. Aguas Calientes 60.5
8. Hidalgo 56.9
9. Veracruz 52.4
10. Colima 44.2
11. Querétaro 41.3
12. Jalisco 41.1
13. Michoacan 38.8
14. Tabasco 31.2
15. Nuevo Leon 26.3
16. Guerrero 25.0
17. Sinaloa 21.8
18. Chiapas 21.2
19. Oaxaca 21.1
20. San Luis Potosi 20.4
21. Nayarit 19.7
22. Yucatan 19.3
23. Tamaulipas 18.3
24. Zacatecas 12.7
25. North Baja California 12.4
26. Durango 7.9
27. Coahuila 7.4
28. Chihuahua 6.5
29. Sonora 5.9
30. Campeche 4.9
31. Quintana Roo 1.8
32. South Baja California 1.7
Persons per square kilometer
Over 100
50-100
20-50
10-20
0-10
State Boundaries
International Boundaries
0 250 500 750 Miles
0 400 800 1200 Kilometers
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27. Puebla
28. Querétaro
29. Reynosa
30. Saltillo
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34. Toluca
35. Torreón
36. Veracruz
37. Villahermosa

Table 3-16. *Rural Monthly Income, by Income Bracket, 1969 to 1970*

Income bracket of family[a] *(pesos)*	*Number of families (thousands)*	*Percentage of rural families*	*Level of income (thousands of pesos)*	*Percentage of income of all rural families*
Less than 401	1,040	29.0	295,718.3	9.2
401 to 500	399	11.1	183,370.7	5.7
501 to 750	655	18.3	416,046.4	12.9
751 to 1,000	506	14.1	444,620.9	13.8
1,001 to 2,000	721	20.1	1,024,560.9	31.8
More than 2,001	267	7.4	854,189.7	26.5
Total	3,589	100.0	3,218,506.9	100.0

a. Average family size = 5.8 persons.
Source: Family Income Survey, 1969-70 (1971).

Table 3-17. *Urban Monthly Income, by Income Bracket, 1969 to 1970*

Income bracket of family[a] *(pesos)*	*Number of families (thousands)*	*Percentage of urban families*	*Level of income (thousands of pesos)*	*Percentage of income of all urban families*
Less than 501	431	8.1	160,765.7	1.3
501 to 750	425	8.0	275,522.4	2.2
751 to 1,000	857	16.2	766,871.9	6.1
1,001 to 2,000	1,742	32.8	2,593,052.9	20.5
2,001 to 3,000	783	14.8	1,974,815.7	15.6
More than 3,001	1,065	20.1	6,869,457.7	54.3
Total	5,303	100.0	12,640,486.5	100.0

a. Average family size = 5.9 persons.
Source: Family Income Survey, 1969-70 (1971).

Table 3-18. *Average Monthly Income per Rural Family, Classified by State and Income Bracket, 1969 to 1970*
(pesos)

State	*Less than 400*	*401 to 500*	*501 to 750*	*751 to 1,000*	*1,001 to 2,000*	*More than 2,001*	*Average*
Aguascalientes	283.8	464.6	643.0	873.3	1,378.2	–	519.4
Baja California	–	–	572.6	914.4	1,529.7	3,906.9	1,913.8
Baja California (Territory)	–	340.0	685.0	934.9	1,586.2	4,325.7	2,317.8
Campeche	313.6	466.3	644.4	862.7	1,412.0	3,407.5	773.8
Coahuila	301.9	455.9	627.8	876.9	1,376.1	2,847.1	1,025.3
Colima	326.3	463.8	642.0	879.7	1,473.8	3,241.0	1,342.4
Chiapas	223.8	476.8	646.4	904.7	1,376.4	–	504.3
Chihuahua	348.5	463.5	655.2	883.8	1,481.1	3,248.1	1,448.7
Durango	317.8	465.8	639.0	898.4	1,353.8	4,549.7	1,288.4
Federal District	–	–	–	–	–	–	–
Guanajuato	314.2	456.4	644.5	892.6	1,395.7	3,117.3	836.8
Guerrero	283.9	458.4	629.5	873.7	1,352.6	–	604.0
Hidalgo	265.4	448.2	614.6	862.8	1,400.8	2,979.7	779.0
Jalisco	295.6	465.8	631.6	877.7	1,414.1	3,272.3	1,077.9
México	294.4	451.4	600.0	864.4	1,466.6	3,495.6	972.6
Michoacán	330.4	466.6	625.6	871.1	1,295.5	2,783.6	842.0
Morelos	273.3	450.5	646.6	893.8	1,447.5	2,771.9	924.1
Nayarit	321.4	487.5	619.5	895.4	1,479.8	2,778.6	1,140.5
Nuevo León	345.0	478.1	626.0	881.9	1,379.4	3,583.1	870.2
Oaxaca	265.4	449.6	629.3	884.3	1,357.5	–	376.0
Puebla	288.1	453.7	626.8	892.2	1,424.1	3,142.0	763.7
Querétaro	234.6	456.6	628.2	836.4	1,409.3	–	489.6
Quintana Roo	320.5	457.1	651.4	858.6	1,578.4	2,933.3	1,048.1
San Luis Potosí	334.2	459.9	650.8	864.8	1,331.1	3,001.8	741.5
Sinaloa	328.4	477.6	662.7	885.6	1,368.5	3,139.5	1,523.6
Sonora	–	–	675.3	894.5	1,542.6	3,057.0	1,702.7
Tabasco	–	439.3	637.8	905.3	1,517.9	2,996.2	1,562.8
Tamaulipas	295.1	459.6	645.1	856.9	1,350.5	3,526.8	947.7
Tlaxcala	288.9	456.3	648.1	891.0	1,389.9	2,572.8	767.1
Veracruz	322.2	457.3	648.3	862.9	1,473.2	2,783.7	1,052.9
Yucatán	240.5	441.6	613.3	842.4	1,338.0	–	477.4
Zacatecas	366.0	444.3	641.5	888.0	1,381.6	3,148.1	978.6
Average	284.2	458.9	634.8	879.2	1,421.1	3,293.0	896.8

– Not applicable.
Source: Family Income Survey, 1969-70 (1971).

Table 3-19. *Average Monthly Income per Urban Family, Classified by State and Income Bracket, 1969 to 1970*
(pesos)

State	*Less than 500*	*501 to 750*	*751 to 1,000*	*1,001 to 2,000*	*2,001 to 3,000*	*More than 3,001*	*Average*
Aguascalientes	301.5	654.4	890.7	1,498.7	2,532.8	4,187.1	1,410.3
Baja California	–	521.4	895.6	1,541.7	2,614.9	5,610.7	3,293.5
Baja California (Territory)	430.0	686.1	904.4	1,536.8	2,424.8	5,876.8	2,539.9
Campeche	415.9	648.4	890.0	1,457.1	2,947.2	5,444.7	1,460.7
Coahuila	383.0	654.3	920.0	1,508.6	2,479.2	4,300.6	2,079.1
Colima	441.7	610.7	896.9	1,511.6	2,458.8	4,726.9	1,941.2
Chiapas	353.3	629.2	873.0	1,442.2	2,431.0	6,424.4	1,298.0
Chihuahua	381.3	650.3	912.0	1,465.8	2,576.8	4,942.3	2,221.1
Durango	455.6	669.1	898.6	1,490.7	2,512.1	7,090.1	2,222.5
Federal District	440.0	660.4	890.7	1,480.4	2,527.1	7,198.4	3,133.3
Guanajuato	386.0	652.2	876.8	1,496.7	2,506.2	9,380.0	2,286.7
Guerrero	386.9	638.6	887.5	1,436.1	2,420.8	5,560.0	1,290.2
Hidalgo	288.8	612.3	885.3	1,422.4	2,456.1	5,204.1	1,725.6
Jalisco	382.0	657.7	936.5	1,556.2	2,552.7	7,055.5	2,917.5
México	425.0	647.5	896.1	1,456.0	2,515.3	6,367.1	2,006.3
Michoacán	371.0	639.9	883.4	1,415.5	2,423.4	4,319.9	1,546.6
Morelos	391.0	667.2	876.4	1,436.8	2,525.9	5,481.1	1,769.4
Nayarit	348.2	645.1	871.2	1,435.4	2,666.7	3,848.8	1,364.4
Nuevo León	428.8	665.5	898.2	1,510.5	2,567.7	5,301.8	1,957.1
Oaxaca	344.3	650.4	888.9	1,385.7	2,543.8	4,204.2	925.4
Puebla	342.1	645.8	897.8	1,485.0	2,489.2	8,585.0	2,676.6
Querétaro	327.2	653.0	923.7	1,542.0	2,505.2	5,808.3	2,774.4
Quintana Roo	208.3	648.0	893.2	1,517.8	2,412.9	4,139.3	1,807.1
San Luis Potosí	383.2	635.1	884.3	1,559.4	2,581.4	6,800.3	3,224.1
Sinaloa	372.4	645.7	903.1	1,551.2	2,536.1	6,401.2	3,138.6
Sonora	–	671.4	918.6	1,544.5	3,464.3	4,995.5	2,259.7
Tabasco	342.5	651.3	892.6	1,488.5	2,576.0	5,508.7	1,754.4
Tamaulipas	350.6	632.7	870.2	1,421.8	2,363.6	4,813.8	1,811.6
Tlaxcala	371.8	634.2	897.8	1,471.6	2,440.8	4,492.1	1,026.1
Veracruz	345.6	670.7	890.6	1,505.2	2,526.7	4,964.5	2,122.4
Yucatán	348.9	639.0	884.6	1,400.1	2,329.1	4,490.4	1,256.1
Zacatecas	406.9	625.1	870.4	1,425.5	2,466.3	4,890.1	1,249.2
Average	373.1	648.6	894.1	1,488.8	2,522.9	6,451.1	2,383.8

– Not applicable.
Source: Family Income Survey, 1969-70 (1971).

Table 3-20. *Average Monthly Income per Family, Classified by State and Income Bracket, 1969 to 1970*
(pesos)

State	*Less than 500*	*501 to 750*	*751 to 1,000*	*1,001 to 2,000*	*2,001 to 3,000*	*More than 3,001*	*Average monthly income*
Aguascalientes	328.0	647.2	885.1	1,471.3	2,532.8	4,187.1	935.2
Baja California	–	542.2	904.1	1,539.1	2,601.5	5,600.4	3,059.0
Baja California (Territory)	383.2	685.1	923.7	1,565.5	2,534.2	6,271.1	2,405.4
Campeche	401.1	647.0	882.7	1,451.7	2,939.7	5,260.1	1,249.6
Coahuila	368.8	640.8	901.6	1,484.9	2,476.5	4,271.5	1,818.8
Colima	378.5	633.4	892.3	1,502.0	2,471.5	4,599.1	1,742.2
Chiapas	291.5	640.5	895.8	1,410.8	2,431.0	6,424.4	716.6
Chihuahua	389.3	653.0	901.3	1,469.4	2,550.1	4,886.8	2,008.7
Durango	423.5	646.0	898.5	1,414.7	2,515.7	7,427.4	1,683.7
Federal District	440.0	660.4	890.6	1,480.4	2,527.1	7,198.4	3,133.3
Guanajuato	371.3	648.2	883.6	1,467.2	3,485.3	8,849.6	1,589.4
Guerrero	350.4	632.3	879.7	1,395.6	2,420.8	5,560.0	841.0
Hidalgo	318.1	614.2	870.7	1,412.0	2,446.4	4,670.9	1,095.2
Jalisco	351.4	638.9	912.7	1,521.3	3,532.2	6,787.6	2,295.8
México	359.5	626.6	881.2	1,459.2	2,522.5	5,724.2	1,534.0
Michoacán	392.0	628.8	877.1	1,368.4	2,527.3	4,319.9	1,164.5
Morelos	352.1	659.4	881.6	1,440.3	2,506.2	5,292.6	1,471.3
Nayarit	356.6	632.7	881.8	1,455.8	2,612.9	3,861.4	1,266.2
Nuevo León	417.5	651.4	894.7	1,496.2	2,567.7	5,187.9	1,733.3
Oaxaca	295.8	636.5	886.9	1,380.6	2,543.8	4,204.2	537.2
Puebla	321.0	632.6	894.7	1,458.4	2,489.2	7,489.5	1,637.9
Querétaro	272.5	633.6	877.3	1,487.3	2,505.2	5,808.3	1,287.7
Quintana Roo	370.7	651.2	866.1	1,544.4	2,406.0	4,089.1	1,251.8
San Luis Potosí	368.8	647.6	871.4	1,454.8	2,562.1	6,492.9	1,654.0
Sinaloa	381.2	656.8	893.7	1,458.8	2,465.4	6,060.5	2,404.7
Sonora	–	673.7	912.1	1,543.8	2,456.1	4,877.7	2,091.3
Tabasco	367.8	641.6	900.4	1,509.4	2,526.4	5,164.6	1,630.4
Tamaulipas	363.8	640.0	864.4	1,490.4	2,362.3	4,308.0	1,466.2
Tlaxcala	381.1	640.3	895.5	1,440.6	2,496.2	4,492.2	906.6
Veracruz	369.5	654.3	878.4	1,489.6	2,473.7	4,872.0	1,576.7
Yucatán	308.7	630.1	877.4	1,389.4	2,329.1	4,490.4	1,000.1
Zacatecas	391.6	637.1	882.2	1,397.2	2,480.0	4,438.8	1,071.2
Average	342.0	640.2	888.6	1,469.0	2,511.4	6,246.1	1,782.0

– Not applicable.
Source: Family Income Survey, 1969-70 (1971).

Table 3-21. *Regional Differences in Income Distribution, 1969 to 1970*
(percent)

Region	*Level of family income in regional income*						*Monthly income per family (national average = 100)*
	Lower 20 percent	*30 percent below median*	*30 percent above median*	*15 percent below top*	*Top 5 percent*	*Total*	
Federal District	5.0	13.0	27.0	35.0	20.0	100.0	176
North Pacific Coast	6.0	16.0	29.0	29.0	20.0	100.0	128
Gulf of Mexico	4.5	16.5	31.0	30.0	18.0	100.0	83
North	6.0	16.5	29.5	30.0	18.0	100.0	99
Center	4.0	12.0	24.0	28.0	32.0	100.0	82
South Pacific Coast	3.0	13.5	27.5	27.0	29.0	100.0	70

Note: The data represent the percentages of regional income earned by a percentage of families of a relative level of income in a given region.
Source: Family Income Survey, 1969-70 (1971), and World Bank estimates.

Although average income levels multiplied by population size provide a general index of market potentials, another important reference is the distribution of income within each administrative entity. The data in Table 3-21 show broad differences in income levels per family among six major regions and emphasize the wealth of the Federal District. In absolute terms, the monthly income of the Federal District greatly exceeded that of any other region; the central region was next highest, followed by the South Pacific (more than half accounted for by Jalisco), the north (without particular concentrations), the Gulf of Mexico (two-thirds accounted for by Veracruz), and the north Pacific.

The data in Table 3-22 suggest that states in which personal incomes in 1969 were highest were those with the most equitable patterns of distribution. Whereas, for example, the Federal District had the highest level of per capita income (Mex$628) and the fifth lowest Gini coefficient (0.501), Oaxaca had the lowest level of per capita income (Mex$109) and the highest Gini coefficient (0.688).

The conjunction of relatively high average incomes and relatively equitable income distribution in the center, the northwest, and the north encouraged the establishment of market-oriented manufacturing activities in these areas. In particular, manufacturing growth in Mexico City was closely related to its large internal market, which gave rise to considerable agglomeration economies in both the Federal District and in the surrounding areas. By the 1960s only two cities—Monterrey and Guadalajara—had surpassed Mexico City's population in 1900, indicating the tremendous advantage accruing to the capital from its market size—an advantage reflected, for example, in its large share of retail sales.

These differences in income potential, compounded by differences in accessibility, were very important. Except for Mexico City, there were no urban areas with sufficiently large aggregate populations and incomes to support an investment which depended exclusively or even primarily on internal urban demand for other than essential consumer goods. This provided contrasting market opportunities for different cities and, in turn, was a principal reason why some places experienced industrial growth and others did not.

Agglomeration economies

Agglomeration economies result from the spatial concentration of population and economic activity; there are several kinds of such economies.

PLANT SIZE. The first kind of economy results from the size of a plant and is internal to the firm. Measures of manufacturing plant size—capital investment per plant, employees per plant, and output per plant—show that

Table 3-22. *Income per Capita and Gini Coefficient, by State, 1969*

State	*Income per capita (pesos per month)*[a]	*Gini coefficient*[b]
Aguascalientes	165	0.533
Baja California	516	0.486
Baja California (Territory)	389	0.474
Campeche	229	0.528
Coahuila	334	0.515
Colima	284	0.495
Chiapas	135	0.628
Chihuahua	408	0.540
Durango	290	0.588
Federal District	628	0.501
Guanajuato	286	0.582
Guerrero	157	0.664
Hidalgo	182	0.623
Jalisco	395	0.529
México	264	0.550
Michoacán	207	0.590
Morelos	258	0.524
Nayarit	240	0.460
Nuevo León	334	0.501
Oaxaca	109	0.668
Puebla	299	0.628
Querétaro	233	0.589
Quintana Roo	251	0.519
San Luis Potosí	301	0.613
Sinaloa	404	0.473
Sonora	371	0.490
Tabasco	294	0.570
Tamaulipas	262	0.558
Tlaxcala	167	0.538
Veracruz	302	0.583
Yucatán	191	0.636
Zacatecas	165	0.649

Note: Correlation coefficient: $r^2 = 0.78$.

a. 1958 prices.

b. See Appendix F for definition.

Source: Family Income Survey, 1969-70 (1971).

plants were larger in the larger cities in the more developed states (Table 3-23). The increase in coefficients for employees per plant and output per plant between 1940 and 1970 suggests that these differences in scale may have increased over the thirty-year interval because manufacturing plants in larger cities probably benefited more than others from internal economies of scale. Manufacturing grew the fastest in cities in which plant sizes in-

Table 3-23. *Analytical Indicators of Industrial Structure in Selected Cities, 1970*

City	*Average plant size (average number of employees per plant)*	*Average capital investment per plant (thousands of pesos)*	*Average inputs in relation to average gross output*	*Average capital output ratio*	*Incremental capital-output ratio*
Aguascalientes	10.37	748.94	2.03	1.36	11.07
Mexicali	26.95	1,805.25	2.29	1.63	30.38
Tijuana	13.88	632.10	4.42	3.06	6.62
Saltillo	31.07	3,430.82	2.53	0.93	5.69
Torreón	15.09	1,575.55	1.75	2.13	9.41
Ciudad Juárez	14.13	711.47	2.92	1.27	5.68
Chihuahua	23.89	2,723.80	2.85	1.37	4.74
Durango	14.38	1,617.44	2.30	1.75	12.43
Irapuato	25.58	925.07	2.57	1.62	3.08
León	15.19	730.48	2.12	1.37	6.68
Acapulco	8.17	592.75	3.05	1.42	5.39
Pachuca	19.41	725.56	3.24	1.05	22.36
Guadalajara	13.63	1,178.03	2.16	1.47	5.92
Toluca	26.49	4,681.36	2.15	1.59	7.46
Morelia	6.24	283.51	1.95	1.90	21.44
Cuernavaca	13.90	1,191.99	2.86	1.22	6.99
Monterrey	33.23	3,237.85	2.16	1.33	7.28
Oaxaca	7.30	219.84	2.55	1.74	-33.57
Puebla	3.79	142.57	2.25	1.88	36.71
Querétaro	25.50	3,344.14	2.35	1.29	4.12
San Luis Potosí	17.62	946.03	2.48	1.73	10.76
Culiacán	11.79	1,457.65	2.22	0.95	7.77
Mazatlán	11.74	1,206.53	2.55	1.11	13.87
Ciudad Obregón	7.58	1,575.26	1.81	2.01	6.26
Hermosillo	21.05	1,770.28	1.99	1.62	5.99
Villahermosa	5.44	261.57	2.05	1.70	3.72
Matamoros	14.28	439.03	2.74	1.90	12.61
Nuevo Laredo	14.28	423.13	1.88	2.62	12.36
Reynosa	60.87	161.48	2.47	1.75	5.11
Tampico	8.33	471.60	2.56	1.55	16.66
Coatzacoalcos	8.59	5,992.60	2.72	0.35	2.11
Minatitlán	6.34	567.07	4.44	1.38	10.68
Orizaba	23.28	2,511.91	3.39	1.81	7.92
Veracruz	22.01	4,070.85	2.20	1.13	11.90
Jalapa	4.26	196.93	2.05	1.75	5.39
Mérida	10.14	1,027.92	2.53	0.81	4.27

Source: IX Censo Industrial, 1970 (1974).

creased the most. Average plant size—measured by output per plant as a percentage of the national average—was also generally higher in those states in which manufacturing employment and output grew most rapidly.

SUPPLY OF LABOR AND CAPITAL. A second class of agglomeration economies is external to the firm. Among them, the supply of labor and capital appear to have been particularly significant.

Skilled labor was a more crucial determinant of industrial location than was aggregate labor supply.[10] This is consistent with a high level of marginal employment in both the urban and rural sectors and with migratory factors that mitigated against interregional differences in labor supply. In manufacturing, capital and unskilled labor are generally combined with skilled labor. The importance of skilled workers is illustrated by the strong link between the proportion of skilled workers in the supply of industrial labor and urban-industrial growth at both the state and city levels.

In the integrated economy that began to evolve in Mexico after 1940 the availability of local capital might not have been expected to be an important determinant of industrial location. Nevertheless, Myrdal (1957) argues that, in the early stages of economic development, the expanding possibilities for external economies in regions of high growth will raise profits and income levels that, in turn, will lead to higher rates of saving. The increased savings are then invested, further expanding the scope for external economies. Hirschman (1962) supports the argument that saving, as well as investment, tends to be higher in cities offering agglomeration economies.

The distribution of per capita private saving by state in 1940, as well as subsequent increases, was consistent with the different rates of aggregate private saving in more and less developed states and in those in which manufacturing development was relatively advanced or retarded (Table 3-24). This pattern continued in later years. In 1970 the Federal District dominated the pattern of saving even more than in 1940, with almost half of Mexico's savings deposits concentrated there.

Spatial patterns of private credit were similar to those for private saving, although the Federal District was even more dominant. In 1940 the District accounted for more than two-thirds of all credit for the country. Other areas of relative concentration at that time were Nuevo León, Coahuila, Sinaloa, and Sonora. By 1972 the dominance of the Federal District in aggregate credit allocations was even stronger, followed by Nuevo León, Chihuahua, and Jalisco.

No data are available on the sectoral distribution of either private or public credit before 1965. In that year industrial credit accounted for almost half of total private credit, most of it allocated to commercial activities. Again, the Federal District was strongly dominant. The sectoral and geographic distribution of public credit was roughly similar to that of private credit,

10. Skilled workers are defined for census purposes in Mexico as "those who, as a result of theoretical training or considerable experience, are capable of realizing a complex and specialized task and whose services are contracted precisely for that purpose."

Table 3-24. *Per Capita Financial Savings, by State, 1940 and 1970*
(thousands of current pesos)

State	*1940*	*1970*
Aguascalientes	359	100,497
Baja California	n.a.	938,267
Baja California (Territory)	n.a.	44,256
Campeche	105	48,278
Coahuila	691	379,138
Colima	165	73,079
Chiapas	204	149,034
Chihuahua	1,197	558,320
Durango	445	163,611
Federal District	2,520	2,407,402
Guanajuato	560	480,446
Guerrero	n.a.	168,659
Hidalgo	285	100,186
Jalisco	1,084	2,019,470
México	445	1,109,975
Michoacán	630	496,149
Morelos	188	214,877
Nayait	n.a.	130,221
Nuevo León	901	1,672,815
Oaxaca	192	168,612
Puebla	480	778,764
Querétaro	n.a.	171,930
Quintana Roo	n.a.	33,799
San Luis Potosí	323	341,623
Sinaloa	280	791,884
Sonora	375	1,181,130
Tabasco	n.a.	85,400
Tamaulipas	1,722	599,446
Tlaxcala	n.a.	23,267
Veracruz	1,161	576,219
Yucatán	711	132,833
Zacatecas	n.a.	149,095

n.a. Not available.
Source: Ministry of Finance, Banking Commission.

the Federal District having a near monopoly on public credit for industry. In 1972 the pattern was roughly similar, although the share of the Federal District in private industrial credit had by then declined slightly (Table 3-25).

The development of manufacturing and urbanization were strongly associated with the accumulation of savings and investment. Indexes of investment in manufacturing and agriculture show that private investment was highest in the most developed states and in the largest and most dynamic cities, suggesting, among other things, that industrial capital was less geographically mobile up to 1970 than might have been expected.

Table 3-25. *Credit Outstanding from Private and Public Credit Institutions, by State and by Sector, 1972*
(thousands of pesos)

State	*Industry*		*Agriculture*	
	Private	*Public*	*Private*	*Public*
Aguascalientes	127,313	1,569	36,141	55,551
Baja California	718,006	13,720	74,949	46,986
Baja California (Territory)	19,543	5,110	3,736	1,955
Campeche	23,084	–	1,076	–
Coahuila	905,269	–	213,083	31,789
Colima	29,242	368	56,267	16,487
Chiapas	97,623	4,698	67,152	46,697
Chihuahua	859,059	203	249,465	34,029
Durango	134,657	–	35,818	–
Federal District	30,586,288	18,091,357	458,291	39,558
Guanajuato	419,666	9,694	168,844	108,609
Guerrero	95,547	–	39,877	–
Hidalgo	75,345	–	21,362	–
Jalisco	2,415,136	5,013	308,585	34,099
México	819,197	426	52,898	18,464
Michoacán	389,918	–	197,675	5,520
Morelos	120,000	–	18,975	–
Nayarit	34,756	49	43,310	23,298
Nuevo León	5,700,357	–	149,890	–
Oaxaca	30,335	245	66,922	21,171
Puebla	836,880	4,360	56,397	28,914
Querétaro	84,839	–	27,444	–
Quintana Roo	8,663	1,991	1,246	800
San Luis Potosí	243,673	2,321	29,807	138
Sinaloa	451,857	22,584	637,938	91,119
Sonora	377,147	4,706	663,108	114,033
Tabasco	57,115	4,525	10,779	118,559
Tamaulipas	364,263	3,703	228,154	132,009
Tlaxcala	36,437	–	10,518	–
Veracruz	550,030	3,006	91,137	8,296
Yucatán	470,735	–	13,198	–
Zacatecas	33,431	296	33,323	14,155
Total	47,136,311	18,179,594	4,066,395	992,236

Source: Bank of Mexico.

LINKS BETWEEN SECTORS. A third class of agglomeration economies, also external to the firm, comprises several links between sectors. First, the concentration of both commerce and services in large cities implies that these locations offer the manufacturer relatively greater advantages than smaller cities. In particular, Mexico City's role as the nation's financial and commercial center was strongly associated with its growth as a manufacturing center, since access to its financial and other services were important factors

Livestock		*Mining*		*Commerce*	
Private	*Public*	*Private*	*Public*	*Private*	*Public*
33,509	13,174	100	–	110,909	4,426
59,475	6,671	31,101	15	868,212	6,949
5,602	8,274	432	–	62,815	436
18,503	–	300	–	40,513	–
268,839	31,741	40,084	–	876,155	6,503
12,360	13,783	251	–	71,345	1,825
199,861	85,869	–	–	186,332	2,617
451,923	11,326	5,258	–	1,272,602	11,269
95,692	–	2,944	–	146,995	1,861
346,143	1,700	2,454,529	3,758,785	26,491,366	29,008,689
65,898	31,417	1,436	469	469,232	17,576
21,546	–	234	–	242,096	–
32,326	–	809	–	148,737	–
280,057	38,177	60,885	–	1,730,369	26,268
43,646	9,556	1,956	–	405,461	1,057
157,355	23,197	542	–	559,217	4,409
7,801	–	38,464	–	245,163	–
15,294	14,897	–	–	108,249	3,940
377,245	–	334,225	–	3,450,447	–
66,714	84,817	394	–	120,362	5,949
32,839	55,016	4,436	6,218	580,468	10,299
31,050	–	4,051	–	154,555	1,147
584	418	–	–	36,996	8,695
150,806	–	5,702	–	325,840	9,303
74,656	19,202	5,352	–	791,523	5,583
315,630	52,183	8,614	–	798,938	6,627
223,141	369,558	239	–	154,964	42,748
463,218	88,357	17,813	–	803,883	6,530
2,673	–	–	–	27,351	–
453,139	65,169	121	–	831,097	7,853
77,438	–	8,542	–	281,268	1,911
59,345	10,315	1,929	145	113,959	9,915
4,504,678	1,033,817	3,031,743	3,765,632	42,505,124	29,214,390

in investment decisions. Government services were particularly crucial, even for entrepreneurs with firms located in other cities, and large enterprises located elsewhere than in Mexico City often maintained permanent offices in the capital (Derossi 1971).[11]

Second, there are links between the primary (minerals) sector and the growth of the basic metals industry. Whereas good access to coal and ore

11. In at least one instance (no doubt there are others) a firm that had its only plant in Monterrey had its head office in Mexico City, 600 miles away.

deposits was crucial to the expansion of this industry in Coahuila and Nuevo León, these materials did not occur in the state of Mexico or the Federal District. Yet both areas experienced substantial development in this sector, a fact that is mainly ascribed to the effects of transfer economies arising from low freight rates on raw materials. The reasons for the concentration of basic metals industries in these four states thus were varied. In each area, however, the industry stimulated growth in the fabricated metals, transport, and electrical goods industries. In the Federal District and the state of Mexico automobile assembly gave rise to the growth of the rubber tire industry. In the three other states other than Coahuila the large concentration of industrial demand also promoted the production of intermediate goods such as synthetic fibers, industrial acid, cement blocks, and glassware. In addition, the accompanying concentration of consumer demand, resulting from a large labor force, stimulated the production of pharmaceuticals, processed food, and other consumer goods.

Third, transfer economies derived from the adjacent location of closely linked industries as well as the internal economies of scale created by the concentration of industrial and consumer markets generated a cumulative expansion of manufacturing. The early prominence of Mexico City and Monterrey as population and manufacturing centers attracted the large-scale industries that the economy was able to support after 1940. Conversely, where industrial growth was based on access to primary materials in rather small urban areas (such as Monclova), consumer and other intermediate goods industries, such as textiles and chemicals, did not grow quickly.

Government policies without explicit spatial objectives

Government policy helped to shape the spatial structure of the industrial sector after 1940 in two ways: first, through macroeconomic policies that had no formal spatial objectives but that nevertheless had important effects on spatial and urban development; and, second, through policies that did have explicit and formal spatial objectives.

The most important policy without explicit spatial objectives—and the only one discussed here—concerns external protection. As noted earlier, Mexico's industrialization after 1940 was closely associated with import controls and, to a lesser extent, with tariff barriers. Compared with the situation in other Latin American countries, Mexican industry was not unduly protected, but protection nevertheless had its effects, particularly on the spatial distribution of industrial growth.

Import substitution led to inefficiencies. High production costs resulted from the fragmentation of industry into small firms, often using inefficient techniques of production and management, and from inadequate specialization, because import licensing encouraged backward integration, with firms

tending to produce their own parts and components instead of buying them from other (domestic) suppliers. In addition, firms were assured of high profits in a closed domestic market. In these circumstances, technical progress was slow, and the quality of many manufactured goods was poor. The low quality of industrial inputs also adversely affected commodities at higher levels of fabrication, and import substitution behind protective barriers led to the establishment of industries (mainly capital intensive) in which Mexico had little comparative advantage.

Lavell (1972) has analyzed the spatial effects of protection, especially the effects of the Law of New and Necessary Industries of 1941 (amended in 1946 and in 1955). Industries covered by the law included basic metals; transport; and chemical, mechanical, electrical, metal, and food products. The law granted total relief from excess-profits, stamp, industrial, and income taxes and from import duties on raw materials or components needed in production. Exemptions were granted for periods of five, seven, or ten years, depending on the industry and its relative importance for national development. Industries defined as new included branches of manufacturing not well represented in Mexico, as well as firms making goods similar to those already produced in the country, provided the new company guaranteed a 20 percent saving in the price over the lifespan of the new product. Industry defined as necessary was that which was of fundamental importance to the nation's industrial growth.

The Law of New and Necessary Industries had no explicit spatial bias. The federal government granted identical exemptions throughout the country without reference to location, although, in practice, most of the exempt firms were located in the Valle de México, and at least 65 percent of the capital investment and 40 percent of the employment affected by the law was in or around Mexico City. In 1960, nineteen of the thirty-two states had not received a single exemption; in 1965 the number had been reduced to fifteen. The data in Table 3-26 show the regional distribution of exemptions in three periods and emphasize the heavy concentration in the central region.[12]

The absence of a spatial bias in the law and in the policy of protection in general does not imply that there were no spatial effects. The lack of spatial criteria may be attributed to the government's concern to promote national industrial growth. When the law went into effect, some parts of the country were already at a severe disadvantage for industrial location compared with others, and to have encouraged location in the periphery might well have meant that already-inefficient producers would have had to contend with cost disadvantages caused by less desirable locations. Thus, if the law had in-

12. Of the 167 plants established under the law in 1959-64, 98 were located in or near Mexico City or Monterrey.

Table 3-26. *Regional Distribution of Factories Granted Tax Relief under the Law of New and Necessary Industries, 1940 to 1964*

Regions	Number of factories		Percentage of total factories		Employment at factories		Percentage of total employment	
	1940-50	*1959-64*	*1940-50*	*1959-64*	*1940-50*	*1959-64*	*1940-50*	*1959-64*
Center	409	122	71.8	73.1	31,061	10,365	63.0	70.3
North	91	30	16.0	18.0	12,095	2,981	24.5	20.2
Pacific North	35	8	6.1	4.8	2,517	596	5.1	4.0
Gulf Coast	30	6	5.2	3.6	3,270	646	6.7	4.4
Pacific South	5	1	0.9	0.6	361	149	0.7	1.0
Total	570	167	100.0	100.0	49,304	14,737	100.0	100.0

Note: Exclusive of 1950-59. The regions as defined in this table consist of the following states: Center—Federal District, Aguascalientes, Guanajuato, Hidalgo, Jalisco, México, Michoacán, Morelos, Puebla, Querétaro, Tlaxcala; North—Chihuahua, Coahuila, Durango, Nuevo León, San Luis Potosí, Zacatecas; Pacific North—Baja California, Sinaloa, Sonora, Nayarit; Gulf Coast—Tamaulipas, Veracruz, Tabasco, Campeche, Yucatán, Quintana Roo; and Pacific South—Colima, Guerrero, Oaxaca, Chiapas.

Source: 1940-50; Lopez Malo, 1960, p. 213; and 1959-64, Secretaría de Industria y Comercia, 1965; as quoted in Lavell (1972).

cluded spatial objectives, entrepreneurs might not have responded as enthusiastically as they did, and Mexico might well not have experienced as much real growth. Nonetheless, external protection encouraged industrial centralization.

Government policies with explicit spatial objectives

Many of the industrial policy instruments introduced after 1940 were seen as means by which to simultaneously achieve both local development and decentralization, thereby obscuring the distinction. For example, policies designed to promote small and medium-size industry at the local level were often called decentralization policies. Although such policies can strengthen local capacity to generate or respond to growth impulses, their effect on decentralization from Mexico City was probably negligible.

A second feature of explicit spatial policy was a tendency to try to induce growth in all places at the same time in the hope of reducing the economic dominance of the larger metropolitan areas, without accounting for differences in the growth potential of various cities. Rather than focusing on targets with comparative advantages that would make them potential countermagnets to Mexico City or true regional growth centers, spatial policy attempted to spread limited investment resources and to provide fiscal incentives across an undifferentiated periphery. The result was to leave the system largely unchanged.

The policies in this category included fiscal policies; credit policies; employment policies; public investment policies; and wage, price, and tariff policies.

FISCAL POLICIES. Fiscal policies were concerned with tax exemptions, and between 1940 and 1960 almost all states introduced tax exemption laws to encourage industrial development. These allowed exemptions from the state's share of the sales tax, from stamp duty, and from local land taxes. Exemptions varied from ten to thirty years, depending on the state, and were applicable to both new and expanding industries.

Romero Kolbeck and Urquidi (1952) concluded, however, that a principal effect of exemptions in the Federal District had been an unnecessary loss of fiscal revenue. They argued that, in the Federal District, the objectives of tax exemption were extremely doubtful since industry was already concentrated there. Continued exemptions, they added, should apply only to industries that would improve the standard of living of the population. And they showed that cancelation of the exemptions would cause a 10 percent loss in profits for 61 percent of the factories studied, or a 25 percent loss for 76 percent of the cases examined. If these losses were passed on to consumers, prices would increase only 1 or 2 percent a year. Not

long after the publication of their study, tax exemptions were abolished in the Federal District.

In other parts of Mexico essentially similar exemption laws were intended to promote industrial growth and, to the extent exemptions were used, caused a loss in fiscal revenues. Moreover, judging from the somewhat scanty empirical evidence available, the laws did not have positive effects on decisions about industrial location. Lavell reports that few if any of a group of entrepreneurs in the states of Puebla, Guanajuato, Querétaro, and Cuernavaca accorded much significance to the exemption laws in their own location decisions.

Legislation introduced in 1972 established fiscal incentives to promote industrial decentralization and regional development. This elaborated a more general 1971 decree, which pointed to the desirability of these aims, linking them to the objectives of national economic efficiency and social justice, the generation of exports and employment, and a more equitable distribution of economic welfare.

To achieve these incentives, the country was divided into three zones: Zone 1 included the three largest metropolitan centers (including some of the surrounding municipios); Zone 2 included the secondary cities of Puebla, Cuernavaca, Querétaro, and Toluca, and two municipalities adjacent to Guadalajara; and Zone 3 included the remainder of the country. Industries locating in Zones 2 and 3 were eligible for reductions of from 50 to 100 percent on import duties, income, sales, stamp, and capital gains taxes, as well as accelerated depreciation and lower interest rates. In addition, firms with investments of less than 5 million pesos could receive technical assistance in the form of preinvestment studies, market research, and assistance in obtaining credit.

The incentives to industries located in Zones 2 and 3 were almost identical. Zone 2 included many cities close enough to Mexico City to share some of its advantages but far enough away to avoid some of its problems. Some, such as Querétaro and Puebla, were likely to undergo accelerated growth without incentives. Because the legislation did not distinguish between areas which required fiscal incentives for rapid growth and those which would grow anyway, it seemed likely to reinforce existing patterns. Unless incentives alter the opportunity costs at various locations quite considerably, they are not likely to attract industries out of the central zones. For example, if the tax savings offered in Zone 3, coupled with lower labor costs, did not exceed the locational advantages of Zone 2, industries would continue to prefer Zone 2. Moreover, within Zone 3, which comprised most of the country, no distinctions were made between different areas. In March 1974, however, a special zone called "Zone 3, Istmo" was created with special incentives to locate in the Isthmus of Tehuantepec.

The effect of such fiscal incentives on decentralization may often be insignificant. Some taxes, such as import duties on raw materials and capital

goods, were already so low in the early 1970s that a further reduction was not likely to affect private location decisions, and tax exemptions may have represented an unnecessary loss of public revenue. Despite the government's association of decentralization with the creation of jobs in lagging areas, such incentives as accelerated depreciation allowances may have effectively subsidized capital and may have led to an increase in capital-intensive production systems, which was inconsistent with the expansion of job opportunities.

Such incentives were likely to result in the "suburbanization" of employment opportunities within or immediately outside large metropolitan areas. The incentives offered in adjacent areas (for example, in two suburbs of Guadalajara) were likely to encourage this sprawl phenomenon, which would substantially increase transport costs for workers and, in the longer run, lead to higher infrastructure costs as well.

Finally, the exclusion of Monterrey and Guadalajara from fiscal and other incentives revealed some confusion about the objectives of a decentralization policy. Monterrey and Guadalajara, with 1970 metropolitan populations of between 1.2 and 1.4 million, were not gigantic cities, and had in fact reached a size at which relatively self-sustained growth should have occurred. Although it might be a good idea to regulate growth so that physical and social infrastructure can keep pace, there was neither a theoretical nor an empirical basis for contending that either city had reached its optimal size or was already too big. On the contrary, these cities and the spatial subsystems around them were among the most promising alternatives to Mexico City.

CREDIT POLICIES. The role of credit policies can first be illustrated by reference to the Guarantee and Development Fund for Small and Medium Industry, which was introduced in 1953 as a more or less explicit instrument of industrial location policy. By June 1970 the fund had awarded some 10,000 credits to more than 5,200 firms, which represented 32 percent of all capital investment in those companies.

The fund was supposed to select factories located outside existing areas of industrial concentration. The regional distribution of credits granted between 1953 and 1970 shows, however, that the relative importance of Jalisco, Mexico (state), and Sinaloa increased in this period, and that the average size of credits in the Federal District and the state of Mexico remained relatively large, although the share of the number of credits granted to the Federal District gradually decreased. In 1961-62 the Federal District attracted 48 percent of all credits, but by 1969-70 its share had fallen to only 23 percent. The data thus suggest that, given the rising shares of Jalisco, Sinaloa, Sonora, Guanajuato, and Oaxaca, the fund's activities provided a small step toward spatial decentralization.

The limited flow of credit to the less developed areas may have been related in part to lack of knowledge about credit facilities outside the central core and a few other regions. But, as Lavell says, it is difficult to believe that

Zacatecas, Campeche, Colima, Nayarit, and Tabasco could each have generated demand for less than ten credits in fifteen years. By 1970 the fund had noticed this problem and was trying to publicize its existence in the less developed states. Nonetheless, its effect was substantially less than had been hoped, and its contribution to decentralization was negligible because the Guarantee and Development Fund failed to shift the geographic incidence of credit. In part, this was a result of demand conditions, and another program, sponsored by Nacional Financiera, was set up to counteract this problem. This was the program of trust funds, which were designed to encourage local enterprise and thus stimulate demand for credit in the periphery.

The Trust Funds for Preinvestment Studies were set up in 1971 in every state to identify and promote investment projects. The administrative structure of each fund comprised a technical committee whose membership was drawn from Nacional Financiera (NAFINSA), the state government, the local private sector, and public agencies.

The state and the local private sector provided the initial capital for each fund, and NAFINSA provided technical contributions as well as overall coordination. The technical staff of the technical committee was basically responsible for feasibility and preinvestment studies (including studies of very specific subsectors) and for presenting projects to the committee. The committee ranked these projects and intervened with the local private sector, NAFINSA, the private and public banks, and state governments to get them implemented.

Forty trust funds of this kind existed by 1975, and 2,500 projects had been identified. Some states had more than one fund, but each state could finance only a limited number of projects. Because of this constraint the technical committee was obliged to rank projects in order of priority.

The Trust Funds for Preinvestment Studies appeared to be an important element in the government's overall program for local area development. Although their effect on decentralization was probably marginal, they were an innovative mechanism for generating local growth and stimulating the development of small- and medium-size industries. By identifying neglected opportunities in local areas, they represented an instrument for the better use of natural and human resources.

PUBLIC INVESTMENT POLICIES. Inasmuch as all public works may have an effect on spatial development, all public fixed investment can be legitimately regarded as having an implicit spatial policy dimension. Explicit investment policies were few, however.

Direct public investment in industry is the most obvious link between the spatial patterns of public investment and industrial growth. There are no data on the geographic distribution of public expenditure before 1959, but from 1959 through 1970 there are detailed data on sectoral outlays in each state.

These data show that industry received between 8 and 15 percent of all public outlays. About 80 percent of this went to the hydrocarbons industry. That industry was already strongly localized, and Tamaulipas and Veracruz together received some 60 percent of all hydrocarbons investment. Steel investment, the next largest category, was heavily concentrated in Coahuila.

The indirect effects of the location of public investment on the spatial structure of industrial growth were more important. Geographic differences in the availability of transport, power, water, and other goods and services provided by the public sector strongly affected the attractiveness and even the viability of alternative industrial locations. For the period for which comparable data are available, 1959-70, the geographic distribution of public investment in infrastructure (transport, power, and water) was closely related to the spatial pattern of urbanization, with the Federal District receiving the largest share of total outlays (Table 3-27). There was also a high correlation between urbanization and public investment in education, and the Federal District again received a disproportionately large share of the total. Finally, the Federal District received an even larger share of all investment in administration because of its role as the seat of the federal government, although this category of expenditure was less important than the others.

Another aspect of public intervention—sometimes involving direct public investment, sometimes not—concerned the development of industrial complexes, parks, and cities. In 1970 a new program was announced as "an instrument with which to reshape the economic geography of the nation," and it had three main components, two of which had a direct industrial dimension.[13]

a. The construction and promotion of industrial parks and cities in or near a large number of urban centers to attract industries and to regulate their future physical growth. The selection of these centers was based on transport studies carried out by the Ministry of Public Works. The program was jointly executed by this Ministry and Nacional Financiera and incorporated a distinction between industrial cities, which included housing and other services for employees, and industrial parks, which did not.
b. The promotion of conjuntos, or complexes of existing industries in a given geographic area, to rationalize production. Unlike industrial parks and cities, conjuntos were largely aimed at existing industries and did not necessarily involve the construction of physical infrastructure. The program was run by Nacional Financiera, which also selected the locations and provided technical and administrative assistance to the small and medium-size industries included in the conjuntos.

13. See Nacional Financiera (1973).

Table 3-27. *Distribution of Federal Public Investment among the States, 1959 to 1970*

State	1959		1960		1961	
	Millions of 1960 pesos	*Percent*	*Millions of 1960 pesos*	*Percent*	*Millions of 1960 pesos*	*Percent*
Aguascalientes	0.25	0.43	0.21	0.30	0.18	0.24
Baja California	1.01	1.75	1.89	2.68	4.30	5.82
Baja California (Territory)	0.24	0.42	0.25	0.35	0.26	0.35
Campeche	0.29	0.50	0.41	0.58	0.44	0.60
Coahuila	4.53	7.84	1.76	2.50	2.83	3.83
Colima	0.31	0.34	1.14	1.62	0.84	1.14
Chiapas	0.75	1.30	0.80	1.13	0.86	1.16
Chihuahua	3.29	5.69	3.74	5.31	3.59	4.86
Durango	0.97	1.68	1.01	1.33	1.68	1.27
Federal District	7.46	12.91	14.20	20.14	13.71	18.55
Guanajuato	1.26	2.18	1.94	2.75	2.24	3.03
Guerrero	1.27	2.20	1.47	2.09	4.18	5.66
Hidalgo	0.58	1.00	0.61	0.87	0.95	1.29
Jalisco	1.66	2.87	2.43	3.45	2.43	3.29
México	1.77	3.06	1.94	2.75	4.95	6.70
Michoacán	1.98	3.43	1.93	2.74	4.54	6.14
Morelos	0.25	0.43	0.41	0.58	0.71	0.96
Nayarit	0.39	0.67	0.38	0.54	0.16	0.24
Nuevo León	3.33	5.76	4.88	6.92	1.38	1.87
Oaxaca	2.07	3.58	1.34	1.90	2.71	3.67
Puebla	3.32	5.74	2.76	3.72	3.74	5.06
Querétaro	0.31	0.54	0.39	0.55	0.25	0.34
Quintana Roo	0.13	0.22	0.26	0.37	0.37	1.50
San Luis Potosí	0.66	1.14	0.74	1.05	0.88	1.19
Sinaloa	2.81	4.86	3.24	4.60	2.75	3.72
Sonora	2.04	3.53	1.77	2.51	1.67	1.27
Tabasco	2.60	4.50	3.90	5.53	2.77	3.75
Tamaulipas	5.05	8.74	6.34	8.79	2.25	3.04
Tlaxcala	0.22	0.38	0.22	0.31	0.39	0.53
Veracruz	6.35	10.99	7.37	10.46	4.59	6.21
Yucatán	0.34	0.59	0.43	0.61	0.50	0.68
Zacatecas	0.34	0.59	0.32	0.45	0.77	1.04

c. The establishment of commercial centers in northern border cities to stem the negative flow of foreign exchange generated by consumer imports from the United States to these cities.

By late 1975 the industrial parks and cities programs had nine developments either operational or under construction in Durango, Mérida, Querétaro, Veracruz, Tepic, Villahermosa, Tijuana, Guaymas (fishing complex), and Mexicali (commercial center). And as of that date the official program

1962		1963		1964	
Millions of 1960 pesos	*Percent*	*Millions of 1960 pesos*	*Percent*	*Millions of 1960 pesos*	*Percent*
0.14	0.17	0.40	0.40	1.45	1.42
2.84	3.41	2.73	2.70	3.30	3.22
0.25	0.30	0.53	0.32	0.68	0.66
0.52	0.62	0.56	0.55	0.76	0.74
3.99	4.79	5.77	5.71	2.65	2.78
0.88	1.06	0.81	0.80	0.40	0.39
1.30	1.56	5.77	5.71	6.30	6.15
2.63	3.16	1.89	1.87	3.77	3.68
0.95	1.14	1.64	1.62	1.32	1.29
19.60	23.52	27.52	27.21	25,37	24.66
1.56	1.87	2.31	2.28	3.38	2.32
3.15	3.78	2.76	2.73	2.25	2.20
0.92	1.10	0.97	0.86	1.72	1.68
2.46	2.95	2.41	2.38	2.04	1.99
2.46	2.95	4.24	4.19	4.68	4.57
3.01	3.61	2.30	2.27	2.92	2.85
0.35	0.42	0.62	0.61	0.51	0.50
0.45	0.54	0.36	0.36	0.34	0.33
2.48	2.98	1.90	1.88	1.55	1.51
1.21	1.45	1.91	1.89	1.65	1.61
1.65	1.98	1.91	1.89	1.63	1.59
0.33	0.40	0.59	0.58	0.80	0.78
0.45	0.54	0.10	0.10	1.28	1.25
1.23	1.48	2.61	2.58	1.09	1.05
3.95	4.74	5.99	5.92	7.53	7.35
3.63	4.36	3.01	2.98	2.60	2.54
5.12	6.20	3.84	3.80	3.62	3.53
4.72	5.66	6.21	6.14	6.80	6.64
0.20	0.24	0.29	0.29	0.29	0.28
8.99	10.79	7.27	7.19	8.30	8.10
0.75	0.90	1.26	1.23	1.06	1.05
1.14	1.37	0.66	0.65	1.18	1.15

(Table continues on the following pages)

projected at least ten additional parks. Unfortunately, that program was not formally coordinated with the growth of industrial parks sponsored by state governments or by private initiatives.

The industrial parks and cities program did not appear to be a powerful instrument for decentralization. It was hampered by the absence of industrial location studies and was mainly supported by the argument that physical infrastructure is important to industrialists. The limited evidence on the subject indicates it is doubtful that industrialists weigh the existence of an

Table 3-27 (*continued*)

State	1965		1966		1967	
	Millions of 1960 pesos	*Percent*	*Millions of 1960 pesos*	*Percent*	*Millions of 1960 pesos*	*Percent*
Aguascalientes	1.17	1.21	0.91	0.83	0.67	0.46
Baja California	1.90	1.96	1.62	1.47	4.03	2.77
Baja California (Territory)	0.18	0.19	1.03	0.94	0.49	1.03
Campeche	0.92	0.95	1.27	1.15	0.98	0.67
Coahuila	5.72	5.91	4.91	4.46	4.45	3.06
Colima	0.28	0.29	0.47	0.43	0.71	0.49
Chiapas	2.79	2.88	3.62	3.29	2.55	1.76
Chihuahua	4.22	4.36	6.69	6.08	6.59	4.54
Durango	0.84	0.87	1.18	1.07	1.00	1.38
Federal District	18.46	19.08	19.50	17.33	34.70	20.81
Guanajuato	2.46	2.54	3.83	3.48	6.12	4.21
Guerrero	4.84	5.00	1.77	1.61	2.85	1.96
Hidalgo	1.05	1.09	1.10	1.00	2.21	1.52
Jalisco	1.75	1.81	2.65	2.41	4.31	2.97
México	3.57	3.69	4.13	3.75	3.68	3.91
Michoacán	1.47	1.52	2.05	1.86	3.46	1.69
Morelos	0.85	0.88	0.95	0.86	0.88	0.61
Nayarit	0.34	0.35	0.71	0.65	0.81	0.56
Nuevo León	2.33	2.41	1.97	1.79	1.69	1.85
Oaxaca	2.61	2.70	1.60	1.45	3.38	2.33
Puebla	2.36	1.41	2.66	1.96	2.66	1.80
Querétaro	1.04	1.07	1.20	1.09	2.06	1.42
Quintana Roo	0.32	0.33	0.37	0.34	0.47	0.32
San Luis Potosí	1.10	1.14	1.63	1.48	2.31	1.59
Sinaloa	5.63	5.82	4.95	4.50	5.77	3.97
Sonora	1.67	1.73	2.09	1.90	2.36	2.31
Tabasco	4.95	5.12	4.28	3.89	7.78	6.96
Tamaulipas	9.49	9.81	10.78	9.80	10.11	8.44
Tlaxcala	0.33	0.34	0.24	0.22	0.48	0.33
Veracruz	11.11	11.48	17.88	16.26	15.34	12.63
Yucatán	1.11	1.15	1.75	1.54	1.62	1.12
Zacatecas	0.83	0.91	0.71	0.65	0.77	0.53

industrial park very heavily in their location choices. If an area is likely to be chosen by industries because of its resource endowment or comparative advantages, an industrial park may facilitate and accelerate the process, and may help regulate the physical growth that is implied by industrial expansion. But if an area's industrial prospects are limited to start with, there may be little justification for such costly, supply-oriented investments.[14]

14. This point is substantiated by the fact that of 177 firms which either located or expressed an interest in the nine initial projects, 63 were interested in Querétaro. The

State	1968		1969		1970	
	Millions of 1960 pesos	*Percent*	*Millions of 1960 pesos*	*Percent*	*Millions of 1960 pesos*	*Percent*
Aguascalientes	0.63	0.40	0.79	0.46	0.49	0.28
Baja California	2.73	1.74	3.09	1.81	5.09	2.91
Baja California (Territory)	1.18	0.75	2.07	1.21	1.46	0.83
Campeche	0.71	0.45	1.01	0.59	0.87	0.50
Coahuila	4.11	2.81	6.49	3.80	8.13	4.65
Colima	1.13	0.72	1.54	0.90	0.77	0.44
Chiapas	1.75	1.11	1.84	1.08	1.91	1.09
Chihuahua	4.38	2.78	4.60	2.78	3.97	2.77
Durango	2.46	1.56	2.74	1.61	2.53	1.45
Federal District	44.22	28.16	43.49	28.41	30.80	29.03
Guanajuato	6.20	3.94	6.97	4.08	4.61	2.63
Guerrero	2.11	2.34	2.22	1.30	2.89	1.65
Hidalgo	2.94	1.87	2.61	1.53	3.65	2.09
Jaliaco	4.22	2.68	4.81	3.82	4.59	2.62
México	6.69	4,25	3.98	3.31	7.12	4.07
Michoacán	2.64	1.63	3.63	2.13	4.93	2.82
Morelos	1.12	0.71	1.40	0.82	1.33	0.87
Nayarit	1.08	0.69	0.72	0.42	0.54	0.37
Nuevo León	3.62	2.30	4.49	2.63	4.02	0.30
Oaxaca	2.77	1.76	3.04	1.78	3.38	1.94
Puebla	2.46	1.56	2.87	1.68	1.83	1.62
Querétaro	2.28	1.45	2.50	1.46	1.30	0.74
Quintana Roo	0.67	0.43	0.64	0.38	1.33	0.79
San Luis Potosí	1.36	0.86	2.07	1.21	1.77	0.98
Sinaloa	6.53	4.15	6.31	3.70	4.20	2.40
Sonora	4.00	2.58	4.02	2.36	4.60	2.63
Tabasco	10.01	6.36	10.72	6.28	9.39	5.48
Tamaulipas	11.18	7.31	12.20	7.18	14.41	8.24
Tlaxcala	0.60	0.38	0.66	0.39	0.43	0.25
Veracruz	13.79	11.95	16.98	9.75	18.28	10.45
Yucatán	1.82	1.16	2.15	1.26	1.84	1.05
Zacatecas	0.73	0.46	1.02	0.60	0.99	0.57

Source: Ministry of Finance and Ministry of the Presidency.

The objectives of NAFINSA's program of conjuntos were less ambitious than those of the industrial parks. A conjunto sought to eliminate some of the problems associated with small- and medium-size industries by encouraging the creation of joint facilities. Industries coming together as a conjunto would typically be engaged in similar or complementary activities and would

interest expressed in Querétaro's industrial city shows the effective demand for industrial locations in this area and suggests that Querétaro (and the spatial subsystem centered around it and Irapuato) fulfilled the requirements for regional industrialization.

be established within a single geographic area. This program sought to alleviate the lack of technical and administrative capability, the inadequate use of machinery and equipment, the difficulties of acquiring raw materials and credit, and the inefficient commercialization of products by centralizing functions and sharing costs.

Six conjuntos had already been set up by the end of 1975, including a shoe complex in León, a clothing and artisan complex in Aguascalientes, and an agro-industrial complex (among others) in Guadalajara. From the list of projected investments it was clear that Jalisco and other relatively prosperous states were likely to receive the bulk of the projected investments.

Although the effects of the conjuntos program on the rationalization of production and on employment and incomes in certain places was potentially significant, its likely effect on the national space-economy appeared to be limited. However, compared with the industrial parks program, greater emphasis was placed on evaluating results, the criteria employed including rates of return, employment and earnings effects, and other benefits to the local community.

Finally there were the commercial centers in northern border cities. One of the pervasive problems of the border area is the enormous leakage of income in the form of imports from the United States. In order to stem this flow of foreign exchange, commercial centers were established in such cities as Mexicali, which were expected to modify the consumer habits of border city residents. It seemed questionable whether such a program could serve to integrate border city residents more fully into the Mexican economy or to diminish consumer preferences for U.S. products.

EMPLOYMENT PROGRAMS. This category of industrial spatial policy essentially contained one instrument: the Assembly Industries Program, which was set up in the mid-1960s and was originally confined to the U.S. border area, where it led to rapid growth in exports and employment after 1966. It was extended to the rest of the country in October 1973. The trade and cultural relations of the border region of Mexico are largely with the United States, and high levels of migration to the region after 1940 were closely linked to the possibility of obtaining employment across the border. During and after the 1940s the government-run "bracero" program facilitated temporary migration for work on farms across the frontier, and by 1964 it employed nearly 200,000 workers. This was terminated in 1965, and the Mexican government initiated the Border Industries Program to facilitate subcontracting by U.S. industrial firms that wanted to take advantage of the inexpensive labor in the Mexican border states.[15] The program had several

15. Articles 806.30 and 806 of the U.S. tariff schedule provided that imported products assembled in foreign countries from components made in the United States were subject to customs duty only on the basis of value-added abroad.

objectives: to increase employment, to generate foreign exchange, to upgrade the labor force, to widen the domestic market for Mexican producers by injecting income into the region, to increase fiscal revenues, to stimulate multiplier activity in nonmanufacturing sectors, and to expand the market for skilled Mexican labor.

The legislation introduced in 1965 set up different regulations for maquila industries located in the Baja California and Sonora free zones than for those in other border areas. The industries in these two areas were allowed to import any item included in the Free Zone Import List, whereas plants in other border areas had to obtain temporary import permits for specific inputs. These arrangements worked fairly smoothly, and both kinds of border area industries considered themselves advantageously placed compared with plants in the interior that also required temporary import permits.

The largest maquila industries, whether in the free zone or in other border areas, were subsidiaries of U.S. corporations. The parent company provided capital, physical inputs, and often management, and also agreed to purchase the entire output of the maquila plants. The Mexican government required the maquila industries to declare costs and revenues and to pay federal and state taxes on sales and profits. But these conditions seem to have been frequently bypassed, particularly by foreign-owned companies, many of which did not keep financial data or accounts in their Mexican plants. The plants used low-valued inputs and transferred their output at or near the domestic cost incurred in Mexico.

The program had a dramatic effect both on the frontier region and on the growth of Mexico's manufactured exports. But it was not entirely successful, even in relation to its stated objectives and may, indeed, have had some undesirable consequences.

Although the effect on the local, regional, and national economy cannot be precisely quantified, it is estimated that by the early 1970s the program had generated some 50,000 jobs, mainly for women between 15 and 24 years old. Minimum wages in the border area had long been higher than elsewhere, and rose quickly after 1966. But whereas employers in the interior, and especially the Federal District, incurred considerable expenses for fringe benefits, border industries generally paid only the prescribed minimum wage. Thus, the difference in total labor cost between the border and the interior was not as great as suggested by published minimum wage schedules. Moreover, many on-the-job trainees were probably used in border plants in violation of Mexican labor laws.

From a fiscal standpoint the results of the program were rather disappointing, and it seems likely that if foreign firms in the border areas had complied fully with the regulations and had declared the full value of their inputs and outputs, the Mexican government would have earned more from both sales and income taxes.

The most serious shortcoming of the border industry program was probably that it did not reduce the traditional dependency of the region on the United States. Although the program generated new income, much of it was lost across the border, and the border cities remained enclave economies largely separated from the rest of Mexico with such common implications as the failure to reinvest profits in the area, the expenditure of a large proportion of wages on imported goods, and local dependence on the vagaries of foreign markets and changes in U.S. and Mexican government regulations.

WAGE, PRICE, AND TARIFF POLICIES. The final category of spatially biased government policies refers to wage, price, and tariff policies. After 1946 minimum wages in Mexico were set by a tripartite commission. Since wages were consistently lower outside the largest metropolitan areas and the northern frontier, it might appear that wage differences were set to encourage industrial growth in other areas, whereas minimum wages were mainly designed to take account of differences in the cost of living. It thus seems unlikely that wage policy was deliberately used to promote industrial growth outside well-established locations.

Similarly, the evidence on public sector prices and tariffs suggests they were not used to encourage decentralization. On the contrary, in the Federal District water prices were held down so that consumers paid less than the incremental cost of providing the water, and after 1940 prices of corn, electric power, diesel fuel, and public transport in the Federal District were also subsidized. Some of these policies were designed to benefit the urban poor, but presumably benefited other groups too. The attractions of the Federal District for the location of economic activity were thus enhanced.

As explained in Chapter 2, the development of the transport network probably facilitated decentralization after 1940. Railroad freight rates, however, were structured to favor routes to or from Mexico City, because the rates were based on the "value of service," which tended to increase the cost of transporting bulk commodities. The cross subsidization encouraged location near markets rather than near raw materials, and thus favored the more developed center of the country.

Finally, property in the Federal District was relatively undervalued for tax purposes, and other states were taxed at relatively higher rates. This situation existed partly because local taxation was necessary in order to finance public education, which in the Federal District was financed by the federal government.

Other determinants of industrial development

Certain other circumstances–some of general but minor relevance, others of local but great importance–affected the process of urban and industrial

development after 1940. A complete description is impossible, but two examples focusing on local conditions illustrate the role of such factors. The evidence suggests that they may, at this level, have outweighed the more general conditions that have already been discussed.

The first such factor concerns the decisionmaker. Decisions about industrial location are necessarily made by people with varying abilities to make rational choices and who may or may not be well informed when making them. Entrepreneurs, or industrial decisionmakers, may vary in their willingness to take risks and in other ways, and differences between entrepreneurs thus may have an important bearing on industrial development.

The available data suggest that in Mexico such differences were between cities rather than between states or regions. For example, Derossi (1971) has shown that in Monterrey the effect of earlier industrial development had already established this city as a leading industrial center by 1940, and that its later growth was largely based on the continued exploitation of its initial advantage relative to other cities and regions. Even so, the continued ability of Monterrey to compete successfully with other cities after 1940, in spite of its location away from the central market, depended upon the ability of its entrepreneurs to identify and develop new opportunities for expansion. There may be a parallel here between the role of enterprise in Monterrey and in Medellín, Colombia.[16] Certainly there is some evidence that the entrepreneurs of Monterrey, like those of Medellín, have sought new opportunities not only in their own city but also in other parts of the country.

Another relatively localized determinant of urban and industrial growth after 1940 was the availability of natural resources. In earlier periods natural resources were crucial. After 1940, however, their importance appears to have been local rather than general. This can be illustrated by the experience of Chihuahua, Sonora, Tamaulipas, Morelos, and Baja California, where raw material processing industries, most of them producing for national or international rather than local markets, provided the main source of manufacturing development.

Commerce and Services and Urban Development

Although profitability may be regarded as a general test of the relative viability and attractiveness of alternative locations for tertiary activities, there are certain differences between the secondary and tertiary sectors and important differences between one tertiary industry and another. Commerce

16. See Hagen (1962). San Pedro Sula (Honduras), Santa Cruz (Bolivia), Santiago de los Caballeros (Dominican Republic), and in a somewhat different way, São Paulo (Brazil) might also fall into this category.

and urban services depend on market potential within a functional hierarchy of centralized activities. The tourist industry, however, does not depend on an urban or even a regional market, but to a large extent depends on international markets.

There are few cities in which initial tertiary multipliers seem to have played decisive roles. To some extent, services, especially government services, were crucial to the development of Mexico City, since its initial size (in 1900) was in many ways a consequence of its historical development as an administrative and political center. And tertiary activities were decisive in generating urban growth in such border cities as Tijuana, Mexicali, Ciudad Juárez, Reynosa, Nuevo Laredo, and Matamoros, and in the tourism centers of Acapulco and Mazatlán.[17]

The physical attributes of the Pacific coast were clearly paramount in determining developments in Acapulco and, less markedly, Mazatlán. Both enjoy remarkable natural settings, although both enterprise and enthusiasm were required to exploit them. Growth was essentially based on an initial development impulse from new investment in nonindustrial activity and corresponded to the development of an export base. Normally an export base is associated with the growth of industrial activities, but in this case multiplier effects were based on the initial growth of tourism, which then led to the subsequent growth of industrial and other tertiary activities.

17. The key to the growth of certain industries in the border cities was the large market provided by the United States. After 1940 new industries began to produce for the U.S. market, and the border industrialization program became important in the 1960s. The development of a cluster of entertainment and recreation industries in Tijuana and in other border cities was another predominant force in the growth of their populations and economies.

PART TWO

Structure of the Modern Urban System

CHAPTER 4

Demographic and Economic Structure

IN THE FIRST SECTION OF THE CHAPTER the demographic structure of the urban system is described. This description is complemented by an account of its socioeconomic characteristics.

Demographic Structure of the Urban System, 1940 to 1970

The structural development of the urban system after 1940 is analyzed here in terms of the thirty-seven largest cities in 1970. In terms of 1970 population, these cities ranged from Pachuca at just under 100,000 to Mexico City at just over 8,600,000 (Table 4-1).

One measure of the aggregate importance of the thirty-seven largest cities throughout the period was that they accounted for 65.0 percent of the nation's urban population in 1950 and for 68.0 percent in 1970. The urban population was concentrated further in the ten largest cities, the five largest cities, and in Mexico City alone. The ten largest cities accounted for 46.0 percent of the national urban population in 1940 and 47 percent in 1970; the five largest cities, for 38.0 percent in 1940 and 43.0 percent in 1970; and Mexico City, for 26.0 percent in 1940 and 31.0 percent in 1970.

Growth of the largest cities

Population growth rates are shown in Table 4-2. Between 1940 and 1970 four cities—Tijuana, Acapulco, Mexicali, and Ciudad Juárez—grew at average annual rates exceeding 7.0 percent, five other cities sustained average growth rates of more than 6.0 percent, and five more grew at average annual rates of more than 5.0 percent. There was no general relation between relative population size in 1940 and subsequent population growth, and there were great variations in growth rates between cities, as well as for individual cities at different periods. For example, the fastest growing cities in 1940-50 were Tijuana (11.5 percent), Mexicali (10.9 percent), and Reynosa (11.6

Table 4-1. *Evolution of the Population of the Thirty-seven Largest Cities, 1940 to 1970*
(thousands of persons)

City	*1940*	*1950*	*1960*	*1970*
Aguascalientes	104	118	154	225
Mexicali	44	124	281	396
Tijuana	22	65	166	341
Saltillo	76	99	128	191
Torreón	160	260	346	438
Ciudad Juárez	55	131	277	424
Chihuahua	79	112	186	277
Durango	62	99	143	204
Irapuato	61	82	127	175
León	103	157	261	420
Acapulco	23	56	85	239
Pachuca	59	64	72	92
Guadalajara	275	440	851	1,456
Toluca	98	115	156	239
Morelia	78	107	153	218
Cuernavaca	26	55	86	161
Monterrey	206	375	708	1,177
Oaxaca	32	50	79	158
Puebla	149	235	297	533
Querétaro	73	79	104	163
San Luis Potosí	98	155	194	268
Culiacán	93	147	209	360
Mazatlán	63	77	113	168
Ciudad Obregón	28	63	124	183
Hermosillo	30	55	108	208
Villahermosa	62	75	105	164
Matamoros	54	128	143	186
Nuevo Laredo	32	59	96	151
Reynosa	23	69	135	151
Tampico	112	138	179	276
Coatzacoalcos	22	28	54	110
Minatitlán	44	53	79	115
Orizaba	83	99	124	160
Veracruz	76	107	154	230
Jalapa	47	59	78	130
Mérida	115	159	191	242
Mexico City	1,828	3,167	5,230	8,624

Note: Thirty-seven cities are used because this is the number of cities that had minimum populations of about 100,000 in 1970.

Source: *VI Censo General de la Población, 1940* (1942); *VII, 1950* (1952); *VIII, 1960* (1962); and *IX, 1970* (1972).

Table 4-2. *Compound Annual Growth Rates For the Thirty-seven Largest Cities, 1940 to 1970*
(percent)

City	*1940-50*	*1950-60*	*1960-70*	*1940-70*
Aguascalientes	1.3	2.7	3.8	2.6
Mexicali	10.9	8.5	3.5	7.6
Tijuana	11.5	9.7	7.5	9.6
Saltillo	2.7	2.6	4.1	3.1
Torreón	5.0	2.9	2.4	3.4
Ciudad Juárez	9.1	7.8	4.4	7.1
Chihuahua	3.6	5.2	4.0	4.3
Durango	4.7	3.8	3.6	4.0
Irapuato	3.1	4.4	3.2	3.6
León	4.3	5.2	4.9	4.8
Acapulco	9.4	4.2	10.9	8.2
Pachuca	.8	1.2	2.4	1.5
Guadalajara	4.8	6.8	5.5	5.7
Toluca	1.6	3.1	4.4	3.0
Morelia	3.2	3.7	3.6	3.5
Cuernavaca	7.9	4.5	6.5	6.3
Monterrey	6.2	6.6	5.2	6.0
Oaxaca	4.6	4.6	7.3	5.5
Puebla	4.7	2.4	6.0	4.4
Querétaro	1.2	2.8	4.6	2.8
San Luis Potosí	4.7	2.2	3.3	3.4
Culiacán	4.7	3.6	5.6	4.6
Mazatlán	2.0	3.9	4.0	3.3
Ciudad Obregón	8.6	7.0	4.0	6.5
Hermosillo	6.1	8.1	5.8	6.7
Villahermosa	2.0	3.4	4.6	3.3
Matamoros	9.0	1.1	2.6	3.6
Nuevo Laredo	6.0	4.9	4.6	5.4
Reynosa	11.6	6.9	1.1	6.5
Tampico	2.0	3.6	4.5	3.1
Coatzacoalcos	2.6	6.8	7.2	5.5
Minatitlán	1.9	4.1	3.8	3.3
Orizaba	1.8	2.2	2.6	2.2
Veracruz	3.6	3.6	4.1	3.8
Jalapa	2.4	2.8	5.2	3.5
Mérida	3.3	1.8	2.4	2.5
Mexico City	5.7	5.1	5.1	5.3

Source: VI Censo General de la Población, 1940 (1942); *VII, 1950* (1952); *VIII, 1960* (1962); and *IX, 1970* (1972).

Table 4-3. *Indexes of Urban Primacy, 1940 to 1970*

Item	*1940*	*1950*	*1960*	*1970*
Population of Mexico City P_1 (thousands)	1,828	3,167	5,230	8,624
P_1/P_2	6.65	7.19	6.14	5.92
P_1/P_2 to P_5	2.31	2.42	2.37	2.39
P_1/P_2 to P_{10}	1.38	1.53	1.53	0.96
P_1/P_2 to P_{25}	0.76	0.88	0.92	0.96

Note: P = place (city); subscript = the number of places (cities).
Source: Based on data from *VI Censo General de la Población, 1940* (1942); *VII, 1950* (1952); *VIII, 1960* (1962); and *IX, 1970* (1972).

percent); in 1950-60 they were Tijuana (9.7 percent), Mexicali (8.5 percent), and Hermosillo (8.1 percent); and in the final decade of the period (1960-70), when urban growth was generally slower, the fastest rate was in Acapulco (10.9 percent).

Comparing growth rates for each city with the average rate for all thirty-seven cities, some cities (such as Culiacán, Minatitlán, and Jalapa) grew faster than the average rate in one decade and more slowly in another; other cities (such as Guadalajara, Tijuana, and Mexico City) sustained faster than average growth throughout the thirty-year period; and yet others (such as Aguascalientes, Morelia, and Orizaba) grew at less than the average rate in each of the three decades after 1940.

With respect to primacy (that is, the proportion of the total population of the various combinations of the twenty-five largest cities [twenty-five being an arbitrary number] compared with that of Mexico City) the record is somewhat ambiguous. Up to 1950 urbanization was associated with increasing primacy whatever the measure used. After 1950, however, only the measure relating the population of Mexico City to the largest base (the second through twenty-fifth ranked cities) showed a continuous increase (Table 4-3). There was a clear decline in the ratio between the size of Mexico City and the size of the second-ranked city (Guadalajara), whereas the ratios between the size of Mexico City and the cities occupying the second through the tenth ranks gradually stabilized. These changes imply that a maximum degree of primacy in the urban system had been reached in the late 1940s; that the dynamism of other larger centers had by then begun to rival that of Mexico City; and that the growth in the expanded group of large cities continued to out-pace that of most of the relatively smaller cities, as well as the smaller cities as a group. The urban system thus became somewhat more balanced after 1950 as its base expanded.[1]

1. That is, the number of smaller cities performing real urban functions and within the sphere of influence of the large cities increased.

Table 4-4. *Membership in the Sets of the Twenty-five, Ten, and Five Largest Cities, 1940 to 1970*

	Number of cities in set			
Initial year	*1940*	*1950*	*1960*	*1970*
Twenty-five largest cities				
1940	(25)	23	21	20
1950	23	(25)	22	22
1960	21	22	(25)	23
1970	20	22	23	(25)
Ten largest cities				
1940	(10)	8	6	6
1950	8	(10)	8	7
1960	6	8	(10)	9
1970	6	7	9	(10)
Five largest cities				
1940	5	5	5	5
1950	5	5	5	5
1960	5	5	5	5
1970	5	5	5	5

Source: *VI Censo General de la Población, 1940* (1942); *VII, 1950* (1952); *VIII, 1960* (1962); and *IX, 1970* (1972).

The urban hierarchy also became increasingly stable during this period. The membership of the sets of the five, ten, and twenty-five largest cities from 1940 through 1970 was remarkably consistent. This suggests that, once established near the top of the urban hierarchy, cities generally grew fast enough to remain there (Table 4-4). This conclusion is reinforced by rank-order correlation analysis, which shows the stability of the order of the urban system was very high after 1940, even within the twenty-five largest cities.[2]

Sources of urban growth

There were marked differences in the relative importance of natural increase and migration as sources of population growth in the nation's largest cities after 1940.[3] The period of fastest urbanization (1940-50) was marked by massive growth in migration from rural to urban areas, but, even though the absolute number of migrants continued to increase thereafter, natural increase became a relatively more important factor after 1950. Thus, the growth of large cities in the 1940s was mainly a result of migration, but in the 1950s and 1960s growth was primarily attributable to natural increase.

2. The correlation coefficients of the sets of the twenty-five, ten, and five largest cities in 1940 and 1970 were 0.6, 0.7, and 0.8, respectively.

3. See Appendix D for a discussion on fertility, mortality, and migration.

Table 4-5. *Cities with Greatest Growth Resulting from Migration, 1940 to 1960*

City	*Number of migrants*	*Percent of total migratory growth*
1940-50		
Mexico City	847,197	49.12
Guadalajara	97,646	5.66
Monterrey	97,041	5.63
Puebla	66,445	3.85
Ciudad Juárez	57,549	3.34
Mexicali	35,086	2.03
Tijuana	34,572	2.00
Torreón	31,107	1.80
San Luis Potosí	27,950	1.63
Mérida	23,095	1.34
City total	1,317,688	76.40
Country total	1,724,770	100.00
1950-60		
Mexico City	739,053	41.97
Guadalajara	227,906	12.94
Monterrey	172,293	9.78
Ciudad Juárez	85,155	4.84
Mexicali	60,779	3.45
Tijuana	50,660	2.88
León	37,322	2.12
Chihuahua	34,366	1.95
Veracruz	26,557	1.51
Hermosillo	25,408	1.44
City total	1,459,499	82.88
Country total	1,760,943	100.00

Source: Unikel (1970).

Although migration was less important to the growth of cities in the 1950s and 1960s than in the 1940s, it affected growth only in a relatively small number of cities throughout the period: 76 percent of all migratory growth in cities of 15,000 or more occurred in only ten cities[4] during the 1940s; 82 percent of all migratory growth in this category of cities also occurred in only ten cities in the 1950s[5] (Table 4-5). Furthermore, the three largest cities (Mexico City, Guadalajara, and Monterrey) had the largest share of total migratory growth. In the 1940s, Mexico City accounted for 49.0 per-

4. Mexico City, Guadalajara, Monterrey, Puebla, Ciudad Juárez, Mexicali, Tijuana, Torreón, San Luis Potosí, and Mérida.

5. Mexico City, Guadalajara, Monterrey, Puebla, Ciudad Juárez, Mexicali, Tijuana, León, Veracruz, and Hermosillo.

cent and the three cities together for 60 percent of all migratory growth, comparable figures for the 1950s being 42 and 64 percent, respectively. This is consistent with the earlier conclusion that Mexico City became a less dynamic growth center relative to the other large cities after 1950.

For purposes of analysis, the largest cities of 1970 were divided into groups using estimates for the determinants of natural increase (Table 4-6).[6] These data show that natural increase accounted for widely different shares of total urban growth in different parts of the country. These divergent trends are consistent with findings for other countries, which show that during rapid internal migration, most migrants are younger than the average age, whereas those older than the average age tend to stay put. Because the younger people tend to be more fertile, there are (at least temporarily) higher rates of natural increase in the principal receiving areas, and lower rates of natural increase in the areas that are losing population.

In addition to migration and natural increase, a third, but only locally important, factor contributed to urban population growth in Mexico after 1940. This was the process of accretion, whereby cities expanded and incorporated existing but formerly separate rural communites. This process was significant in the densely populated central states and was particularly important in Mexico City, where urban size growth and the outward extension of the city toward formerly suburban areas was continuous. The relative importance of accretion (sometimes called coalescence) is shown in Table 4-7.

Geographic distribution of urban growth

In the geographic spread of urban development after 1940 large cities developed for the first time outside the central core (Maps 4-1 and 4-2). Most of them were in the north (with several on the U.S. frontier), and in 1970 there were still only two southern cities with more than 150,000 inhabitants (Mérida and Acapulco). These trends resulted from different growth rates, and reflect the sustained expansion of the northern cities. By 1970, however, a few southern cities, notably Coatzacoalcos and Villahermosa, were among the fastest growing in the country, providing a contrast between the pattern of comparative growth of city size and that of comparative growth rates.

The distribution of the urban population among states between 1940 and 1970 (Table 4-8) shows that certain states maintained almost exactly the same shares of the nation's urban population throughout the period. Thus, although the urban population of the Federal District increased from 1.6 million in 1940 to 6.6 million in 1970, it accounted for 23.9 percent of the nation's urban population in the former year and for 23.5 percent in the latter. Jalisco also retained a roughly constant share of the urban population

6. See Appendix B for explanation of technique used to divide cities into groups.

Table 4-6. *Natural Growth of Large-City Population, by Regional Group, 1940 to 1970, and as a Percentage of Total Growth, Including and Excluding Coalescence*

Group	Natural growth (thousands of persons)			Percentage of total growth					
				Including coalescence			Excluding coalescence		
	1940-50	1950-60	1960-70	1940-50	1950-60	1960-70	1940-50	1950-60	1960-70
1	399	1,159	2,009	29.4	51.6	55.0	31.9	61.3	71.9
2	136	313	595	45.0	49.3	57.7	45.0	49.3	78.9
3	144	277	537	41.2	56.3	79.0	41.2	56.3	79.0
4	108	146	416	43.0	48.3	58.4	45.8	48.3	58.4
5	192	364	625	52.4	76.0	95.1	54.4	76.0	95.1
6	80	242	475	32.0	50.3	73.8	32.0	50.3	73.8
Total/ average	1,056	2,501	4,657	36.8	54.0	63.1	38.6	58.4	71.4

Note: Coalescence is defined as urban growth by fusion of a large city with smaller urban settlements around it.

Because consistent data on fertility and mortality are not available at the city or municipal level, it is necessary to use state data and to group the largest cities as follows:

1. Mexico City, Toluca, and Cuernavaca.
2. Guadalajara, León, Acapulco, Morelia, and Irapuato.
3. Monterrey, Tampico, Matamoros, Nuevo Laredo, and Reynosa.
4. Puebla, Mérida, Veracruz, Villahermosa, Orizaba, Oaxaca, Jalapa, Minatitlán, Coatzacoalcos, and Pachuca.
5. Torreón, Ciudad Juárez, Chihuahua, San Luis Potosí, Aguascalientes, Durango, Saltillo, and Querétaro.
6. Mexicali, Culiacán, Tijuana, Hermosillo, Ciudad Obregón, and Mazatlán.

Source: Unikel (1970) and *Anuario Estadístico* (various years).

Table 4-7. *Urban Population Growth Attributable to Coalescence or Reclassification, 1940 to 1970*

Year	*Absolute growth of urban population in thirty-seven cities (thousands of persons)*	*Percentage of total urban growth from coalescence or reclassification*
1940-50	134	4.6
1950-60	354	7.6
1960-70	858	11.6

Source: VI Censo General de la Población, 1940 (1942); *VII, 1950* (1952); *VIII, 1960* (1962); and *IX, 1970* (1972).

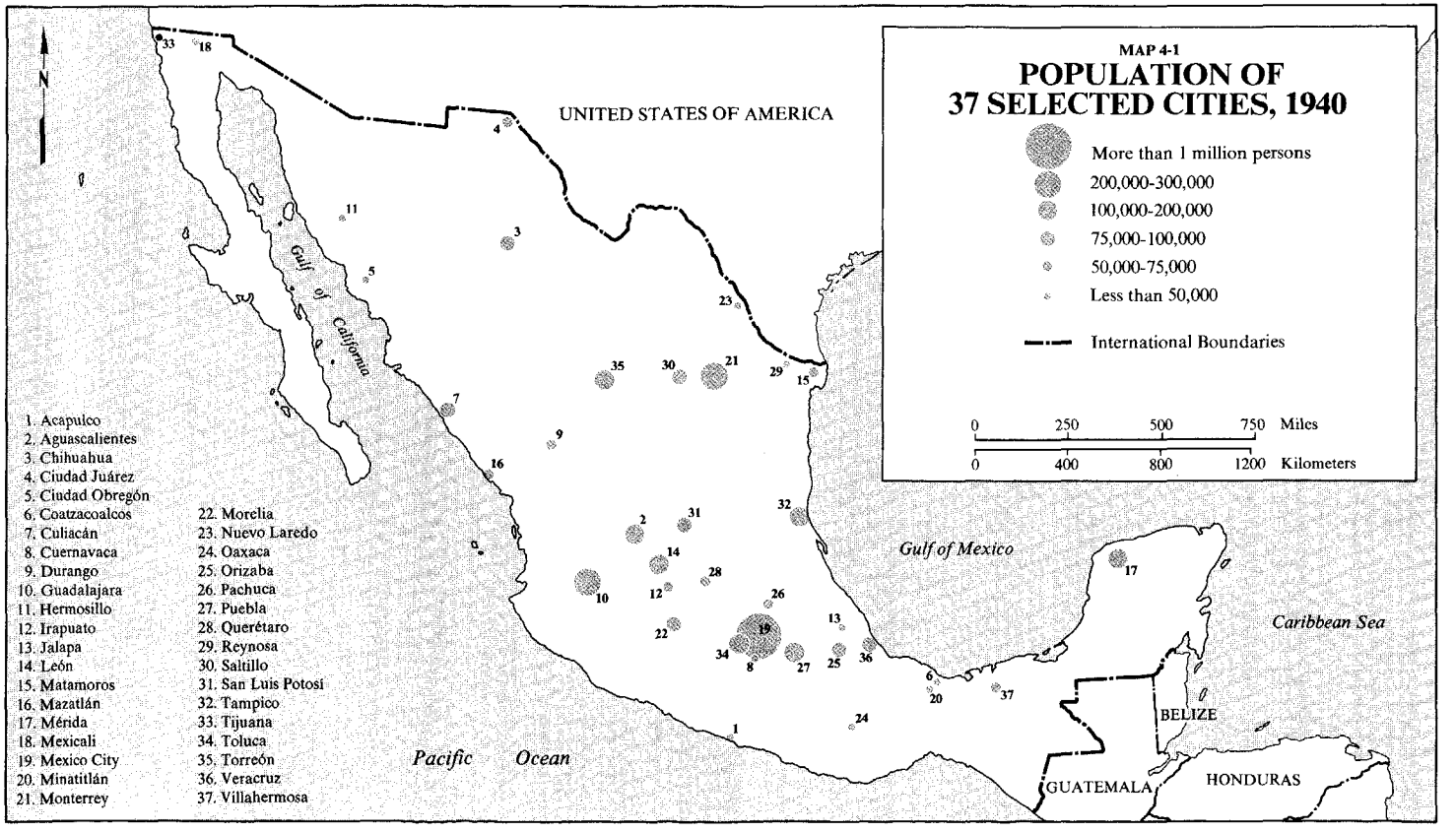
(8 percent), as did Veracruz. There were important increases in Baja California (0.6 to 2.6 percent) and Nuevo León (3.4 to 4.6 percent) and decreases in Puebla (5.2 to 4.1 percent), Coahuila (4.0 to 2.9 percent), and Yucatán (3.0 to 1.7 percent). Most of the states with small shares of the urban population at the beginning of the period (Colima, Nayarit, Querétaro, and Quintana Roo), also had small shares at the end.

The absolute size of the urban population in each state in each census year and average compound growth rates between census years are shown in Table 4-9. These data reflect certain differences in urban growth. Other differences between states derived from different rates of state urbanization and different urban structures within the states.

Moreover, the states with the largest shares of the urban population in 1940 were not necessarily the most urbanized, although by 1970 the most urbanized states (classified as those more than 70 percent urbanized) accounted for a much larger share of the total urban population than in earlier years. Neither was the rate of urbanization at the state level closely associated with the share of the urban population at the beginning of each intercensal period. Some of the least urbanized states in 1940 were among those which urbanized most rapidly thereafter, notably Baja California. Conversely, some of the most urbanized states in 1940 (in terms of their shares of the total urban population and of the level of state urbanization) were among those which urbanized rather slowly thereafter. In some cases, notably the Federal District, this was because the "limit" had been reached before 1970.[7]

There were several instances of slowly urbanizing states, in which cities among 1970's thirty-seven largest did not account for a large share of the state's total urban population. These included Guanajuato, Hidalgo, Michoacán, and Oaxaca. In addition, eight states or Federal Territories did not

7. Obviously, as the level of urbanization approaches 100 percent, the rate of urbanization must first slow down and eventually halt.


MAP 4-1
POPULATION OF
37 SELECTED CITIES, 1940
More than 1 million persons
200,000-300,000
100,000-200,000
75,000-100,000
50,000-75,000
Less than 50,000
International Boundaries
0 250 500 750 Miles
0 400 800 1200 Kilometers
N
UNITED STATES OF AMERICA
Gulf of California
Gulf of Mexico
Caribbean Sea
Pacific Ocean
BELIZE
GUATEMALA
HONDURAS
1. Acapulco
2. Aguascalientes
3. Chihuahua
4. Ciudad Juárez
5. Ciudad Obregón
6. Coatzacoalcos
7. Culiacán
8. Cuernavaca
9. Durango
10. Guadalajara
11. Hermosillo
12. Irapuato
13. Jalapa
14. León
15. Matamoros
16. Mazatlán
17. Mérida
18. Mexicali
19. Mexico City
20. Minatitlán
21. Monterrey
22. Morelia
23. Nuevo Laredo
24. Oaxaca
25. Orizaba
26. Pachuca
27. Puebla
28. Querétaro
29. Reynosa
30. Saltillo
31. San Luis Potosí
32. Tampico
33. Tijuana
34. Toluca
35. Torreón
36. Veracruz
37. Villahermosa

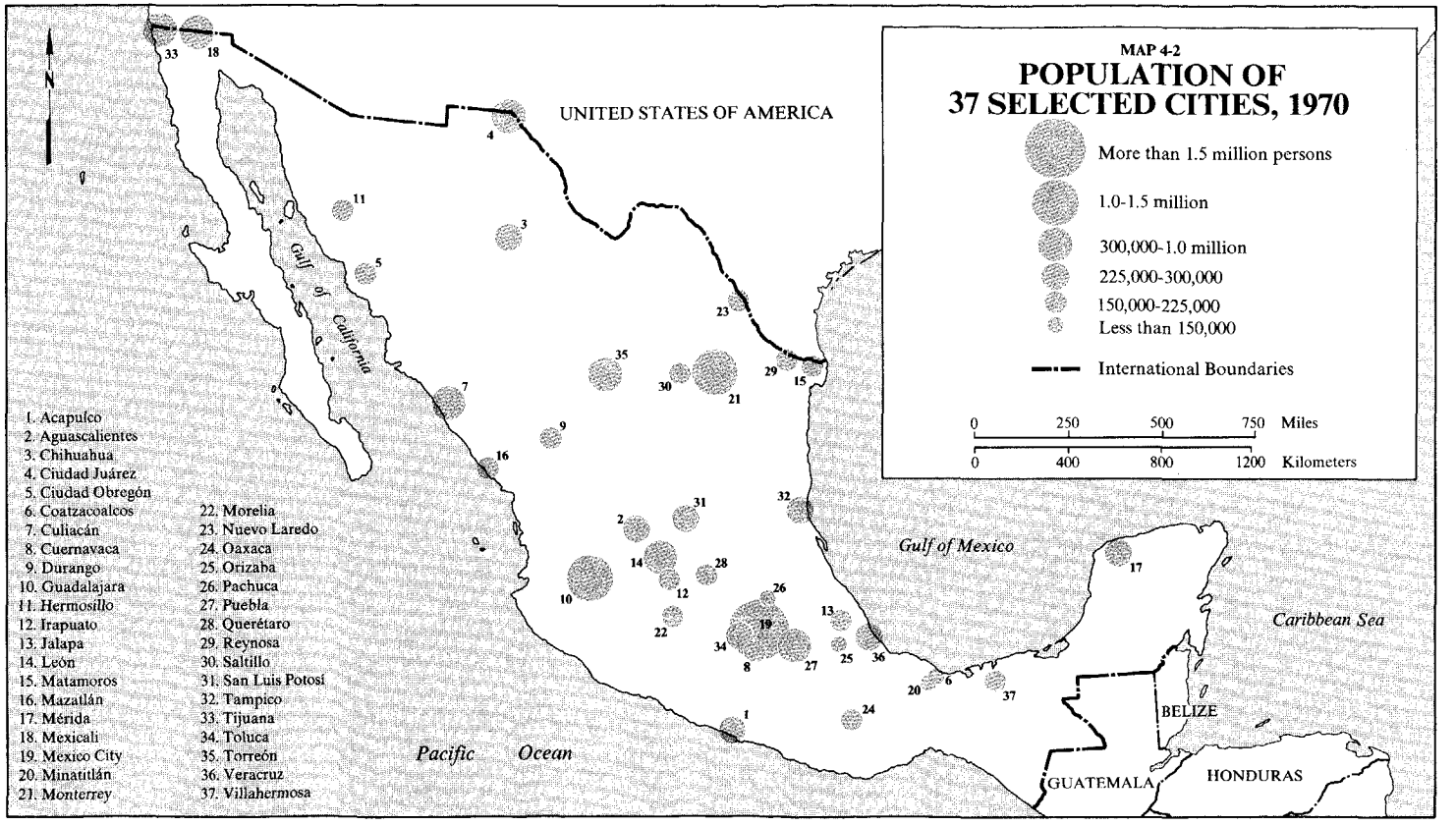

MAP 4-2
POPULATION OF
37 SELECTED CITIES, 1970
More than 1.5 million persons
1.0-1.5 million
300,000-1.0 million
225,000-300,000
150,000-225,000
Less than 150,000
International Boundaries
0 250 500 750 Miles
0 400 800 1200 Kilometers
UNITED STATES OF AMERICA
Gulf of California
Gulf of Mexico
Caribbean Sea
Pacific Ocean
BELIZE
GUATEMALA
HONDURAS
1. Acapulco
2. Aguascalientes
3. Chihuahua
4. Ciudad Juárez
5. Ciudad Obregón
6. Coatzacoalcos
7. Culiacán
8. Cuernavaca
9. Durango
10. Guadalajara
11. Hermosillo
12. Irapuato
13. Jalapa
14. León
15. Matamoros
16. Mazatlán
17. Mérida
18. Mexicali
19. Mexico City
20. Minatitlán
21. Monterrey
22. Morelia
23. Nuevo Laredo
24. Oaxaca
25. Orizaba
26. Pachuca
27. Puebla
28. Querétaro
29. Reynosa
30. Saltillo
31. San Luis Potosí
32. Tampico
33. Tijuana
34. Toluca
35. Torreón
36. Veracruz
37. Villahermosa

Table 4-8. *Distribution of Urban Population among the States, 1940 to 1970*
(percent)

State	*1940*	*1950*	*1960*	*1970*
Aguascalientes	1.3	0.9	0.8	0.8
Baja California	0.6	1.3	2.3	2.6
Baja California (Territory)	0.3	0.2	0.2	0.2
Campeche	0.7	0.6	0.6	0.6
Coahuila	4.0	3.8	3.4	2.9
Colima	0.5	0.6	0.6	0.6
Chiapas	1.6	1.9	1.7	1.5
Chihuahua	3.3	3.4	4.0	3.7
Durango	1.7	1.6	1.5	1.4
Federal District	23.9	26.3	26.4	23.5
Guanajuato	5.3	5.0	4.5	4.2
Guerrero	1.5	1.8	1.7	2.0
Hidalgo	2.0	1.6	1.3	1.2
Jalisco	9.5	7.6	8.1	8.0
México	3.6	3.3	4.1	8.4
Michoacán	5.0	4.1	4.2	3.8
Morelos	0.7	1.1	1.2	1.5
Nayarit	0.9	0.9	0.9	1.0
Nuevo León	3.4	3.8	4.3	4.6
Oaxaca	2.6	2.7	2.4	1.9
Puebla	5.2	4.9	4.4	4.1
Querétaro	0.7	0.6	0.6	0.6
Quintana Roo	0.1	0.1	0.1	0.1
San Luis Potosí	2.5	2.4	2.0	1.8
Sinaloa	1.6	1.6	1.8	2.2
Sonora	1.7	2.1	2.5	2.6
Tabasco	0.7	0.7	0.7	0.9
Tamaulipas	3.0	3.5	3.5	3.5
Tlaxcala	1.0	1.0	0.9	0.7
Veracruz	6.8	6.2	6.1	6.4
Yucatán	3.0	2.6	2.1	1.7
Zacatecas	2.0	1.5	1.3	1.1
Total	100.0	100.0	100.0	100.0

Source: VI Censo General de la Población, 1940 (1942); *VII, 1950* (1952); *VIII, 1960* (1962); and *IX, 1970* (1972).

include any of the thirty-seven cities: Baja California Territory, Campeche, Colima, Chiapas, Nayarit, Quintano Roo, Tlaxcala, and Zacatecas. Generally, however, the slowly urbanizing states contained few large cities, and those cities did not account for an important share of the state urban population. Conversely, all of the rapidly urbanizing states contained one or more of the nation's largest cities.

With the exceptions already noted, the nation's largest cities generally

Table 4-9. *Urban Population and Compounded Annual Growth of Urbanization, by State, 1940 to 1970*

State	*Urban population (thousands of persons)*				*Compound annual growth (percent)*		
	1940	*1950*	*1960*	*1970*	*1940-50*	*1950-60*	*1960-70*
Aguascalientes	92	103	146	215	1.1	3.5	4.0
Baja California	40	145	404	734	13.9	10.7	6.2
Baja California (Territory)	18	20	30	69	0.4	4.0	8.8
Campeche	45	70	106	161	4.6	4.3	4.2
Coahuila	278	414	606	611	4.0	3.9	3.0
Colima	36	68	102	167	6.6	4.2	5.1
Chiapas	109	209	296	435	6.7	3.5	3.9
Chihuahua	229	393	701	1,056	5.0	6.5	4.2
Durango	116	180	270	389	4.5	4.1	3.7
Federal District	1,649	2,284	4,666	6,644	3.3	7.4	3.6
Guanajuato	367	553	805	1,183	4.2	3.8	3.9
Guerrero	107	191	306	569	6.9	4.4	6.4
Hidalgo	140	180	229	337	2.5	2.2	4.2
Jalisco	584	836	1,430	2,259	3.7	5.5	4.7
México	260	368	733	2,387	3.5	7.1	12.6
Michoacán	342	456	752	1,072	2.9	5.1	3.6
Morelos	51	118	206	931	8.8	5.7	7.7
Nayarit	66	39	166	273	4.2	5.3	5.1
Nuevo León	238	414	759	1,297	5.7	6.3	5.5
Oaxaca	183	244	421	614	4.9	3.7	3.8
Puebla	360	531	773	1,168	4.1	3.8	4.2
Querétaro	47	69	92	173	3.9	3.7	5.6
Quintana Roo	5	7	16	32	4.5	8.1	7.3
San Luis Potosí	172	260	353	500	4.3	3.1	3.6
Sinaloa	108	178	320	609	5.1	6.1	6.6
Sonora	119	231	451	721	6.9	6.9	4.9
Tabasco	51	80	132	257	4.4	5.2	6.9
Tamaulipas	209	380	613	1,004	6.2	4.9	5.0
Tlaxcala	66	110	152	209	5.2	3.3	3.2
Veracruz	467	679	1,079	1,798	3.8	4.7	5.2
Yucatán	204	286	367	493	3.4	2.5	3.0
Zacatecas	140	117	222	298	1.8	2.9	3.0

Source: Anuario Estadístico (1940, 1950, 1960, 1970).

accounted for most of the urban populations of their respective states. In the Federal District, inevitably, 100 percent of the urban population was located in the metropolitan area of Mexico City, whereas more than 75 percent of state urbanization was accounted for by large cities in Baja California, Jalisco, Mexico State, Nuevo León, Tamaulipas, and Querétaro. All were rapidly urbanizing states in 1940-70 and all were highly urbanized by the end of the period. On balance then, the geographic distribution of the

largest cities resulted in large differences in the geographic distribution of the urban population in 1970, and spatial differences in urbanization were largely caused by the different growth rates of the nation's largest cities.

Urban Growth and Sectoral Structure

There were significant differences in economic structure both within and between cities. These reflected differences in the economic sources of their growth after 1940 and provided a basis for differences in social conditions.

Contrasts among cities

Tables 4-10 and 4-11 show the percentage distribution of employment in the secondary and tertiary sectors in 1940 and 1970 among the largest cities in 1970.

In 1940, Mexico City had the largest concentration of every secondary and tertiary sector, except for hydrocarbons and mining, which were concentrated elsewhere. Tampico accounted for 45 percent of employment in hydrocarbons and Pachuca for 39 percent of employment in mining among the thirty-seven cities.

By 1970 all sectors had become more concentrated in Mexico City except transport, commerce, and construction, in which the relative shares had declined slightly. Tampico continued to account for a large share (21 percent) of total employment in hydrocarbons, and Coatzacoalcos and Minatitlán each accounted for 11 percent of employment in this sector. Outside Mexico City most other sectors were quite widely dispersed among the thirty-seven cities, although there were pockets of concentration in mining (8 percent in Pachuca, 7 percent in Monterrey, and 6 percent in Guadalajara); commerce (8 percent in Monterrey and 6 percent in Guadalajara), and services (6 percent in Monterrey and 7 percent in Guadalajara).

The general relation between the population size of a city and employment in manufacturing is illustrated in Table 4-12, which shows location quotients for manufacturing in 1940 and 1970.[8] In general, the larger cities, such as León, Monterrey, Orizaba, Guadalajara, Puebla, San Luis Potosí, and Querétaro, had higher quotients of manufacturing employment than the smaller cities; this relation is further confirmed in terms of size cohorts in Table 4-13.

There was a similar pattern in the tertiary sector. The distribution of employment in services was generally correlated with city size, although com-

8. See Appendix F for definition.

merce was disproportionately important in such cities as Tijuana, Ciudad Juárez, and Guadalajara.

The distribution of manufacturing, commerce, and services was thus generally consistent with that of urban population size. But irrespective of location quotients, there was an important difference in the relation between city size and manufacturing, and between city size and commerce and services. Theoretically, commerce and services share an hierarchical structure that provides successively higher functional provision in different cities (central places). The largest cities may thus be assumed to offer higher levels of these tertiary functions than smaller cities, because their larger populations facilitate the achievement of successively higher "thresholds" for different sectors. By comparison, industrial location is less closely tied to the market, although market potential has been an important determinant of Mexico's industrial geography.

Finally, the geographic distribution of transport and government was related both to size (so that larger cities have higher location quotients than smaller ones) and to the disproportionate development of these sectors in certain cities. The location of key transport centers was related to network development such that Aguascalientes, San Luis Potosí, Torreón, and Veracruz were among the country's leading transport junctions. Similarly, the historical importance of state capitals such as Chihuahua, Guadalajara, Monterrey, Culiacán, and Veracruz explains the geographic distribution of cities that were relatively important centers of government and administration.

CONTRASTS IN THE SECONDARY SECTOR. Some industrial subsectors were highly localized, whereas others were spread out (Table 4-14). The food, beverages, furniture, and paper sectors were widely distributed, whereas the extractive industries, tobacco, textiles, leather, oil, basic metals, and vehicles were all relatively localized.

Although some subsectors were highly concentrated and were unrelated to the size of the cities concerned, others (mostly consumer goods industries) were distributed roughly according to urban size. There were, however, relatively high location quotients in foodstuffs in the northwestern cities and also in Irapuato, implying a direct link with agricultural development in the surrounding areas. Other high location quotients occurred in the tobacco subsector (Cuernavaca) and in the wood and cork subsector (Oaxaca).

By comparison, location quotients were generally higher in heavier and more modern industries, such as chemicals, nonmetal mineral processing, basic metals, metal products, machinery, electrical goods, vehicles, and mining. Chemicals were heavily concentrated in Mexico City, oil in Coatzacoalcos and Tampico (Ciudad Madero), nonmetal minerals and basic metals in Monterrey, and vehicles in Toluca, Querétaro, and Monterrey.

Table 4-10. *Distribution of Nonagricultural Employment among Thirty-seven Cities, by Sector, 1940*
(percent)

City	*Hydro-carbons*	*Mining*	*Manu-facturing*	*Construc-tion*	*Elec-tricity*
Aguascalientes	0.18	0.19	1.34	1.58	1.01
Mexicali	0.08	0.11	0.34	0.19	0.26
Tijuana	0.00	0.52	0.23	0.29	0.68
Saltillo	0.12	0.75	1.10	1.23	1.11
Torreón	0.41	5.47	1.92	2.20	2.80
Ciudad Juárez	0.11	0.51	0.77	1.08	0.62
Chihuahua	0.33	11.37	1.15	2.20	1.30
Durango	0.08	1.03	0.69	0.03	0.73
Irapuato	0.07	0.04	0.79	0.65	1.45
León	0.12	0.19	3.97	1.24	1.03
Acapulco	0.04	0.08	0.13	0.30	0.05
Pachuca	0.25	38.92	0.62	0.91	1.66
Guadalajara	0.30	0.75	8.51	8.17	4.84
Toluca	0.18	0.18	1.48	1.01	1.17
Morelia	0.14	0.08	0.98	1.71	1.09
Cuernavaca	0.05	0.13	0.28	0.95	0.15
Monterrey	0.63	9.22	5.07	4.70	7.00
Oaxaca	0.03	0.42	1.17	0.65	0.26
Puebla	0.41	0.23	4.79	3.29	3.50
Querétaro	0.00	0.03	1.20	0.94	0.99
San Luis Potosí	0.32	10.23	1.85	2.55	1.95
Culiacán	0.08	0.44	1.10	0.65	0.41
Mazatlán	0.05	1.81	1.00	0.89	0.78
Ciudad Obregón	0.02	0.24	0.32	0.35	0.10
Hermosillo	0.11	0.39	0.35	0.83	0.31
Villahermosa	0.02	0.00	0.47	0.44	0.41
Matamoros	0.01	0.02	0.25	0.27	0.10
Nuevo Laredo	0.17	0.08	0.37	0.48	0.44
Reynosa	0.02	0.00	0.11	0.14	0.07
Tampico	45.22	0.11	1.36	1.19	3.76
Coatzacoalcos	7.15	0.04	0.24	0.21	0.24
Minatitlán	22.30	0.07	0.20	0.16	1.08
Orizaba	0.17	0.10	3.62	1.09	2.10
Veracruz	0.93	0.04	1.03	1.26	1.47
Jalapa	0.09	0.04	0.87	0.87	0.83
Mérida	0.19	0.10	2.54	2.67	1.94
Mexico City	19.63	16.04	47.83	52.61	53.31
Total	100.00	100.00	100.00	100.00	100.00

Source: VI Censo General de la Población, 1940 (1942).

Commerce	*Transport*	*Services*	*Government*	*Other*	*Average*
1.61	4.61	0.93	1.13	2.89	1.68
0.48	0.43	0.34	0.70	0.50	0.42
0.66	0.22	0.42	0.63	0.43	0.43
1.25	1.56	0.87	0.96	1.88	1.18
2.57	3.05	1.43	1.09	5.07	2.31
1.36	0.93	0.80	1.00	1.20	0.99
1.68	2.16	0.98	1.34	1.72	1.57
0.93	1.25	0.31	0.93	1.23	0.76
0.82	0.69	0.31	0.49	0.31	0.62
1.39	0.60	0.83	0.42	2.07	1.81
0.21	0.18	0.23	0.19	0.68	0.23
1.12	0.85	1.08	1.38	0.61	1.39
6.68	5.20	6.58	4.11	9.37	6.91
1.55	1.12	1.30	2.06	1.14	1.41
1.43	0.86	1.02	1.72	0.40	1.13
0.51	0.30	0.57	0.67	0.23	0.45
4.10	4.79	2.68	2.29	11.54	4.69
0.67	0.42	0.84	0.85	1.05	0.84
3.30	3.57	3.15	2.49	4.82	3.65
0.88	0.55	0.76	0.60	1.47	0.92
1.81	3.35	1.24	1.20	1.56	1.89
0.85	0.68	0.78	1.12	0.64	0.87
1.17	1.93	0.89	1.01	0.55	1.05
0.35	0.29	0.22	0.19	0.67	0.32
0.50	0.36	0.39	0.69	0.47	0.46
0.64	0.78	0.41	0.65	0.38	0.52
0.49	0.30	0.25	0.43	0.65	0.36
0.66	0.83	0.41	0.69	1.17	0.58
0.24	0.13	0.13	0.16	0.66	0.20
2.30	3.11	1.66	2.10	5.36	2.67
0.34	0.52	0.25	0.29	1.00	0.43
0.32	0.19	0.26	0.88	0.76	0.60
1.46	1.76	0.74	0.98	1.00	1.77
1.88	4.19	1.35	2.61	2.28	1.80
0.87	1.36	0.75	1.50	1.34	0.97
3.61	2.88	2.09	1.95	1.25	2.52
49.30	43.99	62.78	58.50	31.62	49.59
100.00	100.00	100.00	100.00	100.00	100.00

Table 4-11. *Distribution of Nonagricultural Employment among Thirty-seven Cities, by Sector, 1970*
(percent)

City	*Hydro-carbons*	*Mining*	*Manu-facturing*	*Construc-tion*	*Elec-tricity*
Aguascalientes	0.21	0.53	0.77	0.94	0.59
Mexicali	0.24	1.39	1.01	1.23	1.60
Tijuana	0.34	1.21	1.25	1.81	1.38
Saltillo	0.13	2.60	0.85	1.03	0.70
Torreón	0.46	3.15	1.22	1.83	2.56
Ciudad Juárez	0.41	1.76	1.27	2.51	1.23
Chihuahua	0.35	4.29	0.88	1.62	1.47
Durango	0.10	2.15	0.45	0.84	0.64
Irapuato	0.62	0.50	0.55	0.61	0.76
León	0.15	1.14	3.30	0.24	0.94
Acapulco	0.13	0.56	0.40	1.29	0.82
Pachuca	0.12	8.20	0.32	0.42	0.63
Guadalajara	0.97	6.61	8.72	9.85	5.81
Toluca	0.15	0.72	1.02	1.30	1.19
Morelia	0.14	0.90	0.50	1.07	1.14
Cuernavaca	0.15	0.82	0.69	1.27	0.63
Monterrey	1.34	7.18	8.61	8.01	4.31
Oaxaca	0.13	0.55	0.44	0.68	1.04
Puebla	0.73	2.19	3.01	2.32	3.63
Querétaro	0.16	1.14	0.72	0.89	0.74
San Luis Potosí	0.34	4.28	1.05	1.42	1.12
Culiacán	0.15	1.21	0.71	1.19	0.85
Mazatlán	0.46	0.60	0.47	0.76	0.66
Ciudad Obregón	0.20	0.78	0.35	0.78	0.59
Hermosillo	0.14	1.83	0.45	1.15	1.56
Villahermosa	1.32	0.32	0.27	0.69	0.82
Matamoros	0.14	0.57	0.48	0.81	0.46
Nuevo León	0.13	0.51	0.52	0.76	0.43
Reynosa	11.42	0.39	0.27	0.84	0.42
Tampico	21.45	1.24	0.69	1.85	1.44
Coatzacoalcos	11.38	1.59	0.25	0.87	0.78
Minatitlán	10.69	3.35	0.16	0.44	0.22
Orizaba	0.45	0.71	0.96	0.67	1.14
Veracruz	1.98	0.41	0.91	1.05	1.69
Jalapa	0.26	0.35	0.31	0.81	1.52
Mérida	0.12	0.85	0.81	1.12	1.46
Mexico City	32.53	33.41	55.34	45.02	52.99
Total	100.00	100.00	100.00	100.00	100.00

Source: IX Censo General de la Población, 1970 (1972).

Commerce	*Transport*	*Services*	*Government*	*Other*	*Average*
0.97	2.36	0.71	0.70	1.58	0.91
1.62	1.12	1.29	1.36	2.13	1.29
1.96	1.20	1.69	0.99	2.51	1.58
0.75	1.06	0.71	0.60	1.16	0.82
1.97	2.43	1.67	1.19	2.66	1.66
2.49	1.86	2.19	1.26	2.80	1.93
1.42	1.90	1.30	1.40	1.64	1.28
0.73	1.03	0.69	0.92	1.25	0.70
0.73	0.59	0.41	0.43	1.04	0.57
1.74	1.17	1.20	0.49	2.02	1.84
0.99	1.16	1.32	0.81	1.83	0.97
0.47	0.37	0.45	0.63	0.45	0.45
8.51	8.28	7.06	4.10	8.62	7.89
1.03	0.99	0.98	1.17	1.61	1.06
0.84	0.65	0.80	1.04	1.20	0.76
0.73	0.62	0.93	1.09	1.29	0.86
6.26	6.73	6.22	2.94	5.39	6.79
0.75	0.69	0.68	1.01	0.82	0.64
2.94	2.82	2.67	2.31	2.83	2.77
0.70	0.54	0.66	0.69	1.10	0.71
1.23	2.21	1.13	1.07	1.56	1.22
1.33	1.17	1.11	1.51	2.09	1.11
0.80	1.20	0.82	0.81	0.96	0.73
0.94	0.67	0.72	0.71	0.87	0.65
1.01	0.83	0.90	1.02	0.99	0.81
0.72	0.50	0.61	0.85	1.00	0.57
0.79	0.71	0.82	0.65	0.93	0.70
0.74	0.77	0.78	0.63	0.95	0.69
0.70	0.53	0.56	0.44	0.83	0.63
1.53	1.67	1.42	1.22	1.32	1.43
0.60	0.60	0.44	0.44	0.59	0.57
0.29	0.27	0.22	0.21	0.54	0.36
0.81	0.87	0.65	0.32	0.78	0.77
1.36	1.76	1.36	1.68	1.65	1.26
0.69	0.87	0.74	1.17	0.95	0.65
1.22	1.15	1.18	0.94	2.01	1.10
47.61	46.64	52.92	61.19	38.03	51.24
100.00	100.00	100.00	100.00	100.00	100.00

Table 4-12. *Location Quotient for Industrial Employment in Thirty-seven Cities, 1940 and 1970*

City	Location quotient 1940	1970	City	Location quotient 1940	1970
Mexico City	0.96	1.07	Jalapa	0.89	0.48
Guadalajara	1.23	1.11	Querétaro	1.30	1.00
Monterrey	1.08	1.27	Durango	0.91	0.64
Puebla	1.31	1.09	Irapuato	1.27	0.97
Tampico	0.51	0.48	Mazatlán	0.95	0.64
Torreón	0.83	0.73	Oaxaca	1.38	0.68
Mérida	1.01	0.74	Nuevo Laredo	0.63	0.75
Aguascalientes	0.80	0.84	Villahermosa	0.90	0.48
San Luis Potosí	0.98	0.86	Culiacán	1.26	0.65
Orizaba	2.04	1.25	Minatitlán	0.32	0.45
León	2.19	1.79	Coatzacoalcos	0.56	0.45
Veracruz	0.57	0.72	Ciudad Obregón	0.98	0.54
Chihuahua	0.73	0.69	Hermosillo	0.76	0.56
Pachuca	0.45	0.71	Mexicali	0.81	0.78
Saltillo	0.93	1.03	Tijuana	0.54	0.79
Ciudad Juárez	0.77	0.68	Matamoros	0.69	0.68
Morelia	0.87	0.65	Reynosa	0.54	0.43
Toluca	1.05	0.96	Acapulco	0.57	0.41
Cuernavaca	0.62	0.80			

Note: See Appendix F for definition.
Source: VI Censo General de la Población, 1940 (1942) and *IX, 1970* (1972).

Mexico City accounted for 67 percent of total industrial employment among the thirty-seven cities, Monterrey for 8 percent, and Guadalajara for 5 percent. Mexico City accounted for more than a proportionate share of employment in the textiles, wooden furniture, paper, printing, linoleum, chemicals, metal goods, machinery, electrical goods, and vehicle subsectors. Its ostensibly large share (notwithstanding a low location quotient) of the hydrocarbons sector (30 percent) is attributable to the location of the headquarters of Petroleos Mexicanos (PEMEX), the state-owned oil company, rather than to the presence of extraction of refinery activities.

Most of the relatively smaller cities (among the thirty-seven) had fewer subsectors than the larger ones. Only Mexico City had all the twenty-five subsectors. Minatitlán, which was the next to the smallest city in the set of thirty-seven, had only fourteen subsectors.

CONTRASTS IN THE TERTIARY SECTOR. The distribution of commercial activity, measured in terms of employment, in the largest cities emphasized the importance of Mexico City, Guadalajara, and Monterrey (Table 4-15). Mexico City dominated in sales of machinery and other equipment;

Table 4-13. *Location Quotients for Industrial Employment in Relation to Urban Population Size, 1940 and 1970*

	Location quotient	
Size of city	*1940*	*1970*
More than 1 million	0.96	1.10
500,000-1 million	–	1.09
200,000-499,999	1.17	0.80
100,000-199,999	1.09	0.79
50,000-99,999	0.79	0.71
15,000-49,999	0.77	–

Note: Includes only the thirty-seven largest cities in 1970.
– Not applicable.
Source: VI Censo General de la Población, 1940 (1942); and *IX, 1970* (1972).

however, its share of total sales of household and primary goods was in line with its share of total employment.

The general pattern also shows the relatively high level of food sales in the agricultural centers of the northwest, which is consistent with the industrial specialization of these cities; the relatively high level of sales of fuel in the border cities, presumably associated with border trade; and a relatively high level of sales of machinery and tools in Monterrey, suggesting links between the industrial and commercial sectors of the urban economy.

Other indicators of commercial activity do not show the same close association between urban size and sectoral structure. Some of the relatively smaller cities (Culiacán, Hermosillo, Irapuato, and Coatzacoalcos) had high levels of sales per worker in commerce (Table 4-16). Conversely, Guadalajara and Mexico City had relatively lower levels of sales, although the lowest levels were in Oaxaca and Acapulco.

Basic data for the services sector (Standard Industrial Classification subsectors 81 to 89, Table 4-17) suggest a pattern of activity generally in line with variations in urban size. Mexico City, Guadalajara, Monterrey, Acapulco, Tijuana, Ciudad Juárez, and Mérida were particularly important in terms of their absolute shares of service sector employment.

The data point to the large shares of Tijuana in recreation, Acapulco in hotels, and Ciudad Juárez in restaurants. There was not, however, a high degree of concentration in education, health, or professional services, which were, in general, distributed according to urban size. The aggregate share of Mexico City, Monterrey, and Guadalajara in each subsector was fairly similar to the average for all subsectors. Professional services (74 percent in the three cities), personal services (71 percent), medical services (72 percent), and education (72 percent) were relatively more concentrated, whereas the shares of total employment in recreation (52 percent), hotels (46 percent), and

Table 4-14. *Distribution of Employment in Industrial Subsectors among Thirty-seven Cities, 1970*
(percent)

City	*Coal*	*Metals*	*Rock/ gravel*	*Non-metal minerals*	*Salt*
Aguascalientes	0.00	0.00	0.34	0.00	0.00
Mexicali	0.00	0.00	0.00	0.32	2.47
Tijuana	0.00	0.00	2.03	0.00	0.00
Saltillo	0.00	8.29	1.88	17.00	0.00
Torreón	0.00	3.01	2.11	4.27	1.65
Ciudad Juárez	0.00	0.00	0.08	0.00	0.00
Chihuahua	0.00	0.00	0.00	0.00	0.00
Durango	0.00	2.10	0.83	2.72	0.00
Irapuato	0.00	0.00	1.17	0.00	0.00
León	0.00	0.00	0.19	0.00	0.00
Acapulco	0.00	0.00	0.00	0.00	0.00
Pachuca	0.00	73.71	3.42	0.00	0.00
Guadalajara	0.00	0.00	2.26	0.00	0.00
Toluca	0.00	0.00	0.11	0.00	0.00
Morelia	0.00	0.00	0.00	0.00	0.00
Cuernavaca	0.00	0.00	0.90	0.00	0.00
Monterrey	0.00	10.72	23.69	16.51	0.00
Oaxaca	0.00	1.91	2.56	0.00	0.00
Puebla	0.00	0.00	0.23	6.52	0.00
Querétaro	0.00	0.69	1.20	0.00	0.00
San Luis Potosí	0.00	0.00	0.23	4.49	0.00
Culiacán	0.00	0.00	0.26	0.00	0.00
Mazatlán	0.00	0.00	0.00	0.00	0.00
Ciudad Obregón	0.00	0.00	0.00	1.44	0.00
Hermosillo	74.16	0.24	0.00	0.00	3.30
Villahermosa	0.00	0.00	0.00	0.00	0.00
Matamoros	0.00	0.00	0.00	0.00	51.65
Nuevo Laredo	0.00	0.00	0.00	0.00	0.00
Reynosa	0.00	0.00	0.71	5.29	0.00
Tampico	0.00	0.00	1.95	0.00	25.82
Coatzacoalcos	0.00	0.00	0.00	0.00	11.81
Minatitlán	0.00	0.00	0.00	11.32	0.00
Orizaba	0.00	0.00	1.54	0.00	0.00
Veracruz	0.00	0.00	0.19	0.00	0.00
Jalapa	0.00	0.00	0.00	0.00	1.10
Mérida	0.00	0.00	2.14	0.00	0.00
Mexico City	25.84	0.15	49.98	30.72	2.20
Total	100.00	100.00	100.00	100.00	100.00

Food	*Beverages*	*Tobacco*	*Textiles*	*Shoes*	*Wood/ cork*	*Furni- ture*
0.78	1.79	0.00	0.81	1.08	0.29	0.15
1.49	0.68	0.00	1.08	1.56	0.87	0.49
1.08	0.79	2.42	0.24	0.91	3.63	1.12
0.46	0.66	0.00	1.58	0.52	0.38	0.03
1.91	2.27	0.00	1.08	1.14	1.39	0.78
1.00	3.75	0.00	0.11	0.92	8.27	0.41
0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.96	1.12	0.00	0.47	0.75	0.07	0.04
4.38	0.57	8.85	0.00	0.74	0.09	0.52
0.94	1.36	0.00	0.24	9.99	0.63	0.27
0.38	1.69	0.00	0.00	0.13	0.15	0.00
0.37	0.40	0.00	0.32	0.49	0.39	0.03
7.41	8.87	7.05	5.75	10.50	5.23	6.47
0.96	1.62	7.58	0.50	0.44	0.60	0.04
1.05	0.71	0.00	0.01	0.12	2.07	0.04
0.50	1.03	0.00	1.67	0.20	0.12	0.00
6.61	7.39	18.58	2.18	6.62	3.73	8.13
0.28	0.39	0.48	0.22	0.09	13.95	0.01
0.58	0.16	0.00	0.01	0.34	0.32	0.01
0.00	0.60	0.00	1.29	0.09	0.21	0.00
1.53	2.12	0.00	2.64	0.73	0.77	0.72
2.44	1.26	0.00	0.12	0.14	0.25	0.41
1.02	1.07	0.53	0.02	0.14	0.33	0.00
1.35	0.88	0.00	1.64	0.04	2.88	0.07
1.16	0.69	0.00	0.82	0.25	0.41	0.25
0.29	0.46	0.00	0.00	0.04	0.37	0.00
1.04	0.72	0.00	0.01	0.05	0.22	0.06
0.43	0.49	0.00	0.00	0.46	0.35	0.06
0.29	0.26	0.00	0.00	0.16	0.08	0.16
1.01	2.51	0.00	0.00	0.22	0.50	0.24
0.15	0.03	0.00	0.00	0.06	0.14	0.04
0.14	0.50	0.00	0.00	0.00	0.07	0.00
0.38	4.50	0.00	3.43	0.23	0.83	0.16
0.67	0.83	1.74	0.00	0.10	0.47	0.12
0.35	0.03	0.00	0.26	0.10	0.29	0.03
1.39	2.36	0.00	2.97	1.29	0.85	0.00
54.02	45.40	52.78	70.58	59.36	48.80	79.11
100.00	100.00	100.00	100.00	100.00	100.00	100.00

(Table continues on the following pages)

Table 4-14 (*continued*)

City	*Paper*	*Printing*	*Leather*	*Lino-leum*	*Chemi-cals*	*Oil*	*Ceramics and glass*
Aguascalientes	0.18	0.27	0.14	0.88	0.03	0.00	0.39
Mexicali	1.35	0.31	0.02	0.64	0.17	6.63	0.32
Tijuana	0.64	0.78	1.18	0.99	0.14	0.34	0.71
Saltillo	0.31	0.33	0.09	0.12	0.10	0.08	1.07
Torreón	0.38	0.93	0.36	0.78	0.65	0.53	1.41
Ciudad Juárez	0.63	0.64	0.07	0.31	0.02	0.27	0.47
Chihuahua	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Durango	0.07	0.16	0.83	0.12	0.45	0.00	0.54
Irapuato	0.00	0.00	1.17	0.00	0.11	0.00	0.55
León	1.85	0.62	17.22	2.42	0.15	0.00	0.96
Acapulco	0.02	0.13	0.00	0.45	0.12	0.00	0.42
Pachuca	0.05	0.18	0.13	0.31	0.03	0.00	0.47
Guadalajara	4.72	3.05	11.39	7.91	3.24	5.03	6.64
Toluca	0.13	0.50	1.03	1.67	1.05	0.00	0.62
Morelia	0.33	0.35	0.27	0.37	0.31	0.00	0.30
Cuernavaca	0.78	0.13	0.02	0.21	0.23	0.00	0.46
Monterrey	10.03	4.35	5.90	5.03	6.26	9.26	23.76
Oaxaca	0.11	0.20	0.48	0.42	0.00	0.00	0.57
Puebla	0.04	0.04	0.16	0.22	0.01	0.00	0.21
Querétaro	0.04	0.21	0.00	0.16	0.02	0.00	0.30
San Luis Potosí	0.64	0.68	0.68	0.37	1.24	0.27	0.57
Culiacán	0.17	0.56	0.99	0.57	0.04	0.00	0.34
Mazatlán	0.04	0.26	0.11	0.27	0.04	0.00	0.39
Ciudad Obregón	0.18	0.49	0.05	0.35	0.09	0.00	0.10
Hermosillo	0.07	0.35	0.02	0.31	0.20	0.00	1.07
Villahermosa	0.10	0.11	0.07	0.32	0.01	0.00	0.13
Matamoros	0.12	0.24	0.02	0.34	0.12	0.00	0.07
Nuevo Laredo	0.17	0.15	0.09	0.35	0.16	0.00	0.26
Reynosa	0.10	0.29	0.02	0.39	0.00	0.00	0.37
Tampico	0.12	0.80	0.01	0.25	0.28	1.56	0.28
Coatzacoalcos	0.02	0.09	0.01	0.10	0.36	9.79	0.15
Minatitlán	0.01	0.07	0.01	0.05	0.00	0.00	0.05
Orizaba	0.58	0.16	1.90	1.01	0.02	0.00	0.52
Veracruz	0.11	0.48	0.02	0.64	0.07	0.00	0.35
Jalapa	0.04	0.29	0.00	0.12	0.02	0.00	0.42
Mérida	0.47	1.14	0.64	0.50	0.26	0.00	0.99
Mexico City	75.38	80.43	56.47	70.98	84.09	66.25	53.67
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Note: Columns may not add to 100 because of rounding.
Source: IX Censo General de la Población, 1970 (1972).

Basic metals	*Metal products*	*Non-electrical machinery*	*Electrical goods*	*Vehicles*	*Other*	*Average*
0.07	0.42	0.93	0.04	0.14	0.08	0.50
0.00	0.20	0.18	1.97	1.29	6.82	0.98
0.07	0.43	0.02	4.89	0.05	0.60	0.90
1.63	1.26	1.77	0.04	4.86	0.54	0.97
1.77	0.43	1.71	0.15	0.55	0.63	1.05
0.02	0.30	0.12	1.19	0.01	0.81	0.70
0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.27	0.13	0.30	0.00	0.00	0.10	0.44
0.08	0.09	0.29	0.19	0.29	0.10	0.81
0.10	0.27	0.43	0.02	0.13	0.60	1.54
0.00	0.09	0.06	0.00	0.00	0.03	0.18
0.00	0.19	0.24	0.02	0.01	0.09	0.52
1.57	3.31	4.59	3.13	2.80	6.28	5.32
0.19	0.27	0.37	1.33	8.20	1.30	1.12
0.00	0.10	0.04	0.01	0.03	0.41	0.32
0.00	0.10	1.22	0.01	1.05	0.19	0.48
24.98	8.69	10.44	6.58	8.82	2.28	8.54
0.00	0.06	0.16	0.00	0.02	1.12	0.34
1.13	0.06	0.23	0.00	0.01	0.40	0.22
0.00	1.68	3.70	0.05	2.67	0.32	0.82
2.08	0.49	1.04	0.19	0.47	0.89	1.08
0.00	0.18	0.23	0.00	0.03	0.03	0.50
0.28	0.06	0.13	0.03	0.81	0.06	0.31
0.00	0.07	0.41	0.02	0.00	0.01	0.46
0.04	0.21	0.26	0.01	0.04	0.05	0.43
0.00	0.04	0.07	0.00	0.00	0.04	0.10
0.00	0.11	0.27	1.59	0.00	0.01	0.36
0.00	0.14	0.02	2.41	0.14	0.50	0.38
0.00	0.03	0.12	0.01	0.02	0.01	0.13
0.00	0.18	0.17	0.00	0.17	0.09	0.40
0.00	0.09	0.11	0.01	0.11	0.01	0.13
0.00	0.02	0.03	0.00	0.00	0.01	0.07
0.00	0.36	0.07	0.00	0.00	0.02	0.66
6.30	0.99	0.20	0.01	2.94	0.06	0.76
0.00	0.22	0.25	0.03	0.01	0.05	0.16
0.03	0.14	0.62	0.06	0.04	0.33	0.88
59.39	78.87	69.15	75.96	64.59	75.22	67.44
100.00	100.00	100.00	100.00	100.00	100.00	100.00

Table 4-15. *Distribution of Employment in Commerce Subsectors among Thirty-five Cities, 1965*
(percent)

City	*Food*	*House-hold goods*	*Raw materials*
Aguascalientes	1.29	0.90	0.69
Mexicali	1.49	1.23	1.68
Tijuana	1.28	1.73	1.51
Saltillo	0.89	0.61	0.73
Torreón	1.82	1.90	2.07
Ciudad Juárez	1.37	1.35	1.27
Chihuahua	1.10	1.59	1.27
Irapuato	0.87	0.61	0.59
León	1.75	1.35	1.89
Acapulco	0.90	0.95	0.71
Pachuca	0.91	0.44	0.43
Guadalajara	6.58	5.85	5.90
Toluca	1.76	0.84	0.64
Morelia	1.04	0.78	0.43
Cuernavaca	1.54	0.73	0.89
Monterrey	3.43	5.65	6.49
Puebla	3.15	2.91	2.36
Querétaro	0.97	0.56	0.54
San Luis Potosí	1.77	1.45	1.00
Culiacán	1.42	1.43	1.25
Mazatlán	0.24	0.76	0.69
Ciudad Obregón	0.85	0.81	2.27
Hermosillo	1.14	0.85	0.99
Villahermosa	0.70	0.62	0.39
Matamoros	1.06	0.42	1.00
Nuevo Laredo	0.70	0.43	0.44
Reynosa	0.62	0.53	0.58
Tampico	2.43	1.77	1.29
Coatzacoalcos	0.49	0.54	0.66
Minatitlán	0.52	0.26	0.13
Orizaba	0.76	0.65	0.35
Veracruz	2.05	1.27	1.00
Jalapa	0.81	0.78	0.26
Mérida	1.49	1.70	1.34
Mexico City	49.86	55.77	56.28
Total	100.00	100.00	100.00

Note: Data for Durango and Oaxaca are not included.
Source: V Censo de Comercio, 1965 (1968).

Machines and tools	*Transport*	*Fuel*	*Other*	*Average*
0.32	1.04	0.98	0.36	0.87
1.29	2.79	3.55	1.00	1.61
0.30	1.80	4.06	1.36	1.69
0.26	1.00	0.97	0.24	0.68
1.67	2.19	2.07	1.13	1.92
0.30	1.21	3.54	1.04	1.39
1.10	2.17	1.99	0.78	1.50
0.42	1.01	0.66	0.48	0.66
0.56	1.48	1.26	0.95	1.41
0.30	1.47	0.88	0.53	0.88
0.08	1.27	0.97	0.48	0.57
5.96	6.18	6.12	6.09	6.00
0.25	0.95	1.23	0.38	0.89
0.41	1.23	0.87	0.36	0.76
0.35	0.93	1.33	2.02	0.91
6.78	8.40	4.07	6.02	5.78
2.36	3.41	3.16	2.61	2.86
0.42	0.83	0.93	0.56	0.64
1.24	1.27	2.03	2.06	1.44
1.28	1.88	2.16	1.22	1.47
0.64	0.82	0.92	0.32	0.80
1.85	1.63	1.03	0.30	1.19
1.63	2.14	1.16	0.44	1.08
0.05	0.82	0.48	0.42	0.55
0.47	0.76	1.39	0.30	0.67
0.02	0.73	0.85	0.44	0.48
0.42	0.60	1.42	0.22	0.60
1.48	2.73	1.79	0.63	1.80
0.49	0.65	0.50	0.23	0.55
0.02	0.15	0.19	0.08	0.23
0.07	0.56	0.64	0.23	0.55
2.58	1.57	1.08	0.65	1.40
0.18	0.69	0.92	0.46	0.65
0.64	1.64	1.24	0.93	1.48
63.83	42.02	43.59	64.70	54.05
100.00	100.00	100.00	100.00	100.00

Table 4-16. *Commercial Indicators for Thirty-seven Cities, 1965*

City	*Sale of merchandise/ number of workers*	City	*Sale of merchandise/ number of workers*
Aguascalientes	119.57	Querétaro	113.88
Mexicali	182.00	San Luis Potosí	102.14
Tijuana	136.86	Culiacán	135.18
Saltillo	105.33	Mazatlán	108.20
Torreón	182.41	Ciudad Obregón	249.45
Ciudad Juárez	93.94	Hermosillo	178.20
Chihuahua	114.38	Villahermosa	115.84
Durango	96.51	Matamoros	130.74
Irapuato	144.17	Nuevo Laredo	101.74
León	126.25	Reynosa	102.95
Acapulco	46.20	Tampico	133.95
Pachuca	111.34	Coatzacoalcos	159.76
Guadalajara	135.15	Minatitlán	116.71
Toluca	104.87	Orizaba	96.54
Morelia	97.92	Veracruz	136.49
Cuernavaca	95.17	Jalapa	131.77
Monterrey	150.63	Mérida	90.96
Oaxaca	85.58	Mexico City	125.86
Puebla	113.77		

Source: V Censo de Comercio, 1965 (1968).

restaurants (46 percent) were lower than the combined average share of total employment in services.

Contrasts within cities

Tables 4-18 and 4-19 show employment in each sector within each city in 1940 and 1970. In most cities in both years the manufacturing sector was dominant, accounting for an average of 25 percent of total employment in 1940 and 29 percent in 1970. By comparison, the average employment shares of other sectors were lower, except for commerce (23 and 15 percent) and services (16 and 30 percent) in 1940 and in 1970, respectively. To some extent, the growth of services was, in part, more apparent than real, because of the reclassification of certain sectors within the intersectoral structure from one census to another, and it was somewhat illusory as well, because it disguised the proliferation of marginal activity.

If the hydrocarbons, mining, manufacturing, construction, and electricity sectors, and the commerce, transport, services, and government sectors are aggregated as the secondary and tertiary sectors, respectively, the tertiary sector had a slightly larger share in total employment in 1970 than in 1940 (53 versus 50 percent). More important changes occurred within each of these

aggregated sectors. Manufacturing increased its average share of secondary employment from less than 50 to 60 percent, and the share of services in tertiary employment rose from 30 to 60 percent. The shares of hydrocarbons and mining in the secondary sector and of commerce in the tertiary sector all declined.

In 1940, León (55 percent in manufacturing), Orizaba (52 percent in manufacturing), Minatitlán (42 percent in hydrocarbons), and Pachuca (34 percent in mining) had the most unbalanced sectoral structures. Several other cities, including Irapuato, Guadalajara, Monterrey, Oaxaca, Puebla, Querétaro, and Culiacán also had higher than average levels of employment in manufacturing, which thus accounted for more than 25 percent of all employment in those cities.

There were high concentrations of employment in 1940 in Ciudad Juárez (31 percent in commerce), Tijuana (36 percent in commerce), Mérida (34 percent in commerce), Matamoros (32 percent in commerce), Aguascalientes (21 percent in transport), and Cuernavaca and Mexico City (20 percent each in services).

In 1970 high secondary sector shares in manufacturing occurred in León (53 percent), Monterrey (37 percent), Orizaba (37 percent), Guadalajara (33 percent), Puebla (32 percent), and Saltillo (31 percent). Hydrocarbons by this time accounted for no more than 28 percent of total employment in Minatitlán.

Among the tertiary sectors in 1970, services provided between 30 and 35 percent of total employment in Mexico City, Mérida, Jalapa, Veracruz, Nuevo Laredo, Matamoros, Villahermosa, Hermosillo, Ciudad Obregón, Mazatlán, Culiacán, Oaxaca, Cuernavaca, Morelia, Chihuahua, and Tijuana and some 40 percent of total employment in Acapulco.

Despite the increased relative share of manufacturing in total employment between 1940 and 1970, the growth rate of manufacturing was significantly lower than that of the other secondary sectors and was also lower than that of services, which registered the fastest growth rate (8.3 percent) of all sectors during the period. The discrepancy arises from the relatively large share of manufacturing in 1940, so that despite its slower growth, it still increased its share of total employment. Services also began with a relatively large share in 1940, grew rapidly thereafter, and, as a result, experienced a larger net increase.

Compound growth rates for each sector in each city in 1940-70 point to some dramatic changes (Table 4-20). Among those which stand out are the increases of 30 and 20 percent in hydrocarbons employment in Reynosa and Villahermosa, respectively, the growth of 15 and 13 percent in mining in Querétaro and Matamoros, respectively, the increase of 12 percent in manufacturing in Tijuana, the increase of 19 percent in construction in Durango, and the increase of more than 10 percent in services in Mexicali, Tijuana,

Table 4-17. *Distribution of Employment in Service Subsectors among Thirty-six Cities, 1965*
(percent)

City	*Recre-ation*	*Lodging*	*Educa-ation*	*Medical*
Aguascalientes	0.91	0.83	0.20	0.17
Mexicali	1.49	0.95	0.52	0.58
Tijuana	9.86	1.68	0.71	1.23
Saltillo	0.97	1.06	1.03	0.16
Torreón	1.66	1.58	2.66	2.56
Ciudad Juárez	5.23	3.23	0.87	1.82
Chihuahua	1.36	1.94	1.09	1.71
Durango	0.66	0.99	0.94	0.39
Irapuato	0.60	0.65	0.43	0.34
León	1.68	1.19	1.14	0.85
Acapulco	2.09	16.33	0.43	0.34
Pachuca	0.40	0.22	0.63	0.28
Guadalajara	5.78	6.51	7.73	6.37
Toluca	0.70	0.38	0.31	0.25
Morelia	0.84	1.56	1.11	0.93
Cuernavaca	0.52	2.29	1.07	0.49
Monterrey	5.91	3.93	8.29	6.95
Oaxaca	0.73	1.46	0.93	0.36
Puebla	0.45	0.24	0.26	1.22
Querétaro	0.56	0.78	0.67	0.62
San Luis Potosí	0.93	1.53	1.71	0.75
Culiacán	1.47	1.21	0.85	0.28
Mazatlán	1.18	3.15	0.57	0.27
Ciudad Obregón	1.43	0.80	0.83	0.85
Hermosillo	0.94	1.20	0.85	0.45
Villahermosa	0.68	1.00	0.17	0.37
Matamoros	1.23	0.52	0.49	0.17
Nuevo Laredo	1.20	1.09	0.30	0.51
Reynosa	1.46	0.52	0.31	0.14
Tampico	1.29	1.40	1.60	1.02
Minatitlán	0.55	0.16	0.18	0.24
Orizaba	0.49	0.47	0.43	0.54
Veracruz	1.63	2.57	0.80	0.94
Jalapa	0.38	0.48	0.32	0.01
Mérida	2.37	1.71	1.85	3.95
Mexico City	40.38	34.45	57.75	61.92
Total	100.00	100.00	100.00	100.00

Note: Data for Coatzacoalcos are not included.
Source: V Censo de Servicios, 1965 (1969).

Personal	*Restau-rants*	*Govern-ment*	*Other*	*Average*
0.68	0.98	0.70	0.19	0.54
1.21	2.19	0.73	0.70	0.99
2.47	2.26	1.26	1.13	2.47
0.54	0.86	0.57	0.17	0.64
1.92	3.31	1.44	1.52	1.97
2.51	5.85	1.30	0.84	2.39
1.13	1.72	1.09	0.69	1.22
0.69	1.01	0.79	0.22	0.67
0.35	0.75	0.52	0.08	0.04
1.09	2.11	1.22	0.08	1.20
1.55	2.41	0.58	0.61	2.70
0.51	0.91	0.46	0.40	0.47
5.43	6.45	6.96	4.87	6.12
1.03	0.90	0.63	0.80	0.66
0.65	0.88	0.91	0.60	0.89
0.47	1.10	0.63	0.80	0.91
4.45	4.55	6.70	6.10	5.95
0.68	1.16	0.66	0.45	0.77
0.52	3.96	0.36	0.23	0.70
0.48	0.99	0.39	0.17	0.51
1.18	1.98	1.71	0.93	1.32
0.66	0.79	0.74	0.75	0.87
0.50	1.02	0.56	0.60	0.94
0.64	1.57	0.89	0.29	0.82
0.64	0.81	1.00	0.92	0.88
0.19	0.85	0.46	0.28	0.46
0.58	1.24	0.48	0.62	0.67
0.87	1.28	1.17	1.42	1.01
0.55	1.13	0.64	0.17	0.57
0.79	1.70	1.38	1.19	1.29
0.13	0.87	0.27	0.03	0.26
0.49	1.06	0.30	0.19	0.44
0.72	2.32	1.05	1.79	1.49
0.54	0.66	0.63	0.35	0.43
0.83	2.95	1.47	1.19	1.79
62.54	35.49	59.36	67.91	54.60
100.00	100.00	100.00	100.00	100.00

Table 4-18. *Distribution of Nonagricultural Employment within Thirty-seven Cities, by Sector, 1940*
(percent)

City	Hydrocarbons	Mining	Manufacturing	Construction	Electricity
Aguascalientes	0.12	0.14	20.10	5.13	0.32
Mexicali	0.21	0.33	20.45	2.55	0.33
Tijuana	0.00	1.48	13.68	3.76	0.84
Saltillo	0.12	0.77	23.56	5.71	0.49
Torreón	0.20	2.88	20.99	5.21	0.64
Ciudad Juárez	0.12	0.63	19.49	5.98	0.33
Chihuahua	0.24	8.83	18.50	7.70	0.44
Durango	0.12	1.66	22.86	0.19	0.51
Irapuato	0.12	0.07	31.16	5.76	1.23
León	0.08	0.13	55.36	3.75	0.30
Acapulco	0.19	0.45	19.29	7.27	0.11
Pachuca	0.20	34.00	11.30	3.56	0.63
Guadalajara	0.05	0.13	31.09	6.47	0.37
Toluca	0.15	0.15	26.42	3.93	0.44
Morelia	0.14	0.09	21.85	8.27	0.51
Cuernavaca	0.13	0.34	15.66	11.58	0.17
Monterrey	0.15	2.39	27.25	5.47	0.78
Oaxaca	0.04	0.60	34.89	4.19	0.16
Puebla	0.13	0.08	33.12	4.92	0.50
Querétaro	0.00	0.04	32.83	5.61	0.57
San Luis Potosí	0.19	6.60	24.68	7.39	0.54
Culiacán	0.11	0.62	31.90	4.04	0.24
Mazatlán	0.05	2.11	24.03	4.66	0.39
Ciudad Obregón	0.08	0.91	24.79	6.14	0.16
Hermosillo	0.26	1.04	19.22	9.80	0.35
Villahermosa	0.05	0.00	22.73	4.56	0.41
Matamoros	0.02	0.07	17.51	4.07	0.14
Nuevo León	0.32	0.18	15.92	4.50	0.40
Reynosa	0.09	0.00	13.57	4.07	0.18
Tampico	19.25	0.05	12.80	2.43	0.74
Coatzacoalcos	18.91	0.10	14.06	2.68	0.30
Minatitlán	42.11	0.14	8.19	1.48	0.07
Orizaba	0.11	0.07	51.52	3.37	0.62
Veracruz	0.59	0.03	14.39	3.85	0.43
Jalapa	0.11	0.05	22.43	4.87	0.45
Mérida	0.08	0.05	25.44	5.79	0.40
Mexico City	0.45	0.39	24.33	5.80	0.56
Average	1.14	1.22	25.23	5.47	0.53

Source: VI Censo General de la Población, 1940 (1942).

Commerce	*Transport*	*Services*	*Government*	*Other*	*Total*
22.44	20.97	8.96	6.95	14.88	100.00
27.20	7.94	13.27	17.36	10.37	100.00
36.28	3.94	15.96	15.26	8.80	100.00
24.99	10.14	11.95	8.46	13.81	100.00
26.08	10.11	10.02	4.88	18.99	100.00
31.15	7.22	13.13	10.45	10.49	100.00
25.26	10.54	10.14	8.85	9.50	100.00
28.73	12.60	6.56	12.71	14.05	100.00
31.13	8.54	8.28	8.29	4.41	100.00
18.11	2.55	7.42	2.41	9.90	100.00
21.19	6.08	16.00	8.62	25.81	100.00
18.95	4.66	12.40	10.28	3.80	100.00
22.75	5.76	15.46	6.17	11.74	100.00
25.85	6.07	14.90	15.12	6.98	100.00
29.83	5.86	14.65	15.72	3.08	100.00
26.77	5.16	20.47	15.34	4.37	100.00
20.53	7.82	9.27	5.04	21.28	100.00
18.94	3.85	16.22	10.37	10.73	100.00
21.25	7.50	14.00	7.06	11.44	100.00
22.49	4.58	13.30	6.76	13.84	100.00
22.58	13.59	10.68	6.58	7.16	100.00
22.98	6.00	14.42	13.30	6.38	100.00
26.28	14.10	13.81	10.03	4.54	100.00
25.54	6.86	11.37	6.06	18.09	100.00
25.34	5.92	13.72	15.50	8.84	100.00
28.87	11.43	12.71	12.87	6.36	100.00
32.22	6.52	11.26	12.34	15.79	100.00
26.75	10.87	11.31	12.33	17.42	100.00
28.71	4.95	10.68	8.40	29.37	100.00
20.25	8.91	10.09	8.12	17.35	100.00
18.39	9.19	9.29	6.88	20.20	100.00
12.51	2.47	6.87	15.17	10.98	100.00
19.34	7.60	6.78	5.70	4.90	100.00
24.64	17.86	12.20	15.03	10.99	100.00
20.90	10.74	12.58	15.95	11.92	100.00
33.72	8.75	13.49	7.99	4.28	100.00
23.38	6.79	20.55	12.22	5.52	100.00
23.52	7.66	16.24	10.35	8.66	100.00

Table 4-19. *Distribution of Nonagricultural Employment within Thirty-seven Cities, by Sector, 1970*
(percent)

City	*Hydro-carbons*	*Mining*	*Manu-facturing*	*Construc-tion*	*Elec-tricity*
Aguascalientes	0.23	0.26	25.04	7.13	0.44
Mexicali	0.18	0.48	23.05	6.57	0.82
Tijuana	0.20	0.34	23.42	7.90	0.58
Saltillo	0.15	1.42	30.57	8.68	0.57
Torreón	0.26	0.85	21.66	7.60	1.02
Ciudad Juárez	0.20	0.41	19.46	8.96	0.42
Chihuahua	0.26	1.50	20.28	8.78	0.77
Durango	0.13	1.38	19.04	8.27	0.61
Irapuato	1.02	0.40	28.73	7.39	0.89
León	0.08	0.28	53.15	0.90	0.34
Acapulco	0.13	0.26	12.15	9.12	0.56
Pachuca	0.26	8.13	21.05	6.48	0.93
Guadalajara	0.12	0.38	32.71	8.62	0.49
Toluca	0.13	0.30	28.30	8.44	0.75
Morelia	0.18	0.53	19.24	9.68	1.00
Cuernavaca	0.16	0.43	23.57	10.19	0.49
Monterrey	0.19	0.47	37.46	8.14	0.42
Oaxaca	0.19	0.38	20.04	7.31	1.08
Puebla	0.25	0.35	32.14	5.78	0.87
Querétaro	0.21	0.71	29.51	8.56	0.68
San Luis Potosí	0.26	1.57	25.45	8.01	0.61
Culiacán	0.13	0.49	19.07	7.44	0.51
Mazatlán	0.59	0.37	19.10	7.20	0.60
Ciudad Obregón	0.29	0.54	16.05	8.28	0.60
Hermosillo	.16	1.01	16.48	9.76	1.28
Villahermosa	2.18	0.25	14.08	8.36	0.96
Matamoros	0.19	0.37	20.21	8.01	0.44
Nuevo León	0.18	0.33	22.19	7.65	0.42
Reynosa	17.22	0.28	12.83	9.27	0.45
Tampico	14.11	0.39	14.16	8.90	0.67
Coatzacoalcos	18.93	1.25	13.20	10.60	0.92
Minatitlán	27.62	4.12	13.30	8.33	0.41
Orizaba	0.55	0.41	36.95	6.06	0.99
Veracruz	1.47	0.14	21.33	5.75	0.89
Jalapa	0.38	0.24	14.11	8.62	1.55
Mérida	0.10	0.35	21.82	7.05	0.88
Mexico City	0.59	0.29	31.92	6.07	0.69
Average	0.94	0.45	29.56	6.90	0.67

Source: IX Censo General de la Población, 1970 (1972).

Commerce	*Transport*	*Services*	*Government*	*Other*	*Total*
16.13	12.40	23.38	4.24	10.77	100.00
18.92	4.12	29.88	5.80	10.19	100.00
18.64	3.62	32.07	3.43	9.79	100.00
13.76	6.16	25.91	4.04	8.73	100.00
17.76	6.94	30.10	3.94	9.87	100.00
19.39	4.59	34.05	3.57	8.94	100.00
16.71	7.08	30.64	6.02	7.96	100.00
15.67	7.03	29.65	7.22	11.00	100.00
19.44	4.92	21.76	4.13	11.32	100.00
14.26	3.03	19.70	1.46	6.78	100.00
15.27	5.68	40.67	4.56	11.60	100.00
15.60	3.94	29.75	7.67	6.19	100.00
16.23	5.00	26.86	2.86	6.75	100.00
14.57	4.45	27.62	6.04	9.39	100.00
16.57	4.02	31.58	7.48	9.73	100.00
12.89	3.43	32.58	6.97	9.29	100.00
13.87	4.72	27.46	2.38	4.90	100.00
17.57	5.10	31.83	8.60	7.91	100.00
15.98	4.84	28.89	4.57	6.32	100.00
14.60	3.57	27.42	5.25	9.48	100.00
15.15	8.60	27.67	4.81	7.88	100.00
18.03	5.02	30.16	7.47	11.67	100.00
16.54	7.83	33.62	6.06	8.09	100.00
21.84	4.89	33.20	6.00	8.31	100.00
18.75	4.89	33.25	6.89	7.53	100.00
18.88	4.18	32.12	8.15	10.84	100.00
17.09	4.83	35.53	5.09	8.24	100.00
16.29	5.36	33.94	5.07	8.57	100.00
16.77	4.06	27.02	3.90	8.20	100.00
16.09	5.54	29.76	4.67	5.71	100.00
16.02	5.03	23.34	4.27	6.43	100.00
12.01	3.53	18.29	3.19	9.20	100.00
15.85	5.37	25.20	2.32	6.29	100.00
16.17	6.63	32.21	7.32	8.07	100.00
15.97	6.37	33.92	9.85	9.00	100.00
16.69	4.98	32.15	4.68	11.28	100.00
13.98	4.33	30.99	6.56	4.59	100.00
15.04	4.76	30.01	5.49	6.18	100.00

Table 4-20. *Average Growth Rates of Sectoral Employment in Thirty-seven Cities, by Sector, 1940 to 1970*
(percent)

City	*Hydro-carbons*	*Mining*	*Manu-facturing*	*Construc-tion*
Aguascalientes	4.9	5.1	3.6	4.0
Mexicali	8.5	10.5	9.5	12.6
Tijuana	–	4.5	11.7	12.5
Saltillo	4.8	5.9	4.7	5.2
Torreón	4.8	0.3	4.0	5.2
Ciudad Juárez	9.2	5.9	7.4	8.8
Chihuahua	4.6	1.7	4.7	4.8
Durango	4.9	4.1	4.1	18.7
Irapuato	12.4	11.1	4.3	5.6
León	5.1	7.9	4.9	0.2
Acapulco	8.9	8.2	9.6	11.0
Pachuca	2.0	3.7	3.3	3.2
Guadalajara	8.0	9.2	5.7	6.5
Toluca	3.7	6.5	4.3	6.7
Morelia	4.4	9.9	3.2	4.2
Cuernavaca	8.0	8.1	8.8	6.9
Monterrey	7.1	0.7	7.5	7.8
Oaxaca	9.6	2.6	2.2	5.9
Puebla	6.4	9.5	4.0	4.6
Querétaro	–	14.9	3.8	5.7
San Luis Potosí	4.6	1.3	3.6	3.7
Culiacán	6.5	5.1	4.1	8.0
Mazatlán	12.7	2.1	3.0	5.3
Ciudad Obregón	12.3	5.7	6.0	8.6
Hermosillo	5.3	6.9	6.5	7.0
Villahermosa	19.6	–	3.7	7.5
Matamoros	15.0	13.4	7.9	9.9
Nuevo Laredo	3.7	7.9	6.8	7.5
Reynosa	30.0	–	9.0	12.2
Tampico	1.8	10.1	3.2	7.4
Coatzacoalcos	6.0	15.3	5.8	11.0
Minatitlán	1.9	15.6	5.0	9.4
Orizaba	7.9	8.5	1.1	4.2
Veracruz	7.0	9.6	5.2	5.2
Jalapa	8.2	9.0	2.0	5.6
Mérida	2.9	9.1	1.8	2.9
Mexico City	5.9	4.1	6.1	5.3
Average	7.3	6.5	5.2	7.1

— Not applicable or negligible.

Source: VI Censo General de la Población, 1940 (1942) and *IX Censo General de la Población, 1970* (1972).

Electricity	*Commerce*	*Transport*	*Services*	*Government*	*Other*
4.0	1.8	1.1	6.2	1.2	1.8
12.4	7.8	6.7	12.9	5.2	9.0
8.4	7.3	9.4	12.3	4.4	10.2
4.3	1.7	2.1	6.5	1.2	2.2
5.6	2.6	2.6	7.8	3.1	1.6
8.3	5.6	5.8	10.9	3.6	6.8
6.3	2.9	3.0	8.2	3.0	3.7
5.4	2.6	2.7	10.1	2.8	3.9
3.6	3.1	2.9	8.2	2.4	8.1
5.6	4.2	5.7	8.6	3.3	3.8
16.3	9.0	10.0	11.1	7.9	7.3
2.5	0.5	0.6	4.1	0.2	2.8
6.5	4.3	5.0	7.5	2.8	3.6
5.9	2.1	2.7	6.2	0.9	5.1
6.0	1.7	2.4	6.4	1.2	7.7
11.1	4.8	5.9	9.0	4.5	10.0
4.2	5.0	4.6	10.3	3.7	1.3
10.9	3.8	5.1	6.5	3.4	3.1
6.0	3.1	2.6	6.6	2.6	2.0
4.8	2.7	3.3	6.7	3.3	2.9
3.9	2.1	1.9	6.9	2.4	3.9
8.5	4.1	5.3	8.6	3.9	8.0
5.3	2.2	1.8	6.9	2.1	5.8
12.4	7.0	6.4	11.4	7.5	4.8
11.7	6.0	6.4	10.2	4.2	6.4
8.4	3.9	1.8	8.6	3.8	7.2
11.5	5.1	6.4	11.6	4.3	5.1
5.8	3.9	3.2	9.5	2.5	3.2
12.7	7.3	8.5	12.6	6.4	4.6
4.2	2.1	1.2	6.7	1.0	0.9
10.1	5.5	3.9	9.3	4.3	2.0
9.5	3.2	4.5	6.7	2.4	3.2
3.7	1.5	1.0	6.7	0.9	3.0
6.4	2.4	0.4	7.2	1.3	2.7
8.0	2.7	1.9	7.1	2.0	2.7
4.9	0.2	0.3	5.2	0.4	5.5
5.9	3.4	3.6	6.6	3.0	4.5
7.2	3.8	3.9	8.3	2.9	4.6

Ciudad Juárez, Durango, Acapulco, Monterrey, Ciudad Obregón, Hermosillo, Matamoros, and Reynosa. Also of interest are negative growth rates in mining (Pachuca, Chihuahua, Torreón, and San Luis Potosí), in commerce (Mérida), and in government (Jalapa and Minatitlán). Some of these reflect population increase, whereas others reflect structural changes in urban economies.

In 1940 seven cities could be said to have specialized economies (Table 4-21), whereas in 1970 (Table 4-22) there was only one city in this category.[9] Similarly, the number of semispecialized cities fell from seven in 1940 to three in 1970, whereas the number of semidiversified cities rose from five to twelve, and the number of diversified cities increased from eighteen to twenty. This suggests a relation between increasing size and decreasing specialization in an aggregate urban economy, in the sense that absolute increases in population were associated with declining indexes of specialization.

Correlation analysis confirms the existence of a general, but weak, relation between specialization and urban size in 1940 and 1970. These weak correlations suggest there was no particular link between economic structure (defined in terms of specialization) and population size in either year. In 1940, however, the largest cities (Mexico City, Guadalajara, and Monterrey) had relatively diversified economies, whereas some of the smallest cities (Minatitlán and Coatzacoalcos) had high indexes of specialization. These differences at the extremes of the size distribution scale also occurred in 1970, despite the absence of a close overall relation between population size and economic specialization. Mexico City was thus the largest and least specialized city and Minatitlán (one of the smallest cities among the thirty-seven) the most specialized. Again, however, some of the smaller cities (Querétaro, Cuernavaca, Irapuato, Mazatlán, Pachuca, and Nuevo Laredo, all of which had populations of less than 200,000 in 1970) had rather low indexes of specialization; at the same time, such larger cities as León (420,000) and Tampico (276,000) had fairly specialized economies.

Similarly, whereas the correlations between economic specialization in 1970 and population growth in 1940-70 were low, the data point to general differences between extremes. For example, Minatitlán had a slow growth rate in 1940-70 and a specialized economy at the beginning of the period, whereas Mexico City and Hermosillo, which had diversified economies in 1940, were among the fastest growing cities in 1940-70.

All the cities that grew at above the average rate for the thirty-seven cities in 1940-70 had much lower indexes of specialization in 1970 than in 1940, whereas in some of the cities which grew slowly in 1940-70, there was a relatively smaller decline. The data point to differences between Mexicali,

9. See Appendix F for definition of the index of specialization. The numerical values of the index are divided into a four-part scale: diversified = less than 0.3; semidiversified = 0.3 to 0.4; semispecialized = 0.4 to 0.5, and specialized = 0.5 and above.

Tijuana, Cuernavaca, Monterrey, and Nuevo Laredo on the one hand and Minatitlán and Pachuca on the other. But there were contradictory patterns, because in such cities as Acapulco—the second fastest growing city in 1940-70 and the fastest growing in 1960-70—the index increased. This leads to the conclusion that specialization and diversification were not consistently related to urban size or urban size growth in 1940-70.

Urban growth theory maintains that the sectors of an urban economy that encourage the development of a city are those which generate export surpluses from which employment and income multipliers are derived. The activities of these sectors may be identified by an index of surplus workers applied to employment data for all sectors in 1940 and 1970 except agriculture (see Tables 4-23 and 4-24).[10]

The pattern for 1940 stresses the importance of manufacturing and commerce in the growth of most cities and, less importantly, that of transport and hydrocarbons. Compared with those for 1940, the data for 1970 suggest that commerce had become a more generally important growth sector, and that government was also far more important in 1970 than in 1940. Manufacturing, transport, and hydrocarbons continued to generate high surpluses in many cities.

In many respects, the relative sectoral emphases of 1940 shown in Table 4-23 correspond to those revealed by the index of sectoral specialization in Table 4-21, at least in the specialized and semispecialized economies. For example, the role of transport in Aguascalientes reflected the high level of relative specialization in this sector while the large surplus in hydrocarbons recorded in Tampico, Coatzacoalcos, and Minatitlán corresponds to a high degree of specialization in that sector. A similar correspondence occurred in mining in Pachuca and manufacturing in León and Orizaba.

The index of surplus workers shows not only the absolute, but also the relative, importance of different sectors. In the more diversified urban economies it reveals that, in 1940, manufacturing was the main surplus sector in both Monterrey and Guadalajara and that commerce was the main surplus in Ciudad Juárez and Mérida. For 1970 the relative surplus values in the specialized and semispecialized economies generally coincided with those revealed by the index of specialization (hydrocarbons in Coatzacoalcos and Minatitlán, manufacturing in León, and services in Acapulco). The values shown in Table 4-22 for the nonspecialized economies also indicate the sector(s) on which nonspecialized economies apparently depended for growth. As might be expected, these cities generally had more export sectors than those which were more specialized.

Although the growth of urban size was not consistently related to sectoral structure, certain trends emerge. Manufacturing was a more important sector

10. See Appendix F for definition of index of surplus workers.

Table 4-21. *Coefficients of Sectoral Specialization for Thirty-seven Cities, by Sector, 1940*

City	*Hydro-carbons*	*Mining*	*Manu-facturing*	*Construc-tion*	*Elec-tricity*
Aguascalientes	0.010	0.011	0.051	0.003	0.002
Mexicali	0.009	0.009	0.048	0.029	0.002
Tijuana	0.011	-0.003	0.115	0.017	-0.003
Saltillo	0.010	0.004	0.017	0.002	0.000
Torreón	0.009	-0.017	0.042	0.003	-0.001
Ciudad Juárez	0.010	0.006	0.057	-0.005	0.002
Chihuahua	0.009	-0.076	0.067	-0.022	0.001
Durango	0.010	-0.084	0.024	0.053	0.000
Irapuato	0.010	0.011	-0.069	-0.003	-0.007
León	0.011	0.011	-0.301	0.017	0.002
Acapulco	0.010	0.008	0.109	-0.018	0.004
Pachuca	0.009	-0.328	0.139	0.019	-0.001
Guadalajara	0.011	0.011	-0.059	-0.010	0.002
Toluca	0.010	0.011	-0.012	0.015	0.001
Morelia	0.010	0.011	0.034	-0.028	0.000
Cuernavaca	0.010	0.009	0.096	-0.061	0.004
Monterrey	0.010	-0.012	-0.020	-0.000	-0.003
Oaxaca	0.011	0.006	-0.097	0.013	0.004
Puebla	0.010	0.011	-0.079	0.005	0.000
Querétaro	0.011	0.002	-0.076	-0.001	0.000
San Luis Potosí	0.009	-0.054	0.005	-0.019	0.000
Culiacán	0.010	0.006	-0.067	0.014	0.003
Mazatlán	0.011	-0.009	0.012	0.008	0.001
Ciudad Obregón	0.011	0.003	0.004	-0.007	0.004
Hermosillo	0.009	0.002	0.060	-0.043	0.002
Villahermosa	0.011	0.012	0.025	0.009	0.001
Matamoros	0.011	0.011	0.077	0.014	0.004
Nuevo Laredo	0.008	0.010	0.093	0.010	0.001
Reynosa	0.010	0.012	0.117	0.014	0.004
Tampico	-0.181	0.012	0.124	0.030	-0.002
Coatzacoalcos	-0.178	0.011	0.112	0.028	0.002
Minatitlán	-0.410	0.011	0.170	0.040	0.005
Orizaba	0.010	0.011	-0.263	0.021	-0.001
Veracruz	0.005	0.012	0.108	0.016	0.001
Jalapa	0.010	0.012	0.028	0.006	0.001
Mérida	0.011	0.012	-0.002	-0.003	0.001
Mexico City	0.007	0.008	0.009	-0.003	0.000

a. See Appendix F for definition.

b. Relative level of economic specialization: S = specialized; SS = semispecialized; SD = semidiversified; and D = diversified.

Source: VI Censo General de la Población, 1940 (1942).

Commerce	*Transport*	*Services*	*Government*	*Other*	*Coefficient of specialization*[a]	*Class*[b]
0.011	0.133	0.073	0.034	0.062	0.391	SS
0.037	0.003	0.030	0.070	0.017	0.254	D
0.128	0.037	0.003	0.049	0.001	0.368	SS
0.015	0.025	0.043	0.019	−0.052	0.187	D
0.026	−0.025	0.062	0.055	−0.103	0.342	SD
−0.086	0.004	0.031	−0.001	−0.018	0.221	D
−0.017	−0.029	0.061	0.015	−0.008	0.306	SD
−0.052	−0.049	0.097	−0.024	−0.054	0.367	SS
−0.076	−0.009	0.080	0.021	0.042	0.328	SD
0.054	0.051	0.088	0.079	−0.012	0.628	S
0.023	0.016	0.002	0.017	−0.172	0.379	SS
0.046	0.030	0.036	0.001	0.049	0.658	S
0.008	0.019	0.008	0.042	−0.031	0.199	D
−0.023	0.016	0.013	−0.048	0.017	0.166	D
−0.063	0.018	0.016	−0.054	0.056	0.290	D
−0.033	0.025	−0.042	−0.050	0.043	0.372	SS
0.030	−0.002	0.070	0.053	−0.126	0.325	SD
0.046	0.038	0.000	0.000	−0.021	0.235	D
0.023	0.002	0.022	0.033	−0.028	0.213	D
0.010	0.031	0.029	0.036	−0.052	0.259	D
0.009	−0.059	0.056	0.038	0.015	0.265	D
0.005	0.017	0.018	−0.029	0.023	0.192	D
−0.028	−0.064	0.024	0.003	0.041	0.202	D
−0.020	0.008	0.049	0.043	−0.094	0.243	D
−0.018	0.017	0.025	−0.051	−0.002	0.230	D
−0.059	−0.038	0.035	−0.025	0.023	0.233	D
−0.087	0.011	0.050	−0.020	−0.071	0.357	SS
−0.032	−0.032	0.049	−0.020	−0.088	0.343	SD
−0.052	0.027	0.056	0.019	−0.207	0.518	S
0.033	−0.013	0.061	0.022	−0.087	0.566	S
0.051	−0.015	0.070	0.035	−0.115	0.617	S
0.110	0.052	0.094	−0.048	−0.023	0.962	S
0.042	0.001	0.095	0.046	0.038	0.528	S
−0.011	−0.102	0.040	−0.047	−0.023	0.367	SS
0.026	−0.031	0.037	−0.056	−0.033	0.239	D
−0.102	−0.011	0.028	0.024	0.044	0.237	D
0.001	0.009	−0.043	−0.019	0.031	0.131	D

Table 4-22. *Coefficients of Sectoral Specialization for Thirty-seven Cities, by Sector, 1970*

City	*Hydro-carbons*	*Mining*	*Manu-facturing*	*Construc-tion*	*Elec-tricity*
Aguascalientes	0.007	0.002	0.045	−0.002	0.002
Mexicali	0.008	−0.000	0.065	0.003	0.002
Tijuana	0.007	0.001	0.061	−0.010	0.001
Saltillo	0.008	−0.010	−0.010	−0.018	0.001
Torreón	0.007	−0.004	0.079	−0.007	−0.004
Ciudad Juárez	0.007	0.000	0.101	−0.021	0.002
Chihuahua	0.007	−0.011	0.093	−0.019	−0.001
Durango	0.008	−0.009	0.105	−0.014	0.001
Irapuato	−0.001	0.000	0.008	−0.005	−0.002
León	0.009	0.002	−0.236	0.060	0.003
Acapulco	0.008	0.002	0.174	−0.022	0.001
Pachuca	0.007	−0.077	0.085	0.004	−0.003
Guadalajara	0.008	0.001	−0.031	−0.017	0.002
Toluca	0.008	0.001	0.013	−0.015	−0.001
Morelia	0.008	−0.001	0.103	−0.028	−0.003
Cuernavaca	0.008	0.000	0.060	−0.033	0.002
Monterrey	0.008	0.000	−0.079	−0.012	0.002
Oaxaca	0.007	0.001	0.095	−0.004	−0.004
Puebla	0.007	0.001	−0.026	0.011	−0.002
Querétaro	0.007	−0.003	0.000	−0.017	−0.002
San Luis Potosí	0.007	−0.011	0.041	−0.011	0.001
Culiacán	0.008	0.000	0.105	−0.005	0.001
Mazatlán	0.004	0.001	0.105	−0.003	0.001
Ciudad Obregón	0.006	−0.001	0.135	−0.014	0.001
Hermosillo	0.008	−0.006	0.131	−0.028	−0.006
Villahermosa	0.012	0.002	0.155	−0.014	−0.003
Matamoros	0.008	0.001	0.093	−0.011	0.002
Nuevo Laredo	0.008	0.001	0.074	−0.007	0.002
Reynosa	−0.163	0.002	0.167	−0.024	0.002
Tampico	−0.131	0.001	0.154	−0.020	0.000
Coatzacoalcos	−0.180	−0.008	0.163	−0.037	−0.002
Minatitlán	−0.267	−0.037	0.162	−0.014	0.003
Orizaba	0.004	0.000	−0.074	0.008	−0.003
Veracruz	−0.005	0.003	0.082	0.011	−0.002
Jalapa	0.006	0.002	0.154	−0.017	−0.009
Mérida	0.008	0.001	0.077	−0.001	−0.002
Mexico City	0.003	0.002	−0.024	0.008	0.000

a. See Appendix F for definition.

b. Relative level of economic specialization: S = specialized; SS = semispecialized; SD = semidiversified; and D = diversified.

Source: IX Censo General de la Población, 1970 (1972).

Commerce	*Transport*	*Services*	*Government*	*Other*	*Coefficient of specialization*[a]	*Class*[b]
−0.011	−0.076	0.066	0.012	−0.046	0.271	SD
−0.039	0.006	0.001	0.003	−0.040	0.168	D
−0.036	0.011	−0.021	0.021	−0.036	0.205	D
0.013	−0.014	0.041	0.014	−0.025	0.154	D
−0.027	−0.022	−0.001	0.015	−0.036	0.202	D
−0.043	0.002	−0.040	0.019	−0.028	0.264	SD
−0.017	−0.023	−0.006	−0.005	−0.018	0.199	D
−0.006	−0.023	0.004	−0.017	−0.048	0.235	SD
−0.044	−0.002	0.083	0.014	−0.051	0.210	D
0.008	0.017	0.103	0.040	−0.006	0.484	SS
−0.002	−0.009	−0.107	0.009	−0.054	0.389	SS
−0.006	0.008	0.003	−0.022	0.000	0.214	SD
−0.012	−0.002	0.031	0.026	−0.006	0.137	D
0.005	0.003	0.024	−0.005	−0.032	0.108	D
−0.015	0.007	−0.016	−0.020	−0.035	0.236	SD
0.021	0.013	0.026	−0.015	−0.031	0.209	D
0.012	0.000	0.025	0.031	0.013	0.183	D
−0.025	−0.003	0.018	0.031	−0.017	0.207	D
−0.009	−0.001	−0.011	0.009	−0.001	0.079	D
0.004	0.012	−0.026	0.002	−0.033	0.105	D
−0.001	−0.038	−0.023	0.007	−0.017	0.157	D
−0.030	−0.003	−0.001	−0.020	−0.055	0.229	SD
−0.015	−0.031	−0.036	−0.006	−0.019	0.219	SD
−0.068	−0.001	−0.032	−0.005	−0.021	0.284	SD
−0.037	−0.001	−0.032	−0.014	−0.013	0.277	SD
−0.038	0.006	0.021	−0.027	−0.047	0.325	SD
−0.020	−0.001	−0.055	0.004	−0.021	0.216	D
−0.012	−0.006	−0.039	0.004	−0.024	0.178	D
−0.017	0.007	0.030	0.016	−0.020	0.448	SS
−0.010	−0.008	0.002	0.008	0.005	0.340	SD
−0.010	−0.003	0.067	0.012	−0.003	0.485	SS
0.030	0.012	0.117	0.023	−0.030	0.696	S
−0.008	−0.006	0.048	0.032	−0.001	0.185	D
−0.011	−0.019	−0.022	−0.018	−0.019	0.194	D
−0.009	−0.016	−0.039	−0.044	−0.028	0.324	SD
−0.016	−0.002	−0.021	0.008	−0.051	0.189	D
0.011	0.004	−0.010	−0.011	0.016	0.089	D

Table 4-23. *Surplus Workers in Thirty-seven Cities, by Sector, 1940*
(number of persons)

City	*Hydro-carbons*	*Mining*	*Manu-facturing*	*Construc-tion*
Aguascalientes	-200	-212	-1,009	-67
Mexicali	-45	-43	-232	-142
Tijuana	-57	13	-577	-86
Saltillo	-141	-62	-231	33
Torreón	-253	449	-1,146	-71
Ciudad Juárez	-118	-68	-664	59
Chihuahua	-164	1,394	-1,232	408
Durango	-90	39	-210	-468
Irapuato	-73	-83	500	20
León	-224	-230	6,369	-364
Acapulco	-25	-21	-293	48
Pachuca	-152	5,335	-2,266	-310
Guadalajara	-878	-875	4,735	807
Toluca	-164	-176	197	-255
Morelia	-131	-149	-447	370
Cuernavaca	-53	-46	-504	322
Monterrey	-540	644	1,113	2
Oaxaca	-108	-61	954	-126
Puebla	-430	-486	3,366	-232
Querétaro	-123	-127	820	14
San Luis Potosí	-209	1,187	-120	424
Culiacán	-105	-61	682	-146
Mazatlán	-133	109	-147	-99
Ciudad Obregón	-40	-12	-16	25
Hermosillo	-47	-10	-324	-233
Villahermosa	-67	-74	-152	-55
Matamoros	-46	-48	-322	-58
Nuevo Laredo	-56	-71	-634	-66
Reynosa	-24	-28	-266	-32
Tampico	5,657	-364	-3,882	-950
Coatzacoalcos	894	-56	-562	-140
Minatitlán	2,885	-76	-1,199	-261
Orizaba	-213	-238	5,442	-435
Veracruz	-115	-250	-2,276	-341
Jalapa	-117	-132	-318	-69
Mérida	-310	-344	63	94
Mexico City	-3,983	-4,770	-5,209	1,932

Note: See Appendix F for definition of surplus workers.
Source: VI Censo General de la Población, 1940 (1942).

Electricity	*Commerce*	*Transport*	*Services*	*Government*	*Other*
-41	-212	2,618	-1,431	-669	1,225
-10	179	14	-144	341	83
16	638	-186	-14	245	7
-4	203	342	-592	-261	711
30	694	663	-1,682	-1,478	2,743
-23	1,001	-51	-360	12	212
-16	320	527	-1,116	-275	154
-2	464	438	-858	209	478
51	549	64	-574	-148	-306
-48	-1,144	-1,079	-1,864	-1,679	263
-11	-62	-42	-6	-47	460
17	-744	-487	-590	-11	-791
-127	-617	-1,530	-625	-3,378	2,489
-15	385	-263	-220	787	-277
-2	834	-238	-210	710	-737
-19	171	-131	223	253	-226
142	-1,641	87	-3,821	-2,913	6,928
-36	-452	-376	-2	2	204
-9	-969	-68	-953	-1,405	1,185
4	-110	-332	-317	-387	558
4	-206	1,309	-1,226	-832	-331
-29	-55	-169	-185	301	-232
-16	337	786	-297	-39	-503
-14	76	-30	-182	-161	354
-9	98	-94	-136	247	10
-7	327	231	-216	154	-140
-16	363	-48	-208	85	298
-9	220	219	-336	135	597
-8	119	-62	-127	-45	473
67	-1,020	392	-1,919	-698	2,716
-11	-258	77	-350	-175	581
-32	-775	-365	-659	339	163
20	-865	-12	-1,958	-962	-778
-20	236	2,143	-849	963	490
-9	-298	350	-416	637	372
-36	3,005	322	-810	-695	-1,288
228	-793	-5,018	25,027	10,777	18,191

Table 4-24. *Surplus Workers in Thirty-seven Cities, by Sector, 1970*
(number of persons)

City	*Hydro-carbons*	*Mining*	*Manu-facturing*	*Construc-tion*
Aguascalientes	−335	−86	−2,091	104
Mexicali	−505	23	−4,289	−223
Tijuana	−598	−85	−4,955	804
Saltillo	−330	408	424	744
Torreón	−580	340	−6,708	593
Ciudad Juárez	−732	−40	−9,967	2,033
Chihuahua	−446	689	−6,051	1,224
Durango	−290	332	−3,758	489
Irapuato	24	14	−239	142
León	−812	−159	22,134	−5,626
Acapulco	−404	−94	−8,651	1,099
Pachuca	−158	1,773	−1,964	−97
Guadalajara	−3,327	−293	12,686	6,919
Toluca	−440	−78	−681	834
Morelia	−298	30	−4,023	1,082
Cuernavaca	−344	−10	−2,628	1,441
Monterrey	−2,624	87	27,413	4,291
Oaxaca	−248	−21	−3,128	133
Puebla	−983	−132	3,655	−1,588
Querétaro	−268	96	−16	608
San Luis Potosí	−425	701	−2,559	686
Culiacán	−459	24	−5,925	302
Mazatlán	−132	−30	−3,900	112
Ciudad Obregón	−216	30	−4,485	457
Hermosillo	−324	233	−5,410	1,180
Villahermosa	361	−57	−4,526	424
Matamoros	−269	−28	−3,321	393
Nuevo Laredo	−266	−40	−2,584	261
Reynosa	5,195	−53	−5,336	755
Tampico	9,632	−43	−11,260	1,458
Coatzacoalcos	5,204	233	−4,733	1,070
Minatitlán	4,967	683	−3,025	265
Orizaba	−153	−14	2,906	−344
Veracruz	343	−196	−5,304	−744
Jalapa	−188	−70	−5,142	571
Mérida	−472	−57	−4,346	83
Mexico City	−9,099	−4,081	61.784	−21,944

Note: See Appendix F for definition of surplus workers.
Source: IX Censo General de la Población, 1970 (1972).

Electricity	*Commerce*	*Transport*	*Services*	*Government*	*Other*
−106	502	3,534	−3,068	−578	2,124
103	2,553	−425	−86	204	2,646
−69	2,908	−924	1,662	−1,665	2,922
−38	−536	584	−1,715	−607	1,066
304	2,308	1,854	72	−1,320	3,136
−238	4,296	−168	3,991	−1,898	2,722
65	1,084	1,516	413	348	1,159
−20	225	810	−128	−619	1,722
66	1,275	45	−2,395	−395	1,491
−303	−734	−1,619	−9,669	−3,776	563
−53	113	456	5,298	−461	2,696
60	130	−190	−61	503	3
−705	4,761	963	−12,702	−10,606	2,303
43	−256	−167	−1,295	297	1,743
130	596	−287	612	776	1,382
−78	−944	−583	1,129	651	1,366
−846	4,086	−151	−8,861	−10,798	−4,426
136	830	111	596	1,022	569
293	1,321	113	−1,581	−1,302	203
7	−164	−437	−950	−87	1,211
−36	65	2,395	−1,457	−426	1,057
−86	1,691	149	86	1,120	3,100
−23	557	1,147	1,344	215	712
−22	2,257	42	1,060	171	707
254	1,534	56	1,340	579	558
85	1,123	−170	618	778	1,363
−80	729	26	1,959	−140	732
−87	437	211	1,376	−146	839
−68	552	−224	−956	−509	644
3	768	572	−184	−601	−346
73	283	80	−1,932	−353	74
−48	564	−229	−2,182	−426	563
127	318	241	−1,889	−1,247	45
144	729	1,209	1,416	1,181	1,222
295	308	536	1,299	1,451	940
123	926	122	1,203	−453	2,870
595	−27,894	−11,196	25,636	27,880	−41,682

in larger cities. It was usually a dominant sector in that it was not generally associated with other large export sectors, and it was the largest export sector in all the largest cities in 1970: Mexico City, Monterrey, Guadalajara, Puebla, and León. These were not, however, the fastest growing of the thirty-seven cities, and those which grew faster were, without exception, associated with the rapid growth of the tertiary sector. Finally, the cities that had been closely and uniquely identified with mining (Pachuca) or hydrocarbons (Minatitlán and Coatzacoalcos) in 1940 were, with the important exception of Coatzacoalcos, among the slowest growing cites in 1940-70. One city (Reynosa) became a "hydrocarbons city" during the period and was one of those with faster than average growth.

CONTRASTS IN THE SECONDARY SECTOR. The percentage share of each industrial subsector in each city in relation to total employment in mining and manufacturing emphasized the extent to which specific industries dominated the industrial sector of particular cities (Table 4-25). Among those in which one sector accounted for 50 percent or more of all employment in mining and manufacturing were Pachuca (metallic-mineral mining), Culiacán and Irapuato (food), and León (footwear). In addition to these highly specialized cities, many had more than one-third of all industrial employment concentrated in one sector. These included (apart from those already mentioned) Morelia, Puebla, Mazatlán, Ciudad Obregón, Hermosillo, Villahermosa, and Matamoros (food); Acapulco (beverages); Orizaba (textiles); Coatzacoalcos (chemicals); Nuevo Laredo (electrical); and Toluca (vehicles).

Differing subsectoral structures and subsectoral mixes have an important bearing on the nature of industrial development. Although it is impossible to study the links between industries because of data constraints, it is possible to identify certain relations between different subsectoral mixes and other characteristics of industrial development.

The industrial mix of each city was classified on the basis of the relative amount of employment provided by the three broad subsector groups: extractive industries (subsectors 11-16), final-demand industries (subsectors 20-30), and intermediate-demand industries (subsectors 31-38), (Table 4-26).

The emerging pattern shows that a few cities (Pachuca and Minatitlán) depended quite heavily on extractive industries, but that most cities depended primarily on either final-demand or intermediate-demand subsectors.

The former category included Aguascalientes, Ciudad Juárez, Durango, Irapuato, León, Acapulco, Guadalajara, Morelia, Cuernavaca, Oaxaca, San Luis Potosí, Culiacán, Mazatlán, Ciudad Obregón, Hermosillo, Villahermosa, Reynosa, Orizaba, Jalapa, and Mérida. The industrial sectors of more than half these cities included industries producing final demand consumer goods: food, beverages, tobacco, textiles, footwear, wood and cork products, furniture, paper, printing, and leather. The relative importance of material costs

and distribution costs varied, some subsectors required large intersectoral inputs, and links between sectors were rather unimportant.

By comparison, the subsectors that have been termed intermediate-demand industries had relatively complex links between sectors. Here too assembly and distribution costs varied between the subsectors, particularly in the basic metals industry where the historical record shows that the rationale for locating the steel industry varied from one plant to another. All other subsectors in this broad category depended on inputs from other industries. The cities most dependent on them were Saltillo, Toluca, Monterrey, Querétaro, Nuevo Laredo, Tampico, Veracruz, and Coatzacoalcos.

There was no measurable relation between the subsectoral mix as thus defined and urban size or geographic distribution. The ratio between final-demand and intermediate-demand industries suggests that final-demand industries were more important in smaller cities. There were some exceptions, however, such as Querétaro, Toluca, and Coatzacoalcos, where the relative strength of intermediate-demand industries was considerable in spite of the small size of the city. All the large cities (Mexico City, Monterrey, Guadalajara, Puebla, and Torreón), however, had fairly low ratios.

There was no general relation between different urban growth rates in 1940-70 and different subsector mixes in 1970. The fastest growing cities in 1940-70 were often specialized in final-demand industries, although some (including Monterrey) were relatively specialized in intermediate demand subsectors. From this, it might be expected that cities where employment was concentrated in one industry would be specialized rather than diversified and thus dependent on the industry concerned.

In order to measure the degree of relative industrial diversification, a form of the index of specialization was used to assess the extent to which a given city resembled or was different from the thirty-seven cities as a whole in this regard.

Table 4-27 shows the results of this analysis. Values range from 0.159 for Mexico City, with a very diversified industrial profile, to 1.27 for a specialized center such as Minatitlán. The index provides a basis for labeling each city's industrial sector as diversified, semidiversified, semispecialized, or specialized.

There was some relation between the index of specialization and urban size. At the extremes, Mexico City had the lowest index and the largest population, whereas Guadalajara and Monterrey, second and third largest cities, respectively, had the next lowest index values. By contrast such smaller cities as Minatitlán, Orizaba, Oaxaca, Pachuca, and Irapuato had high indexes of specialization. There were several exceptions, however, such as León, Acapulco, Veracruz, and Tampico, which were large and specialized, and such as Durango, Toluca and Jalapa, which were relatively small and diversified.

The overall coefficient of correlation between size and diversity was not

Table 4-25. *Distribution of Employment in Industry within Thirty-seven Cities, by Subsector, 1970*
(percent)

City	*Coal*	*Metals*	*Rock/ gravel*	*Non-metal minerals*	*Salt*
Aguascalientes	0.00	0.00	0.13	0.00	0.00
Mexicali	0.00	0.00	0.00	0.04	0.07
Tijuana	0.00	0.00	0.44	0.00	0.00
Saltillo	0.00	3.42	0.38	2.31	0.00
Torreón	0.00	1.15	0.39	0.56	0.04
Ciudad Juárez	0.00	0.00	0.02	0.00	0.00
Chihuaha	0.00	0.00	0.00	100.00	0.00
Durango	0.00	1.91	0.37	0.85	0.00
Irapuato	0.00	0.00	0.28	0.00	0.00
León	0.00	0.00	0.02	0.00	0.00
Acapulco	0.00	0.00	0.00	0.00	0.00
Pachuca	0.00	56.67	1.28	0.00	0.00
Guadalajara	0.00	0.00	0.08	0.00	0.00
Toluca	0.00	0.00	0.02	0.00	0.00
Morelia	0.00	0.00	0.00	0.00	0.00
Cuernavaca	0.00	0.00	0.37	0.00	0.00
Monterrey	0.00	0.50	0.54	0.27	0.00
Oaxaca	0.00	1.30	1.47	0.00	0.00
Puebla	0.00	0.00	0.20	4.01	0.00
Querétaro	0.00	0.34	0.29	0.00	0.00
San Luis Potosí	0.00	0.00	0.04	0.57	0.00
Culiacán	0.00	0.00	0.10	0.00	0.00
Mazatlán	0.00	0.00	0.00	0.00	0.00
Ciudad Obregón	0.00	0.00	0.00	0.43	0.00
Hermosillo	1.14	0.22	0.00	0.00	0.21
Villahermosa	0.00	0.00	0.00	0.00	0.00
Matamoros	0.00	0.00	0.00	0.00	3.82
Nuevo Laredo	0.00	0.00	0.00	0.00	0.00
Reynosa	0.00	0.00	1.08	5.63	0.00
Tampico	0.00	0.00	3.71	0.00	1.96
Coatzacoalcos	0.00	0.00	0.00	0.00	2.48
Minatitlán	0.00	0.00	0.00	23.27	0.00
Orizaba	0.00	0.00	0.46	0.00	0.00
Veracruz	0.00	0.00	0.05	0.00	0.00
Jalapa	0.00	0.00	0.00	0.00	0.18
Mérida	0.00	0.00	0.48	0.00	0.00
Mexico City	0.00	0.00	0.14	0.06	0.00
Average	0.01	0.40	0.20	1.37	0.03

Food	*Beverages*	*Tobacco*	*Textiles*	*Shoes*	*Wood/ cork*	*Furni- ture*
20.22	14.77	0.00	13.23	19.01	0.63	0.15
19.75	2.86	0.00	9.08	14.09	0.98	0.25
15.58	3.67	1.43	2.23	9.00	4.45	0.62
6.20	2.82	0.00	13.36	4.70	0.43	0.02
23.61	8.99	0.00	8.44	9.66	1.46	0.37
18.50	22.09	0.00	1.27	11.50	12.93	0.29
0.00	0.00	0.00	0.00	0.00	0.00	0.00
28.34	10.57	0.00	8.82	15.06	0.17	0.05
70.38	2.94	5.80	0.00	8.04	0.13	0.32
7.87	3.65	0.00	1.28	57.25	0.45	0.09
26.58	38.02	0.00	0.00	6.44	0.87	0.00
9.09	3.17	0.00	5.08	8.31	0.83	0.03
18.08	6.91	0.70	8.87	17.45	1.08	0.60
11.10	5.97	3.58	3.66	3.44	0.59	0.02
43.26	9.28	0.00	0.16	3.23	7.22	0.07
13.37	8.86	0.00	28.48	3.73	0.27	0.00
10.06	3.59	1.15	2.10	6.86	0.48	0.47
10.70	4.74	0.76	5.26	2.27	45.31	0.02
33.64	3.06	0.00	0.43	13.47	1.58	0.03
19.27	3.07	0.00	13.03	1.00	0.29	0.00
18.43	8.15	0.00	20.11	5.96	0.78	0.33
62.95	10.37	0.00	1.92	2.53	0.55	0.41
42.63	14.37	0.90	0.45	3.95	1.16	0.00
37.81	7.94	0.00	29.14	0.81	6.86	0.08
35.17	6.72	0.00	15.75	5.26	1.05	0.29
38.74	19.76	0.00	0.00	3.45	4.21	0.00
37.44	8.26	0.00	0.14	1.22	0.67	0.08
14.76	5.36	0.00	0.00	10.79	1.03	0.08
29.68	8.36	0.00	0.00	11.03	0.68	0.63
64.66	29.65	0.00	0.00	17.62	3.74	0.33
15.23	0.98	0.00	0.00	4.15	1.21	0.17
26.78	31.06	0.00	0.00	0.00	1.10	0.00
7.58	28.28	0.00	42.86	3.14	1.38	0.12
11.48	4.52	1.22	0.01	1.18	0.69	0.08
27.99	0.78	0.00	13.24	5.71	2.01	0.09
20.59	11.14	0.00	27.81	12.96	1.06	0.00
10.40	2.79	0.42	8.60	7.79	0.80	0.58
12.98	4.14	0.53	8.22	8.85	1.10	0.50

(Table continues on the following pages)

Table 4-25 (*continued*)

City	*Paper*	*Printing*	*Leather*	*Lino-leum*	*Chemi-cals*	*Oil*	*Ceramics and glass*
Aguascalientes	1.76	2.45	0.25	2.86	0.77	0.00	4.27
Mexicali	6.79	1.44	0.02	1.07	2.02	1.30	1.78
Tijuana	3.51	3.97	1.17	1.80	1.82	0.07	4.33
Saltillo	1.59	1.55	0.08	0.20	1.21	0.02	5.99
Torreón	1.81	4.06	0.31	1.22	7.05	0.10	7.34
Ciudad Juárez	4.39	4.19	0.09	0.71	0.36	0.07	3.66
Chihuaha	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Durango	0.73	1.61	0.00	0.45	11.66	0.00	6.69
Irapuato	0.16	1.30	0.47	0.13	1.55	0.00	3.70
León	5.90	1.84	9.95	2.57	1.08	0.00	3.40
Acapulco	0.64	3.26	0.00	3.97	0.99	0.00	12.36
Pachuca	0.51	1.60	0.22	0.97	0.60	0.00	4.91
Guadalajara	4.36	2.62	1.91	2.43	6.97	0.18	6.81
Toluca	0.56	2.02	0.82	2.43	10.65	0.00	3.00
Morelia	5.20	5.06	0.77	1.93	11.19	0.00	5.27
Cuernavaca	7.96	1.27	0.03	0.70	5.52	0.00	5.21
Monterrey	5.78	2.33	0.62	0.96	8.39	0.21	15.21
Oaxaca	1.58	2.71	1.26	2.04	0.13	0.00	9.22
Puebla	0.82	0.82	0.66	1.61	0.69	0.00	5.12
Querétaro	0.23	1.18	0.00	0.31	0.26	0.00	2.01
San Luis Potosí	2.90	2.88	0.56	0.56	13.13	0.05	2.91
Culiacán	1.63	5.10	1.75	1.85	0.84	0.00	3.67
Mazatlán	0.64	3.91	0.31	1.44	1.37	0.00	6.82
Ciudad Obregón	1.87	4.81	0.10	1.24	2.14	0.00	1.22
Hermosillo	0.84	3.77	0.05	1.19	5.45	0.00	13.65
Villahermosa	5.13	5.28	0.69	5.44	0.77	0.00	7.50
Matamoros	1.46	3.01	0.04	1.52	3.94	0.00	1.11
Nuevo Laredo	2.26	1.80	0.21	1.53	4.82	0.00	3.73
Reynosa	3.98	10.40	0.11	4.89	0.00	0.00	15.86
Tampico	2.22	11.65	0.02	2.54	33.35	5.54	8.57
Coatzacoalcos	0.92	3.23	0.06	1.33	32.83	14.83	6.41
Minatitlán	0.99	4.61	0.11	1.32	0.77	0.00	4.50
Orizaba	4.31	1.10	2.57	2.49	0.32	0.00	4.29
Veracruz	0.73	2.88	0.03	1.38	0.99	0.00	2.48
Jalapa	1.37	8.17	0.00	1.23	1.28	0.00	14.16
Mérida	2.61	5.93	0.65	0.93	3.40	0.00	6.17
Mexico City	5.50	5.45	0.75	1.72	14.26	0.19	4.35
Average	4.92	4.57	0.89	1.63	11.44	0.19	5.46

Source: IX Censo General de la Población, 1970 (1972).

Basic metals	*Metal products*	*Non-electric machinery*	*Electrical machinery*	*Vehicles*	*Other*	*Total*
0.61	9.44	7.27	0.50	1.37	0.32	100.00
0.00	2.36	0.74	14.19	6.63	14.31	100.00
0.34	5.43	0.09	38.37	0.26	1.39	100.00
7.45	14.62	7.18	0.27	25.05	1.16	100.00
7.50	4.63	6.44	0.99	2.64	1.25	100.00
0.16	4.74	0.68	11.89	0.05	2.41	100.00
0.00	0.00	0.00	0.00	0.00	0.00	100.00
2.71	3.34	2.71	0.00	0.00	0.47	100.00
0.44	1.25	1.41	1.65	0.03	0.03	100.00
0.28	1.94	1.11	0.10	0.42	0.81	100.00
0.00	5.36	1.19	0.00	0.00	0.32	100.00
0.00	4.17	1.82	0.24	0.14	0.36	100.00
1.31	7.01	3.39	4.14	2.64	2.46	100.00
0.77	2.73	1.29	8.32	36.64	2.40	100.00
0.00	3.50	0.51	0.19	0.49	2.69	100.00
0.00	2.44	9.98	0.08	10.93	0.81	100.00
13.00	11.50	4.81	5.42	5.19	0.56	100.00
0.00	2.14	1.88	0.00	0.30	6.91	100.00
22.54	3.12	4.14	0.00	0.33	3.75	100.00
0.00	23.24	17.84	0.42	16.41	0.81	100.00
8.55	5.12	3.80	1.26	2.20	1.72	100.00
0.00	4.03	1.82	0.00	0.33	0.13	100.00
4.05	2.11	1.70	0.66	13.14	0.40	100.00
0.00	1.64	3.49	0.38	0.00	0.05	100.00
0.38	5.57	2.39	0.17	0.48	0.24	100.00
0.00	5.05	2.91	0.00	0.15	0.92	100.00
0.00	3.41	2.92	30.88	0.00	0.06	100.00
0.00	4.12	0.19	44.70	1.88	2.75	100.00
0.00	2.73	3.58	0.40	0.85	0.11	100.00
0.00	8.71	1.92	0.00	2.77	0.50	100.00
0.00	7.91	3.46	0.46	4.15	0.17	100.00
0.00	3.51	1.76	0.00	0.00	0.22	100.00
0.00	6.14	0.42	0.00	0.00	0.06	100.00
36.86	14.68	1.06	0.09	19.43	0.15	100.00
0.00	15.43	6.16	1.23	0.27	0.68	100.00
0.18	1.77	2.80	0.51	0.22	0.79	100.00
3.91	13.20	4.04	7.92	4.81	2.32	100.00
4.44	11.29	3.94	7.04	5.02	2.08	100.00

Table 4-26. *Distribution of Employment in Industry within Thirty-seven Cities, by Groups of Subsectors, 1970*
(percent)

City	*A*	*B*	*C*	*D*	*E*
Aguascalientes	0.13	75.32	5.65	18.58	0.32
Mexicali	0.11	56.34	5.17	23.92	14.51
Tijuana	0.44	47.39	6.57	44.15	1.39
Saltillo	6.11	30.95	14.67	47.11	1.16
Torreón	2.15	59.92	21.99	14.70	1.25
Ciudad Juárez	0.02	75.96	4.25	17.36	2.41
Chihuahua	0.00	0.00	0.00	0.00	0.00
Durango	3.13	68.92	21.06	6.06	0.47
Irapuato	0.28	89.67	5.69	4.34	0.03
León	0.02	90.84	4.76	3.57	0.81
Acapulco	0.00	79.78	13.35	6.56	0.32
Pachuca	57.94	29.81	5.51	6.32	0.36
Guadalajara	0.08	65.02	15.27	17.18	2.46
Toluca	0.02	34.18	14.42	48.97	2.40
Morelia	0.00	76.17	16.45	4.69	2.69
Cuernavaca	0.37	64.66	10.73	23.43	0.81
Monterrey	1.31	34.40	36.81	26.93	0.56
Oaxaca	2.77	76.64	9.35	4.33	6.91
Puebla	4.20	56.11	28.35	7.59	3.75
Querétaro	0.63	38.37	2.28	57.91	0.81
San Luis Potosí	0.61	60.66	24.63	12.38	1.72
Culiacán	0.10	89.06	4.51	6.19	0.13
Mazatlán	0.00	69.75	12.24	17.61	0.40
Ciudad Obregón	0.43	90.65	3.37	5.51	0.05
Hermosillo	1.56	70.09	19.48	8.65	0.24
Villahermosa	0.00	82.70	8.27	8.12	0.92
Matamoros	3.82	53.85	5.06	37.22	0.06
Nuevo Laredo	0.00	37.81	8.55	50.89	2.75
Reynosa	6.71	69.76	15.86	7.56	0.11
Tampico[a]	5.67	132.43	47.46	13.40	0.50
Coatzacoalcos	2.48	27.30	54.07	15.98	0.17
Minatitlán	23.27	65.97	5.27	5.27	0.22
Orizaba	0.46	93.84	4.61	6.56	0.06
Veracruz	0.05	24.21	40.33	35.26	0.15
Jalapa	0.18	60.59	15.43	23.10	0.68
Mérida	0.48	83.69	9.75	5.30	0.79
Mexico City					
Average	0.77	48.34	21.53	27.28	2.08

Note: A. Subsectors 11 to 16 (extractive industries), which include coal (11), metals (12), rock/gravel (14); nonmetal minerals (15), and salt (16).

B. Subsectors 20 to 30 (final-demand industries), which include food (20), beverages (21), tobacco (22), textiles (23), shoes (24), wood/cork (25), furniture (26), paper (27), printing (28), leather (29), and linoleum (30).

C. Subsectors 31 to 34 (intermediate-demand industries), which include chemicals (31), oil (32), ceramics and glass (33), and basic metals (34).

D. Subsectors 35 to 38, which include metal products (35), nonelectrical machinery (36), electrical machinery (37), and vehicles (38).

E. Other subsectors.

a. Includes both Tampico and Ciudad Madero, so percentages should add to 200.

Source: IX Censo General de la Población, 1970 (1972).

Table 4-27. *Index of Industrial Specialization in Thirty-seven Cities, 1970*

City	*Index*	*City*	*Index*
Aguascalientes	0.751886	Querétaro	0.968510
Mexicali	0.741814	San Luis Potosí	0.551347
Tijuana	0.782971	Culiacán	1.155802
Saltillo	0.813073	Mazatlán	0.995298
Torreón	0.513688	Ciudad Obregón	1.116409
Ciudad Juárez	0.862472	Hermosillo	0.835871
Chihuahua	1.000000	Villahermosa	1.025001
Durango	0.683549	Matamoros	1.124305
Irapuato	1.255096	Nuevo Laredo	0.865265
León	1.187305	Reynosa	0.981547
Acapulco	1.134109	Tampico	1.049681
Pachuca	1.146919	Coatzacoalcos	0.835865
Guadalajara	0.418660	Minatitlán	1.277854
Toluca	0.777911	Orizaba	1.181891
Morelia	0.864025	Veracruz	1.025750
Cuernavaca	0.810417	Jalapa	0.795221
Monterrey	0.432938	Mérida	0.813098
Oaxaca	1.131234	Mexico City	0.159576
Puebla	0.991779		

Source: IX Censo General de la Población, 1970 (1972).

very high, but the index was fairly well correlated with the number of subsectors established in each city. This relation is less tautological than it might seem, because the existence of a subsector in a city is not necessarily a reliable indicator of its contribution to the diversity of its industrial structure. Diversification was generally based on a relatively large number of subsectors, although the extent of diversification varied according to the mix of subsectors in a given city. The subsectoral values of the index of specialization are shown in Table 4-28. These generally correspond to the percentage shares of subsectors within the industrial sector of each city. High indexes thus occur in Pachuca (metal mining); Irapuato, Morelia, and Culiacán (food); Acapulco (beverages); Oaxaca (wood and cork products); Orizaba (textiles); Veracruz (basic metals); Tijuana and Nuevo Laredo (electrical); and Toluca (vehicles).

CONTRASTS IN THE TERTIARY SECTOR. In most cities the largest share of tertiary activity was in commerce, and the largest subsector was household goods (Table 4-29), which accounted, on average, for 48 percent of all commercial employment. There were some deviations, such as the low share of this sector in Matamoros (30 percent), in association with the unusually high share of raw material sales in that city (23 percent versus an average of 15 percent). There was a similar pattern in Ciudad Obregón. In general, however, the distribution of commercial activity was similar from city to city.

Table 4-28. *Coefficients of Industrial Specialization for Thirty-seven Cities, 1970*

City	*Coal*	*Metals*	*Rock/ gravel*	*Non-metal minerals*	*Salt*
Aguascalientes	0.000	0.004	0.001	0.001	0.000
Mexicali	0.000	0.004	0.002	0.001	0.000
Tijuana	0.000	0.004	−0.002	0.001	0.000
Saltillo	0.000	−0.030	−0.002	−0.022	0.000
Torreón	0.000	−0.007	−0.002	−0.004	0.000
Ciudad Juárez	0.000	0.004	0.002	0.001	0.000
Chihuahua	0.000	0.004	0.002	0.001	0.000
Durango	0.000	−0.015	−0.002	−0.007	0.000
Irapuato	0.000	0.004	−0.001	0.001	0.000
León	0.000	0.004	0.002	0.001	0.000
Acapulco	0.000	0.004	0.002	0.001	0.000
Pachuca	0.000	0.563	−0.011	0.001	0.000
Guadalajara	0.000	0.004	0.001	0.014	0.000
Toluca	0.000	0.004	0.002	0.001	0.000
Morelia	0.000	0.004	0.002	0.001	0.000
Cuernavaca	0.000	0.004	−0.002	0.001	0.000
Monterrey	0.000	−0.001	−0.003	−0.001	0.000
Oaxaca	0.000	−0.009	−0.013	0.001	0.000
Puebla	0.000	0.004	0.000	−0.039	0.000
Querétaro	0.000	0.001	−0.001	0.001	0.000
San Luis Potosí	0.000	0.004	0.001	−0.004	0.000
Culiacán	0.000	0.004	0.001	0.001	0.000
Mazatlán	0.000	0.004	0.002	0.004	0.000
Ciudad Obregón	0.001	0.002	0.002	−0.003	0.000
Hermosillo	−0.011	0.004	0.002	0.001	0.002
Villahermosa	0.000	0.004	0.002	0.001	0.000
Matamoros	0.000	0.004	0.002	0.001	0.038
Nuevo Laredo	0.000	−0.004	0.002	0.001	0.000
Reynosa	0.000	−0.004	−0.009	−0.055	0.000
Tampico	0.000	−0.004	−0.004	0.001	0.019
Coatzacoalcos	0.000	0.004	0.002	0.001	0.024
Minatitlán	0.000	0.004	0.002	−0.231	0.000
Orizaba	0.000	0.004	−0.003	0.001	0.000
Veracruz	0.000	0.004	0.001	0.001	0.000
Jalapa	0.000	−0.004	0.002	0.001	0.001
Mérida	0.000	0.004	−0.003	0.001	0.000
Mexico City	0.000	0.004	0.000	0.001	0.000

Food	*Beverages*	*Tobacco*	*Textiles*	*Shoes*	*Wood/ cork*	*Furniture*
−0.072	−0.106	0.005	−0.050	−0.102	0.005	0.003
−0.068	0.013	0.005	−0.009	−0.052	0.001	0.002
−0.026	0.005	−0.009	0.060	−0.001	−0.033	−0.001
0.068	−0.013	0.005	−0.051	0.041	0.007	0.005
−0.106	−0.048	0.005	−0.002	−0.008	−0.004	0.001
−0.055	0.179	0.005	0.069	−0.027	−0.118	0.002
0.130	−0.041	0.005	0.082	0.088	0.011	0.005
−0.153	0.064	0.005	−0.006	−0.062	0.009	0.004
−0.574	0.012	−0.053	0.082	0.008	0.010	0.002
0.051	−0.005	0.005	0.069	−0.483	0.006	0.004
−0.136	0.339	0.005	0.082	0.024	0.002	0.005
0.039	−0.010	0.005	0.031	0.005	0.003	0.005
−0.051	−0.028	−0.002	−0.006	−0.086	0.000	−0.001
0.019	−0.018	−0.030	0.046	0.054	0.005	0.005
−0.303	−0.051	0.005	0.081	0.056	−0.061	0.004
−0.004	0.047	−0.005	−0.202	0.051	0.008	0.005
0.029	−0.005	−0.006	0.061	0.020	0.006	0.000
0.023	0.006	0.002	0.030	0.066	−0.442	0.005
−0.207	0.011	0.005	0.078	−0.046	−0.005	0.005
−0.063	−0.011	0.005	−0.048	0.078	0.008	0.005
−0.054	−0.040	0.005	−0.119	0.029	0.003	0.002
−0.500	−0.062	0.005	0.063	0.063	0.005	0.001
−0.296	−0.102	−0.004	0.078	0.649	−0.001	0.005
−0.248	−0.038	0.005	−0.209	0.080	−0.058	0.004
−0.222	−0.026	0.005	−0.075	0.036	0.000	0.002
−0.258	−0.156	0.005	0.082	0.054	−0.031	0.005
−0.245	−0.041	0.005	0.081	0.076	0.004	0.004
−0.018	−0.012	0.005	0.082	−0.019	0.001	0.004
−0.167	−0.042	0.005	0.082	−0.022	0.004	−0.001
−0.190	−0.255	0.005	0.082	0.055	−0.007	0.002
−0.022	0.032	0.005	0.082	0.047	−0.001	0.003
−0.138	−0.269	0.005	0.082	0.088	0.000	0.005
0.054	−0.241	0.005	−0.346	0.057	−0.003	0.004
0.015	−0.004	−0.007	0.082	0.077	0.004	0.004
−0.150	0.034	0.005	−0.050	0.031	−0.009	0.004
−0.076	−0.070	0.005	−0.196	−0.041	0.000	0.005
0.026	0.013	0.001	−0.004	0.011	0.003	−0.001

(Table continues on the following pages)

Table 4-28 (*continued*)

City	*Paper*	*Printing*	*Leather*	*Lino-leum*	*Chemi-cals*	*Oil*	*Ceramics and glass*
Aguascalientes	0.032	0.021	0.006	−0.012	0.107	0.002	0.012
Mexicali	−0.019	0.031	0.009	0.006	0.094	−0.011	0.037
Tijuana	0.014	0.006	−0.003	−0.002	0.096	0.001	0.011
Saltillo	0.033	0.030	0.008	0.014	0.102	0.002	−0.005
Torreón	0.031	0.005	0.006	0.004	0.044	0.001	−0.019
Ciudad Juárez	0.005	0.004	0.008	0.009	0.111	0.001	0.018
Chihuahua	0.049	0.046	0.009	0.016	0.114	0.002	0.055
Durango	0.042	0.030	0.009	0.012	−0.002	0.002	−0.012
Irapuato	0.048	0.033	0.004	0.015	0.100	0.002	0.018
León	−0.010	0.027	−0.091	−0.009	0.103	0.002	0.021
Acapulco	0.043	0.013	0.009	−0.024	0.104	0.002	−0.069
Pachuca	0.844	0.030	0.007	0.007	0.108	0.002	0.005
Guadalajara	0.006	0.019	−0.010	0.008	0.045	0.000	−0.013
Toluca	0.044	0.025	0.001	−0.008	0.008	0.002	0.025
Morelia	−0.003	−0.005	0.001	−0.003	0.002	0.002	0.002
Cuernavaca	−0.030	0.033	0.009	0.009	0.059	0.002	0.002
Monterrey	−0.009	0.022	0.003	0.007	0.030	0.000	−0.007
Oaxaca	0.033	0.019	−0.009	−0.004	0.113	0.002	−0.038
Puebla	0.041	0.037	0.002	0.000	0.107	0.002	0.003
Querétaro	0.047	0.034	0.009	0.013	0.112	0.002	0.034
San Luis Potosí	0.020	0.017	0.003	0.011	−0.017	0.001	0.025
Culiacán	0.033	−0.005	−0.009	−0.002	0.106	0.002	0.018
Mazatlán	0.043	0.007	0.006	0.002	0.101	0.002	−0.013
Ciudad Obregón	0.030	−0.002	0.008	0.004	0.093	0.002	0.042
Hermosillo	0.041	0.008	0.008	0.004	0.060	0.002	−0.082
Villahermosa	−0.002	−0.007	0.002	−0.038	0.107	0.002	−0.020
Matamoros	0.035	0.016	0.008	0.001	0.075	0.002	0.043
Nuevo Laredo	0.027	0.028	0.007	0.001	0.066	0.002	0.017
Reynosa	0.009	−0.058	0.008	−0.033	0.114	0.002	−0.104
Tampico	0.034	−0.056	0.009	0.007	0.065	0.002	0.019
Coatzacoalcos	0.041	0.013	0.008	0.003	−0.214	−0.146	−0.009
Minatitlán	0.039	0.000	0.008	0.003	0.107	0.002	0.010
Orizaba	0.061	0.035	−0.017	−0.009	0.111	0.002	0.012
Veracruz	0.042	0.017	0.009	0.002	0.104	0.002	0.030
Jalapa	0.035	−0.036	0.009	0.004	0.102	0.002	−0.087
Mérida	0.023	−0.014	0.002	0.001	0.080	0.002	−0.007
Mexico City	−0.006	−0.009	0.001	−0.001	−0.028	0.000	0.011

Source: IX Censo General de la Población, 1970 (1972).

Basic metals	*Metal products*	*Non-electrical machinery*	*Electrical goods*	*Vehicles*	*Other*
0.038	0.018	−0.033	0.065	0.036	0.018
0.044	0.089	0.032	−0.071	−0.016	0.124
0.041	0.059	0.038	−0.313	0.048	0.007
−0.030	−0.033	−0.032	0.068	−0.200	0.009
−0.031	0.067	−0.025	0.060	0.024	0.008
0.043	0.065	0.033	−0.048	0.050	0.003
0.044	0.113	0.039	0.070	0.050	0.021
0.017	0.079	0.012	0.070	0.050	0.016
0.040	0.100	0.025	0.054	0.050	0.020
0.042	0.093	0.028	0.069	0.946	0.013
0.044	0.059	0.027	0.070	0.050	0.018
0.044	0.071	0.021	0.068	0.049	0.017
0.031	0.043	0.005	0.029	0.024	0.004
0.037	0.086	0.026	−0.013	−0.316	0.003
0.044	0.078	0.034	0.068	0.045	0.006
0.044	0.088	−0.060	0.070	−0.059	0.013
−0.086	−0.002	−0.009	0.016	−0.002	0.015
0.044	0.091	0.020	0.070	0.047	0.048
−0.181	0.082	−0.002	0.070	0.047	0.017
0.044	−0.120	−0.139	0.066	−0.114	0.013
−0.041	0.062	0.001	0.058	0.028	0.004
0.044	0.072	0.021	0.070	0.047	0.019
0.004	0.092	0.022	0.064	−0.081	0.017
0.044	0.096	0.004	0.067	0.050	0.020
0.041	0.057	0.015	0.069	0.045	0.018
0.044	0.062	0.010	0.070	0.049	0.012
0.044	0.079	0.010	−0.238	0.050	0.020
0.044	0.072	0.037	−0.377	0.031	−0.007
0.044	0.086	0.003	0.066	0.042	0.020
0.044	0.061	0.020	0.070	0.028	0.016
0.044	0.034	0.005	0.066	0.009	0.019
0.044	0.078	0.022	0.070	0.050	0.019
0.044	0.051	0.035	0.070	0.050	0.020
−0.324	−0.034	0.029	0.070	−0.144	0.019
0.044	−0.041	−0.022	0.058	0.047	0.014
0.043	0.095	0.011	0.065	0.048	0.013
0.005	−0.019	0.001	−0.009	0.002	−0.002

Table 4-29. *Distribution of Employment in Commerce within Thirty-five Cities, by Subsector, 1965*
(percent)

City	*Food*	*Household goods*	*Raw materials*
Aguascalientes	15.97	49.63	12.40
Mexicali	9.88	36.38	16.20
Tijuana	8.13	48.87	13.94
Saltillo	14.08	42.72	16.74
Torreón	10.17	47.47	16.92
Ciudad Juárez	10.62	46.49	14.37
Chihuahua	7.85	50.43	13.23
Irapuato	14.19	44.73	13.96
León	13.26	45.82	20.89
Acapulco	10.92	51.14	12.53
Pachuca	16.99	36.88	11.83
Guadalajara	11.76	46.67	15.39
Toluca	21.27	45.52	11.28
Morelia	14.71	49.10	8.84
Cuernavaca	10.17	30.46	15.40
Monterrey	6.36	46.82	17.56
Puebla	11.82	48.62	12.92
Querétaro	16.24	42.02	13.28
San Luis Potosí	13.18	48.14	10.92
Culiacán	10.32	46.51	13.29
Mazatlán	16.71	45.89	13.60
Ciudad Obregón	7.66	32.38	29.83
Hermosillo	11.32	37.39	14.34
Villahermosa	13.63	53.88	10.90
Matamoros	16.86	29.60	23.19
Nuevo Laredo	15.52	42.27	14.17
Reynosa	11.16	42.72	15.16
Tampico	14.48	47.14	11.24
Coatzacoalcos	9.50	47.12	18.94
Minatitlán	24.65	54.30	8.47
Orizaba	14.75	56.49	10.00
Veracruz	15.67	43.20	11.17
Jalapa	13.35	57.59	6.20
Mérida	10.75	54.84	14.14
Mexico City	9.89	49.36	16.28
Average	10.72	47.84	15.64

Note: Data for Durango and Oaxaca are not included.
Source: V Censo Comercial, 1965 (1968).

Machines and tools	*Transport*	*Fuel*	*Other*	*Total*
2.79	10.53	7.49	1.19	100.00
5.97	15.19	14.61	1.77	100.00
1.35	9.41	16.00	2.31	100.00
2.88	13.03	9.55	1.00	100.00
6.52	10.06	7.18	1.68	100.00
1.64	7.72	17.01	2.15	100.00
5.48	12.72	8.81	1.47	100.00
4.82	13.51	6.71	2.07	100.00
2.95	9.22	5.94	1.92	100.00
2.51	14.63	6.58	1.70	100.00
0.98	19.63	11.31	2.38	100.00
7.43	9.08	6.79	2.90	100.00
2.06	9.45	9.19	1.23	100.00
4.07	14.28	7.63	1.37	100.00
2.87	9.02	9.74	0.35	100.00
8.78	12.82	4.67	2.98	100.00
6.18	10.51	7.34	2.61	100.00
4.86	11.38	9.72	2.50	100.00
6.46	7.81	9.40	4.09	100.00
6.49	11.25	9.78	2.37	100.00
5.97	9.04	7.64	1.15	100.00
11.60	12.07	5.75	0.72	100.00
11.29	17.37	7.12	1.17	100.00
0.64	13.04	5.72	2.19	100.00
5.27	10.01	13.79	1.27	100.00
0.37	13.32	11.73	2.63	100.00
5.28	8.89	15.75	1.04	100.00
6.16	13.38	6.61	1.00	100.00
6.69	10.52	6.04	1.19	100.00
0.51	5.65	5.39	1.03	100.00
0.96	8.93	7.70	1.18	100.00
13.73	9.82	5.09	1.33	100.00
2.10	9.34	9.43	2.01	100.00
3.23	9.72	5.54	1.79	100.00
8.83	6.85	5.36	3.42	100.00
7.48	8.81	6.65	2.86	100.00

The high correlation ($r^2 = 0.97$) between urban size and the index of specialization in commerce is to be expected. The largest cities (Mexico City, Monterrey, Guadalajara, and Puebla) had the most diversified commercial sectors, whereas the smallest cities were the most specialized: Pachuca (0.43), Ciudad Obregón (0.43), and Matamoros (0.44). This supports the assumption that tertiary functions were generally linked with urban population size, and that, as a whole, the tertiary sector would be larger and less specialized in larger than in smaller cities.

There was another very high coefficient of correlation ($r^2 = 0.99$) between urban size growth and specialization in commerce. This is more significant because it strongly suggests that the most specialized cities grew slowly, irrespective of size, and that the least specialized cities grew quickly, also irrespective of size.

A high overall index of subsectoral specialization (Table 4-30) was, in most instances, explained by specialization in household goods. In Minatitlán, however, a high index in the food subsector was the essential cause of a high overall value. Without subsector data beyond the two digit level, it is impossible to refine the analysis of the relation between size and population thresholds with respect to commercial activities. One implicit indicator, however, is the relation between population and functional specialization. This is consistent with the theoretical premise that the larger the urban population, the larger the market and the more diverse the demands for different commercial activities. Reciprocally, the larger the market, the greater the probability a given subsector can survive.

Table 4-31 shows the surplus activity in each subsector in each city and suggests that the largest volume of export activity was generally in the food subsector, although this was not true in either Mexico City or Monterrey. Although there was not a consistent relation between city size and export surpluses in commerce, Mexico City had by far the largest surplus. The export surplus of Monterrey was also large relative to its size, although the surpluses of the frontier cities were even larger, supporting the argument that international rather than domestic demand played a large role in their commercial development.

The tertiary sectors of the frontier cities (and of certain other cities) also differed from others in their service industry components, and these variations are reflected in Table 4-32. In Acapulco, for example, 65 percent of total employment in services was in the hotel subsector, which also accounted for large shares of total employment in Cuernavaca, Oaxaca, Mazatalán, Villahermosa, and Veracruz—all of them tourist centers. In Puebla, 50 percent of employment in services was in the restaurant subsector, and this industry also accounted for 21 percent of employment in services in Ciudad Juárez. Recreation accounted for 48 percent of employment in services in Tijuana,

26 percent in Ciudad Juárez, 22 percent in Matamoros, 31 percent in Reynosa, and 26 percent in Minatitlán. All except the last are on the U.S. border and are large centers for border tourism.

In general, the distribution between service subsectors was rather even, the highest average share for all thirty-seven cities being in education (14 percent), and the lowest in medical services (6 percent). Nevertheless, some cities had fairly high levels of relative specialization. Table 4-33 shows a range of specialization from less than 0.2 (Guadalajara, Monterrey, Hermosillo, and Tampico) to more than 1.0 (Acapulco).

Specialization may occur because of the development of a highly specialized service industry such as tourism, or because a city is not large or developed enough to support a full range of urban services. Examples of the first are Acapulco, Mazatalán, and Cuernavaca, where tourism accounted for a high level of sectoral specialization. Of the other six cities with indexes of specialization of 0.50 or above, five were on the U.S. border. In four of them the recreation and entertainment sector was the basis for a high level of specialization, and in the other (Mexicali) the high index was associated with the food and restaurant industry, which was closely related to both entertainment and recreation. The two remaining cases were Aguascalientes and Minatitlán.

As in the commercial sector, a very close relation exists between increasing size and decreasing specialization. This is consistent with the suggested interpretation of high indexes in cities such as Minatitlán, which were small and unable to provide more than nominal support for certain services. With regard to the cities that had legitimate service specializations, the congruence of size and specialization is explained by their relatively small size.

The index of specialization indicates reasonably well which service subsectors generated the largest export surpluses in each city. Among the outstanding instances of high levels of export surplus were those of recreation in Tijuana; hotels in Acapulco, Cuernavaca, Oaxaca, and Mazatlán; education in Guadalajara, Monterrey, and Mexico City; restaurants in Ciudad Juárez and Puebla; and professional services in Mexico City (Table 4-34).

Consumption and Economic Welfare

Urbanization after 1940 was associated with important changes in the patterns of consumption of goods and services. Those trends were linked to the growth of output, investment, and exports, but there were no necessary relations between the level of consumption and its distribution among individuals or regions. This applied both to private goods and services (those exchanged in the market economy) and to public goods and services (those produced and distributed by the public sector).

Table 4.30. *Coefficients of Specialization in Commerce for Thirty-five Cities, by Subsector, 1965*

City	*Food*	*Household goods*	*Raw materials*
Aguascalientes	−0.052	−0.018	0.032
Mexicali	0.008	0.115	−0.056
Tijuana	0.026	−0.010	0.017
Saltillo	−0.033	0.051	−0.011
Torreón	0.006	0.004	−0.013
Ciudad Juárez	0.001	0.013	0.013
Chihuahua	0.029	−0.026	0.024
Irapuato	−0.035	0.031	0.017
León	−0.025	0.020	−0.052
Acapulco	−0.002	−0.030	0.031
Pachuca	−0.063	0.110	0.038
Guadalajara	−0.010	0.012	0.002
Toluca	−0.105	0.023	0.044
Morelia	−0.040	−0.013	0.068
Cuernavaca	0.074	0.094	0.002
Monterrey	−0.044	0.010	−0.019
Puebla	−0.011	−0.008	0.027
Querétaro	−0.055	0.058	0.024
San Luis Potosí	0.024	−0.003	0.047
Culiacán	−0.004	0.013	0.023
Mazatlán	0.060	0.019	0.020
Ciudad Obregón	−0.031	0.154	−0.142
Hermosillo	−0.006	0.104	0.013
Villahermosa	−0.029	−0.060	0.047
Matamoros	−0.061	0.182	−0.075
Nuevo Laredo	−0.048	0.056	0.015
Reynosa	−0.004	0.051	0.005
Tampico	−0.037	0.007	0.044
Coatzacoalcos	−0.012	0.007	−0.033
Minatitlán	−0.139	−0.065	0.072
Orizaba	−0.040	−0.087	0.056
Veracruz	−0.049	0.046	0.045
Jalapa	−0.026	−0.097	0.094
Mérida	0.000	−0.070	0.015
Mexico City	0.008	−0.015	−0.006

Note: See Appendix F for definition of coefficients of specialization. Data for Durango and Oaxaca are not included.

Source: V Censo Comercial, 1965 (1968).

Machines and tools	*Transport*	*Fuel*	*Other*	*Total*
0.047	−0.017	−0.008	0.017	0.192
0.015	−0.064	−0.080	0.011	0.298
0.061	−0.006	−0.093	0.005	0.220
0.046	−0.042	−0.029	0.019	0.231
0.010	−0.012	−0.005	0.012	0.061
0.058	0.011	−0.104	0.007	0.207
0.020	−0.039	−0.022	0.014	0.173
0.027	−0.047	−0.001	0.008	0.165
0.046	−0.004	0.007	0.009	0.164
0.050	−0.058	0.001	0.011	0.186
0.065	−0.108	−0.047	0.005	0.435
0.000	−0.003	−0.001	0.000	0.029
0.054	−0.006	−0.025	0.016	0.274
0.034	−0.055	−0.010	0.015	0.234
0.046	−0.002	−0.031	−0.035	0.285
−0.013	0.040	0.020	−0.001	0.147
0.013	−0.017	−0.007	0.002	0.085
0.026	−0.026	−0.031	0.004	0.223
0.010	−0.010	−0.027	−0.012	0.135
0.010	−0.024	−0.031	0.005	0.111
0.015	−0.002	−0.010	0.017	0.144
−0.041	−0.033	0.009	0.021	0.431
−0.038	−0.086	−0.005	0.017	0.269
0.068	−0.042	0.009	0.007	0.263
0.022	−0.012	−0.071	0.016	0.441
0.071	−0.045	−0.051	0.002	0.287
0.022	−0.001	−0.091	0.018	0.192
0.013	−0.046	0.000	0.019	0.156
0.008	−0.017	0.006	0.017	0.100
0.070	0.032	0.013	0.018	0.402
−0.065	0.000	−0.010	0.017	0.277
0.062	−0.010	0.016	0.015	0.244
0.054	−0.005	−0.028	0.008	0.314
0.042	−0.009	0.011	0.011	0.159
−0.013	0.020	0.013	−0.006	0.082

Table 4-31. *Surplus Workers in Commerce in Thirty-five Cities, by Subsector, 1965*
(number of persons)

City	*Food*	*House-hold goods*	*Raw materials*
Aguascalientes	154	53	−95
Mexicali	−46	−628	31
Tijuana	−148	59	−97
Saltillo	77	−117	25
Torreón	−36	−24	83
Ciudad Juárez	−5	−63	−60
Chihuahua	−146	132	−123
Irapuato	77	−69	−37
León	121	−97	251
Acapulco	6	99	−93
Pachuca	121	−212	−74
Guadalajara	210	−238	−52
Toluca	317	−69	−131
Morelia	102	32	−174
Cuernavaca	229	−288	−7
Monterrey	−854	−198	376
Puebla	106	76	−263
Querétaro	119	−126	−51
San Luis Potosí	119	15	−230
Culiacán	−20	−66	−117
Mazatlán	162	−53	−55
Ciudad Obregón	−124	−624	573
Hermosillo	22	−383	−47
Villahermosa	54	113	−89
Matamoros	140	−415	172
Nuevo Laredo	78	−91	−24
Reynosa	9	−104	−10
Tampico	228	−42	−268
Coatzacoalcos	−23	−13	61
Minatitlán	108	50	−56
Orizaba	75	162	−106
Veracruz	235	−221	−213
Jalapa	58	214	−207
Mérida	1	352	−75
Mexico City	−1,524	2,785	1,180

Note: See Appendix F for definition of surplus workers. Data for Durango and Oaxaca are not included.

Source: *V Censo Comercial, 1965* (1968).

Machine and tools	*Transport*	*Fuel*	*Other*
−138	50	25	−49
−83	350	436	−60
−351	34	535	−31
−106	97	66	−43
−62	81	34	−77
−274	−51	486	−33
−102	199	110	−71
−59	104	1	−17
−217	20	−34	−45
−149	174	−2	−35
−126	209	90	−9
−10	54	28	8
−163	19	76	−49
−87	140	25	−38
−142	6	95	107
254	784	−385	24
−126	164	67	−24
−57	56	66	−8
−50	−48	134	60
−50	121	156	−24
−41	6	27	−46
166	131	−36	−86
140	314	17	−62
−128	79	−17	−12
−50	27	163	−36
−116	74	83	−4
−44	2	184	−37
−80	278	−3	−113
−15	32	−11	−31
−54	−25	−10	−14
−122	2	20	−31
297	48	−74	−73
−118	12	61	−19
−214	46	−56	−54
2,476	−3,589	−2,357	1,031

Table 4-32. *Distribution of Employment in Services within Thirty-six Cities, by Subsector, 1965*
(percent)

City	*Recreation*	*Lodging*	*Education*	*Medical*
Aguascalientes	20.40	16.49	5.23	1.85
Mexicali	18.27	10.23	7.83	3.46
Tijuana	48.33	7.27	4.10	2.94
Saltillo	18.34	17.73	22.91	1.50
Torreón	10.20	8.60	19.29	7.70
Ciudad Juárez	26.41	14.43	5.18	4.51
Chihuahua	13.54	17.05	12.72	8.33
Durango	11.92	15.83	20.21	3.48
Irapuato	17.58	16.74	14.68	4.81
León	16.91	10.54	13.47	4.20
Acapulco	9.35	64.72	2.28	0.74
Pachuca	10.24	4.89	18.90	3.46
Guadalajara	11.42	11.36	18.00	6.16
Toluca	12.94	6.20	6.80	2.23
Morelia	11.38	18.63	17.71	6.13
Cuernavaca	6.97	26.81	16.75	3.17
Monterrey	12.02	7.06	19.87	6.91
Oaxaca	11.36	20.23	17.18	2.72
Puebla	7.72	3.60	5.18	10.25
Querétaro	13.08	16.19	18.68	7.12
San Luis Potosí	8.55	12.39	18.51	3.38
Culiacán	20.53	14.90	14.03	1.89
Mazatlán	15.15	35.87	8.67	1.67
Ciudad Obregón	20.96	10.37	14.39	6.14
Hermosillo	12.92	14.57	13.77	3.03
Villahermosa	17.94	23.48	5.30	1.48
Matamoros	22.09	8.34	10.46	1.49
Nuevo Laredo	14.30	11.49	4.23	2.96
Reynosa	30.98	9.60	7.73	1.50
Tampico	12.05	11.58	17.17	4.65
Minatitlán	25.86	6.64	10.10	5.53
Orizaba	13.54	11.52	13.95	7.30
Veracruz	13.23	18.39	7.62	3.75
Jalapa	10.82	11.91	10.57	0.17
Mérida	15.97	10.17	14.58	13.05
Mexico City	8.94	6.74	15.08	6.71
Total	12.09	10.69	14.26	5.92

Note: Data for Oaxaca are not included.

Personal	*Restaurants*	*Government*	*Other*	*Total*
15.10	16.22	16.29	8.41	100
14.63	19.75	9.30	16.83	100
11.96	8.18	6.36	10.85	100
10.14	12.04	11.09	6.24	100
11.65	15.02	9.17	18.37	100
12.53	21.81	6.82	8.31	100
11.11	12.60	11.20	13.45	100
12.30	13.48	14.87	7.91	100
9.96	16.05	15.53	4.63	100
10.81	15.63	12.64	15.78	100
6.87	7.97	2.71	5.36	100
12.88	17.17	12.20	20.26	100
10.59	9.40	14.22	18.84	100
18.76	12.23	12.01	28.82	100
8.68	6.76	12.77	15.92	100
6.14	10.76	8.61	20.78	100
8.23	6.82	14.09	24.29	100
10.48	13.39	10.72	13.90	100
8.78	50.30	6.45	7.72	100
11.07	16.26	9.55	8.03	100
10.74	13.45	16.23	16.75	100
9.09	8.19	10.74	20.62	100
6.36	9.70	7.46	15.11	100
9.29	17.03	13.44	8.38	100
8.64	8.15	14.21	24.71	100
4.99	16.61	12.56	14.27	100
10.25	16.52	8.92	21.93	100
7.96	11.27	14.52	33.26	100
11.47	17.71	14.03	6.98	100
7.29	11.72	13.29	21.74	100
6.22	30.01	12.86	2.77	100
13.22	21.49	8.60	10.38	100
5.78	13.90	8.84	2.85	100
15.15	13.82	18.32	19.23	100
5.52	14.56	10.27	15.67	100
13.67	5.80	13.60	29.45	100
11.93	8.92	12.51	23.68	100

Table 4-33. *Coefficient of Specialization in Services for Thirty-six Cities, by Subsector, 1965*

City	*Recreation*	*Lodging*	*Education*	*Medical*
Aguascalientes	−0.083	−0.058	0.090	0.041
Mexicali	−0.062	0.004	0.067	0.025
Tijuana	−0.362	0.034	0.102	0.030
Saltillo	−0.062	−0.070	−0.086	0.044
Torreón	0.019	0.021	−0.050	−0.018
Ciudad Juárez	−0.143	−0.037	0.091	0.014
Chihuahua	−0.014	−0.064	0.015	−0.024
Durango	0.002	−0.051	−0.059	0.024
Irapuato	−0.055	−0.060	−0.004	0.011
León	−0.048	0.001	0.008	0.017
Acapulco	0.027	−0.054	0.120	0.052
Pachuca	0.018	0.058	−0.046	0.025
Guadalajara	0.007	−0.007	−0.037	−0.002
Toluca	−0.008	0.045	0.075	0.037
Morelia	0.007	−0.079	−0.034	−0.002
Cuernavaca	0.051	−0.161	−0.025	0.027
Monterrey	0.001	0.036	−0.056	−0.010
Oaxaca	0.007	−0.095	−0.029	0.032
Puebla	0.044	0.071	0.091	−0.043
Querétaro	−0.010	−0.055	−0.044	−0.012
San Luis Potosí	0.035	−0.017	−0.042	0.025
Culiacán	−0.084	−0.042	0.002	0.040
Mazatlán	−0.031	−0.252	0.056	0.042
Ciudad Obregón	−0.089	0.003	−0.001	−0.002
Hermosillo	−0.008	−0.039	0.005	0.029
Villahermosa	−0.058	−0.128	0.089	0.011
Matamoros	−0.100	0.023	0.038	0.044
Nuevo Laredo	−0.022	−0.008	0.100	0.030
Reynosa	−0.189	0.011	0.065	0.044
Tampico	0.000	−0.009	−0.034	0.013
Minatitlán	−0.138	0.040	0.042	0.004
Orizaba	−0.015	−0.008	0.003	−0.014
Veracruz	−0.011	−0.077	0.066	0.022
Jalapa	0.013	−0.012	0.037	0.057
Mérida	−0.039	0.005	−0.004	−0.071
Mexico City	0.031	0.039	−0.008	−0.008

Note: See Appendix F for definition of coefficient of specialization. Date for Coatzacoalcos are not included.

Source: V Censo de Servicios, 1965 (1968).

Personal	*Restaurants*	*Government*	*Other*	*Coefficient of specialization*
−0.032	−0.073	−0.038	0.153	0.567
−0.027	−0.108	0.032	0.069	0.394
0.000	0.007	0.061	0.128	0.725
0.018	−0.031	0.014	0.174	0.501
0.003	−0.061	0.033	0.053	0.258
−0.006	−0.130	0.057	0.154	0.631
0.008	−0.037	0.013	0.102	0.278
−0.004	−0.046	−0.024	0.158	0.367
0.020	−0.071	−0.030	0.190	0.443
0.011	−0.067	−0.001	0.079	0.233
0.051	0.009	0.098	0.183	1.081
−0.009	−0.082	0.003	0.034	0.277
0.013	−0.005	−0.017	0.048	0.137
−0.068	−0.033	0.005	−0.051	0.323
0.033	0.002	−0.003	0.078	0.238
0.058	−0.018	0.039	0.029	0.409
0.030	0.021	−0.016	−0.006	0.176
0.014	−0.045	0.018	0.098	0.339
0.031	−0.414	0.061	0.160	0.914
0.086	−0.073	0.030	0.157	0.389
0.012	−0.045	−0.037	0.069	0.284
0.028	0.007	0.018	0.031	0.253
0.056	−0.008	0.050	0.086	0.580
0.026	−0.081	−0.009	0.153	0.365
0.033	0.008	−0.017	−0.010	0.149
0.069	−0.077	0.000	0.094	0.528
0.017	−0.076	0.036	0.017	0.352
0.040	−0.024	−0.020	−0.096	0.339
0.005	−0.088	−0.015	0.167	0.584
0.046	−0.028	−0.008	0.019	0.158
0.057	−0.211	−0.004	0.209	0.704
−0.013	−0.126	0.039	0.133	0.350
0.061	−0.050	0.037	−0.048	0.373
−0.032	−0.049	−0.058	0.044	0.303
0.064	−0.057	0.022	0.080	0.343
−0.017	−0.031	−0.011	−0.058	0.204

Table 4-34. *Surplus Workers in Services in Thirty-six Cities, by Subsector, 1965*
(number of persons)

City	*Recreation*	*Lodging*	*Education*	*Medical*
Aguascalientes	125	88	−136	−61
Mexicali	172	−13	−187	−68
Tijuana	2,511	−237	−704	−206
Saltillo	112	126	155	−79
Torreón	−104	−115	278	98
Ciudad Juárez	962	251	−610	−95
Chihuahua	50	217	−53	83
Durango	−3	96	111	−46
Irapuato	64	70	5	−13
León	163	−5	−27	−58
Acapulco	−208	4,093	−907	−392
Pachuca	−25	−77	62	−33
Guadalajara	−115	116	644	42
Toluca	16	−83	−137	−68
Morelia	18	200	87	5
Cuernavaca	−131	412	64	−70
Monterrey	−12	−606	937	166
Oaxaca	−16	207	63	−69
Puebla	−86	−140	−179	85
Querétaro	14	80	64	17
San Luis Potosí	−131	63	157	−94
Culiacán	205	102	−6	−98
Mazatlán	81	665	−147	−112
Ciudad Obregón	205	−7	3	5
Hermosillo	21	96	−12	−72
Villahermosa	75	164	−115	−14
Matamoros	188	−44	−72	−83
Nuevo Laredo	63	23	−285	−84
Reynosa	303	−17	−105	−71
Tampico	−1	33	124	−46
Minatitlán	100	−29	−30	−3
Orizaba	18	10	−4	17
Veracruz	48	323	−278	−91
Jalapa	−15	15	−44	−69
Mérida	196	−26	21	359
Mexico City	−4,829	−6,050	1,263	1,217

Note: See Appendix F for definition of surplus workers. Data for Coatzacoalcos are not included.

Source: V Censo Comercial, 1965 (1968).

Personal	*Restaurant*	*Government*	*Other*
48	110	57	−231
75	300	−89	−190
2	−51	−426	−889
−32	56	−25	−313
−16	337	−184	−293
40	866	−382	−1,033
−28	126	−45	−350
7	85	44	−295
−23	83	35	−222
−38	227	5	−267
−384	−72	−742	−1,388
12	110	−4	−46
−232	83	295	−833
126	61	−9	94
−82	−4	7	−195
−148	47	−100	−74
−502	−350	265	101
−31	97	−39	−212
−62	815	−119	−315
−12	106	−43	−226
−44	167	138	−256
−69	−18	−43	−75
−147	21	−133	−226
−61	188	22	−354
−82	−19	42	25
−89	99	1	−121
−32	143	−67	−33
−113	67	57	292
−7	141	24	268
−169	102	29	−71
−41	153	3	−151
16	155	−48	−164
258	209	−154	201
39	59	70	−53
−323	289	−113	−403
2,661	−4,787	1,671	8,853

Nationally, changes in welfare roughly paralleled the progress of urbanization. Insofar as welfare depends on the level of public sector services (a valid assumption for education and health services), this may imply that urbanization made it easier to provide these services by opening up the possibility of scale economies in urban areas that could not be achieved in rural areas. Urbanization thus coincided with the growth of public sector social services and with more efficient distribution.

If economic welfare is considered a function of conditions in the market economy and of the growth of personal incomes (a valid assumption with respect to food, footwear, and nonbasic consumption), urbanization was also associated with the growth of personal incomes. The trend of urbanization was at variance, however, with the trend of national income distribution. This suggests that urbanization was associated with a deteriorating pattern of distribution, which may well have been associated with changing sector shares and different rates of growth in urban as compared with rural sectors of the economy.

Level and distribution of income

There are no consistent data for the analysis of welfare trends in the thirty-seven cities from 1940 to 1970, but the level and distribution of income and the level of welfare at the end of the period can be measured.

Data on disposable family income in the thirty-seven cities for 1969-70 show substantial contrasts in absolute levels. The ratio of the highest income (Mex$2,255 in Tijuana) to the lowest (Mex$871 in Oaxaca) was 1:2.5. The Gini coefficients also show considerable variation: from 0.62 in Puebla to 0.45 in Mazatlán; in general, the pattern was such that the higher the income level the more equitable the distributive pattern.

There was no special relation between urban size and the Gini coefficient. Nor was there a close relation between the Gini coefficient and urban size growth. Some fast growing cities appeared to have relatively high income levels, but in these cities, income generally was not well distributed. The correlations suggest, however, that cities which sustained rapid growth over the whole thirty years had better income distribution than those which grew rapidly only in 1960-70.

There was a clear relation between differences in income levels and differences in economic structure, as defined by the sectoral structure of employment. In general, the fast-growing industrial cities and fast-growing cities with primarily commercial economies (such as Tijuana) had relatively higher average incomes than others. Generally, the economic dynamism of the city was the predominant factor in accounting for income differentials, although at the subsector level industrial cities associated with modern

branches of manufacturing were more dynamic than those with more traditional industrial structures, and they had consistently higher income levels than other cities, except for those on the U.S. border.

For the relation between income and unemployment, the 1970 census shows that only 3.7 percent of the economically active population (defined as those aged 12 and over—equivalent to 13 million people) was openly unemployed. But only 81 percent of the nominally active population was employed for more than nine months of the year. Moreover, about 45 percent of the labor force in 1970 is estimated to have been marginally employed, that is, to have been engaged in activities in which monthly income was less than the minimum wage. Those concerned were mainly in the agricultural or tertiary sectors.

Cities with high levels of underemployment were Mexicali, Oaxaca, Culiacán, and Villahermosa.[11] Some of the suburbs of Mexico City also had very high levels, rising to 60 percent in one instance. Cities with low levels of underemployment were Monterrey (16 percent), Tampico (19 percent), and some of the other suburbs of Mexico City (as low as 15 percent).

There was no apparent relation between urban size and underemployment. Implicitly, however, there was a close relation between urban growth and underemployment in several cities, including Hermosillo, Oaxaca, Villahermosa, Culiacán, and Acapulco, but underemployment was also high in less demographically dynamic cities, such as Toluca and Ciudad Obregón. Rapid population growth has often been associated with the development of economic activities that are not labor absorptive. This point is illustrated by the high incidence of underemployment in fast growing cities in fast urbanizing states, in which services were a leading urban sector. Most of these states—Baja California, Sonora, Chihuahua, Tamaulipas, and Nuevo León—were in the north, but Veracruz was in the south. In all the cities of these six states, the level of underemployment exceeded the average for the largest cities as a group. The large cities in Baja California—Tijuana and Mexicali—were heavily specialized in tertiary activity and both had relatively low participation rates, Mexicali in particular. In both cities the minimum wage was relatively high. Mexicali was also strongly associated with the service sector, and at the same time had the highest minimum wage of any city in the country and the highest level of underemployment; it was also one of the fastest growing cities in Mexico in 1940-70. The data suggest that a similar, though less consistent, association between underemployment, rapid growth, and service sector development could be made for several other cities.

11. Defined in terms of inactivity over a nine-month period.

Other indicators of welfare

Differences among cities in income and income distribution imply differences in living conditions. Those conditions can be measured directly in terms of health and nutrition, housing, education, and nonbasic goods and services (telephones, electricity, and automobile ownership). Table 4-35 presents the basic data and shows a variable pattern. For example, the distribution pattern of those who had not eaten meat in the week before the 1970 census showed that Durango and San Luis Potosí ranked lowest, whereas Mexico City, Cuernavaca, Puebla, Veracruz, and Villahermosa fared best.[12] The infant mortality index showed a range around the central value of Mexico City (1.00) from 0.41 in Mazatlán to 1.82 in León, a pattern for which there is no obvious explanation.

Quantitative indicators of medical services show that among the thirty-seven cities, the large cities did not always have the highest levels of services. Three indicators were examined: number of beds, number of doctors, and number of nurses in public hospitals (SSA, state and municipal, and MSS) per 10,000 people.[13] The highest ranking cities were Saltillo, Torreón, Pachuca, San Luis Potosí, Hermosillo, Orizaba, Veracruz, Jalapa, Mérida, and Mexico City; the lowest ranking were Mexicali, Tijuana, Ciudad Juárez, Irapuato, Mazatlán, Matamoros, and Minatitlán.

Persistent difficulties in the housing sector in Mexico have arisen from continuing pressures on supply because of the high rate of urban growth and the limited scope of public intervention. A 1962 housing survey showed that 37 percent of urban dwellings were less than 50 square meters in size, and that about 40 percent of the dwellings had only one room. It also showed that about 6 percent of urban dwellings lacked access to water, 24 percent lacked drainage, and about 10 percent had no electricity. In the 1970 census, a large number of dwellings still lacked access to water and drainage, and about 10 percent still lacked electricity.

The housing indicators were not, in all cases, correlated with each other. The overcrowding index showed that the worst conditions occurred in Acapulco (54 percent of all dwellings had only one room) and Villahermosa (50 percent of all dwellings had only one room), and the best in San Luis Potosí (19 percent of dwellings with one room).

12. Most cities which ranked low on this index were either in meat-producing areas or had high income levels, Pachuca being the only exception.

13. MSS, Ministry of Health and Social Security; SSA, Social Security Institute.

The water supply indexes were mutually compatible. They showed that the largest numbers of units without indoor water supply were in Mexicali, Nuevo Laredo, Monterrey, Matamoros, Mexico City, Cuernavaca, Oaxaca and Tampico. The percentage of the population without access to piped water supply was as high as 45 in Culiacán and Minatitlán and 53 in Villahermosa and as low as 6 percent in Monterrey and 8 percent in Mexico City. This implies that in some cities where many units were without indoor supply (as in Mexico City), aggregate water supply was more satisfactory. In other cases (such as Tijuana) where the convenience level was relatively high, the aggregate availability of water was poor. There was a third category of cities, such as Oaxaca, with approximately the same convenience and aggregate levels.

The percentage of those without indoor water supply was higher in Mexico City than in many smaller cities. The same was true of Monterrey, but not of Guadalajara. Conversely, some of the smaller cities (San Luis Potosí and Durango) were relatively better off.

There is general but not conclusive evidence that some of the fastest growing cities had the poorest housing conditions. This was conspicuously true in the border cities of Mexicali, Ciudad Juárez, Reynosa, Nuevo Laredo, and Matamoros, all of which had more than an average share of the population without indoor water supply. Some of the most demographically dynamic cities, which were also, in most instances, economically dynamic, had some of the poorest housing conditions. Conversely, slow growing and economically backward cities, such as Durango, had much better conditions.

Three indicators of primary education were examined: number of students per class, the rate of graduation from the first and sixth grades, and the percentage of the population without schooling. The cities with the smallest number of pupils per class (an indicator of schooling environment) were Morelia, Mazatlán, Matamoros, Orizaba, and Jalapa. Those which had the highest rates of graduation were Torreón, Guadalajara, Cuernavaca, Villahermosa, Tampico, and Mexico City. For the third indicator, Chihuahua, Pachuca, Monterrey, Orizaba, and Mexico City had high scores. Generally, the first indicator and the other two did not coincide. The quality of primary education is reflected in the second indicator. The medium-size cities generally had high-to-medium scores for other urban services, except for Villahermosa. The relations between these indicators and urban size emphasized the relatively better-off status of the largest cities.

With respect to the number of telephones per 1,000 population, Acapulco, Mexico City, Cuernavaca, and Monterrey had the highest scores. In view of the national effort to improve the telephone network, cities that had a small

Table 4-35. *Social Indicators for Thirty-seven Cities, 1970*

City	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*
Primate core area									
Mexico City[a]	5	1.00	30	94.7	32	8	19	49.9	88.0
Subsidiary core areas									
Guadalajara[b]	12	0.82	23	90.4	13	14	25	53.3	80.0
Monterrey[c]	10	0.78	30	89.7	31	6	8	68.6	73.0
Regional growth centers									
Puebla[d]	9	0.79	30	84.4	27	17	23	50.9	77.0
Torreón[e]	24	0.55	26	86.2	20	19	46	52.4	81.0
León	20	1.82	25	79.5	17	28	38	60.0	77.0
Chihuahua	19	0.64	24	84.9	28	14	19	45.3	66.0
Tampico[f]	12	0.64	30	84.6	34	22	21	50.0	88.0
San Luis Potosí	23	0.83	19	81.4	16	16	26	45.4	74.0
Mérida	12	0.63	26	84.0	12	33	23	47.0	63.0
Veracruz	9	1.17	28	91.2	27	13	22	49.1	74.0
Morelia	22	0.55	31	69.2	19	20	32	44.6	71.0
Saltillo	18	1.01	22	77.0	25	17	22	47.8	78.0
Villahermosa	7	0.49	50	52.3	15	53	29	51.6	80.0
Irapuato[g]	22	0.82	31	70.4	18	24	43	61.2	73.0
Querétaro	22	0.80	30	65.2	24	19	34	47.7	75.0
Coatzacoalcos	8	0.82	43	75.3	27	41	29	74.4	70.0
Minatitlán	17	0.69	41	68.6	13	45	34	60.3	65.0
Local centers									
Ciudad Júarez	21	1.09	29	81.6	32	18	24	59.3	70.0
Mexicali	18	0.65	24	79.1	33	29	26	48.4	70.0
Culiacán	16	0.62	46	62.2	19	45	32	47.0	68.0
Tijuana	14	0.64	23	83.1	18	38	26	56.2	74.0
Toluca	10	0.68	24	71.2	21	33	32	50.0	63.0
Acapulco	15	0.29	54	66.6	24	37	38	56.5	75.0
Aguascalientes	30	0.80	22	75.8	17	12	25	49.7	79.0
Hermosillo	21	0.54	21	78.2	23	24	22	55.7	70.0
Durango	38	0.68	26	71.4	16	25	22	49.3	55.0
Matamoros	19	0.48	37	69.0	33	30	23	41.4	77.0
Ciudad Obregón	17	0.56	25	74.2	28	25	24	55.0	71.0
Mazatlán	8	0.41	34	72.8	25	20	23	44.7	75.0
Cuernavaca	7	0.64	40	81.8	38	13	28	51.6	85.0
Orizaba[h]	10	1.10	29	88.8	32	16	24	44.0	78.0
Oaxaca[i]	12	0.47	42	63.1	35	33	26	49.2	72.0
Nuevo Laredo	17	0.79	31	84.6	32	14	24	61.0	79.0
Reynosa	17	0.70	34	72.4	30	25	27	56.2	73.0
Jalapa	14	1.03	28	85.8	28	14	25	39.6	74.0
Pachuca	7	0.68	22	83.4	25	13	21	50.9	73.0

Note: Column definitions.

1. Population not eating meat the week before the census (percent).
2. Infant mortality rate relative to that of the Mexico City metropolitan area.
3. Housing units with only one room (percent).
4. Housing units with electricity (percent).
5. Housing units without indoor water supply (percent).
6. Population without access to water supply (percent).
7. Population six years old and over without primary education (percent).
8. Average number of students in each primary school class.

(10)	*(11)*	*(12)*	*(13)*	*(14)*	*(15)*	*(16)*
95.0	1.34	72	36.2	10.6	14.9	1,126
91.0	0.80	44	19.1	7.9	13.7	615
90.0	1.14	48	19.5	8.1	16.1	633
93.0	0.83	45	22.9	7.0	11.3	580
92.0	0.54	30	30.0	14.2	25.2	976
94.0	0.45	24	11.4	6.7	7.7	597
88.0	0.82	36	21.0	7.0	15.4	844
95.0	0.72	38	28.4	6.8	9.0	1,004
88.0	0.71	34	30.5	11.3	18.9	474
86.0	0.94	45	32.2	12.7	17.1	826
89.0	0.98	39	37.1	10.7	18.9	822
87.0	0.55	36	17.6	8.1	10.4	347
84.0	0.68	37	28.5	13.8	21.6	628
95.0	0.40	18	15.8	4.5	6.9	557
92.0	0.42	17	13.7	3.9	7.2	494
90.0	0.55	29	17.4	8.8	16.8	565
88.0	0.55	25	15.0	5.6	9.0	763
89.0	0.34	18	7.8	4.1	6.4	473
89.0	0.43	13	10.6	4.4	7.7	1,034
90.0	0.45	82	12.6	4.0	7.2	1,906
88.0	0.37	19	13.6	4.2	9.4	700
89.0	0.71	68	8.0	3.8	6.5	1,165
86.0	0.82	44	12.5	6.2	10.4	282
87.0	1.37	21	13.0	6.7	13.9	859
91.0	0.32	39	15.8	6.0	11.4	474
81.0	0.83	51	47.7	9.7	17.6	852
79.0	0.60	27	23.4	6.4	13.1	387
93.0	0.55	11	8.5	4.3	8.0	912
87.0	0.65	21	22.1	7.7	14.3	839
89.0	0.77	21	8.5	4.1	7.4	702
95.0	1.26	53	20.2	8.7	17.1	494
86.0	0.45	18	37.9	9.1	19.2	473
89.0	0.54	35	10.0	5.4	8.5	225
93.0	0.85	13	14.6	5.0	6.0	1,153
91.0	0.52	21	10.2	5.0	9.0	963
90.0	0.78	27	44.3	8.5	17.5	469
88.0	0.86	67	39.8	10.2	16.1	494

9. Students graduating from first grade (percent).
10. Students graduating from sixth grade (percent).
11. Telephones per 1,000 population relative to the average for all thirty-seven cities.
12. Registered private automobiles per 1,000 population.
13. Beds in public hospitals per 10,000 population.
14. Doctors in public hospitals per 10,000 population.
15. Nurses in public hospitals per 10,000 population.
16. Residential consumption of electricity (kilowatt-hours per housing unit.

(Footnotes are on the following page)

Table 4-35 (*continued*)

a. Mexico City includes the whole of the Federal District, plus ten municipios in the state of Mexico: Atizapán de Zaragoza, Coacalco, Cuautitlán, Chimalhuacán, Ecatepec, Naucalpan, Netzacualcóyotl, La Paz, Tlanepantla, and Tultitlan.

b. Guadalajara includes the municipios of Tlaqupaque and Zapopan in the state of Jalisco.

c. Monterrey includes the municipios of Garza García, San Nicolás de los Garza, Santa Catarina, and Guadalupe in the state of Nuevo León.

d. Puebla includes the municipios of Cuautlancingo and San Pedro Cholula in the state of Puebla.

e. Torreón includes the municipios of Lerdo and Gómez Palacio in the state of Durango.

f. Tampico includes the municipio of Ciudad Madero in the state of Tamaulipas.

g. For purposes of discussion in the text, Irapuato and Querétaro, on the one hand, and Coatzacoalcos and Minatitlán, on the other hand, have been considered jointly as single regional growth centers.

h. Orizaba includes the municipios of Camerino Z, Mendoza, Nogales, and Tenango del Río Blanco in the state of Veracruz.

i. For Oaxaca the data were gathered on the basis of the Distrito Central, and not the municipio of Oaxaca de Juarez. Thus, the urban municipio of Oaxaca de Juárez is over-represented by the figures that appear here.

Source: Most of the indicators were estimated using data from the Census of Population, principally the *IX Censo General de la Población, 1970* (1972). There are some exceptions, however. Registered automobiles (12) and infant mortality (2) were obtained directly from the Direccion General de Estadistica, S.I.C., and telephones (11) was calculated on the basis of data from *Anuario Estadistico*, table 4.2, Secretaria de Comunicaciones y Transportes.

number of telephones in service generally had high rates of increase (Querétaro, Reynosa, Coatzacoalcos, and Minatitlán). Acapulco and Tampico, however, had both a high level of telephone service and a high rate of increase. There were no concomitant relations between telephone installations and urban size or urban growth.

The Comisión Federal de Electricidad (CFE) and the Compañía de Luz y Fuerza del Centro, S. A. (Centro) provided electric power throughout the nation.[14] All urban areas are covered by the supply network. In general, fast growing cities, except for the largest, including Mexico City, appeared to be less well off than others, presumably reflecting pressure on the capacity of the public sector to keep up with the growing demand for services.

The highest level of residential electricity consumption occurred in Mexicali, Tijuana, Ciudad Juárez, Nuevo Laredo, Matamoros, Reynosa, and Mexico City. The lowest levels of consumption occurred in Durango, Toluca, Morelia, and Oaxaca. The cities with the highest levels of residential consumption were not in all cases those with the highest percentage of homes with electricity.

14. There was a small amount of private generating capacity too.

Finally, the automobile index showed substantial differences in terms of population. Mexico City (72) had a lower index than Mexicali (82), and Minatitlán (18) had a higher index than several other cities, including Ciudad Juárez and Matamoros. This points to interesting contrasts among the border cities.

CHAPTER 5

Regional Structure

THE OBJECTIVE OF THIS CHAPTER IS TWOFOLD: to relate patterns of area development from 1940 to 1970 to patterns of urbanization and to the spatial distribution of large cities, and to construct a set of economic regions defined in terms of state aggregations and built around the spatial framework of the nation's urban system.

Area Development from 1940 to 1970

A composite index developed by Unikel and Victoria (1970) provides a way to measure geographic variations in economic development. The variables of the index are: (a) state product per capita; (b) industrial output as a percentage of state product; (c) industrial employment as a percentage of total employment; (d) capital investment in agriculture; (e) irrigated area as a percentage of cultivated area; (f) electricity consumption per capita; (g) gasoline consumption per capita; (h) infant mortality per 1,000 live births; (i) sugar consumption per capita; (j) percentage of houses with water; (k) percentage of population with shoes; and (l) literacy.

Table 5-1 shows that state development reflected trends in the national economy and that progress was far from even. Twenty-four states maintained the same rank for thirty years. But Baja California (Territory), México, Tabasco, Sinaloa, and Morelos all improved on their initial ranks, whereas Yucatán, Quintana Roo, and Durango lost in relative status. These changes do not fundamentally alter the general pattern of relative stability, which is further reflected in the fact that the Federal District retained the first rank at all times and that the same group of states occupied the first nine ranks throughout the period, except for Aguascalientes (in 1950) and Baja California (Territory) (in 1970). Similarly, Oaxaca remained at the bottom from 1940 through 1970, and the same group of states (Oaxaca, Chiapas, and Guerrero) occupied the last three ranks in each year.

Geographically, eight of the fourteen most developed states were in the north, three of the others were around Mexico City (Federal District, México, and Morelos), and one was in the Pacific southwest (Jalisco). In contrast, almost all of the poorest states were in the south, and most of the states in the intermediate category were geographically between these extremes. This suggests a three-tier pattern of development (north, center, south), except that part of the central area (around Mexico City) and Jalisco fell into the highly developed rather than the intermediate category.

In order to test the validity of the hypothesis of circular and cumulative causation introduced in Chapter 1, the same index of twelve components was used as a dynamic measure of relative development. This shows trends in the relation between the development levels of each state during thirty years. The measurements are based on the position of each state relative to the highest ranking state (the Federal District) in each year and are shown in Map 5-1. The results indicate the tendency toward increasing disequilibrium in relation to the Federal District in the southern states, only moderate disequilibrium in the north, and a variable situation in the center.

The states that were most developed in 1940 tended in general to maintain their relatively higher status (Table 5-2). The trend over the whole period indicates that the states that suffered the least amount of change relative to the Federal District ranked the highest in terms of differential development. Baja California stood out as the area which developed most rapidly. Conversely, the lowest ranking states in 1970 were among those in which the annual rate of difference in relation to the Federal District was greatest, notably Quintana Roo, Zacatecas, Guerrero, Chiapas, and Oaxaca. Some of the states that had intermediate levels of development, however, also experienced relatively rapid deterioration in relative status, such as Durango and Yucatán.

Area development and urbanization

Spatial differences in development were consistently linked to spatial differences in urbanization. In 1940 the relative index of state development was highly correlated with the level of urbanization ($r^2 = 0.75$). In 1970 the association was even stronger ($r^2 = 0.85$). This tends to confirm that relative development, whether measured on the narrower basis of income level or on the broader basis of the index of twelve components, was strongly related to urbanization.

The fact that the degree of association between relative development and relative urbanization was close in 1940, but grew even closer in 1970, suggests that the trend of state development was closely related to the trend of state urbanization. A comparison of the two trends confirmed the dynamic relation between relative development and relative urbanization, and tests showed

Table 5-1. *Index of State Development, 1940 to 1970*

	1940		1950	
	State and rank	*Index*	*State and rank*	*Index*
1.	Federal District	4,712	1. Federal District	5,942
2.	Baja California	2,323	2. Baja California	3,490
3.	Coahuila	0,174	3. Nuevo León	1,796
4.	Nuevo León	0,029	4. Coahuila	1,699
5.	Chihuahua	−0,633	5. Tamaulipas	1,417
6.	Sonora	−0,785	6. Chihuahua	0,970
7.	Tamaulipas	−0,946	7. Sonora	0,953
8.	Aguascalientes	−0,978	8. Colima	0,037
9.	Colima	−1,475	9. Baja California (Territory)	−0,190
10.	Baja California (Territory)	−1,658	10. Durango	−0,341
11.	Durango	−1,865	11. Morelos	−0,424
12.	Campeche	−1,760	12. Aguascalientes	−0,466
13.	Yucatán	−1,921	13. Sinaloa	−0,513
14.	Jalisco	−2,002	14. Campeche	−0,775
15.	Quintana Roo	−2,070	15. Yucatán	−0,777
16.	Sinaloa	−2,263	16. Jalisco	−0,778
17.	Morelos	−2,356	17. Veracruz	−0,844
18.	Guanajuato	−2,519	18. Quintana Roo	−1,426
19.	Veracruz	−2,585	19. Guanajuato	−1,530
20.	Querétaro	−2,589	20. Nayarit	−1,589
21.	Nayarit	−2,824	21. México	−1,684
22.	Michoacán	−2,864	22. San Luis Potosí	−1,711
23.	San Luis Potosí	−2,943	23. Michoacán	−1,738
24.	Hidalgo	−3,053	24. Puebla	−1,938
25.	México	−3,116	25. Zacatecas	−1,971
26.	Zacatecas	−3,124	26. Querétaro	−2,032
27.	Tlaxcala	3,221	27. Hidalgo	−2,113
28.	Puebla	−3,308	28. Tlaxcala	−2,263
29.	Tabasco	−3,654	29. Tabasco	−2,304
30.	Chiapas	−3,792	30. Guerrero	−3,080
31.	Guerrero	−3,924	31. Chiapas	−3,175
32.	Oaxaca	−4,150	32. Oaxaca	−3,223

Note: Comparisons of economic development based on single indicators, such as state product, have shortcomings when used to describe conditions both within and between states. The choice of a twelve-component index based on various social and economic indicators overcomes some of the defects of a single component measure. This index illustrates differences and trends in agriculture, industry, labor productivity, the size and structure of the labor force, and various social welfare indicators, including the consumption of gasoline, electric power, and sugar. It also incorporates differences in housing conditions, health, and education.

Although the index is an improvement over past efforts, it too has defects. Being largely based on the percentage of a given population falling into (or out of) a particular category, as the percentage nears 100, differences are obscured.

Source: Unikel and Victoria (1970).

1960			1970		
	State and rank	*Index*		*State and rank*	*Index*
1.	Federal District	7,439	1.	Federal District	8,816
2.	Baja California	4,862	2.	Nuevo León	6,456
3.	Nuevo León	4,577	3.	Baja California	5,463
4.	Sonora	3,244	4.	Sonora	5,135
5.	Coahuila	3,001	5.	Coahuila	4,907
6.	Tamaulipas	2,284	6.	Baja California (Territory)	4,349
7.	Chihuahua	1,730	7.	Aguascalientes	3,929
8.	Baja California (Territory)	1,628	8.	Tamaulipas	3,898
9.	Aguascalientes	1,536	9.	Chihuahua	3,739
10.	Sinaloa	0,782	10.	México	3,645
11.	Morelos	0,478	11.	Sinaloa	2,779
12.	Jalisco	0,447	12.	Jalisco	2,632
13.	México	0,419	13.	Colima	2,141
14.	Colima	0,264	14.	Morelos	2,062
15.	Veracruz	0,155	15.	Veracruz	1,911
16.	Campeche	−0,026	16.	Campeche	1,742
17.	Durango	−0,084	17.	Querétaro	1,609
18.	Guanajuato	−0,341	18.	Guanajuato	1,494
19.	Yucatán	−0.516	19.	Durango	1,490
20.	Nayarit	−0,805	20.	Tabasco	1,311
21.	Michoacán	−0,957	21.	Yucatán	1,204
22.	Querétaro	−0,982	22.	San Luis Potosí	0,683
23.	San Luis Potosí	−0,994	23.	Puebla	0,620
24.	Puebla	−1,068	24.	Michoacán	0,610
25.	Tabasco	−1,414	25.	Hidalgo	0,529
26.	Tlaxcala	−1,427	26.	Nayarit	0,376
27.	Hidalgo	−1,492	27.	Tlaxcala	0,234
28.	Zacatecas	−1,750	28.	Zacatecas	−0,287
29.	Quintana Roo	−1,882	29.	Quintana Roo	−0,320
30.	Chiapas	−2,566	30.	Guerrero	−0,400
31.	Guerrero	−2,577	31.	Chiapas	−1,037
32.	Oaxaca	−2,950	32.	Oaxaca	−1,226

that the states (led by Baja California) which urbanized most quickly after 1940 were also those which developed most quickly.

Because urbanization and area development were generally related, and because urbanization and the development of large cities were generally related, was there a general association between area development and the development of large cities? The existence of such a relation is obvious in the case of the Federal District and in such states as Baja California and Nuevo León, where large and prosperous cities were located in (and accounted for the prosperity of) relatively prosperous states. There were, however, some instances

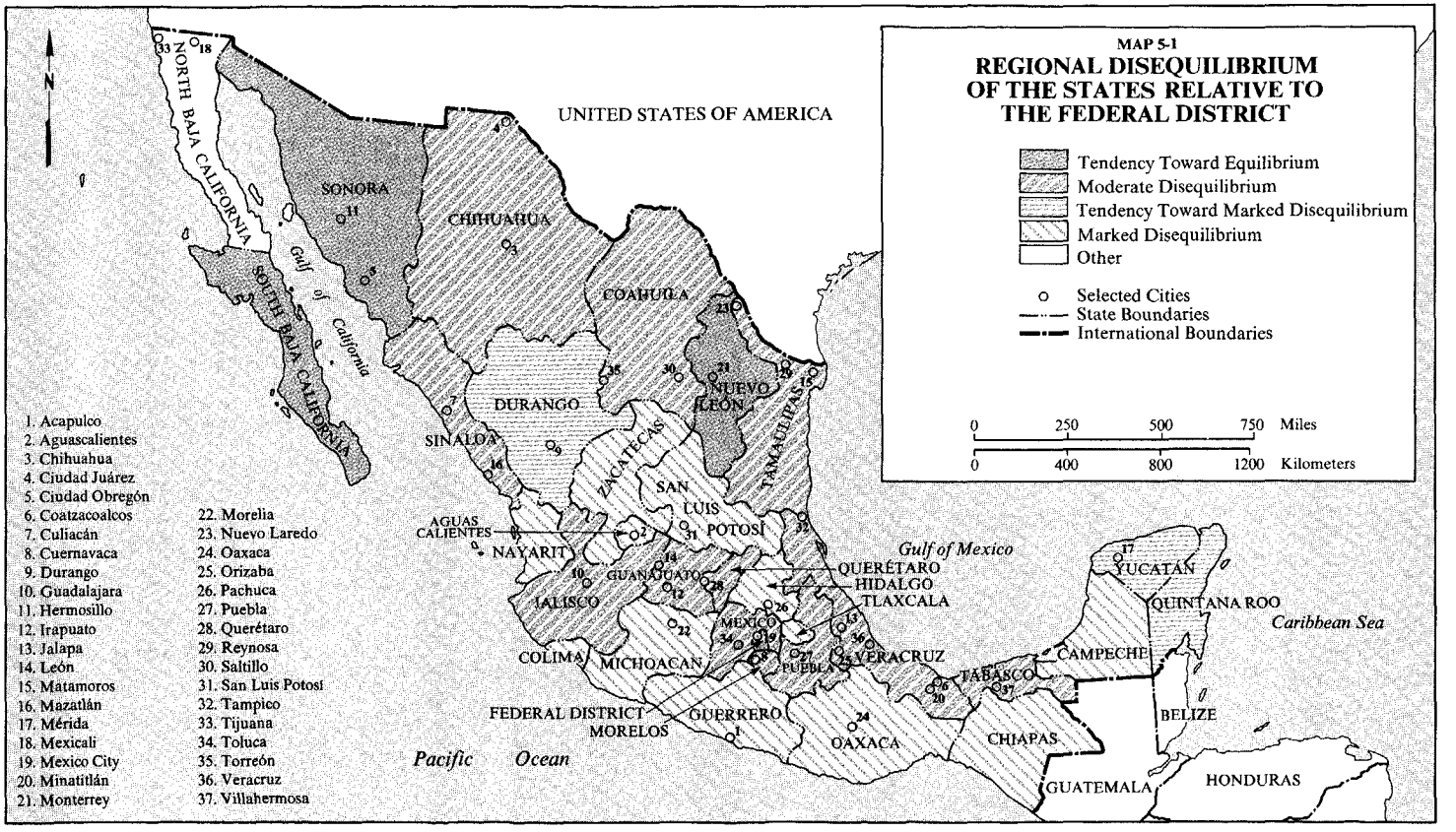

MAP 5-1
REGIONAL DISEQUILIBRIUM OF THE STATES RELATIVE TO THE FEDERAL DISTRICT
Tendency Toward Equilibrium
Moderate Disequilibrium
Tendency Toward Marked Disequilibrium
Marked Disequilibrium
Other
Selected Cities
State Boundaries
International Boundaries
0 250 500 750 Miles
0 400 800 1200 Kilometers
N
UNITED STATES OF AMERICA
NORTH BAJA CALIFORNIA
SOUTH BAJA CALIFORNIA
Gulf of California
SONORA
CHIHUAHUA
COAHUILA
NUEVO LEÓN
TAMAULIPAS
DURANGO
SINALOA
ZACATECAS
SAN LUIS POTOSÍ
AGUAS CALIENTES
NAYARIT
JALISCO
GUANAJUATO
QUERÉTARO
HIDALGO
TLAXCALA
MÉXICO
COLIMA
MICHOACÁN
PUEBLA
VERACRUZ
FEDERAL DISTRICT
MORELOS
GUERRERO
OAXACA
TABASCO
CAMPECHE
CHIAPAS
YUCATÁN
QUINTANA ROO
BELIZE
GUATEMALA
HONDURAS
Gulf of Mexico
Caribbean Sea
Pacific Ocean
1. Acapulco
2. Aguascalientes
3. Chihuahua
4. Ciudad Juárez
5. Ciudad Obregón
6. Coatzacoalcos
7. Culiacán
8. Cuernavaca
9. Durango
10. Guadalajara
11. Hermosillo
12. Irapuato
13. Jalapa
14. León
15. Matamoros
16. Mazatlán
17. Mérida
18. Mexicali
19. Mexico City
20. Minatitlán
21. Monterrey
22. Morelia
23. Nuevo Laredo
24. Oaxaca
25. Orizaba
26. Pachuca
27. Puebla
28. Querétaro
29. Reynosa
30. Saltillo
31. San Luis Potosí
32. Tampico
33. Tijuana
34. Toluca
35. Torreón
36. Veracruz
37. Villahermosa

Table 5-2. *Development of States Relative to That of the Federal District, 1940 to 1970*
(index values)

State	*1940*	*1950*	*1960*	*1970*	*1940-50*	*1950-60*	*1960-70*	*1940-70*
Federal District	–	–	–	–	–	–	–	–
Nuevo León	4,583	4,146	2,862	3,818	-0.10	-3.64	2.92	-0.61
Baja California	2,389	2,452	2,577	4,811	0.26	0.50	6.44	2.36
Sonora	5,497	4,989	4,190	5,129	-0.96	-1.73	2.04	-0.23
Coahuila	4,538	4,243	4,438	5,367	-0.67	0.45	1.92	0.56
Baja California (Territory)	6,370	6,132	5,811	5,925	-0.38	-0.54	1.94	-0.24
Aguascalientes	5,690	6,408	5,905	6,345	1.20	-0.81	0.72	0.36
Tamaulipas	5,658	4,525	5,155	6,376	-2.21	1.31	2.15	0.40
Chihuahua	5,345	4,972	5,709	6,535	-0.72	1.31	1.36	0.67
México	7,828	7,626	7,020	8,087	-0.26	-0.82	1.43	0.11
Sinaloa	6,975	6.455	6,677	7,495	-0.77	0.34	1.75	0.24
Jalisco	6,714	6,720	6,992	7,642	0.01	0.40	0.89	0.43
Colima	6,187	5,905	7,175	8,133	-0.47	1.97	1.26	0.92
Morelos	7,068	6,366	6,961	8,212	-1.04	0.90	1.67	0.50
Veracruz	7,297	6,786	7,284	8,363	-0.72	0.71	1.39	0.46
Campeche	6,472	6,717	7,465	8,532	0.37	1.06	1.34	0.93
Querétaro	7,301	7,974	8,421	8,665	0.89	0.55	0.29	0.57
Guanajuato	7,231	7,472	7,780	8,780	0.33	0.40	1.22	0.65
Durango	6,377	6,283	7,523	8,784	-0.15	1.82	1.56	1.07
Tabasco	8,366	8,246	8,853	8,963	-0.14	0.71	0.12	0.23
Yucatán	6,633	6,719	7,955	9,070	0.13	1.70	1.32	1.05
San Luis Potosí	7,655	7,375	8,433	9,591	0.00	0.98	1.30	0.75
Puebla	8,020	7,875	8,507	9,654	-0.18	0.77	1.27	0.62
Michoacán	7,576	7,680	8,396	9,664	0.14	0.90	1.42	0.81
Hidalgo	7,765	8,055	8,931	9,745	0.37	1.04	0.88	0.76
Nayarit	7,536	7,531	8,244	9,898	0.00	0.91	1.85	0.91
Tlaxcala	7,933	8,205	8,866	10,040	0.34	0.78	1.25	0.79
Zacatecas	7,836	7,913	9,189	10,561	0.10	1.51	1.40	1.00
Quintana Roo	6,782	7,368	9,321	10,594	0.83	2.38	1.29	1.50
Guerrero	8,636	9,022	10,016	10,674	0.44	1.05	0.64	0.71
Chiapas	8,504	9,117	10,005	11,311	0.70	0.93	1.23	0.96
Oaxaca	8,862	9,165	10,389	11,500	0.34	1.26	1.02	0.87

– Not applicable.
Source: Unikel and Victoria (1970).

of disjunction between area development and the development of important cities.

In some states the level of area development was higher than might have been expected, assuming a general correlation between urbanization, the development of large cities, and area development; in all such cases, however, there was rapid urbanization in 1940-70. In other states the level of urbanization was both low and compatible with the level of relative area development—notwithstanding the presence of one or more large city. The spatial

Table 5-3. *Relative Urbanization and Agricultural Development, by State, 1970*

State	*Ranking of relation between capital and production*	*Ranking of relation between capital and cultivable hectares*	*Ranking of relation between capital and labor*	*Ranking of relation between value of production and labor*
Coahuila	1	4	4	14
Baja California	4	5	2	2
Guanajuato	7	3	24	32
Sonora	2	25	1	1
Aguascalientes	16	19	14	20
Michoacán	14	17	22	28
Morelos	17	7	18	24
Sinaloa	9	8	7	12
Puebla	19	21	25	30
México	12	12	23	29
Colima	15	15	8	10
Tamaulipas	5	6	5	5
Nuevo León	6	9	10	16
Tlaxcala	21	29	26	27
Jalisco	8	13	13	22
Hidalgo	23	24	27	24
Querétaro	11	11	11	17
Zacatecas	9	26	12	21
Chihuahua	18	10	6	3
Durango	20	14	9	4
Baja California (Territory)	3	1	3	7
San Luis Potosí	12	16	17	26
Nayarit	25	23	16	15
Yucatán	31	31	29	11
Guerrero	29	30	30	23
Oaxaca	26	28	31	31
Tabasco	24	20	21	18
Chiapas	28	27	28	19
Federal District	22	2	15	6
Campeche	27	22	19	13
Veracruz	30	18	20	8
Quintana Roo	32	32	32	9

Source: V Censo Agrícola, 1970 (1972) and *IX Censo General de la Población, 1970* (1972).

structure of the agricultural sector seems to be a key to explaining such disjunctions.

Table 5-3 suggests that, in general, the less urbanized states also had low levels of agricultural development. Disjunction between urbanization and area development with a correlation in agricultural development was more ap-

Ranking of relation between cultivable hectares and labor	*Per capita income estimate (1970 pesos)*	*State development index*	*Percentage of urbanization*
16	4,763.0	4.902	73
1	4,719.0	5.463	84
15	4,451.4	−1.494	52
4	5,392.7	5.135	67
4	755.1	3.929	64
25	4,063.7	0.610	46
31	1,572.8	2.062	70
10	3,435.7	2.779	48
27	4,877.8	0.620	47
30	7,221.1	3.645	62
2	1,276.9	2.141	69
8	6,181.9	3.898	69
14	8,170.4	6.456	77
11	584.0	0.234	50
18	8,772.4	2.632	69
25	2,258.0	0.529	28
18	973.0	1.609	36
4	1,442.2	−0.287	35
7	5,675.8	3.739	65
4	2,153.3	1.490	41
28	384.1	4.349	54
23	3,230.5	0.683	39
13	1,294.1	0.376	50
2	2,069.6	1.204	65
18	3,472.3	−0.400	36
29	3,148.0	−1.226	28
21	1,696.8	1.311	33
11	2,193.9	−1.037	28
32	43,199.1	8.816	97
16	759.7	1.742	64
23	11,663.0	1.911	47
9	178.2	0.320	36

parent when urban development was considered in terms of the existence of large cities located in relatively unurbanized and underdeveloped states. Two cases were outstanding: Puebla (Puebla) and Guanajuato (León). The overall level of urbanization in each of these states in 1970 was relatively low: 47 percent in Puebla and 52 percent in Guanajuato. The overall development index was relatively low: 0.6 in Puebla and −1.5 in Guanajuato. The indicators of agricultural development were also low. In terms of capi-

Table 5-4. *Rank Order of Agricultural Development and Migration, 1950 and 1960*

	1950					
State	*Relation between capital and production*	*Relation between capital and cultivable hectare*	*Relation between capital and labor*	*Relation between value of production and labor*	*Relation between cultivable hectare and labor*	*Net migration difference*
Coahuila	1	3	3	11	12=	27
Baja California	2	5	1	1	2	3
Guanajuato	3	19	14	31	11	26
Sonora	4	4	2	3	7	6
Aguascalientes	5	21	11	25	5	21
Michoacán	6	13	13	24	18=	32
Morelos	7	6	12	22	29=	9
Sinaloa	8	8	7	13	12=	18
Puebla	9	23	26	30	22=	28
México	10	12	21	27	29=	2
Colima	11	11	9	14	12=	11
Tamaulipas	12	7	4	5	9	8
Nuevo León	13	9	6	9	12=	4
Tlaxcala	14	27	25	29	10	17
Jalisco	15	18	17	17	17	16
Hidalgo	16	25	27	28	22=	25
Querétaro	17	17	19	20	20	20
Zacatecas	18	30	18	16	3	29
Chihuahua	19	10	5	2	4	5
Durango	20	14	8	7	6	31
Baja California (Territory)	21	1	10	10	32	12
San Luis Potosí	22	24	23	21	21	24
Nayarit	23	15	15	12	12=	14
Yucatán	24	31	29	18	8	19
Guerrero	25	28=	30	23	22=	23
Oaxaca	26	28=	32	26	27=	30
Tabasco	27	22	28	15	26	15
Chiapas	28	26	31	19	28	22
Federal District	29	2	16	4	31	1
Campeche	30	20	20	6	18=	13
Veracruz	31	16	24	8	27=	7
Quintana Roo	32	32	22	32	1	10

Note: = indicates equal ranking.
Source: *VII Censo General de la Población, 1950* (1952); *VIII, 1960* (1962).

tal investment per agricultural worker, for example, Puebla and Guanajuato ranked twenty-fifth and twenty-fourth out of thirty-two states. In terms of labor productivity, they ranked, respectively, thirtieth and thirty-second. In spite of the presence of large, industrialized urban areas in each state (which ranked, in the order given above, sixth and seventh with respect to

	1960					
Emigration	*Relation between capital and production*	*Relation between capital and cultivable hectares*	*Relation between capital and labor*	*Relation between value of production and labor*	*Relation between cultivable hectare and labor*	*Net migration difference (1950-60)*
10	1	4	4	14	16=	23
22	4	5	2	2	1	5
3	7	3	24	32	15	25
24	2	25	1	1	4=	14
17	16	19	14	20	4=	11
1	14	17	22	28	25=	32
31	17	7	18	24=	31	6
13	9=	8	7	12	10	4
6	19	21	25	30	27	29
26	12=	12	23	29	30	1
29	15	15	8	10	2=	10
16	5	6	5	5	8	19
18	6	9	10	16	14	2
21	21	29	26	27	11=	17
2	8	13	13	22	18=	3
9	23	24	27	24=	25=	26
19	11	11	11	17	18=	12
8	9=	26	12	21	4=	30
23	18	10	6	3	7	24
7	20	14	9	4	4=	20
30	3	1	3	7	28	7
12	12=	16	17	26	23=	27
25	25	23	16	15	13	15
20	31	31	29	11	2=	18
14	29	30	30	23	18=	28
5	26	28	31	31	29	31
27	24	20	21	18	21=	13
15	28	27	28	19	11=	16
4	22	2	15	6	32	21
28	27	22	19	13	16=	8
11	30	18	20	8	23	22
32	32	32	32	9	9	9

rural population density), it seems likely that the conditions of the rural sector impeded the diffusion of the benefits of urban industrial growth.

Spatial differences in the structure of agricultural production and income influenced migratory movements. In particular, heavy outmigration from Chiapas, Oaxaca, and Guerrero was associated with a low relative level of agricultural development (Table 5-4). In the northwest (Sonora, Sinaloa, and Baja California), however, migratory movements were associated with high

levels of agricultural development. The growth of output was not linked with land reform or with the development of the traditional sector, but with large-scale irrigated commercial agriculture, mainly after 1940. Although no relation between the spatial incidence of net population change and land reform has been established, it can be argued that land reform efforts were concentrated in states with the most severe population pressure. Otherwise, emigration (as an index of rural conditions) would almost certainly have been greater.

The states with the least favorable conditions in agriculture generated a large proportion of migrants to states with better agricultural conditions or migrants who contributed to urban population increase. Urbanization was thus linked with the deficiencies of the agrarian structure of the states of the center and the south, although migrants from these areas often moved to cities far removed from their places of origin–particularly to cities in the north.

The states with highly developed agriculture (Baja California, Sinaloa, and Sonora) ranked highly in terms of their rates of urbanization, although they were relatively unurbanized as measured by the urbanized percentage of the state population. In these states, agricultural development seems to have preceded urban development, which was, therefore, partly a consequence of the prior growth of irrigated commercial agriculture. This implied that urbanization in this region was associated with the development of an agricultural export base. This type of urban growth was a common phenomenon during the Porfiriato, but does not seem to have occurred in other parts of the country after 1940.

Relative Development of the Regions

The regional structure of the economy may be defined in terms of the spatial framework of economic exchange between regions that are not necessarily characterized by homogeneous socioeconomic conditions and that may not provide a suitable basis for programming development.

There are many levels of spatial interaction and many levels of spatial integration. The relevant level here refers to a high order of interaction, based on the network of large cities that are centers of economic activity and dominate the economies of the areas around them. This relation can be most clearly observed in the spatial structure of the tertiary sector, where large cities provide services not only for their own populations and those of nearby areas but also for the populations of areas farther away from the city. Because of the link between urban size and the level of manufacturing activity, which is generally strongest for consumer goods industries, large cities

also serve as manufacturing and distribution centers for their associated regions.

Regional definitions

On the assumption that all parts of the nation were spatially integrated by 1970 and that integration was achieved through links between large cities, there are at least three complementary levels at which to examine Mexico's spatial structure at that time. The first concerns only Mexico City and views the whole country as a single region, or alternatively, as two regions consisting of a core (Mexico City) and a periphery (the rest of the country). This approach is justified for certain purposes because of Mexico City's economic and social dominance. Tucker (1957) observed: "In Mexico, all roads lead to the capital of the country; the Federal District is the chief political and governmental center of the nation. Moreover, it is the economic, educational, social and cultural center of Mexico . . . its influence is all pervasive. Other cities are satellites of greater or lesser magnitude held in their orbits by the central sun." In more prosaic terms, Table 5-5 illustrates why Mexico City's primate role was the single most important feature of Mexico's spatial economic structure.

Map 5-2 divides the nation into zones of influence around the three largest metropolitan areas: Mexico City, Guadalajara, and Monterrey. This too is a realistic pattern; although certain functions (those of the federal government in particular) were performed exclusively in Mexico City, other relatively important functions were also performed in the second and third largest cities and not anywhere else. The most striking feature of this pattern is that the largest territorial area is assigned to Monterrey, although the zones

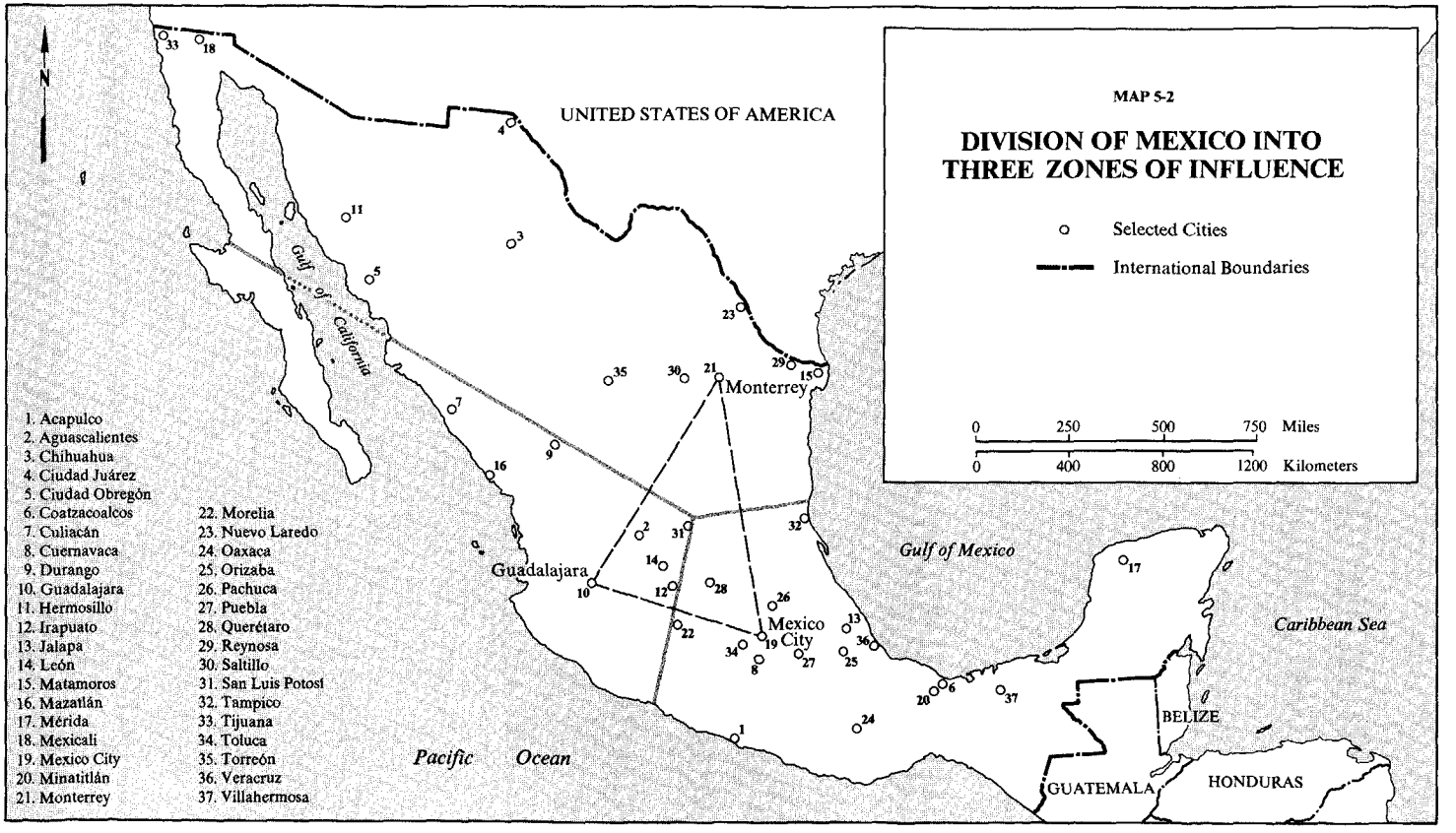
Table 5-5. *Indexes of Concentration for Mexico City, 1970*

Index	*Percentage share*
1. Total national population	17.8
2. Total urban population[a]	30.3
3. Population of cities over 100,000[a]	45.2
4. Rural-urban migrants (1950-60)	41.9
5. Employment in manufacturing (national)	30.3
6. Employment in commerce (national)	27.9
7. Employment in services (national)	38.3
8. Employment in government (national)	68.9
9. National bank deposits	43.6[b]
10. National credits	60.6[b]
11. National investment in higher education	62.0
12. Research activity	80.0

a. "Threshold" = 2,500.

b. 1965.

Source: *VII Censo General de la Población, 1950* (1952); *VIII, 1960* (1962); *IX, 1970* (1972); Bank of Mexico; and Ministry of Finance.

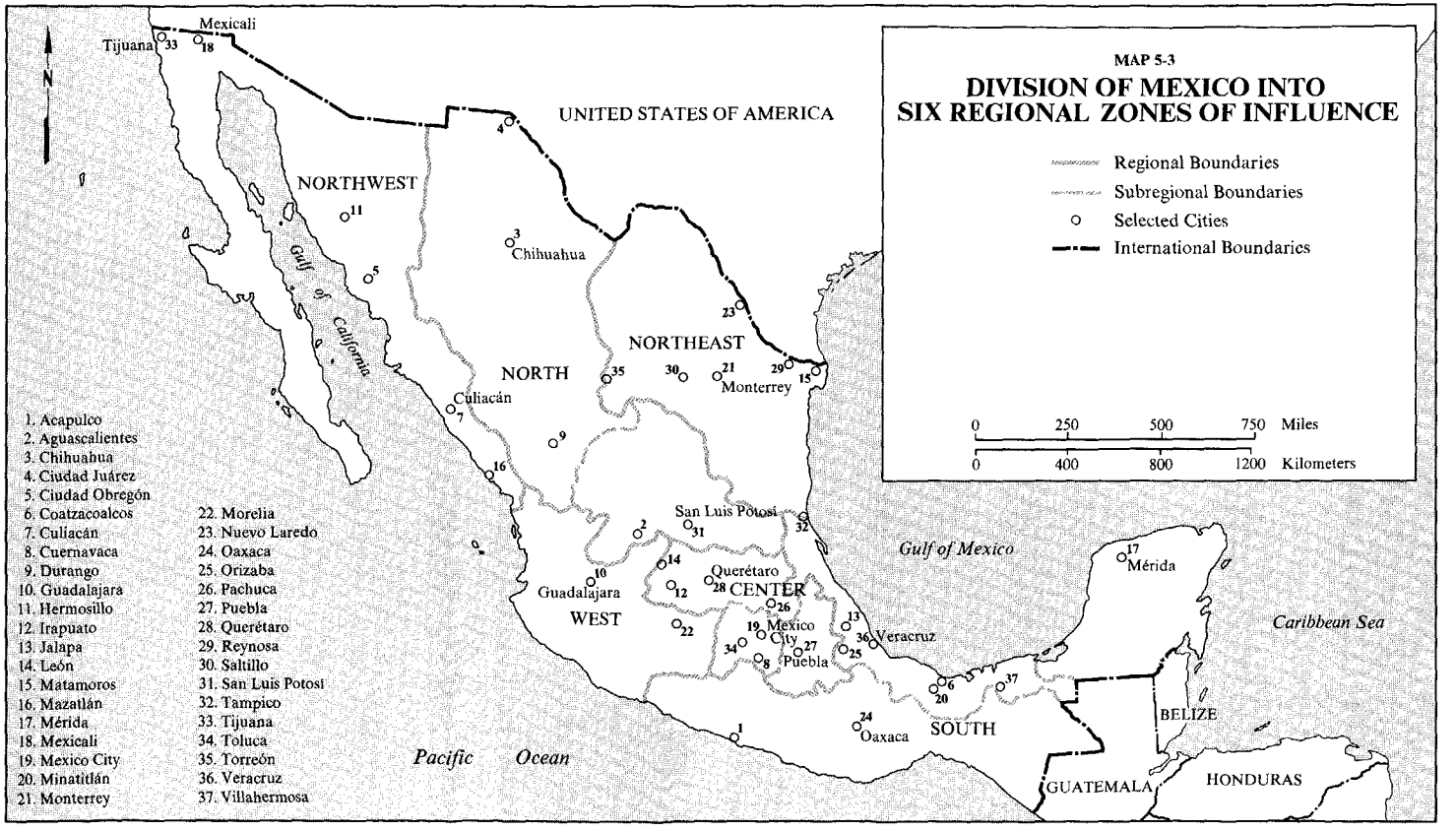

MAP 5-2
DIVISION OF MEXICO INTO THREE ZONES OF INFLUENCE
Selected Cities
International Boundaries
0 250 500 750 Miles
0 400 800 1200 Kilometers
N
UNITED STATES OF AMERICA
Gulf of California
Monterrey
Guadalajara
Mexico City
Gulf of Mexico
Caribbean Sea
Pacific Ocean
BELIZE
GUATEMALA
HONDURAS
1. Acapulco
2. Aguascalientes
3. Chihuahua
4. Ciudad Juárez
5. Ciudad Obregón
6. Coatzacoalcos
7. Culiacán
8. Cuernavaca
9. Durango
10. Guadalajara
11. Hermosillo
12. Irapuato
13. Jalapa
14. León
15. Matamoros
16. Mazatlán
17. Mérida
18. Mexicali
19. Mexico City
20. Minatitlán
21. Monterrey
22. Morelia
23. Nuevo Laredo
24. Oaxaca
25. Orizaba
26. Pachuca
27. Puebla
28. Querétaro
29. Reynosa
30. Saltillo
31. San Luis Potosí
32. Tampico
33. Tijuana
34. Toluca
35. Torreón
36. Veracruz
37. Villahermosa

associated with Guadalajara and particularly Mexico City had greater population densities. Amount of territory alone therefore does not determine the relative size of each zone. But the zone associated with Monterrey is so vast that the possibility of functional interaction with its western parts (in the península) must be questioned. The common border of the northern zone with the United States impedes spatial economic interaction between these areas, but is not an absolute barrier. The economies of the northwestern states had developed close functional ties with the United States, and consequently, a substantial part of the northern zone was oriented toward cities in the United States border region including Los Angeles/Long Beach (1970 population 7.0 million), San Diego (1970 population 1.4 million), Phoenix (1970 population 1.0 million), and El Paso (1970 population 800 thousand).

These massive zones are not really regions, however, because they are too large to correspond to anything other than approximate territorial divisions among the three largest cities according to certain economic functions. It is therefore necessary to consider a structure of smaller regions built around large cities (Map 5-3). The regions thus defined vary greatly in territorial and demographic size, as well as in socioeconomic conditions. They vary, too, with respect to the size and characteristics of their central cities or regional centers. Six principal regions have been delineated, and regional boundaries have been adjusted to coincide with state boundaries. The six regions (some of which are subdivided to make twelve subregions) correspond to zones of general socioeconomic integration. They do not necessarily correspond to development regions, if these are defined as areas that can be used for integrated development planning. The regional capitals associated with these twelve economic subregions are: Mexico City, Guadalajara, Monterrey, Tijuana/Mexicali, Chihuahua, Culiacán, San Luis Potosí, Querétaro, Puebla, Veracruz, Oaxaca, and Mérida.

As with any such scheme of allocation, there are certain anomalies. The first kind of anomaly refers to problems that arise because of the allocation of states that did not include large cities and that did not have strongly developed links with any of the leading metropolitan areas. These are usually either poor, small, or both, such as Oaxaca, Chiapas, Hidalgo, Guerrero, Colima, Nayarit, and Michoacán. The allocation of these states to their respective regions is thus a somewhat arbitrary matter. The second problem is that some cities are located on state boundaries, such as León, Torreón, and Tampico. As a result, their allocation is also somewhat arbitrary because, in a regional scheme unconstrained by the form in which data are available (that is, one that does not have to respect state boundaries), these cities would be important regional centers.

No scheme of regional allocation can be perfect when the availability of regional information is an important criterion (that is, when it is necessary to describe and compare the demographic and socioeconomic characteristics


MAP 5-3
DIVISION OF MEXICO INTO
SIX REGIONAL ZONES OF INFLUENCE
Regional Boundaries
Subregional Boundaries
Selected Cities
International Boundaries
0 250 500 750 Miles
0 400 800 1200 Kilometers
N
UNITED STATES OF AMERICA
Mexicali
Tijuana
NORTHWEST
Gulf of California
Chihuahua
NORTHEAST
NORTH
Culiacán
Monterrey
San Luis Potosí
Gulf of Mexico
Mérida
Caribbean Sea
Querétaro
CENTER
Guadalajara
WEST
Mexico City
Veracruz
Puebla
Oaxaca
SOUTH
BELIZE
GUATEMALA
HONDURAS
Pacific Ocean
1. Acapulco
2. Aguascalientes
3. Chihuahua
4. Ciudad Juárez
5. Ciudad Obregón
6. Coatzacoalcos
7. Culiacán
8. Cuernavaca
9. Durango
10. Guadalajara
11. Hermosillo
12. Irapuato
13. Jalapa
14. León
15. Matamoros
16. Mazatlán
17. Mérida
18. Mexicali
19. Mexico City
20. Minatitlán
21. Monterrey
22. Morelia
23. Nuevo Laredo
24. Oaxaca
25. Orizaba
26. Pachuca
27. Puebla
28. Querétaro
29. Reynosa
30. Saltillo
31. San Luis Potosí
32. Tampico
33. Tijuana
34. Toluca
35. Torreón
36. Veracruz
37. Villahermosa

of different regions). Yet, the urban-based regional structure described here corresponds well with the basic framework of the urban system in 1970 and thus represents a reasonably accurate outline of Mexico's spatial economic structure as it had then evolved.

The regions

The six regions identified here are the northwest, the north, the northeast, the west, the center, and the south. This section expands the description of some of the key features of the regional structure in terms of contrasts and characteristics within and among the regions. Table 5-6 shows demographic, social, and economic indicators for each region, measured on the basis of states. Tables 5-7, 5-8, 3-7, and 3-8 provide the basis for references to regional integration.

THE NORTHWEST. The four states in this region fall into two subgroups: Baja California and Baja California (Territory), centered on Tijuana/Mexicali, and Sinaloa and Sonora, centered on Culiacán. The northwest as a whole was distinguished by an advanced level of agricultural development and a relatively high level of socioeconomic development. Its principal cities—Tijuana, Mexicali, and Culiacán—had generally poor social conditions, but high levels of service. Although it was neither highly urbanized nor highly industrialized, the northwest had undergone very rapid urbanization; from 1960 to 1970 it was the country's most rapidly urbanizing area, with the four states having an average rate of population increase well above the national average. The northwest still had a low average population density, however, containing about 20 percent of Mexico's land area but less than 7 percent of its population in 1970.

Besides being demographically dynamic, the northwest had, by 1970, become an aggressive and upwardly mobile socioeconomic region with the highest levels of agricultural productivity in the nation, an average per capita income almost 50 percent above the national average, and a relatively equitable pattern of income distribution as measured by the Gini coefficient. There were sufficient differences, however, between the Tijuana/Mexicali subregion and the Culiacán subregion to provide important subregional identities within the northwest.

The Tijuana/Mexicali subregion experienced rapid demographic expansion in the 1950s and 1960s, particularly in its urban areas. It also stood out in its economic dynamism and high average per capita income, which was relatively well distributed despite a high degree of skewness in its core cities. Tijuana and Mexicali contained a large proportion of the region's total population (67 percent in 1970), as well as an even larger proportion of its urban population (85 percent in 1970)

Table 5-6. *Socioeconomic Development Indicators for the States, 1970*

State	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Aguascalientes	0.28	338	0.69	39.1	60.5	64
Baja California	3.57	8.70	1.79	67.3	12.4	84
Baja California (Territory)	3.74	128	0.26	56.1	1.7	54
Campeche	2.63	252	0.52	50	5	64
Coahuila	7.71	1,115	2.30	22.8	7.4	73
Colima	0.27	241	0.50	47.0	44	69
Chiapas	3.76	1,569	3.25	30	21	28
Chihuahua	12.56	1,613	3.35	31.4	6.5	65
Durango	6.08	939	1.95	23.4	7.9	42
Federal District	0.08	6,874	14.20	41.1	3,486	97
Guanajuato	1.57	2,270	4.70	30.8	74	52
Guerrero	3.24	1,597	3.30	34	25	36
Hidalgo	1.07	1,194	2.49	20.0	57	28
Jalisco	4.07	3,297	6.85	35.0	41	69
México	1.09	3,833	7.93	101.9	179	62
Michoacán	3.04	2,324	4.80	25.5	39	46
Morelos	0.25	616	1.27	59.6	125	70
Nayarit	1.40	544	1.12	39.5	20	50
Nuevo León	3.28	1,695	3.50	57.1	23.6	77
Oaxaca	4.85	2,015	4.48	17	23	27
Puebla	1.72	2,508	5.18	27.1	74	46
Querétaro	0.60	486	1.00	36.9	41	36
Quintana Roo	2.55	88	0.18	76	2	37
San Luis Potosí	3.20	1,282	2.64	22.3	20.4	39
Sinaloa	2.95	1,267	2.61	51.2	21.8	48
Sonora	9.40	1,099	2.27	40.4	5.9	67
Tabasco	1.25	768	1.59	59	31	34
Tamaulipas	4.06	1,457	3.01	42.3	18.3	69
Tlaxcala	0.20	421	0.87	21.3	107	50
Veracruz	3.70	3,815	7.88	39.8	52	47
Yucatán	2.00	758	1.56	23	19	65
Zacatecas	3.81	952	1.96	16.3	12.7	31

Note: Column definitions.

1. Area (percentage of Mexico).
2. Population (thousands).
3. Population (percentage of Mexico).
4. Population increase, 1960–70 (percent).
5. Population density per square kilometer (number of persons).
6. Urban population (percent).

(7)	*(8)*	*(9)*	*(10)*	*(11)*	*(12)*	*(13)*	*(14)*
0.8	4.1	24	2.9	225	37	16	0.6
2.6	6.4	88	15.6	712	22	18	1.0
0.2	9.2	100	10.1	95	34	8	0.2
0.6	4.4	4	6.2	42	14	14	0.6
2.9	3.1	80	6.5	52	30	18	1.7
0.6	5.3	62	10.1	707	44	9	0.6
1.5	4.1	2	2.6	179	5	5	5.7
3.7	4.3	26	8.1	65	36	13	3.0
1.4	3.9	7	3.8	43	55	9	2.4
23.5	3.7	–	–	–	2	30	1.0
4.2	4.1	26	1.7	214	49	17	5.4
2.0	6.7	4	2.2	107	8	8	4.6
1.2	4.9	15	1.0	175	61	10	3.6
8.0	4.9	6	3.9	258	34	21	6.0
8.4	13.0	16	1.5	318	30	25	5.8
3.8	3.8	24	1.9	178	59	10	6.2
1.5	8.0	29	2.2	492	43	13	1.4
1.0	5.2	5	4.5	223	59	8	1.7
4.6	5.7	46	4.2	100	17	30	1.7
1.9	2.7	9	1.0	71	9	9	7.3
4.1	4.4	14	1.2	235	56	14	7.4
0.6	5.8	30	1.4	109	48	13	1.2
0.1	7.7	–	4.9	35	6	6	0.3
1.8	3.7	9	1.4	62	53	11	3.4
2.2	6.9	70	6.3	466	51	9	3.5
2.6	5.1	98	16.1	162	38	10	2.1
0.9	7.1	55	2.0	160	6	6	2.3
3.5	5.3	49	5.7	216	33	12	2.5
0.7	3.4	3	0.9	171	54	17	1.1
6.4	5.4	8	3.3	362	53	10	10.7
1.7	3.1	2	3.2	191	11	11	2.2
1.1	3.1	7	2.1	48	64	6	2.7

7. Urban population (percentage of Mexico).
8. Annual increase in urban population, 1960–70 (percent).
9. Irrigated area as a percentage of cultivated area.
10. Productivity per worker in agriculture (thousands of pesos).
11. Productivity per hectare in agricultural production (pesos).
12. Economically active population employed in agriculture (percent).
13. Economically active population employed in manufacturing (percent).
14. Population employed in agriculture (percent).

(Table continues on the following page)

Table 5-6 (*continued*)

State	*(15)*	*(16)*	*(17)*	*(18)*	*(19)*
Aguascalientes	0.6	0.5	173	6.1	0.553
Baja California	1.9	2.8	149	13.5	0.654
Baja California (Territory)	0.1	0.4	385	14.6	0.474
Campeche	0.5	0.4	119	6.6	0.528
Coahuila	2.4	3.7	232	14.2	0.515
Colima	0.3	0.7	141	12.8	0.495
Chiapas	1.0	1.3	140	3.4	0.628
Chihuahua	2.4	3.1	130	8.1	0.540
Durango	1.0	1.2	137	5.4	0.588
Federal District	30.7	33.6	230	20.7	0.501
Guanajuato	4.5	2.8	161	5.1	0.582
Guerrero	1.4	2.1	157	5.6	0.664
Hidalgo	1.4	1.3	134	4.5	0.623
Jalisco	8.6	5.2	153	6.7	0.529
México	11.4	6.8	299	7.5	0.550
Michoacán	2.6	2.2	130	4.0	0.590
Morelos	1.0	0.9	150	6.4	0.524
Nayarit	0.5	0.8	153	6.0	0.460
Nuevo León	6.7	6.1	216	15.3	0.501
Oaxaca	2.1	1.5	99	3.1	0.668
Puebla	4.2	2.9	150	4.9	0.628
Querétaro	0.8	0.7	180	5.6	0.589
Quintana Roo	0.1	0.1	227	6.6	0.519
San Luis Potosí	1.7	1.9	143	6.1	0.613
Sinaloa	1.4	2.0	150	6.8	0.473
Sonora	1.3	3.2	154	12.5	0.490
Tabasco	0.5	0.7	84	4.1	0.517
Tamaulipas	2.1	3.0	109	8.8	0.558
Tlaxcala	0.8	0.3	116	3.0	0.538
Veracruz	4.4	5.9	114	6.5	0.583
Yucatán	1.0	1.1	130	6.3	0.636
Zacatecas	0.6	0.8	123	3.4	0.649

15. Population employed in manufacturing (percent of Mexico).
16. Total income (percentage of Mexico).
17. Total income (percentage increase 1960–70).
18. Per capita income (thousands of pesos).
19. Income distribution, 1969 (Gini coefficient).

Source: Area—*Atlas de Mexico* (1972); population and economically active population—*IX Censo General de la Población, 1970* (1972); irrigated acreage—Secretaria de Recursos Hidraulicos (1973); productivity in agriculture and income distribution—World Bank data; and income—Presidencia de la Republica and U.N. Economic Commission for Latin America. Data are in current prices.

Table 5-7. *Origin and Destination of Road Traffic, 1970*
(thousand vehicles a year)

Origin	*Destination*						
	Northwest	*North*	*Northeast*	*Southwest*	*Central*	*Southeast*	*Total*
Northwest	5,114	23	29	141	79	8	5,394
North	28	1,864	2,968	250	380	8	5,495
Northeast	27	2,894	7,060	120	370	455	10,926
Southwest	142	244	144	8,108	1,393	28	10,059
Central	89	387	369	1,505	26,531	1,163	30,044
Southeast	5	10	497	35	1,181	4,419	6,148
Total	5,405	5,419	11,067	10,159	29,935	6,081	68,066

Source: Data provided by Ministry of the Presidency.

Table 5-8. *Origin and Destination Percentage Distribution of Telephone Traffic, 1973*

	Destination								
Origin	*International*	*San Luis Potosí*	*Tijuana*	*Torreón*	*Ciudad Juárez*	*Mexico City*	*León*	*Guadalajara*	*Monterrey*
San Luis Potosí	3.50	16.31	–	–	–	35.90	3.51	5.71	7.13
Tijuana	–	2.75	–	–	–	43.51	–	10.55	–
Torreón	3.53	5.20	–	14.71	2.53	29.66	–	2.98	13.11
Ciudad Juárez	19.30	–	–	4.63	12.94	21.00	–	–	3.90
Mexico City	8.40	1.47	0.78	1.61	0.73	8.19	1.87	7.74	5.94
León	1.86	2.52	–	–	–	28.69	23.20	10.22	–
Guadalajara	5.09	1.01	0.84	0.77	–	39.11	2.91	17.33	3.37
Monterrey	12.99	1.35	–	3.36	0.56	32.82	0.74	3.48	9.85
Oaxaca	0.92	–	–	–	–	53.56	–	–	–
Puebla	0.98	–	–	–	–	59.71	–	0.92	0.93
Mazatlán	5.28	–	–	–	–	24.91	–	13.27	–
Reynosa	13.08	–	–	–	–	14.26	–	–	22.75
Tampico	2.13	2.69	–	–	–	36.38	–	2.15	9.70
Coatzacoalcos	0.50	–	–	–	–	32.80	–	–	–
Hermosillo	10.34	–	4.82	–	–	19.90	–	4.84	–
Veracruz	0.93	–	–	–	–	43.97	–	–	–
Mérida	2.42	–	–	–	–	39.62	–	–	–

	Destination									
Origin	*Oaxaca*	*Puebla*	*Mazatlán*	*Reynosa*	*Tampico*	*Coatzacoalcos*	*Hermosillo*	*Veracruz*	*Mérida*	*Others*
San Luis Potosí	–	–	–	–	3.40	–	–	–	–	24.54
Tijuana	–	–	2.07	–	–	–	10.33	–	–	30.79
Torreón	–	–	–	–	–	–	–	–	–	28.28
Ciudad Juárez	–	–	–	–	–	–	–	–	–	38.23
Mexico City	1.23	7.18	0.45	0.49	2.05	1.22	0.88	2.82	1.36	45.59
León	–	–	–	–	–	–	–	–	–	33.51
Guadalajara	–	0.61	1.10	–	0.54	–	0.77	–	–	26.55
Monterrey	–	0.73	–	3.64	2.73	–	–	–	–	27.75
Oaxaca	19.38	7.46	–	–	–	–	–	–	–	18.68
Puebla	1.09	19.15	–	–	–	–	–	1.62	–	15.60
Mazatlán	–	–	15.34	–	–	–	–	–	–	41.20
Reynosa	–	–	–	16.67	4.13	–	–	–	–	29.11
Tampico	–	–	–	2.59	16.62	–	–	–	–	27.74
Coatzacoalcos	–	1.85	–	–	–	28.16	–	9.45	–	27.24
Hermosillo	–	–	–	–	–	–	18.85	–	–	41.25
Veracruz	–	3.54	–	–	–	5.00	–	10.27	–	36.29
Mérida	–	–	–	–	–	–	–	–	29.21	28.75

– Not applicable.

Source: Ministry of Public Works (1973).

There is no doubt that the northwest as a whole was strongly integrated. One measure of this is the fact that a larger proportion of road transport movements in 1970 both originated and terminated within the region than in any other of the six principal regions. Although these data refer to both subregions, they were strongly influenced by the internally oriented nature of the Baja California economy relative to the rest of Mexico. Inevitably, given its location and economic structure, the Tijuana/Mexicali subregion had very strong links with the economy of southern California, implying that it was not completely autarkic. Distance was, and will remain, a significant impediment to more complete integration with the Mexican economy. In 1970, it still took forty-four hours to travel by road from Mexico City to Tijuana and forty-one hours to travel from Mexico City to Mexicali.

In sum, the Tijuana/Mexicali subregion was in many ways set apart from the rest of the country. Its economy was thriving mainly as a result of the development, since 1940, of intense relations with the even more thriving and highly prosperous economy of southern California. It was also, however, an area with many problems that were, for the most part, related to the proximity of the United States. The rapid growth rates of Mexicali and Tijuana were strongly affected by migration from other parts of Mexico, since the principal motivation for migrating to Baja California was the opportunity to eventually migrate to the United States. Although these cities were relatively prosperous, this migratory influx was larger than they were able to absorb, either economically or socially.

The Culiacán subregion was more closely integrated with the rest of the Mexican economy than was the Tijuana/Mexicali subregion. The development of prosperous agricultural economies and thriving cities was closely related to the impetus of the agricultural sector, but was also strongly affected by influences from the United States. This was particularly true of market opportunities, but also of enterprise and technological diffusion.

This subregion was characterized by both demographic and economic growth. The core city of Culiacán had grown at a rate well above the national average, and its secondary cities—Ciudad Obregón, Hermosillo, and Mazatlán—had also been dynamic.[1] Per capita income in the subregion was much higher than in the nation as a whole, and income distribution was among the most equitable in the country: the Gini coefficient in 1970 being less than 0.50, whereas the national average was 0.58. Accessibility between the Culiacán subregion and the rest of the country was better than that of the Tijuana/Mexicali subregion, as reflected in the driving time of eighteen hours from Culiacán to Mexico City, compared with that to Tijuana and Mexicali, and the relatively well developed transport services to the rest of the country.

1. Mazatlán has been an exception during most of the period, but it became a major tourist center during the late 1960s.

Culiacán had relatively more intensive links with the northwest (Monterrey and Monclova) and the southwest (Guadalajara and Salamanca) than with Mexico City, but its internal links (with Hermosillo, Mazatlán, Nogales, and Ciudad Obregón) were stronger still. The pattern of traffic to and from Hermosillo shows that Culiacán did not dominate this subregion to the same extent that Tijuana/Mexicali dominated Baja California. Hermosillo had strong links with the center (Mexico City and Puebla in particular), with the northwest, and with the southwest. The pattern of telephone traffic confirms strong links with Mexico City, although they were notably weaker than those for most other large cities. Problems of interpretation arise from the fact that data on railroad freight movements and air traffic patterns inevitably emphasize long journeys and thus deemphasize movements within regions. All these data suggest, however, that the Culiacán subregion was more closely tied to the rest of the country than to the Tijuana/Mexicali subregion.

THE NORTH. This region is also divided into two subregions: the states of Chihuahua and Durango, with a regional center in Chihuahua City, and the states of Zacatecas, Aguascalientes, and San Luis Potosí, with a regional center in the city of San Luis. The region as a whole had little homogeneity, and can best be described in terms of its two subregions.

The Chihuahua/Durango subregion is extensive, occupying almost 20 percent of the national territory, but accounting for less than 5.0 percent of its population. It was generally not a dynamic region, either demographically or economically; its rate of population growth and income growth in the 1960s was lower than in other parts of the north. Compared with other parts of the country, it was relatively well off, but income levels and income distribution were inversely related, and the Gini coefficient was relatively high.

Compared with the central and the southern regions, the Chihuahua subregion was not heavily urbanized. Chihuahua and Ciudad Juárez dominated the urban structure. The latter is considerably larger than the former but, because of its location near the border, it did not fulfill the functions of a regional capital. Like Tijuana and Mexicali its economy was closely linked with that of the United States.

On the basis of road traffic data, the north region appeared to be strongly integrated with the northeast but had relatively weak connections with the northwest, the west, and the center, and hardly any at all with the south. Links between Chihuahua and other parts of the country were weak, but Ciudad Juárez had strong ties with both the center (Mexico City) and Guadalajara. These ties resulted from through traffic from the United States rather than from traffic originating in the Ciudad Juárez area. Air traffic data show that links with the center were an important part of the total air traffic pattern. As in the northwest, traffic with Mexico City accounted for a smaller share of the total traffic than that in the northeast, the west, or the south.

The second subregion of the northern region is much smaller (occupying little more than 7 percent of the country's land area), more densely populated (particularly in Aguascalientes), less urbanized, and poorer than the Chihuahua/Durango subregion. Agriculture provided more than half of all employment in this region, and productivity, except in Aguascalientes, was very low, resulting in a per capita income below the average for northern Mexico as a whole and only slightly above that of the southern states. Income was poorly distributed, the average Gini coefficient being above 0.60.

This subregion was quite strongly dominated by San Luis, its largest city, the only other sizable urban center besides Aguascalientes. Rail traffic between San Luis and other cities in the region shows strong links with Aguascalientes and Zacatecas, and also shows that the region had a strong relation with the ports of Tampico and Matamoros and with the inland cities of Monterrey and Nuevo Laredo, all of which are in the northeast. In spite of the relative proximity of the San Luis region to Mexico City and to the states of the center region (San Luis was only five hours by road from the capital), it should be regarded as part of northern Mexico.

THE NORTHEAST. Occupying nearly 15 percent of the nation's territory, this region was one of the best integrated in the country. Besides the regional capital of Monterrey, it contained several large cities, including Nuevo Laredo, Reynosa, and Matamoros on the U.S. frontier; the port of Tampico in the southeast corner of the region; and Saltillo and Torreón in the west. Although its population amounted to more than 8 percent of the national total, the fact that this was a highly urbanized region meant its share of the nation's urban population exceeded 11.0 percent.

It was also a prosperous region. More than 25 percent of the population was employed in manufacturing, as compared with an average of 14 percent in the northern region. Its prosperity was linked to the fact that agricultural productivity was unusually high. Per capita income was consequently well above the national average, but the Gini coefficient was comparable to that of other northern states. This region was both demographically and economically dynamic, having had higher rates of population and income growth than most other regions during the 1960s.

Rail freight data suggest that the northeast was not only well integrated internally, but also strongly linked to all other parts of the country, particularly the central region, and, to a lesser degree, the northern region. This is supported also by the patterns of air passenger traffic, road freight traffic, and telephone traffic. The northeast was thus large, prosperous, dynamic, and well integrated, enjoying a large internal market, close connections with the United States, and strong links with the rest of the country, emanating in particular from its unchallenged regional capital in Monterrey.

THE WEST. A comparison between the west and the northeast is particularly interesting. These regions were dominated by, respectively, the country's second and third largest cities, but there were marked socioeconomic and structural differences between them. Territorially, the western region was not very large, but contained about 10 percent of the nation's population and, in the 1960s, was one of the country's most demographically dynamic areas. Despite the presence of almost one and a half million people in Guadalajara in 1970, however, the region was less urbanized than might be expected, its urban population being about the same as the national average, whereas its rate of urbanization in the 1960s was somewhat slower than that of the nation as a whole. The level of employment in agriculture was similar to the national average, but productivity was relatively higher. This, and the fact that its share of manufacturing employment in 1970 was less than proportionate to its share of total employment, suggests that agriculture was the mainstay of the region's economy. Notwithstanding relatively good agricultural productivity, however, average per capita income was below that of the northern and central states, although the distribution pattern was relatively favorable.

Whereas the northeast boasted several large metropolitan areas besides Monterrey that provided a strong framework for regional integration and growth, the west did not. At a regional level, Guadalajara was a strongly primate city, being more than ten times larger than Morelia, the only other city in this region with more than 100,000 people.

Rail traffic movements suggested strong ties with the northwest (particularly with the Culiacán region), and the center (particularly the Federal Capital subregion centered in Mexico City and the Bajio subregion, which lies between Guadalajara and Mexico City). Data on road traffic, air traffic, and telephone traffic support this finding, although rail freight data show important links with the Chihuahua subregion to the north.

THE CENTER. Without question, Mexico City dominates the whole of the central region, an area that includes the states of México, Morelos, Guanajuato, Querétaro, Hidalgo, Puebla, and Tlaxcala, as well as the Federal District. Because it contains several regional centers, the central region may be divided into three subregions: The Federal District, México, and Morelos, with its center in Mexico City; Guanajuato, Querétaro, and Hidalgo, with its center in Querétaro (called the Bajio subregion); and Puebla and Tlaxcala, with its center in Puebla.

The central region covers less than 8 percent of the land area of Mexico, but, in 1970, contained at least 36 percent of its total population, nearly 25 percent of whom lived in the Federal District and the state of México. It was a more densely populated region than any other in Mexico, and more

than 70 percent of the population was urbanized. Outside the Mexico City subregion, the states of Querétaro, Guanajuato, and Puebla remained largely rural, and the population density of Querétaro and Hidalgo was notably lower than that of the region as a whole. Demographically, it had generally been less dynamic than most of northern Mexico and, except for Querétaro, México, and Morelos, the pace of urbanization had been slower.

Despite the largely urban nature of the central region, agriculture remained the source of livelihood for much of its population, accounting for more than half of all employment in Hidalgo, Guanajuato, and Tlaxcala. Agricultural productivity, particularly in Morelos, was generally high, with an average income in 1970 of over 150 pesos per hectare in all parts of the region except Tlaxcala. However, it was the manufacturing, commerce, and service activities of the central region which distinguished it from the rest of the economy.

Given these conditions, per capita income would also be expected to be comparatively high. Although this was the case for the Federal District, it was not so in many other parts of the region, such as Guanajuato, Hidalgo, Puebla, Querétaro, Morelos, and Tlaxcala. All of these states had relatively low income levels and relatively skewed patterns of income distribution. This, rather than the relatively favorable nature of the aggregate indexes of employment structure, revealed the region's dichotomous nature. The intense contrasts in socioeconomic welfare resulted mostly from the highly unequal pattern of land distribution in the rural sector and from the widespread rural poverty that occurred despite the high average levels of agricultural productivity.

Transport flows reveal the pattern of economic interaction, and show very strong centralization within the region. Rail traffic is not a good measure of links within the region, however, because of the relatively short distances involved and the excellence of the road transport system. This is reflected in the short road journey times between Mexico City and other cities in the region: Puebla was only two hours away; Querétaro, two-and-a-half; León, less than five; Toluca, only one; and Pachuca, less than two.

Traffic data show that although Mexico City and other cities of the central region were strongly linked with other parts of the country, rail links with the northeast, the northwest, and with the port of Veracruz to the east, were particularly strong. The pattern of road traffic distribution shows strong ties with the west and south. This is also reflected in air traffic. Although the northeast had strong links with the center in 1970, the western region accounted for more than 40 percent of the central region's outgoing traffic. The strength of the connections between the center and other regions—when measured in terms of different modes of transport—reflects the traditional powerful links with all other parts of the country. This region also had a relatively strong network of internal links, although these were comparatively weaker than those in the northeast.

Among the subregions of the center, the Mexico City subregion stood out by virtue of its large, urbanized population, its emphasis on manufacturing, its high level of personal income, and the dynamism of its recent demographic and economic growth. This was not only a tightly knit subregion, it was also the core of the national economy.

The Bajio subregion includes the states of Querétaro, Guanajuato, and Hidalgo and four of the nation's thirty-seven largest cities in 1970: León, Irapuato, Querétaro, and Pachuca. The role of León within the regional scheme was–like that of Torreón and Tampico–somewhat anomalous. In 1970 it was Mexico's seventh largest city. Straddling the border of Guanajuato and Jalisco, León occupied an uncertain status between the western region and the Bajio subregion. Despite its size, it did not have a dynamic recent history. It could therefore be argued that Querétaro should be the regional capital, although a case can also be made for the existence of a nascent linear metropolis, stretching from Querétaro to Irapuato, which enjoyed strong links within the subregion, as well as a close but independent relation with Mexico City.

In the eastern portion of the central region, the city of Puebla was the undisputed center of a densely populated and generally poor subregion, characterized by low and unequally distributed incomes.

THE SOUTH. Compared with the other regions, the southern states present a picture of almost unrelieved poverty and underemployment. Unlike the central region, however, where the strength of Mexico City provides a single dominant center, the south can be divided into three more equal subregions: Veracruz and Tabasco, with a principal center in the city of Veracruz; Oaxaca, Guerrero, and Chiapas with a center (albeit weak) in Oaxaca City; and Yucatán, Quintana Roo, and Campeche with a relatively strong center in Mérida.

The Veracruz subregion was markedly better off than the rest of the south in 1970. It was relatively large, accounting for 5 percent of the nation's area; relatively populous, containing almost 10 percent of the country's population; and, in the 1960s, was quite dynamic. It was relatively unurbanized, despite the fact that it contained six cities with more than 100,000 people: Veracruz, Coatzacoalcos, Minatitlán, Jalapa, Orizaba, and Villahermosa. Most of its population was employed in agriculture. Although the productivity of this sector was quite high, per capita income was low relative to that of the states of the northern and central regions.

Railroad links within the subregion were rather weak, although the Gulf Coast served as a traffic route between Villahermosa and Veracruz. There were strong ties to the central region in terms of outward railroad freight movements, and there were even stronger ties with the northeast in terms of inward movements. Patterns of road, air passenger, and telephone traffic stress the importance of links with the center, with roughly balanced flows

in either direction. The history of the southern region provides an outstanding example of how the core-periphery relation had so far operated to the general detriment and backwardness of the periphery.

The Oaxaca subregion is different in that it was hardly developed at all. Geography has had a lot to do with this, since the mountainous terrain in all three states inhibits economic progress. The subregion is fairly homogenous but barely integrated area that contains almost 12 percent of the national territory and, in 1970, was populated by about the same share of the national population, with an average density close to the national average. It was little urbanized and, except for Acapulco and Oaxaca, lacked large cities. Its agriculture was poor, and its productivity was low. Income here was the lowest in Mexico and was very badly distributed. The strongest links outside the region were with the center and the northeast (Torreón), and with the other subregions of the south, through the Isthmus of Tehuantepec. This was, in sum, an underdeveloped, poorly integrated subregion, perhaps presenting greater challenges to development strategy than any other in Mexico.

Finally, there is the Mérida subregion, where the city of Mérida, twelfth in population rank in 1970, provided an eccentrically located but nonetheless dominant center for the states of Yucatán, Quintana Roo, and Campeche. There were no other cities of any size in the subregion. The subregion was comparatively large, sparsely populated, unurbanized, and poor. Here too, geography is a critical factor in explaining why it had remained underdeveloped. The crucial problem with this subregion was that it lay at one extreme of the nation, and did not possess a resource base adequate to offset the disadvantages of its relative isolation. In the 1800s it became prosperous because of henequen cultivation, but as world demand for that crop declined, so did the fortunes of the subregion, and they have never recovered. This area was still heavily agricultural, but productivity was only moderate. Although the average level of income was somewhat higher than in the other subregions of the south, income was poorly distributed. Its links in 1970 were mainly with the center, which had to some extent replaced the intensive ties which this area once enjoyed with the southern United States (New Orleans) and with Cuba, although its rail links with the northeast were also (but only in a relative sense) quite strong.

The Mérida subregion was, in several respects, the antithesis of the northwest. Both were located at the extremities of the nation. But, whereas the Yucatán bordered on Central America, the northeast bordered on the United States. This, rather than resource endowment or enterprise, led to a fundamental difference in its development.

PART THREE

Urban and Spatial Policy

CHAPTER 6

Issues in Urban and Spatial Policy

ALL OF THE BASIC ISSUES of general urban and spatial policy outlined in Chapter 1 are well exemplified in Mexico. One of those issues—centralization in the core area of Mexico City—may indeed be better exemplified in Mexico than in any other country in the world, whereas the others—regional balance and the integration of rural and urban areas—are probably at least as well illustrated there as anywhere else.

Centralization

Discussions concerning the consequences of the dominant role of Mexico City are apt to generate more heat than light. As in other strongly primate countries, there is a widespread view that the centralization of economic power in Mexico City is both inequitable and inefficient. This view is based on the concept of the parasitic city which, because of its initial advantages relative to other cities, is able to draw on and, in certain respects, live off the rest of the country. Although this view is often carried to extremes, it is in fact closely related to the general concept of the core-periphery framework that was advanced earlier as an appropriate model for interpreting Mexico's urban and regional development up to the 1970s.

Another argument against centralization implicitly assumes that the absolute and relative size of Mexico City is incompatible with maximizing national economic growth, particularly in the long run. This position is not necessarily based on the idea of optimal city size. It rests, rather, on the fact that Mexico City, with a population of 11.0 million in 1975, is already among the world's largest cities, and that, even if its future growth is slower than that of the recent past, it will soon be the world's largest city. Apart from the disadvantages of location, the general concern is that its great size will pose increasing problems for both the metropolitan and the national economies, and therefore will constrain national economic growth.

There is no corollary to either point of view that calls for actually reducing the size of Mexico City. No one is proposing to relocate substantial

parts of the urban economy, although the 1970s saw some initiatives to move certain federal government agencies out of the capital. Nor has anyone seriously proposed direct controls on the growth of Mexico City, because it is generally appreciated that, in a free market and a free society, there is no practicable way to enact legislation to halt vigorous urban growth. The interpretation of these concerns has been, rather, that in the future, incremental urban growth should be encouraged outside Mexico City. This would ameliorate the problems associated with excessive centralization, and would encourage the rational development of resources in the periphery, which may otherwise be ignored. Although supporters of decentralization may be motivated by diverse concerns, such as national economic growth, distributive equity, and social and political equilibrium, there is a general consensus that decentralization is desirable. So far, however, there has been limited progress toward this goal.

Demographic and economic concentration

The extent of demographic concentration in Mexico City in 1940-70 has already been discussed. The annual rate of increase of the city's population decreased in the 1950s and 1960s compared with the 1940s, whereas the growth rate of the national population accelerated. At the same time, the components of population growth in the capital had changed significantly by 1970. Migration had become much less important than it had been in the 1940s, and natural increase had become more important, both relatively and absolutely. In 1970, Mexico City accounted for 18 percent of the total national population, for 30 percent of its urban population, and for more than 45 percent of the population of large cities (those with more than 100,000 inhabitants).

The degree of economic concentration in an area, as measured by various indexes, is generally greater than the degree of demographic concentration. In 1970 there was a higher concentration of the economically active population in Mexico City than elsewhere, which implies that employment was more concentrated there than population. Mexico City accounted for 30 percent of national employment in manufacturing, 38 percent of employment in services, 28 percent of employment in commerce, and 69 percent of employment in government.

Although the city has always been more important as a commercial and service center than as an industrial city, it was also the unchallenged industrial capital of the nation, as well as its principal market place, financial center, and seat of government. Its share of the nation's industrial employment has increased over time, and its share of industrial output has increased even faster (Table 6-1). This was presumably due in part to changes in productivity and to the fact that Mexico City's industrial sector

Table 6-1. *Economically Active Population and Value of Production in the Industrial Sector of Mexico City, 1940 to 1965*

Year	*Industrially active population (thousands of persons)*	*Proportion of total national industrial employment (percent)*	*Value of production (millions of pesos at current prices)*[a]	*Proportion of total national industrial production (percent)*
1940	178,369	24.4	n.a.	n.a.
1950	397,938	28.8	6,475	30.0
1960	701,385	34.4	19,967	43.2
1965	n.a.	n.a.	41,040	48.0

n.a. Not available.

a. These figures are for the Federal District and would be higher if they included the value of production of the municipios which are part of the metropolitan area but for which separate figures are not available.

Source: Unikel and Torres (1970) and Lavell (1972).

was relatively more modern (that is, there were more dynamic growth industries) than those of most other cities. Moreover, Mexico City had a relatively diversified industrial profile compared with the industrial sectors of the nation's other largest cities.

Nonemployment indicators showed the heavy concentration of commercial activities in Mexico City. Measurements refer to the Federal District rather than to the whole metropolitan area because of the way in which census data were recorded.[1] In 1965 the Federal District accounted for almost half the national value of sales (Mex$32 billion out of Mex$74 billion) and for a similar proportion of capital investment in commerce (Mex$20 billion out of Mex$43 billion). The Federal District had a notably higher level of sales per establishment than any other state (Table 6-2).

Data constraints limit the measurement of the concentration of services in Mexico City, but show that the services sector was even more concentrated there than was commerce. In 1965 the value of its services accounted for Mex$9.3 billion out of a national total of Mex$16.8 billion, and capital investment in the sector accounted for Mex$11.4 billion out of a total of Mex$19.7 billion. In 1972 more than 90 percent of the country's banks had their main offices in Mexico City, with savings deposits amounting to more than 60 percent of the national total. The hotels and restaurants of the capital produced more than half the national income generated in these subsectors. Up to 90 percent of the assets of professional activities, foreign trade agencies, consulting firms, research organizations, and investment services were concentrated there. As the seat of the federal government, Mex-

1. If available, data for Mexico City would show much greater concentration.

Table 6-2. *Sales of Goods and Services per Establishment, and Establishments per 1,000 Inhabitants, by State, 1940 to 1960*

State	*Sales per establishment (thousands of pesos)*			*Establishments per 1,000 inhabitants*		
	1940	*1950*	*1960*	*1940*	*1950*	*1960*
Federal District	72	136	275	11.11	36.42	22.79
México	48	39	64	0.59	5.96	6.18
Nuevo León	134	163	256	2.22	13.71	14.85
Coahuila	95	125	211	2.43	13.42	11.32
Chihuahua	70	132	204	2.40	9.08	7.30
Sonora	113	214	261	2.46	12.59	10.79
Tamaulipas	101	106	164	3.43	18.47	13.11
Morelos	45	63	87	1.61	12.44	13.06
Baja California	74	274	348	7.86	23.04	12.78
Quintana Roo	89	59	61			
Puebla	81	53	71	0.95	11.46	9.15
Veracruz	82	77	104	1.10	9.49	9.88
San Luis Potosí	73	105	81	1.24	6.41	9.83
Yucatán	92	53	89	1.90	20.03	9.90
Durango	68	57	83	1.12	8.50	7.01
Jalisco	88	76	126	1.08	11.43	8.85
Oaxaca	62	90	70	0.29	3.33	4.11
Guanajuato	75	61	102	0.78	7.15	7.58
Chiapas	50	53	67	0.69	5.66	5.81
Michoacán	60	51	66	0.72	6.91	6.85
Zacatecas	57	35	50	0.64	8.61	7.10
Tlaxcala	34	19	30	0.63	8.52	9.51
Hidalgo	61	36	58	0.70	6.10	6.55
Querétaro	86	54	87	0.65	8.96	7.57
Sinaloa	74	98	179	1.81	11.90	9.74
Campeche	45	51	140	1.69	13.89	12.20
Aguascalientes	66	74	97	1.47	9.82	12.69
Nayarit	84	53	70	1.30	11.36	10.12
Guerrero	57	78	147	0.47	3.56	4.23
Colima	40	58	93	2.83	14.05	10.62
Tabasco	60	75	95	0.76	7.29	7.34
Baja California (Territory)	80	105	139	1.98	15.49	12.04
Average	77	103	172	2.06	12.50	10.51

Note: Data on both commercial and service establishments are included.
Source: Anuario Estadístico, (various years).

ico City provided almost 70 percent of national employment in this sector, although the significance of its governmental functions was much greater than is implied by employment data alone.

Mexico City is the economic, demographic, cultural, political, and social core of the country and dominates the nation. Yet it is a less primate city

than the capital cities of many other Latin American countries, and its primacy in some respects, particularly demographic, has been decreasing since 1960. Other urban areas—including Monterrey and Guadalajara among the five largest cities, and Mexicali, Acapulco, Tijuana, and Coatzacoalcos among other large cities—grew more rapidly through 1970. Measured in these terms, the problem of centralization may thus seem of declining urgency. That impression, however, may be erroneous, because centralization must be seen not only in relative and comparative terms but also in absolute terms.

The case against centralization

The historical dynamics of the growth of Mexico City embodied in the core-periphery relation are now of less concern than the question of whether centralization has or is likely to have malevolent rather than benevolent consequences. Thus, it is not important to ask whether the growth of Mexico City has been parasitic. Instead, it is important to establish, from the viewpoint of the national economy, what disadvantages are associated with its relative and absolute size, either now or in the future. These possible disadvantages include economic, social, and political problems at a national level as well as problems associated with the quality of life in Mexico City.

PROBLEMS OF MACROECONOMIC EFFICIENCY. There is no feasible way to measure the cumulative negative effects of centralization. A number of arguments, however, are commonly advanced to support the view that from the standpoint of the national economy it is undesirable.

First, if important opportunities for national economic growth are foregone as a result of centralization in the core, centralization could be said to be inefficient. Such opportunities generally refer to untapped natural resources in the periphery. A case in point is the mineral resources of the southern states of Oaxaca, Chiapas, and Guerrero, which it would almost certainly be in the national interest to exploit. Because these states have been historically neglected, however, they have relatively little infrastructure, and because their human resources are poorer than those in the core, there have been few local development initiatives. Likewise, the tropical Gulf Coast, a potentially rich agricultural region, has not been developed, partly because economic decisionmakers in the metropolitan core have regarded the area as little else than a valuable source of petroleum. In such circumstances any development is likely to leave the periphery dependent on the core.

The cost of providing certain kinds of social overhead appears to be higher in Mexico City than elsewhere, although the data are incomplete and do not lead to definite conclusions. The best example concerns water

supply and sewerage. In the 1960s it became increasingly expensive to supply the capital with water because it was necessary to bring it from increasingly remote sources; the option of obtaining water by mining of aquifers below the city no longer existed, since Mexico City is built on a lake bed, and aquifer mining had exacerbated the long existing problem of the city sinking into the lacustrine subsoil. Subsidence was a serious problem and already by 1970 had caused the urban area to sink substantially since 1900. This greatly increased the cost and reduced the possibility of building upward. It also increased the cost of underground tunneling and of some kinds of road building. Water supply problems combined with subsidence problems usually imply increased drainage and sewerage costs. In this case, the main part of the urban area was 40 feet below the surface of the basin, so that sewage had to be pumped up in order to evacuate it. Aquifer mining not only exacerbated this problem, but also involved a greater risk of seismic tremors, because the more plastic the geophysical structure, the more vulnerable it becomes to earth tremors.

The only alternative to water mining is water transfer between basins. But the marginal cost of this process rose steeply in the 1960s because of high demand. In addition, the geographic circumstances require very high pumping lifts to the valley as well as transfers over very long distances. One of the newest sources was the Miguel Aleman dam, 200 miles away in the state of Veracruz. By the mid-1970s water supply was a serious issue, and assuming that the costs of water supply in other cities were likely to rise less sharply in the future than those in the capital, this seemed likely to represent an increasingly significant disadvantage. (Plan Nacional Hidraúlico, 1975)

A similar but less powerful, argument against centralization is the cost of supplying Mexico City with electric power. The area immediately around the capital has no thermal or hydropower resources, and the city's power requirements are therefore met with energy generated elsewhere and transported through the national grid. Moreover, by the 1970s, the power sector in Mexico City probably was less efficient than elsewhere, because the very size of the urban area implied the need for a more complex distribution network than in other cities.

The evidence on other activities is diffuse. Construction costs in Mexico City seemed to be higher than elsewhere, not only because the cost of materials, and in many cases of labor, was relatively high, but also because there were severe and unique problems associated with the physical conditions of building in the metropolitan area. These are closely related to the phenomenon of subsidence, mentioned earlier, and to the need to build with due regard to the risk of earthquakes. Moreover, the mountains surrounding the Valley of Mexico greatly restrict and increase the cost of developing suitable land for urban expansion. In the past, the city tended to

grow toward the south and west of the original core because the soil and subsoil conditions were relatively better. By the 1970s, however, urbanization had expanded as far as the mountains in most directions, so that the future thrust will probably be through gaps in the mountains to the north and the southeast, which will tend to increase the costs of new infrastructure.

Another economic disadvantage of centralization concerns the operation of the transport network and poses problems on three levels. First, the national railroad and road systems are strongly centered on the capital, to which "most roads lead" (Tucker 1957). This implies the inevitable congestion of interregional traffic, because so much traffic must pass through one place.

Second, the increasing size of the city has caused increasingly serious congestion within the city. The economic cost of agglomeration certainly includes that arising from the slowed communications within the urban area. This problem has existed since the 1950s, and although the metropolitan authorities appreciated its existence, there was no evidence through the mid-1970s that it was being resolved. Most road transit services were privately owned, but even with the completion of a publicly owned three-route underground railway system in 1972, the journey to work and all manner of routine communications within the city had become more difficult and less efficient. In brief, transport problems arose because of: (a) the large number of vehicles (by 1975 more than a million registered automotive vehicles in the metropolitan area); (b) the inefficiencies in the urban transport system resulting in the duplication of some passenger routes, a lack of service on others, and unreliable schedules; (c) the unorganized traffic control system; and (d) the disregard of parking regulations in the city center, although stricter enforcement began in the early 1970s.

Besides constructing the metro and tightening up parking controls, efforts were made after 1970 to improve traffic flows by constructing a new beltway within the city. This illustrates another cost of urban centralization, since if the city were smaller, an inner-beltway would not be needed, and it is clear that both its direct and indirect costs were very high. The indirect costs were particularly substantial, because the road was built through an already urbanized area, and thus involved substantial disinvestments.

The third point concerning the relation between the efficiency of the transport system and centralization is that, because both the urban and the transport systems are so heavily concentrated, the transport system failed to provide adequate service for the development of the periphery. There are still relatively few east-west routes across the country, and the density of both the road and rail systems is related to the development of less developed states. The lack of adequate transport facilities helps to explain the relative backwardness of the periphery, but even more important is the fact

that future national economic growth could be retarded by the unbalanced nature of the transport system.

These appeared to be the principal economic disadvantages of centralization through the mid-1970s, and they were not inconsequential. But it seemed that the noneconomic disadvantages could well be more important.

SOCIAL PROBLEMS. It is easy to fall prey to fears of gigantism when considering such social consequences of centralization as crime, the weakening of the family, and the erosion of the social fabric. None of these, however, fall within the scope of this book. But the social consequences of centralization have several other dimensions, which can be divided into macrosocial (or national) consequences and microsocial (or local) consequences. Since the latter belong to the subsequent discussion of the quality of life, only the first is considered here.

On a national scale, there is a clear and inevitable relation between urbanization and social change. When social development is measured by a composite index of socioeconomic development, the most urbanized entity (the Federal District) was also the most developed, and the least urbanized entity (Oaxaca) was the least developed (Chapter 3). It could thus be argued that the concentration of such a large proportion of the nation's urban development in one city has been harmful to the rest of the nation, particularly to the least advantaged parts of the periphery.

To say this implies, however, that in an alternative scheme, some of the urban growth that has occurred in Mexico City could have been equitably and efficiently distributed around the country. In some other scheme, a less concentrated urban system might perhaps have evolved, especially had there been a less protected internal market that might have led to less concentration. The goals of social justice would not have necessarily been thus served, however, although the concentration of the urban system was historically associated with a geographic allocation of public social expenditures that strongly favored Mexico City.

Another aspect of the social consequences of centralization that does not directly concern equity, refers rather to the social consequences of massive agglomeration. Given Mexico's economic conditions in the 1970s this also meant a concentration of underemployment, and thus low incomes, in the metropolitan area. The larger this mass, the more critical the situation. Although there is clearly a political side to this question, it may be inferred that the sheer size of the problem provides a compelling reason for allocating federal resources to the Federal District to maintain a manageable social situation. In the past, the inhabitants of Mexico City have received subsidized tortillas, subsidized electricity, and even subsidized fuel. And whereas all of these things may be viewed in terms of economic efficiency, they may also be seen in terms of equity. The question is whether, basi-

cally, it is fair that Mexico City, because of its size and its delicate social constitution, should absorb a disproportionate share of the available amount of public expenditure for social welfare. What happens as it grows? Surely, the existing imbalances will become even greater and more inequitable.

The critical question here is whether, given the past and likely future levels of underemployment in Mexico City (estimated in the mid-1970s at around 30 percent), ever larger amounts of public resources should be allocated to maintain a minimum standard of living in the capital. By the end of this century, the Mexico City metropolitan area will contain more than 20 million people, and assuming that the percentage of underemployed may not be much reduced from its 1970 level, it is evident that there could be a very large number of underemployed people in the capital at that time. In such circumstances, the resources that would be needed to maintain social equilibrium could become very significant.

POLITICAL PROBLEMS. The political and social consequences of centralization are closely related in that the problem of preserving social equilibrium in an urban mass exceeding 20 million people is also, almost by definition, a political problem.

Beyond this, there are two other closely related political dimensions to centralization. One concern is that the federal government is by far the most powerful agency of public action in the Mexican political system and is strongly concentrated in Mexico City. Decisionmaking has been centralized so much that the needs and circumstances of the periphery may have been disregarded and misunderstood in formulating national policies. On the one hand, the economic potentials of the periphery may have been ignored; on the other, the social conditions of the periphery may have been disregarded, and this was reflected in hostility toward the capital. Those in the periphery felt, no doubt to an exaggerated extent, that the concentration of political power in the Federal District left them little voice in determining their own futures.

A second consequence of political concentration is that private firms often behave in such a way as to suggest that access to the federal government is an important consideration in locating their offices. Businesses found it increasingly necessary to locate their headquarters and sometimes their plants in the capital and there were several large firms that had their plants in Monterrey, Guadalajara, or Puebla, but their head offices were in Mexico City. From a national point of view, Mexico City may be a desirable location for industrial growth, but it may also be undesirable that political accessibility should play such a powerful role in deciding where to locate industries. However, alternatives within the Mexican political system were not obvious.

PROBLEMS WITH THE QUALITY OF LIFE. Finally, some negative implications of centralization concern the quality of life in the metropolitan area. Several of these have been mentioned earlier. Traffic congestion is a prime example of a consequence of concentration that negatively affects both national economic efficiency and the quality of life.

Several measurements show that by 1970 Mexico City had one of the highest levels of atmospheric pollution of any large city in the world, caused principally by more than one million motor vehicles, a third of which were more than eight years old and which produced 60 percent of the atmospheric impurities, and by industrial effluence from more than 40,000 industrial plants and more than 4,000 boilers producing toxic gases. Given the heavy concentrations of motor vehicles and industry in the capital, both causes of pollution appeared to be linked to the structure of the urban system; if the economy had been less centralized, Mexico City would have been less polluted.

Industry and traffic did not, however, account for all of the air pollution. Other factors included the use of oil for domestic purposes in many households and the deficiency of refuse services, resulting in the deposit of more than 4,000 metric tons of garbage on the city outskirts and in a limited number of unurbanized spaces within the metropolitan area each day. A 1973 United Nations study showed that toxicity of the air in the Federal District was 100 times above the admissible level, and that the carbon monoxide content alone was twice that of Manhattan Island in New York City. The same study noted that the city consumed more than 3 million cubic meters of gasoline, 1 million cubic meters of fuel oil, and 1.7 million cubic meters of gas a day, all of which produced 5,000 tons of toxic matter every day.

Wherever Mexico City were located, its pollution would be a serious problem. But, as with the problems of water supply and construction costs mentioned earlier, geographic location undoubtedly makes matters worse. The intermontane basin of the valley gives rise to the phenomenon of thermal inversion, which causes some of the impurities that might be diffused into the atmosphere, were Mexico City located on a coastal plain, to be instead dumped onto the city. Further, the dried-up bed of Lake Texcoco to the north of the city and the prevalence of north-south winds, meant that in 1972, in addition to other environmental impurities, about 500 metric tons of dust carrying silicone particles and pathogenic germs (estimated to reach 750 kilograms per square kilometer) fell daily on the urban area. To judge from interviews with a cross-section of the city's population, there was no question that the inhabitants were increasingly aware of the psychic and physical costs which this imposed on their everyday lives. And there were few visitors who failed to remark on the smog, which on most days lay like a grey blanket over the Valley of Mexico.

The case for centralization

Some of the arguments in favor of centralization have already been mentioned, particularly those concerning agglomeration economies. There are also, however, several noneconomic advantages.

ADVANTAGES FOR MACROECONOMIC EFFICIENCY. Each of the principal categories of agglomeration economies (economies internal to the firm, economies external to the firm but internal to the industry, and economies external to both firms and industries) has had an important bearing on the growth of Mexico City (Chapter 2). This is true not only in terms of aggregate population size, but also, and more significantly, in terms of the concentration of income. Many firms have located in Mexico City for proximity to the largest market in the country and because communications between the capital and the rest of the country provided easy access to other markets within Mexico. In addition, the historical structure of freight rates tended to favor a central market location, even for firms producing goods that involved the use of heavy, bulky, raw materials. A core location was thus almost inevitable for many firms in many industries, because any other would have imposed substantial cost disadvantages.

Industrial concentration also has been closely linked with industrial protection. Were the importance of the domestic market to decline and the economy to become more open and competitive, a central location would have become less crucial, and prospects for the development of domestic markets in the periphery would have improved. In particular, the growth of demand in the periphery would imply the achievement of new minimum threshold sizes for noncentral markets. Thus, because of changing geographic demand, the overwhelming advantages of proximity to a specific market may have become less important.

Mexico City has offered and still offers many economies external to firms but internal to industries, such as those derived from the development and maintenance of specialized labor and material markets and of forward and backward links between industrial branches. Mexico City's status as a dominant industrial center can be documented from 1900, and, by 1940, when rapid industrialization began, it was the country's principal place of manufacturing (Chapter 2). It continued to attract new enterprises, because in any other location firms (especially small ones) would have suffered from the lack of access to ancillary and auxiliary industries.

In the mid-1970s this situation seemed likely to continue. Insofar as new firms depend on the availability of specialized markets, Mexico City seemed likely to retain its initial advantage as an industrial location. But would these advantages also become available elsewhere? To some extent they

already were, because the size and industrial complexity of Monterrey and Guadalajara implied a significant array of external economies, since both were sufficiently diversified to provide a viable footing for most branches of industrial activity.

There are also external economies that result from increases in total economic size of given locations. These are probably more relevant than those already mentioned and indicate the advantages of agglomeration that may be referred to as urbanization economies. In this context, the argument for the relative attractiveness of Mexico City as a center for continued growth appears quite strong. First, as noted previously, the presence of the federal government is a powerful magnet for industrial firms, offering a major externality unique to Mexico City. Second, the city has a large and in many respects unique supply of labor, especially of managerial talent. Because Mexico City provides an attractive social, cultural, political, and economic milieu, it is uniquely attractive to many middle and senior managers in both the public and private sectors and to many entrepreneurs, despite the drawbacks of the quality of life of the city. Third, Mexico City's traditional role as the center of financial and commercial services implies that firms tend to look to the capital for loans or equity capital, unless they are strongly tied to another location.

Finally, Mexico City previously offered significant economies of scale for many public services (notably in health and education), although this picture had already begun to change by the 1950s (Yates 1962). By 1975 it was doubtful that the argument remained valid. Yet the past and perhaps the present advantages of agglomeration may not be trivial, for it is difficult to envisage that Mexico could have achieved its remarkable record of sustained economic growth for more than thirty years without the externalities that were available to promote industrial development in its capital city.

NONECONOMIC ADVANTAGES. Historically, and to the point at which the economies of scale are exhausted, centralization has made it possible, and may still make it possible, to provide certain social services in Mexico City that could not be provided elsewhere at the same cost. Centralization may also have helped to consolidate the nation's social fabric over the past half century. The same thing could perhaps be said about the political advantages of a centralized urban system: that the concentration of federal authority has been a significant factor in developing the nation's political structure since the revolution.

The social and political environments of the city are, moreover, important aspects of the advantages that it offers to individuals whose decisions about household location are strongly influenced by social, political, educational, and cultural opportunities as well as economic advantages. The

capital is, after all, the center of innovations, the setter of new trends, and the arbiter of the nation's cultural values. As a result many Mexicans wish to live there.

Not all Mexicans, however, have the desire to live in the capital. For one thing, Mexico City had not been, and in 1975 was not, the only source of entrepreneurial spirit in the country. Indeed, Monterrey is probably more remarkable in this respect. Nor is the capital, in the present era of rapid communications and cultural diffusion, the only center for the transmission of international values. Many cities are closer to the United States, which is an important source of such trends. But many of those who live in the cities of the periphery feel they are denied the excitement of, and the involvement in, new developments that come from living in the center of things. And, whether this advantage is—for most of them—more imaginary than real, there is no denying the adverse effects of this attitude on the development of a number of peripheral cities. How much these attitudes affect the quality of life is perhaps debatable.

Although some people may measure the quality of life in terms of physical criteria (which point to the city's shortcomings), others believe that it refers to cultural and psychological criteria as well. And in these terms, Mexico City is far and away the most desirable place in which to live and work, because it offers a range and diversity of cultural facilities, which have no parallel in the country.

On balance

There is no way of reaching a conclusive and quantified judgment about the tradeoff between the advantages and disadvantages of centralization, even if the analysis were confined to economic matters. The addition of social, political, and cultural factors makes it even harder to reach a definite conclusion.

A key issue, however, is obviously the future size of Mexico City and its implications for national economic efficiency, social justice, and the quality of life. It is therefore appropriate first to assess the probable course of the future growth of the metropolitan area.

From 1940 to 1970 the population of the Mexico City metropolitan area grew from 1.8 to 8.6 million, and it will continue to grow, regardless of whatever else happens. Even if all further migration to the area were to have ceased in 1970, Mexico City's population would still amount to 24 million by the year 2000. A possible figure, however, assuming a 50 percent reduction of migration compared to the 1960s, would yield the astounding population of 35 million, representing 26 percent of the country's projected population by the end of the century (Carrillo Arronte 1970). And even

this may be a conservative estimate.[2] Regardless of its exact size at the turn of the century, Mexico City's population will probably triple its 1970 size and could grow by much more. This is of central importance in arriving at some tentative conclusions about the issue of centralization from the viewpoint of spatial policy.

ECONOMIC CONSIDERATIONS. Looking first at the economic advantages and disadvantages, it has been stated earlier that there seems to be a close relation between the historical process of industrial growth led by import substitution in a protected market and the process of centralization. And in the future, the growth of exports and of the manufacturing sector will be required for sustained economic growth. This implies a more open economic environment, featuring less protection and a gradual increase in the ratio of exports to GDP, which implies, in turn, a corresponding increase in the ratio of imports to GDP. Assuming that these trends emerged, the role of the central market would be modified by the increased importance of external markets, and it would be less important in the future to locate a business in Mexico City in order to have the greatest access to the market. Given this situation, and taking account of transport cost, location in the periphery, close to points of exit for manufactured exports, would thus become more efficient from the standpoint of the national economy than location in Mexico City.

Further, whereas Mexico City now offers a unique range of externalities, the future growth of cities in the periphery will necessarily dampen that advantage. As their growing internal markets demand successively more commerce and service functions and increasingly more complex manufacturing products, these cities will also tend to acquire a wider array of business facilities. Moreover, entrepreneurs, executives, and managers would be more willing to live in peripheral cities if the quality of life in Mexico City continued to deteriorate. As the growing cities offer more conveniences and amenities, the cultural dominance of the capital may tend to weaken, particularly if public sector resources in the periphery are allocated to improve the conditions of life, such as schools, hospitals, and other public services. It can also be reasonably expected that, as opportunities develop, the private sector will tend to provide other facilities such as entertainment and recreation.

The preceding argument suggests that by the 1970s Mexico may have entered, or may have been on the verge of entering, a phase in its development when polarization reversal would begin to occur. This is consistent with the earlier observation that the marginal cost of providing certain public services and of constructing some kinds of social overhead capital was by then higher in Mexico City than elsewhere.

2. Those who regard Mexico City as already too large will have to revise their thinking.

There is the further consideration that whether decentralization is economically desirable depends also on whether it is considered more efficient or otherwise preferable to tap the resources of the periphery by enclave exploitation or by an integrated kind of development. Although there is no final answer on this question either, a fundamental and obvious distinction in values exists between what is best for the firm and what is best for the national economy. For the firm, the decision may be relatively easy, in that the question can be answered by the overall balance of the costs of production and distribution in alternative locations. When the question is raised from a national point of view, the relevant perspective is that of social cost. The evidence suggests, however, that in some cases resource development may be more efficient if undertaken in the context of integrated regional growth.

NONECONOMIC CONSIDERATIONS. The social consequences of the continued growth of Mexico City would almost certainly include a disproportionate concentration of public as well as private resources in the capital. First, it is probable that the marginal efficiency of capital in Mexico City would be reduced as economies of scale and other agglomeration economies were exhausted. Second, it would become necessary to concentrate social outlays to compensate for an increasing mass of underemployment. Under such conditions urban concentration would certainly be even more at odds with the concept of equity, since those who lived outside the capital would continue to receive less in per capita outlays than those who lived in it. And if the problems of metropolitan government became so severe that only federal intervention could resolve them, this imbalance could become increasingly delicate.

Finally, there is the question of the quality of life. The metropolitan area of Mexico City is not a single, homogeneous urban space. The next ten to fifteen million people are not likely to move into the physical space occupied by the first ten. Most of them will seek a place to live beyond the boundaries of the presently built-up areas in the valleys of Toluca, Cuernavaca, Puebla, and Tlaxcala. These and other areas less than an hour from the Federal District are so closely linked with the old center that they form one coherent economic and social unit. The internal cohesion of this region is likely to be greatly strengthened in the future, whatever else happens.

A comparison with Los Angeles is relevant. By 1975, Mexico City's metropolitan area occupied only 22 percent of the land area of Los Angeles County.[3] Without suggesting that the future of Mexico's capital could already be detected in the southern California metropolis, it could never-

3. Los Angeles County, with a 1970 population of 7.0 million, covers an area of 10,541 square kilometers. The corresponding figures for Mexico City's metropolitan area were 8.6 million persons and 2,286 square kilometers.

theless be concluded that the city's functional unit may be preserved even if its total urban space were to grow several times.

Many of the great problems of this massive region will result from its spatial organization and the way in which it is governed. In some very important ways, the quality of life of its inhabitants will depend on how these problems are resolved and not on the size of its population. Significant changes will no doubt occur, as some areas decline in population (suggesting the need for their physical redevelopment to lower densities) and as others experience explosive growth.[4] These problems are, however, primarily internal to the region, and will not affect its relations with the rest of the country.

The world has no experience with the management of an urban agglomeration of upward of 20 million people. But it is not hard to envisage that the problems of management may become extremely difficult to resolve. If, as seems likely, the city tends to spread into surrounding valleys, which essentially means into the state of México, what will happen to the tax base of the Federal District? Will the District government be able to maintain essential public services? The answer is uncertain. But the problems of governing and of maintaining some kind of cohesion and order in the metropolitan area may well cause the quality of life to deteriorate further. Moreover, without much firmer policies for dealing with environmental pollution, it is difficult to envisage that Mexico City will become a more physically attractive place in which to live. Assuming that Mexico City continues to grow, even at a slower rate than before, it is likely to become more difficult to govern and a less agreeable place in which to live and work.

Regional Balance

There are wide differences in socioeconomic development among the various regions of the country (Chapter 5). Regional balance—defined as approximately similar socioeconomic conditions—has probably never existed in Mexico, although this assertion can only be demonstrated for the time since 1940. But is such balance a necessary condition of economic growth? Is it a realizable and feasible goal? For the time being at least, it would seem not to be so.

Those who favor a more balanced spatial economy have not satisfactorily explained why they think of balance as beneficial or achievable. It seems

4. During 1960-70, for example, some areas in the state of México contiguous with the Federal District—such as Tultitplan, Tlalnepantla, Naucalpan, Atizapan, and Netzahualcoyotl—doubled, tripled, quadrupled, and even sextupled their populations.

that it is not economically beneficial and that it could not be achieved until there are spare resources to invest in states or regions that offer few comparative advantages. It is one thing to argue in favor of regional development or to support so-called backward or lagging regions in already developed areas such as Europe or the United States; it is, as elsewhere, another thing to do so in Mexico, where the imperative is rapid national economic development at the lowest cost and in the shortest time.

It can be argued indeed that nothing is more natural than a core-periphery relation, and that nothing is more normal than regionally differentiated development. Looking at the spatial economy in terms of whether its configuration is generally consistent with the maximum growth of output produces no evident reason why an unbalanced structure—differences among states in income levels and other indexes of development—is not conducive to maximizing the growth of GDP; certainly it is difficult to envisage an alternative structure for the past.

For the future, it is also difficult to find a logical or necessary relation between balance among regions and national economic growth or social equity. Unfortunately, however, there is a common tendency to consider the distribution of the benefits of economic progress among persons and among regions as if they were one and the same thing, and to look upon regionally balanced development as a way to equalize social justice. Equalization of economic opportunities and economic welfare throughout a nation is not a realistic objective, for the basic reason that different resource endowments—whether natural or manmade over time—mean that some regions have more potential for development than others. It is, of course, fair to argue that centralization has implied an inequitable allocation of resources between the core and the periphery. But this should not lead to an inevitably fruitless attempt to equalize development throughout the nation.

In brief, although regional balance is a matter of concern, it is often mistakenly bound up with the issue of centralization. The latter is a main issue of economic policy; regional balance is not. A solution to the problem of centralization implies a concerted attempt to decentralize, thereby changing the present core-periphery relation. There is no reason to believe this would necessarily produce greater balance within the periphery; it could in fact produce less.

Spatial Integration

A third issue concerns the discontinuity of economic and cultural relations between urban and rural areas. At the national level, the process of urbanization has been closely associated with economic growth. This fol-

lows from the close relation between urbanization and the development of the secondary and tertiary sectors, and the fact that the shift from agriculture was historically associated with rising factor productivity. The degree of urbanization at the state level was also closely associated with the level of economic development: the more urbanized the state, the higher the level of economic development (Chapter 3).

It is also a fact, however, that many of the country's largest cities are located in relatively poor and undeveloped states. For example, Puebla in 1970 was the country's fourth largest city, but was the capital of a state that ranked among the five least developed in the nation. The prosperity of the city of Puebla contrasted sharply with the poverty of the state. Conversely, some of the more developed states did not have high indexes of urbanization. In the northwest, for example, Sonora and Sinaloa ranked among the ten most prosperous states in the country in 1970, though they ranked low in their degree of urbanization. These states also did not contain any of the country's very largest cities. Culiacán, the largest city in either state, ranked ninth in the urban size hierarchy for 1970.

Both urbanization and the growth of large cities have been historically associated with relatively advanced economic development at the state level, but neither is a requirement of economic development at the regional level. Why? First, because in some parts of the country economic development occurred in the relative absence of a high degree of urbanization, and, second, because urban development has often (probably more often than not) occurred without inducing development in the surrounding area.

There is thus a considerable discontinuity between the urban and rural sectors, as seen in the enormous contrasts in income and socioeconomic welfare between rural and urban areas. As a result, the issue of rural-urban integration is a legitimate aspect of spatial development policy, representing a spatial dimension of the broader issue of social equity. Since the operational question is whether this discontinuity can be modified, a review of past urban-rural relations provides some necessary background for understanding why the situation occurred and for evaluating the prospects for change.

An exceptional case

In some parts of the country, the northwest in particular, economic development was historically linked with agricultural development. And urban development in the northwestern states was closely associated with the development of the agricultural sector, as can be seen by examining the industrial and commercial structures of Culiacán, Obregón, and Hermosillo.

There was also much less discontinuity between the urban and rural sectors there than in other parts of the country. What is the background of

this apparently successful process of integrated development, and why did it not occur elsewhere?

The northwestern states were the recipients of a large share of public investment in irrigation since 1940 (Chapter 2). In earlier times, only areas with adequate rainfall could be used for intensive agricultural production. But the development of new techniques for large-scale irrigation and the decision to invest large amounts of public resources in new irrigation works resulted in a spatial emphasis on the northwest, because this was the only area where irrigation was both permitted by tenurial conditions and demanded by climatic conditions. Because of this strategy the agricultural development of the area leaped ahead of that of other parts of the country. In the absence of countervailing measures to stimulate the development of rainfed agriculture in the south and center, regional differences in the agricultural sector were thus exaggerated.

The northwestern states were relatively undeveloped before their emergence as important areas of agricultural growth. Since urban development and the resulting growth of the secondary and tertiary sectors were consequences of agricultural development, urbanization in this region was associated with the development of an agricultural export base (see Chapter 5).

The likelihood of developing new industries from an export base depends largely on the nature of the base. When development of the base leads to the construction of large-scale infrastructure (particularly in transport), production and distribution costs for many activities may be lowered. Growing internal and external economies of scale tend to stimulate export growth, thereby expanding the base. Development of the export base thus depends on the successful generation of new activities from the original export-oriented activity, and there is ample evidence that this is precisely what happened in the northwest after 1940.

Driven by massive public investment in irrigation, the regional economy generated large surpluses of agricultural output for the rest of the country and for export. Agricultural growth also generated new demands for services and, to an increasing degree, was linked to the growth of manufacturing, especially food processing industries. In sum, urbanization and agricultural development in this region were intimately linked, and this explains the higher level of rural-urban integration here than elsewhere in the country.

The general rule

The more usual relation between urban and rural development in Mexico has been that towns and cities have generally developed without being closely integrated with the areas around them. This is particularly true of

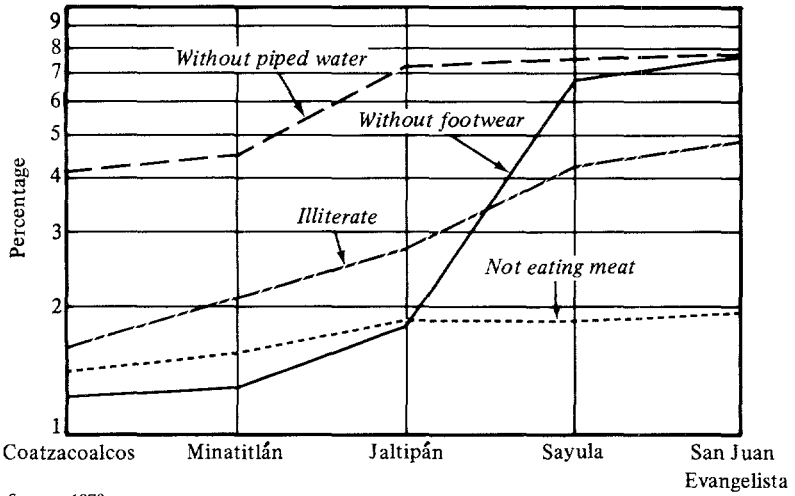
the urban areas of the central region, and especially of Mexico City. The roots of dualistic relations between urban and rural economies in such relatively poor yet urbanized states have many dimensions, including the allocation of investments (particularly public investments) and the relative prices that favor urban growth and facilitate the expansion of industrial activities in cities far removed from the sources of raw materials and foodstuffs. Under these conditions, a city apparently can grow almost indefinitely without particular effect on the surrounding rural area.

Many, and perhaps most, of Mexico's cities have not therefore been associated with the spread of development to their hinterlands, and urbanization did not historically have large beneficial effects on surrounding areas. Places that were relatively close to large cities were often as poor as those much farther away. At the regional and subregional level, development did not, in general, trickle down from large urban centers to smaller cities and rural areas. Stand on Avenida Reforma or in the Zona Rosa in Mexico City; then go to the center of Toluca about an hour and a half away in the state of México; then to a small town, say 20 kilometers from Toluca; then, to any one of the many villages. Firsthand observation of these areas (which the data support) shows that the smaller the place, the lower the level of absolute and relative welfare. The example given represents one of the most extreme developmental contrasts that one might find in an area of less than 100 kilometers in the whole of Mexico, but the pattern would be essentially similar if the starting point were any one of the country's large cities. The transition from the urban to the rural sector is characteristically abrupt (Figure 6-1).

The spatial diffusion, or spread, of the benevolent effects of urbanization depends on the existence of certain conditions. For example, a city that develops because it is near a mineral resource, but that is located in the middle of an arid and unirrigated plain, may continue to grow for as long as the resource base endures and that resource is in demand. Its development will not however foster the development of the surrounding area. In general, if the physical, economic, and social conditions of an area surrounding a city do not facilitate the diffusion of the development that may originate in the city, such diffusion will not occur.

There are several states where the presence of a large city did not coincide with a high level of overall development at the state level, resulting in a discontinuity between urbanization (in terms of urban size growth) and socioeconomic development. As mentioned in Chapter 5, the state of Puebla ranked sixth in rural population density in 1970. It contained the nation's fourth-largest city, yet ranked very low in indexes of development such as investment in agriculture, agricultural productivity, per capita income, and urbanization. It thus seems that the conditions of the rural sector in this state impeded the diffusion of the benefits of urban industrial

Figure 6-1. *Decline of Living Standards with Increasing Distance from a Large City, Isthmus Region, 1970*



Source: 1970 census.

growth and perhaps of urbanization itself, since a very large share of the total urban population in this state was concentrated in the largest city. It is less easy to specify these conditions, how they evolved, and how they operated to attenuate the growth impulses generated by development in nearby urban centers. It seems, however, that the general answer is related to land tenure and the mobility of the labor force. Other factors presumably include rural infrastructure deficiencies and unfavorable relative prices for the rural sector.

To sum up, the urban and rural sectors have generally developed separately, not harmoniously, and this fact goes to the heart of the issue of social justice. An attempt to improve matters by achieving closer and more dependent relations between the urban and rural sectors should therefore be an essential feature of any long-run program for socioeconomic development in Mexico, although it should be preceded by research aimed at a better knowledge of the underlying relations that policies would attempt to change, or to which they would have to adapt.

CHAPTER 7

Options for Future Urban and Spatial Policy

IF THE PRECEDING CHAPTER has correctly identified some of the significant issues of urban and spatial policy in Mexico, what might be done to resolve them? Any answer must be tentative; not least because the choices have political as well as technical dimensions. This discussion reviews the parameters of and some alternative approaches to the spatial aspect of economic policy in light of the evolution of the spatial system through the mid-1970s. It does not take account of policy changes since 1975. Although the analysis is specific to Mexico, some of it could be applied to other countries.

Parameters of Urban and Spatial Policy

Several of the parameters of urban and spatial policy require no elaboration beyond what has been provided in the first six chapters of this book because any and every aspect of such policy must be rooted in the urban and spatial structure of the present and its evolution from the past. To a powerful degree, what has been and is must help determine what shall be. Among the things that would clearly affect future urban and spatial policy in Mexico and the geography of its future development are the distribution of the urban population among large cities and among the states; the pattern of industrial growth, which is so intimately bound up with this distribution; and the network of communications between large urban areas.

These parameters and the geography of natural resources, among which water resources are particularly important, are spatial in nature.[1] In addition there are the more general nonspatial parameters that will help

1. See also Appendix E.

shape Mexico's economy in the future. The analysis of where growth will or should occur is therefore preceded by an assessment of how much demographic and economic growth may be anticipated.

Growth of the population

In mid-1970, Mexico's population was 50.4 million, and was increasing at an average annual rate of 3.5 percent. In projecting possible trends of population increase through 2000, it was assumed that life expectancy at birth was likely to rise from 60.0 years for males and 63.8 years for females in 1970 to 68.4 and 70.4 years, respectively. Further, it was assumed that fertility might either continue at the recent level or decline. The range of fertility in 2000 could thus vary from 6.3 to 3.5 children per woman, the low estimate implying a decline of 46 percent in fertility from 1970 to 2000. This was not out of the question, but was improbable and would depend upon a highly successful effort to promote planned parenthood. More likely, moderate success with population programs would result in a smaller decline in fertility.

Based on these assumptions about life expectancy and fertility, three population projections are shown in Table 7-1, the variable factor being fertility. The intermediate projection indicates a population of about 140 million in 2000 and may be the most realistic. If realized, it probably would give Mexico the seventh largest population of any country in the world by the end of the century.

The range of possible population sizes in 2000 thus varies from 122 million to 152 million—a difference of 30 million, which is not enormous. But if the population in that year is regarded as the base year for population growth from 2000 to 2050 and beyond, the implications become very important. The extrapolation of the highest and lowest trends over a longer period would naturally accentuate the differences between them.

On the basis of a population projection for 2000 of 140 million, the economically active population in that year is estimated at 40 million (Table 7-2). Since the economically active population in 1970 was 1.3 million, this projection assumes a decline in the participation of those under 14 and over 64 years old and an increase in the participation of women, but implies almost no change in the size of the economically active population as a proportion of the working age population (42 percent in 2000 versus 41 percent in 1970).

Distribution of the population

It is impossible to forecast, except very generally, how these people would be employed and where they would live. But the important determi-

Table 7-1. *Projected Population of Mexico, 1970 to 2000: Three Alternatives*

Item	*1970*	*1975*			*1980*	
		First	*Second*	*Third*	*First*	*Second*
Population (thousands) on July 1	50,417	60,071	59,928	59,786	71,925	71,282
Males	25,246	30,133	30,060	29,988	36,174	35,846
Females	25,171	29,933	29,868	29,798	35,751	35,430
Birth rate (per thousand of population)	43.1	43.2	42.2	41.3	43.5	41.7
Death rate (per thousand of population)	8.6	7.7	7.6	7.6	6.9	6.9
Growth rate (percent)	3.46	3.55	3.46	3.37	3.65	3.48
Total fertility rate	6.538	6.538	6.376	6.218	6.538	6.218
Life expectancy at birth (years)						
Male	60.03	62.03	62.03	62.03	64.03	64.03
Female	63.75	65.35	65.35	65.35	66.35	66.35
Age distribution on January 1						
Total	49,545	50,005	58,892	58,779	70,611	70,040
0-4	9,163	10,915	10,802	10,690	13,199	12,738
5-9	7,645	8,989	8,989	8,989	10,748	10,637
10-14	6,375	7,600	7,600	7,600	8,944	8,944
15-19	5,155	6,326	6,326	6,326	7,550	7,550
20-24	4,144	5,096	5,096	5,096	6,263	6,263
25-29	3,366	4,086	4,086	4,086	5,034	5,034
30-34	2,820	3,314	3,314	3,314	4,031	4,031
35-39	2,396	2,769	2,769	2,769	3,261	3,261
40-44	2,046	2,341	2,341	2,341	2,712	2,712
45-49	1,694	1,983	1,983	1,983	2,276	2,276
50-54	1,335	1,622	1,622	1,622	1,905	1,905
55-59	1,065	1,252	1,252	1,252	1,528	1,528
60-64	888	968	968	968	1,144	1,144
65-69	658	766	766	766	841	841
70-74	430	523	523	523	613	613
75+	366	454	454	454	563	563

nants of the distribution of the population between rural and urban areas include the likely rate of national economic growth, the possible course of technological change, and, derived from these considerations, the probable sectoral structure of the national economy in terms of output and employment.

1980	*1985*			*1990*			*1995*
Third	*First*	*Second*	*Third*	*First*	*Second*	*Third*	*First*
70,538	86,539	84,892	82,428	104,399	100,763	95,165	126,092
35,466	43,663	42,821	41,561	52,820	50,960	48,096	63,942
35,072	42,877	42,071	40,867	51,579	49,803	47,069	62,150
38.9	43.7	41.1	36.4	43.5	39.5	32.8	43.2
6.8	6.3	6.3	6.2	5.8	5.8	5.7	5.3
3.21	3.73	3.48	3.02	3.77	3.37	2.71	3.78
5.735	6.538	6.034	5.184	6.538	5.738	4.498	6.538
64.03	65.43	65.43	65.43	66.43	66.43	66.43	67.43
66.35	67.35	67.35	67.35	68.35	68.35	68.35	69.35
69,405	84,924	83,415	81,184	102,434	99,064	93,876	123,706
12,214	16,066	15,122	13,518	19,472	17,599	14,622	23,479
10,527	13,037	12,583	12,066	15,903	14,969	13,382	19,306
8,944	10,701	10,535	10,481	12,987	12,535	12,020	15,849
7,550	8,893	8,893	8,893	10,647	10,537	10,428	12,929
6,263	7,484	7,484	7,484	8,823	8,823	8,823	10,572
5,034	6,196	6,196	6,196	7,412	7,412	7,412	8,747
4,031	4,975	4,975	4,975	6,130	6,130	6,130	7,341
3,261	3,974	3,974	3,974	4,911	4,911	4,911	6,059
2,712	3,202	3,202	3,202	3,908	3,908	3,908	4,836
2,276	2,644	2,644	2,644	3,126	3,126	3,126	3,822
1,905	2,192	2,192	2,192	2,551	2,551	2,551	3,022
1,528	1,800	1,800	1,800	2,077	2,077	2,077	2,423
1,144	1,402	1,402	1,402	1,657	1,657	1,657	1,917
841	1,000	1,000	1,000	1,230	1,230	1,230	1,460
613	678	678	678	811	811	811	1,003
563	681	681	681	789	789	789	940

(Table continues on the following page)

RATE OF NATIONAL ECONOMIC GROWTH. Fundamentally, Mexico has a strong and diversified economic structure. The entrepreneurial ability of the private sector has been amply demonstrated, and the record of public sector management is sound. It possesses a rich, diversified natural resource base, and it has the advantage of geographic contiguity with the world's

Table 7-1 (*continued*)

Item	1995		2000		
	Second	*Third*	*First*	*Second*	*Third*
Population (thousands) on July 1	118,946	108,133	152,458	139,643	121,606
Males	60,284	54,750	77,455	70,896	61,664
Females	58,661	53,383	75,003	68,747	59,942
Birth rate (per thousand of population)	38.0	29.6	43.0	36.5	27.8
Death rate (per thousand of population)	5.3	5.3	4.9	5.0	5.1
Growth rate (percent)	3.26	2.43	3.81	3.16	2.26
Total fertility rate	5.457	3.902	6.538	5.190	3.527
Life expectancy at birth (years)					
Male	67.43	67.43	68.43	68.43	68.43
Female	69.35	69.35	70.35	70.35	70.35
Age distribution on January 1					
Total	117,006	106,819	149,553	137,439	120,230
0-4	20,127	15,092	28,341	22,893	15,812
5-9	17,449	14,499	23,312	19,984	14,987
10-14	14,918	13,337	19,249	17,398	14,457
15-19	12,479	11,966	15,787	14,862	13,285
20-24	10,463	10,355	12,849	12,401	11,891
25-29	8,747	8,747	10,492	10,363	10,276
30-34	7,341	7,341	8,673	8,673	8,673
35-39	6,059	6,059	7,265	7,265	7,265
40-44	4,836	4,836	5,975	5,975	5,975
45-49	3,822	3,822	4,737	4,737	4,737
50-54	3,022	3,022	3,703	3,703	3,703
55-59	2,423	2,423	2,878	2,878	2,878
60-64	1,917	1,917	2,244	2,244	2,244
65-69	1,460	1,460	1,698	1,698	1,698
70-74	1,003	1,003	1,198	1,198	1,198
75+	940	940	1,153	1,153	1,153

Source: 1970, IX Censo General de la Población, 1970 (1972); and 1975-2000, World Bank estimates.

largest market: the United States. The outlook for long-term growth is therefore favorable.

It would be futile to predict a long-run GDP growth rate over a quarter of a century with any pretense of accuracy. With appropriate policies of external and internal adjustment, however, it is possible that Mexico would be able, through the end of the century, to sustain a GDP growth rate equivalent to the historical average of the 1950s and 1960s of 6 to 7 percent. Sus-

tained long-run growth will depend mainly on a dynamic export sector in an open economy, and on a strong and self-reliant public sector.

The results of an exercise to illustrate the relation between future labor force growth, GDP growth, and technological change are shown in Tables 7-3, 7-4, and 7-5. The labor force figures in Table 7-3 are those projected in Table 7-2, and the GDP growth rate of 6.3 percent is the 1950-70 average. If productivity increases were to follow the trends of 1950-70, this combination of factors would imply a substantial increase in employment in other sectors and, in turn, a consequent increase in marginal employment. The basis for this conclusion is shown in Table 7-4, which indicates that if past levels of productivity in other sectors were to be maintained, the level of required employment would be substantially less than is shown. The difference amounts to 10.6 million employees—about 25 percent of the projected labor force in 2000.

The distribution of sectoral employment shown in Table 7-3 (18 percent in industry, 15 percent in agriculture, and 66 percent in other sectors) reflects a large amount of marginal employment in other sectors. This is emphasized in Table 7-5, which shows the effect of removing marginal employment from the economically active population. When this is done, the sector employment shares are greatly modified and are closer to those implied by international comparison data for a level of GDP per capita of $1,400 (in 1970 prices), the level implied by a growth rate of 6.3 percent through 2000. The percentage of employment would be distributed among the sectors as follows:

	Illustration	*International cross-section*
Industry	25	35
Agriculture	21	20
Other sectors	54	45

On this basis GDP would have to grow faster than the historical rate to absorb the projected labor force growth. If historical trends in agriculture and industry were sustained, and if productivity in other sectors were to rise only moderately faster, the economy would have to grow at an average rate of at least 8.0 percent to maintain underemployment at its 1970 level. In order to reduce underemployment in relation to the economically active population, GDP would have to grow more than 8.0 percent a year.

A GDP growth rate of 8.0 percent would produce a level of GDP per capita in 2000 of about US$2,450 in 1970 prices. If there were no increase in marginal employment, it could be further assumed there would be no deterioration in the pattern of income distribution. This would imply that those in the lowest income decile, who had an average per capita income of US$90 (in 1969 prices) in 1969, would receive an average per capita income

Table 7-2. *Working Population, by Age, and Economically Active Population, by Sex, According to Second Population Projection, 1970 to 2000*
(thousands of persons)

Segment of population	*1970*[a]	*1975*	*1980*	*1985*	*1990*	*1995*	*2000*
Working population[b]							
10-14	6,375	7,600	8,944	10,591	12,535	14,928	17,398
15-64	24,909	29,757	35,704	42,762	51,132	61,100	73,119
65+	1,454	1,743	2,017	2,359	2,830	3,403	3,049
Total	32,738	39,100	46,665	55,712	66,497	79,440	94,566
Economically active population							
10-14							
Males	419	493	581	659	819	977	1,140
Females	158	191	224	265	313	371	433
15-64							
Males	9,995	11,972	14,440	17,407	20,439	25,162	30,212
Females	2,310	2,755	3,300	3,937	4,685	5,574	6,609
65+							
Males	482	577	653	754	904	1,085	1,288
Females	88	105	122	145	175	211	249
Subtotal							
Males	10,896	13,042	15,674	18,850	22,662	27,224	32,640
Females	2,556	3,091	3,646	4,347	5,173	6,156	7,321
Total	13,453	16,093	19,320	23,197	27,835	33,380	39,961

a. Figures for 1970 are corrected for underenumeration and age distribution.
b. Population as of January 1st each year.
Source: IX Censo General de la Población, 1970 (1972) and World Bank estimates.

Table 7-3. *Employment Pattern with GDP Growth of 6.3 Percent, 1950 to 2000*

Item	1950		1970		Growth rate, 1950-70 (percent)	2000		Growth rate, 1970-2000 (percent)
	Number	Percent	Number	Percent		Number	Percent	
GDP								
(thousands of 1960 pesos)	86,953	100	296,600	100	6.3	1,854,242	100[a]	(6.3)
Industry	18,168	20	80,532	27	7.6	741,696	40	(7.7)
Agriculture	15,442	18	34,535	12	4.1	129,796	7	(4.5)
Other sectors	53,363	62	178,644	61	6.2	982,748	53	(5.9)
Economically active population								
(thousands of persons)	8,345	100	12,955	100	2.2	39,961	100	3.8
Industry	972	12	2,169	17	4.1	7,406	18	4.2
Agriculture	4,824	58	5,104	39	0.25	6,205	15	0.4
Other sectors	2,549	30	5,682	44	4.1	26,305	66	5.2
Output per person (thousands of 1960 pesos)	10,422	–	22,894	–	4.0	46,401	–	2.4
Industry	18,691	–	37,128	–	3.5	100,143	–	(3.5)[b]
Agriculture	3,201	–	6,766	–	3.8	20,915	–	(3.8)[b]
Other sectors	20,935	–	32,469	–	2.2	37,295	–	0.4

— Not applicable

Note: Assumptions are in parentheses.

a. Sectoral shares in output based on past growth rates, and on implied shares from international cross section analysis.

b. Output per person in industry and agriculture is assumed to follow past trends.

Source: VII Censo General de la Población, 1950 (1952); *IX, 1970* (1972); Bank of Mexico; and Ministry of Finance.

Table 7-4. *Employment Pattern with GDP Growth of 6.3 Percent, Adjusted to Reveal Marginal Employment, 1950 to 2000*

Item	*1950*	*1970*	*2000*	*Growth rate, 1950-70 (percent)*	*Growth rate, 1970-2000 (percent)*
Value-added in "other" sectors (thousands of 1960 pesos)	53,363	178,644	982,748	6.2	5.9
Output per person (thousands of 1960 pesos)	20,935	32,469	62,371	2.2	(2.2)[a]
Economically active population "required" (thousands of persons)	2,549 (actual)	5,682 (actual)	15,756	4.1	3.5

Note: The difference between "required" employment in "other" sectors and projected employment in "other" sectors = 26,350 – 15,756 = 10,594.

a. Output per person is assumed to follow past trends.

Source: VII Censo General de la Población, 1950 (1952); *IX, 1970* (1972); Bank of Mexico; and Ministry of Finance.

of US$325 in 2000. This would enable the population as a whole to enjoy a standard of living superior to that of 1970.

Faster growth, however, is only one of two hypothetical means to achieve more employment. Another involves the assumption that the development of labor-intensive technology in industry or agriculture would create more jobs at given levels of output.

Would future productivity trends in industry and agriculture be likely to differ from those of the past? In the industrial sector the answer would probably depend largely on the evolution of labor relations. In a free enterprise system (and it is assumed that Mexico will retain this kind of system), entrepreneurial decisions about combinations of labor and capital will be made primarily on the basis of profitability. Although an increasingly elastic supply of labor may tend to encourage entrepreneurs to substitute labor for capital, institutional factors such as minimum wage laws and strong trade unions will tend to counteract any such tendency. It may be argued that a policy of reducing minimum wages in order to spread employment opportunities among a larger number of workers would encourage the use of labor, but labor unions would almost certainly resist such an attempt.

CHOICE OF TECHNOLOGY. There are also technological constraints to substitution between labor and capital. As Mexico's manufacturing sector moves increasingly into the production of capital and durable consumer goods, substitution will become increasingly difficult unless new techniques, specifically designed for economies with labor surpluses, are evolved over

Table 7-5. *Employment Pattern with GDP Growth of 6.3 Percent, Adjusted to Show Effects of Removing Marginal Employment in Other Sectors, 1970 to 2000*

Item	1970		2000		Growth rate, 1970-2000 (percent)
	Number	Percent	Number	Percent	
GDP	296,600	100	1,854,242	100	(6.3)
Industry	80,532	27	741,696	40	(7.7)
Agriculture	34,535	12	129,796	7	(4.5)
Other sectors	178,644	61	982,748	53	(5.9)
Economically active population	12,955	100	29,367	100	2.8
Industry	2,169	17	7,406	25	4.2
Agriculture	5,104	39	6,205	21	0.4
Other sectors	5,682	44	15,756	54	3.4
Output per person	22,894	–	63,140	–	3.4
Industry	37,128	–	100,143	–	(3.5)
Agriculture	6,766	–	20,915	–	(3.8)
Other sectors	32,469	–	62,371	–	2.2

— Not applicable.

Note: Assumptions are in parentheses.

Source: Tables 7-1, 7-2, 7-3, 7-4, and World Bank estimates.

the next two or three decades. Mexican industrialization has developed mainly on the basis of imported techniques, most of which were initially tried and tested in countries where labor was relatively scarce and capital relatively abundant. The problem of disequilibrium between the growth of the labor force and employment opportunities is not unique to Mexico; it applies, in some degree, to almost all developing economies. But, in light of the massive growth of population in the past and the expected persistence of this growth in the future, the Mexican case may be particularly acute.

Certain things could be done to help alleviate these problems. Technology could be developed in Mexico—for Mexico—which would be better suited to its needs and conditions than that which was imported. The development of appropriate and effective legislation in this regard would not be easy, but greater influence could perhaps be exerted in due course on choices of factor combinations.

STRUCTURE OF THE SECTORS. The data on the agricultural sector in Table 7-3 may underestimate the size of the economically active population. To the extent this is so, the implicit increase in agricultural productivity from 1950 to 1970 would be smaller than indicated, as would the projected increase in productivity through 2000. In this case, there would be more em-

ployment in agriculture in both 1970 and 2000 and less in the other sectors. This statistical change would probably imply nothing more, however, than a shift of underemployment from other sectors to agriculture because underrecording mainly refers to marginal activity in the agricultural sector. The difference between one case and the other refers therefore to the location of marginal activity: in one case, rural; in the other, urban.

Despite this change, substantial increases in agricultural employment seem unlikely because the future growth of agricultural output may be conditioned on the adoption of more advanced, capital-intensive technology. There is, moreover, no prospect that any substantial part of the potentially underemployed population could be settled into subsistence agriculture, because there is little unused land available for distribution, although legislation, which restricts the size of indivdual farms in new irrigation districts, could enable more families to obtain land. Even with this however, the agricultural sector's capacity to absorb labor would not be greatly increased.

It is therefore difficult to substantiate a case for assuming patterns of industrial and agricultural productivity and labor absorption rates different from those suggested in Table 7-2. Consequently, it may be difficult for either sector to absorb much more labor than has been estimated. A trend toward labor-intensive technology would help mitigate the employment problem but would probably not solve it.

The distribution of the population between the urban and rural sectors cannot be established with any certainty. But even if there were a shift away from agriculture, Mexico's rural population would continue to increase in absolute numbers, at an estimated rate of 2 percent a year, which would place the total rural population at 38 million by the year 2000 and would represent an increase of 17 million people over 1970. This would mean that approximately that number of people would have to be absorbed in agricultural activities, even though the cultivated area would probably not expand much during this period. Thus, further crowding on the land, smaller farm units, and more intensive cultivation could be expected, with the result that land resources, at least in the already over-populated dry farming areas in central and southern Mexico, would deteriorate further. The multiple problems of rural poverty would likely become more severe in all but a few areas of large-scale irrigated farming, where methods of production would be increasingly capital-intensive.

The projected increase in urban population is even greater. Compared with 30 million in 1970, estimates of urban population for the year 2000 amount to between 84 and 115 million (that is, 70 to 75 percent of the total population).[2] Even though a good part of this increase would result from

2. Defined in terms of a threshold population of 2,500.

increased birth rates and decreased death rates, rural to urban migration would continue to be a significant, though declining, factor in the growth of Mexico's cities.

These nonspatial parameters thus hold out prospects of continued urban population growth. Taken together with the parameters of spatial structure discussed in previous chapters, this outlook provides the background to the following discussion of policy alternatives.

Alternative Strategies for Urban and Spatial Policy

A spatial framework for development policy represents a series of choices that are determined partly on the basis of objective reasoning and partly on the basis of normative judgments. Each of the three issues examined in Chapter 6—centralization, balance, and integration—can be translated into policy objectives. But, in terms of reasonable and viable objectives, they are not equally important.

Decentralization as a development policy

The first issue, centralization, translates directly into the objective of decentralization and, in the same context, deconcentration. It is important to distinguish between these two terms. As used here, deconcentration policies refer to measures that would deflect the future growth of Mexico City to locations less than 100 kilometers from the Federal District. In contrast, a policy of decentralization refers to measures that would strengthen prospects for growth in and around regional centers beyond this radius. Although addressing the same issue, the problems involved in the design and execution of these policies differ. The national economic system is already generating more than sufficient growth in Mexico City; the problem is that the spatial organization and physical planning of its future growth—as well as that of the emerging region around it—must be guided. In contrast, a decentralization policy must both guide and help generate new growth in the periphery.

Decentralization (and deconcentration) appear to be consistent with achieving long-run national economic efficiency. They also seem consistent with the pursuit of social justice and of a tolerable quality of life in Mexico City as well as elsewhere. But the polemical debates that surround this subject sometimes obscure the fact that these objectives are means to an end and not ends in themselves. Decentralization implies reducing the size of Mexico City relative to the size of other cities in the country, assuming both that there are no countervailing trends and that increases in demographic and economic growth are absorbed in areas outside the nation's capital. This is the point of departure. It must be accompanied, however,

by a point, or a series of points, of arrival. Some will be around Mexico City and will be part of a deconcentration strategy. Others will be much farther away. But all of them should be cities that, for one reason or another, have unusually good prospects for achieving sustained and rapid growth in the future.

GROWTH CENTERS. What is the correct number of such growth centers for an economy the size of Mexico's? There is no precise answer. Clearly, however, too many centers would lead to an excessive dispersal of resources, and nothing much could be expected to happen to the country's spatial structure.[3] Locational attractions requiring large investments would be difficult to develop on a significant scale, and both the external economies and income multipliers generated would be insufficient to induce sustained growth within a reasonable period. With fewer growth centers success could not be guaranteed, but the chances of success would certainly be enhanced.

Conversely, if there were too few centers, their combined effect on the overall growth rate of Mexico City would probably not be substantial. For example, doubling Mexico City's 1970 population in fifteen years would add another 9 million people, whereas doubling the population of say, León, over the same period would add only 400,000. Less than half of this gain could be properly ascribed to a decentralization policy, since some growth would have occurred in any event. In this hypothetical case, therefore, the maximum number of people potentially withheld from Mexico City would be only 200,000 or roughly 2 percent of the projected increase.

A related objective of any decentralization strategy is to achieve sustained growth in the periphery, rather than enclave development. Enclave economies are centers whose growth requires continued public assistance in the form of investments and subsidies; if this ceases, growth tends to revert to the "natural" long-term rate of the local economy. Enclaves arise for various reasons. In general, few linkages are made within the local economy, and business services may have to be imported. Income multipliers remain small, because a portion of the new income is spent on goods produced outside the locality and because a share of business profits are sent elsewhere. Finally, investment decisions in enclave economies tend to be made sequentially and in relative ignorance about the intentions of others, with the effect that leakages and uncertainties prevent the initial growth from multiplying and becoming sustained growth. In enclave econo-

3. If US$100 million were available for investing in a national growth center policy and was spread evenly among 50 centers of 80,000 people each, each city would receive only US$2 million or US$25 per capita. But spread over ten larger cities of 250,000 inhabitants, each city would receive a transfer payment of US$10 million or US$40 per capita; selectivity increases the likelihood of impact.

mies, the multiplier effects are, for the most part, captured by the larger, more established centers within and outside the national economy. This model should be avoided in any strategy to develop growth centers.

BALANCE AND INTEGRATION. Of the remaining policy issues—balance and integration—balance does not in itself deserve high priority, although the kind of decentralization that seems to be needed in Mexico would clearly involve changes in the relation between the core and the periphery because the periphery, as a whole, would become relatively stronger in relation to the core. In this sense, but only in this sense, it could be argued that the balance of the economy would be improved. An appropriate strategy would basically promote the development of those parts of the periphery that would have the greatest comparative advantages for sustained growth. This process could, however, reduce the overall differentiation between the core and the periphery, but nevertheless increase differentiation within the periphery. Decentralization would not therefore imply the generalized development of areas outside the metropolitan core. Nor would it necessarily lead to better balance among different parts of the periphery. Rather, decentralization should be seen as a way to relieve centralization and to promote the growth of those parts of the periphery that might have substantial development potential.

The foregoing does not imply that objectives related to social justice should be ignored, but it does imply that these objectives should be seen in an interpersonal and not an interregional context. Furthermore, they should be pursued by a separate, though related, strategy that operates both within the core and within the periphery, and that does not conflict with a strategy of decentralization. There are numerous measures that can be taken in the field of social policy to advance distributional goals without being at variance with a strategy for the selective development of the periphery.

In contrast, spatial integration should be seen as an essential part of any macroeconomic strategy for Mexico. The question arises of how this relates to other aspects of spatial strategy and specifically to a policy of growth centers designed primarily to confront the problem of centralization. Growth centers are likely to serve only as many purposes as local or regional conditions permit. Nevertheless, one of the ideas underlying a growth centers approach to decentralization is that growth impulses will, in time, filter down the urban hierarchy into the periphery of each center. Historically, the beneficial effects of urban and industrial growth have tended to spread quite unevenly, if at all, and to deteriorate rather quickly with increasing distance from a given center.

The notion of spread effects is based on the assumption of the existence of more or less spontaneous economic processes that would generate in-

creased production in the periphery of an existing growth center. The conditions that would allow this spread to occur include:

a. Sustained, cumulative economic expansion in the growth center itself
b. Good physical access between the growth center and individual production units in its periphery
c. Potential backward and forward linkages originating with new economic activities at the growth center that can be developed by expanding or creating new production in the periphery of the center
d. Spatial diffusion of appropriate market signals concerning opportunities for new production and the availability of knowledge, entrepreneurial ability, credit facilities, and other objective conditions necessary for acting on this information
e. Extension of efficient market organizations into the periphery, which will increase the demand for rural labor and agricultural products, both of which in turn will increase rural income and allow the rural population to increase their propensity to save and invest
f. Existence of sufficient income thresholds to allow appropriate entrepreneurial innovations to filter down to individual production units in the periphery.

These conditions are met infrequently. Economic expansion at growth centers is frequently of the enclave type and fails to generate the sustained, cumulative growth that is required by the first condition. Access to individual production units has, in the past, been poor, especially in the mountainous agricultural regions of the central and southern parts of the country. The peasant farming that is typical of these areas remains largely outside the market economy and consequently lacks the capacity to respond even to the weak market signals that it does receive. Most of these signals, which refer to potential backward and forward linkages, tend to be captured by large commercial enterprises in Mexico City, by the subsidiary core areas of Guadalajara and Monterrey, and by the highly capitalized and rationally oriented farming enterprises in large irrigation districts. It is these enterprises that tend to have the available knowledge, entrepreneurial ability, credit facilities, and other objective conditions which facilitate an appropriate response.

The ejido farmers, small-holders, and small town merchants in the immediate periphery of the growth center do not have these tools. Furthermore, additional income that may be generated through extending product and labor markets into the periphery is more likely to be consumed than invested, in view of the low initial income of peasant operators and the lack of supporting programs that might facilitate a shift of at least part of the additional income to investment. And finally, income thresholds

may simply be too low for appropriate innovations (such as the use of fertilizer and improved seed varieties, or the conversion of maize farms to dairy and poultry productions) to filter down to individual production units.

Given these circumstances it is not surprising that spread effects occur infrequently. Much of the potential spread is in fact absorbed by the large core region economies and commercial farming areas. As shown earlier, urban growth centers have generated spread effects resulting in a reciprocal relation with the rural economy only in such cases as those of Hermosillo, Ciudad Obregón, and Culiacán on the Gulf of California, where large-scale commercial farming has taken root.

The lessons of this experience may be applied elsewhere, however, especially to some of the poorer states, such as Tabasco, Chiapas, Guerrero, Puebla, Oaxaca, and Durango, where urban growth is being held in check by the small size and stagnation of local rural markets. Of course, social conditions as well as topography, land tenure arrangements, and water availability in these areas differ substantially from conditions in, for example, Sonora and Sinaloa. But the basic idea—to stimulate urban economic growth by increasing agricultural productivity and raising rural incomes—could be applied profitably through small-scale irrigation, reforestation, flood control works, rural roads, rural electrification, and improved land use practices, illustrating the fact that town and country are complementary concepts. Thus, an approach to economic growth based exclusively on cities—such as growth center strategies sometimes imply—might not work as well as one that pays equal attention to the rural population and economy.

The use of growth centers as a means to the end of rural and urban integration may not work everywhere. Indeed, even where it seems to have a good chance of working, the processes involved are not perfectly understood, and the risk of failure is high. Yet if growth centers are not the answer to integration, other alternatives are by no means clear, and development policy certainly should promote symbiosis between rural and urban areas.

The outstanding issues of spatial policy would be easier to solve if the pressures generated by Mexico City's continued high rate of population growth could be reduced and if employment opportunities could be improved in other parts of the country. This poses the need for a comprehensive decentralization policy that would accelerate economic growth in selected parts of the periphery. Such a policy would not only help alleviate some of the problems of managing Mexico City's growth, but would also be consistent with the efficient use of national resources and the pursuit of social equity.

The geographic distribution of future urban and spatial growth will depend, to a considerable degree, on the willingness of the government to

consistently pursue a coordinated set of policies for urban and spatial development which would emphasize some areas more than others. The path of least resistance would be to give equal attention to all of the periphery or to devise a formula that would allocate development resources in direct proportion to the local population. Such a formula would produce too small an effect on some areas and too large an effect on others. In either case, resources would be wasted.

Another formula is based on distributional efficiency and proposes that government expenditures (and other financial flows) should go to those areas with the lowest economic growth rates. This is commonly called the "worst first" policy and is based on the assumption that economic growth can be stimulated anywhere so long as financial resources are available and are correctly applied. This policy does not consider the fact that prospects for sustained growth also depend upon an economy's capacity to respond to new stimuli and the size of the local market. They also ignore the fact that if the objective constraints to growth possibilities are not accounted for, most policies designed to promote it will fail. Finally, they ignore the opportunity costs involved in allocating resources to areas with few comparative advantages.

Alternative strategies

In devising a spatial framework for development, two criteria underlie any of the major alternative strategies. First, large cities and metropolitan areas must be selected according to their general prospects for economic growth, and grouped into sets in descending order, according to the prospects of each city for stimulating secondary growth in the rural and small-town economies that surround it. The second criterion, which relates to the first, is to devise a spatial system that is capable of integration on the basis of complementary functions.[4]

The following discussion is based on the data sets for 1970 and presents the results of two alternative approaches to devising a national spatial policies framework in the mid-1970s. The first approach illustrates the utilization of the growth centers concept. The second approach, by way of contrast, is less selective.

4. As in France, economic relations in Mexico are extremely centralized. Most cities and regions relate to Mexico City but few have commercial relations among themselves. This is evident from the analysis of interregional traffic, commodity flows, and telecommunications in Chapter 5. An alternative view is that powerful economic interests in Mexico City have organized the national economy to maximize their own profits. A spatial policy seeking to decentralize growth will have to break free from this traditional pattern and try to build up regional economies that are complementary. For example, what can the southeastern region produce that is needed in the North, and vice versa? By analyzing comparative regional advantages along these lines, the basis for an appropriate spatial policy can be evolved.

ALTERNATIVE I: GROWTH CENTERS. What follows should be interpreted neither as a plan nor as a program, but rather as an illustration of how the growth centers concept may be put to work. Although it is specific in identifying and ranking potential growth centers, these ranks and identities are less important than the selective nature of the strategy. Although a rationale for the selection of cities is given, it is tentative; a more definite identification and ranking would require further elaboration and more detailed analysis. The idea that the set of centers should be small is more important than the inclusion of any particular city, and it is recognized that somewhat modified criteria would probably lead to some changes in the set.[5]

A growth centers strategy would attempt to integrate regional economies through an interconnected hierarchy of cities and to increase spatial integration on the basis of interdependent regional subsystems within the national economy.

Map 7-1 shows a four-level hierarchy of centers consisting of (a) a primate core area, (b) two subsidiary core areas, (c) thirteen regional growth centers, and (d) nineteen local growth centers. Tables 7-6, 7-7, and 4-35 show demographic, economic, and social indicators, respectively, for each center.

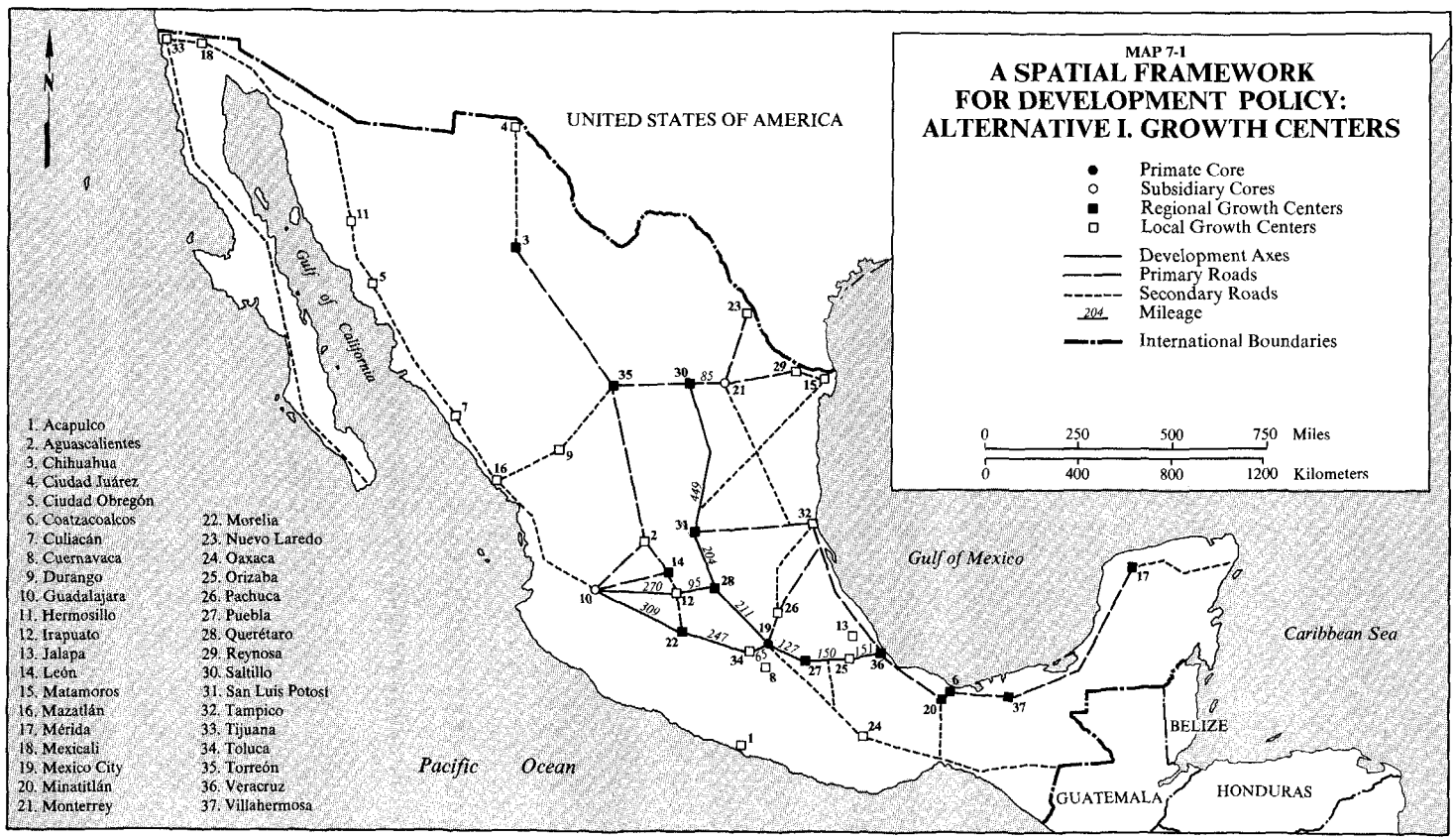
The primate core area included the Federal District and ten additional municipalities in the state of México which comprised the Mexico City metropolitan area. In 1970 this area had a population of 8.6 million.[6]

The subsidiary core areas, the Guadalajara and the Monterrey metropolitan areas, were important urban regions in their own right, with populations of more than 1 million in 1970. Part of their economic achievement may be ascribed to the distance that separates them from the Federal Capital: far enough away to allow a certain degree of autonomy in development decisions, but close enough to benefit from its services and to exploit its market. As a result of past growth, their areas of influence extended for about 200 kilometers along principal routes.

The choice of regional growth centers was less obvious than in the case of Guadalajara, and Monterrey, which would be included in any spatial strategy. In approaching this choice, three principles were considered. First, the center had to have a reasonable expectation of reaching or surpassing the estimated threshold size of between 600,000 and 800,000 people by the

5. This discussion should not be read as an implicit critique of the National Urban Development Plan (1978). The plan was published more than a year after the reports on which this book is based were issued. Interestingly, however, the plan identifies ten regional centers (in addition to Mexico City, Guadalajara, and Monterrey). With few exceptions, these sets are the same. Discrepancies occur in the criteria regarding the treatment of the Northwest, the mid-Pacific, and the Baja California regions.

6. By 1978 the population of the Mexico City metropolitan area exceeded 13 million.


MAP 7-1
A SPATIAL FRAMEWORK FOR DEVELOPMENT POLICY: ALTERNATIVE I. GROWTH CENTERS
Primate Core
Subsidiary Cores
Regional Growth Centers
Local Growth Centers
Development Axes
Primary Roads
Secondary Roads
204 Mileage
International Boundaries
0 250 500 750 Miles
0 400 800 1200 Kilometers
N
UNITED STATES OF AMERICA
Gulf of California
Gulf of Mexico
Caribbean Sea
Pacific Ocean
BELIZE
GUATEMALA
HONDURAS
1. Acapulco
2. Aguascalientes
3. Chihuahua
4. Ciudad Juárez
5. Ciudad Obregón
6. Coatzacoalcos
7. Culiacán
8. Cuernavaca
9. Durango
10. Guadalajara
11. Hermosillo
12. Irapuato
13. Jalapa
14. León
15. Matamoros
16. Mazatlán
17. Mérida
18. Mexicali
19. Mexico City
20. Minatitlán
21. Monterrey
22. Morelia
23. Nuevo Laredo
24. Oaxaca
25. Orizaba
26. Pachuca
27. Puebla
28. Querétaro
29. Reynosa
30. Saltillo
31. San Luis Potosí
32. Tampico
33. Tijuana
34. Toluca
35. Torreón
36. Veracruz
37. Villahermosa

year 2000, which implied a 1970 population on the order of at least 200,000, and a record of sustained annual growth of between 5 and 7 percent. Second, the center had to have a high degree of contact with other potential regional centers and with at least one core area. Third, the center had to be situated with respect to other cities and rural populations so that it would be possible for it to eventually exert strong regional, as opposed to merely local, economic influence.

On the basis of these criteria, the following cities were tentatively identified as regional growth centers: Chihuahua, the Torreón metropolitan area, Saltillo, San Luis Potosí, León, Irapuato-Querétaro, Morelia, Puebla, the Tampico metropolitan area, Veracruz, Coatzacoalcos-Minatitlán, Villahermosa, and Mérida.[7] The largest of these was Puebla, with 6 percent of the primate core area population in 1970, and the smallest was Coatzacoalcos-Minatitlán, with only 2 percent.

This list did not include any of the cities of the northern border. None of these had an extensive hinterland to which growth impulses might be diffused, and backward linkages with the rest of the Mexican economy were weak, due primarily to the effects of distance. Because of these two factors, a substantial share of the income earned in these cities eventually found its way back across the border (Chapter 3). Many Mexican workers spent part of their income in the United States, and the (mostly) American firms located in these areas repatriated a substantial share of profits. It was thus more accurate to think of them as belonging to the periphery of American counterpart cities (San Diego, El Paso, and Brownsville) and as participating in the growth of these cities rather than generating their own.

For these reasons the northern cities identified as potential regional growth centers were in the interior where more of their total economic effect might remain in Mexico. The centers that might substitute for the growth of the border cities included Chihuahua, Torreón, and Saltillo. Two of the three were located in the northeast where their economies could be tied more effectively to the subsidiary core area of Monterrey and where they would also have direct access not only to the large eastern markets of the United States, but also to the rapidly growing Gulf Coast region in Texas.[8]

A second group of cities excluded from this tentative list included those in the Gulf of California: Hermosillo, Ciudad Obregón, and Culiacán.

7. Both Irapuato-Querétaro and Minatitlań-Coatzacoalcos should be thought of as metropolitan zones. The first two cities lie about 100 kilometers from each other, but their areas of influence contain two additional cities of medium size, Salamanca and Celaya. The second set of cities are only 24 kilometers apart and may be considered as an integrated urban-industrial complex.

8. Tijuana, Mexicali, Nogales, and Ciudad Juárez are at a disadvantage with respect to these markets, since their primary access is only to the western parts of the United States.

Table 7-6. *Demographic Indicators for Thirty-seven Cities, 1970*

City	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*
Primate core area										
Mexico City[a]	8,623	2,286	3,772	73	65	64	1.07	1.12	n.a.	n.a.
Subsidiary core areas										
Guadalajara[b]	1,456	934	1,550	60	93	71	1.18	1.24	44	2.03
Monterrey[c]	1,213	1,743	690	81	89	71	1.18	1.24	72	1.25
Regional growth centers										
Puebla[d]	533	524	1,016	57	27	79	1.31	1.38	21	2.93
Torreón[e]	438	4,807	90	62	33	27	0.44	0.47	39[j]	1.17[j]
León	420	1,183	355	52	66	61	1.01	1.07	18	1.99
Chihuahua	277	9,219	30	42	66	49	0.81	0.85	17	1.56
Tampico[f]	276	131	2,100	22	30	55	0.91	0.96	19	1.30
San Luis Potosí	268	1,353	198	58	25	38	0.64	0.66	21	1.73
Mérida	242	858	280	38	20	27	0.45	0.47	32	1.15
Veracruz	230	241	955	41	43	50	0.83	0.87	6	1.25
Morelia	218	1,336	163	37	44	42	0.70	0.73	9	1.65
Saltillo	191	6,837	28	30	30	50	0.82	0.87	17	2.17
Villahermosa	184	1,766	93	21	39	56	0.93	0.98	21	1.02
Irapuato[g]	175	786	222	35	55	37	0.62	0.64	8	1.21
Querétaro	163	760	215	07	32	57	0.94	1.00	34	1.55
Coatzacoalcos	110	730	150	29	92	101	1.68	1.77	3	2.54
Minatitlán	95	4,124	23	19	54	38	0.64	0.66	3	0.97
Local growth centers										
Ciudad Juárez	424	4,854	87	138	111	53	0.88	0.92	26	1.69
Mexicali	396	13,689	29	180	126	41	0.68	0.71	46	0.51
Culiacán	360	7,044	51	57	42	72	1.20	1.26	28	1.42
Tijuana	340	1,392	245	197	154	106	1.75	1.85	39	1.57
Toluca	239	377	634	17	36	53	0.88	0.92	6	0.52
Acapulco	239	1,883	127	145	52	182	3.01	3.19	15	5.25
Aguascalientes	224	1,763	127	13	30	46	0.76	0.80	66	1.17
Hermosillo	208	14,880	14	81	117	76	1.26	1.33	19	1.90
Durango	204	10,042	20	58	45	43	0.71	0.75	22	1.84
Matamoros	186	3,352	56	137	12	30	0.50	0.52	13	0.71
Ciudad Obregón	183	4,037	45	129	97	47	0.78	0.82	17	1.18
Mazatlán	168	3,068	55	21	46	49	0.81	0.85	13	0.96
Cuernavaca	161	245	657	114	56	88	1.45	1.54	26	1.48
Orizaba[h]	160	168	950	19	25	29	0.48	0.50	4	0.73
Oaxaca[i]	158	643	246	56	43	41	0.68	0.71	8	2.46
Nuevo Laredo	151	1,666	91	88	61	58	0.95	1.01	10	1.36
Reynosa	151	2,961	51	200	94	12	0.20	0.21	10	0.28
Jalapa	130	118	1,101	26	32	67	1.11	1.17	3	1.68
Pachuca	92	195	469	8	12	27	0.45	0.47	8	1.35

Note: Column definitions.
1. Population (thousands of persons).
2. Area (square kilometers).
3. Population density (population per square kilometer).
4. Population change, 1940-50 (percent).
5. Population change, 1950-60 (percent).
6. Population change, 1960-70 (percent).
7. Population change, relative to all areas in the sample, 1960-70 (index).
8. Population change relative to all areas of the sample, excluding the Mexico City metropolitan area, 1960-70 (index).
9. Proportion of the state population (percent).
10. Population growth rate, relative to that of the state, 1960-70 (index).

Footnotes:
n.a. Not available.
a. Mexico City includes the whole of the Federal District, plus ten municipios in the state of México: Atizapán de Zaragoza, Coacalco, Cuautitlán, Chimalhuacán, Ecatepec, Naucalpan, Netzacualcóyotl, La Paz, Tlanepantla, and Tultitlán.
b. Guadalajara includes the municipios of Tlaqupaque and Zapopan in the state of Jalisco.
c. Monterrey includes the municipios of Garza García, San Nicolás de los Garza, Santa Catarina, and Guadalupe in the state of Nuevo León.
d. Puebla includes Cuautlancingo and San Pedro Cholula in the state of Puebla.
e. Torreón includes the municipios of Lerdo and Gómez Palacio in the state of Durango.
f. Tampico includes the municipio of Ciudad Madero in the state of Tamaulipas.
g. For purposes of discussion in the text, Irapuato and Querétaro, on the one hand, and Coatzacoalcos and Minatitlán, on the other hand, have been considered jointly as single regional growth centers.
h. Orizaba includes the municipios of Camerino Z, Mendoza, Nogales, and Tenango del Río Blanco in the state of Veracruz.
i. For Oaxaca the data were gathered on the basis of the Distrito Central, and not the municipio or Oaxaca de Juárez. Thus, the urban municipio of Oaxaca de Juárez is overrepresented by the figures that appear here.
Source: IX Censo General de la Población, 1970 (1972).

These medium-size cities owed their past growth primarily to the expansion of irrigated farming in their immediate vicinities. To the extent that water supply problems in these areas become increasingly severe and the further expansion of irrigation would mean importing water from other regions at a likely excessive cost, the future outlook would be for less rapid agricultural growth. In manufacturing, their comparative advantage for many kinds of industry is substantially reduced by the distance to large domestic markets in the central zone. Their location is an advantage only for exports to the western portion of the United States. Agricultural processing industries, which formed the backbone of the manufacturing sector in these cities, do not suffer from limitations of location. For these reasons, it is unlikely that any of the Gulf of California cities will attain a minimum threshold size before the turn of the century.

A third group of cities that were excluded were the Pacific Coast ports of Mazatlán and Acapulco. Both experienced rapid growth in the 1960s, chiefly because of their attractiveness for international tourism. But Mazatlán was a less promising port than Manzanillo, which was a much smaller city farther south, or than Acapulco with its superior access to the Mexico City area. Both cities suffer from being wedged between the sea and the

Table 7-7. *Economic Indicators for Thirty-seven Cities, 1970*

City	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7[i])*	*(8)*	*(9)*	*(10)*
Primate core area										
Mexico City[a]	71	27	2	31	1.15	1.06	2.32	42	1.13	1.00
Subsidiary core areas										
Guadalajara[b]	71	16	5	28	1.51	0.83	1.80	41	0.87	0.97
Monterrey[c]	71	23	3	36	1.38	1.26	2.75	38	0.97	0.97
Regional growth centers										
Puebla[d]	68	22	6	29	0.71	0.45	0.97	37	1.06	0.88
Torreón[e]	69	15	24	16	0.07	1.06	2.30	29	0.73	0.85
León	71	18	11	45	1.20	0.45	0.98	51	0.51	0.81
Chihuahua	66	20	11	17	0.74	1.21	2.62	32	0.97	0.90
Tampico[f]	66	20	5	13	−1.15	0.66	1.43	45	0.97	1.02
San Luis Potosí	64	20	9	23	0.12	0.73	1.58	35	0.95	0.75
Mérida	64	17	12	19	−0.58	0.48	1.04	51	1.15	0.78
Veracruz	69	20	6	20	0.89	1.25	2.73	41	0.96	0.88
Morelia	60	17	23	14	−0.05	0.56	1.22	41	1.10	0.81
Saltillo	68	15	15	25	1.10	0.74	1.61	44	0.89	0.80
Villahermosa	72	16	33	9	0.51	0.52	1.14	43	0.76	0.78
Irapuato[g]	69	16	34	18	0.46	0.44	0.97	35	0.46	0.81
Querétaro	72	20	17	24	1.53	1.10	2.39	39	0.85	0.74
Coatzacoalcos	76	19	9	11	0.38	1.86	4.06	29	0.73	1.09
Minatitlán	69	15	23	10	−0.74	1.01	2.20	38	0.77	1.09
Local growth centers										
Ciudad Juárez	65	19	8	17	0.53	0.52	1.14	50	0.77	1.11
Mexicali	65	17	33	15	1.61	0.78	1.70	48	0.78	1.33
Culiacán	71	19	42	10	1.12	0.84	1.83	36	0.69	0.90
Tijuana	66	20	9	21	3.20	0.73	1.60	47	0.84	1.33
Toluca	69	21	16	23	1.30	1.76	3.84	28	1.09	0.88
Acapulco	66	18	18	9	3.51	0.78	1.69	40	0.65	1.00
Aguascalientes	69	18	20	19	−0.05	0.55	1.20	37	0.69	0.71
Hermosillo	64	17	22	12	0.66	1.46	1.66	37	1.02	0.90
Durango	65	16	26	13	0.43	1.00	2.18	30	0.89	0.66
Matamoros	68	17	26	14	0.87	0.47	1.02	47	0.71	1.04
Ciudad Obregón	68	17	29	11	0.51	2.02	4.40	22	0.82	0.90
Mazatlán	73	21	23	14	0.92	0.80	1.74	39	0.81	0.82
Cuernavaca	72	25	9	21	2.30	0.85	1.84	47	0.93	0.83
Orizaba[h]	64	15	8	33	−0.38	1.14	2.48	49	0.85	0.98
Oaxaca[i]	66	20	23	15	−0.28	0.40	0.87	37	0.98	0.57
Nuevo Laredo	67	19	11	19	1.71	0.48	1.04	56	0.77	1.04
Reynosa	69	14	16	10	−0.12	0.36	0.79	50	0.81	1.04
Jalapa	65	23	11	12	−0.12	0.50	1.08	36	1.26	0.84
Pachuca	64	21	5	19	0.20	0.39	0.85	61	1.30	0.65

Note: Column definitions.

1. Male economically active population (EAP) as a proportion of total population 12 years or older.
2. Female economically active population (EAP) as a proportion of total population 12 years or older.
3. EAP employed in agriculture, cattle-raising, fishing, and hunting.
4. EAP employed in manufacturing.
5. Growth in manufacturing employment, relative to growth for all areas in the sample, 1960-70 (index).
6. Value-added per worker in manufacturing, relative to all areas (index).
7. Value-added per worker in manufacturing, relative to all areas, excluding Mexico City (index).
8. Wages and salaries as a proportion of value-added in manufacturing.
9. Professionals per 1,000 EAP, relative to all areas.
10. General minimum wage, relative to the minimum wage in the Mexico City metropolitan area, 1974-75 (index).

Data are for 1970 unless otherwise indicated.

Footnotes: a. to i., see Table 7-6.

j. Calculated with manufacturing employment figures from the Industrial Census, whereas indicators 4 and 5 use the figures from the population census.

Source: Most of the indicators were estimated using data from the decennial census of population, principally the *IX Censo General de la Población, 1970* (1972). There are some exceptions, however. Economic indicators using value-added (6, 7, and 8) were calculated with data from the *IX Censo Industrial, 1970* (1974). Minimum wage data for 1974-75 were obtained directly from the Comision Nacional de Salarios Minimos.

mountains. Lacking significant hinterlands, they are unlikely to be able to spread growth much beyond their immediate boundaries.

The cities of the southern mountain states—Michoacán, Guerrero, Oaxaca, and Chiapas—were also excluded. With one exception, none of these states had urban centers large enough to warrant designation as regional growth centers. The exception was Morelia, the state capital of Michoacán, which has been identified as a regional growth center. As a whole, these four states were among the poorest, least accessible, most traditional areas of Mexico. In relation to more favorably situated regions, they offered few prospects for economic growth, with the possible exception of certain parts of Oaxaca and Chiapas because of the development of the Isthmus of Tehuantepec.

The final group of cities not included among the prospective growth centers were the deconcentration centers for Mexico City: Pachuca, Toluca, and Cuernavaca. No city less than 100 kilometers from Mexico City was considered suitable as a regional growth center, regardless of its present population. This was the overspill or deconcentration area for Mexico City, and existing centers would likely become absorbed into the metropolitan economy well before the turn of the century.

The options for regional growth centers were sharply reduced as a result of excluding these five groups. The cities that remained for consideration were: the north and northeast cities below the border, including Chihuahua, Torreón, and Saltillo, but not Durango, which is deep in the mountains and disadvantageously located for access to national markets; the Gulf of Mexico cities, including Tampico, Veracruz, Coatzacoalcos-Minatitlán, Villahermosa, and Mérida, but neither Orizaba, which was a

declining industrial center halfway between Veracruz and Puebla, nor Jalapa, the state capital of Veracruz and primarily an administrative and educational city; and the cities of the center, including Puebla, Querétaro-Irapuato, Morelia, León, and San Luis Potosí.

This last set requires additional comment. By all standards, the most promising of these centers was that of Querétaro-Irapuato, which defined the region traditionally known as El Bajio. It is located on the main road between Mexico City and Guadalajara and industrialized rapidly during the 1960s. It was also a highly productive agricultural region. The two cities are less than an hour's drive apart and enclose two additional towns of less than 100,000 population each (Salamanca and Celaya), both of which were becoming important industrial centers. From Querétaro, it is only an hour and a half to the northern industrial districts of the Mexico City metropolis on a limited access highway. And once this highway was extended beyond Irapuato to Guadalajara, the distance to the state capital of Jalisco would be reduced to three hours. In addition, the area was well connected to the northeastern cities of Saltillo, Monterrey, and Torreón and to the U.S. border. Outside the immediate vicinity of the Federal Capital, there were no large areas in central Mexico that offered better opportunities for economic expansion. Mexico City industrialists may regard the area as a deconcentration center. But for those in the region, it is better thought of as a growth center with considerable potential.

The other four cities each had their special characteristics. Puebla is an old industrial center on the edge of Mexico City's deconcentration area and, in 1970, was the fourth largest city in the country. Its growth picked up substantially after the mid-1960s, and its future appeared promising. Morelia is a state capital and the only large city on the alternate route connecting Guadalajara with Mexico City. It is also tied by road to the Bajio Region. León is an important regional center of some size (420,000 in 1970) that has a long tradition of local shoe and leather manufacturing. And San Luis Potosí, an important city in Mexican history and a state capital, lies astride a key transport junction between the Mexico City-Monterrey highway and the Guadalajara-Tampico road. Because socioeconomic indexes were more promising for San Luis Potosí than Aguascalientes, the former was included over the latter as a regional growth center.

Local growth centers constituted a residual category for urban and metropolitan areas containing more than 100,000 people in 1970. Many of these cities are primarily administrative, service, or commercial centers, with relatively limited growth prospects. But they also include ports and tourist centers, border towns, and older manufacturing centers, such as Orizaba, which have different growth characteristics and, for reasons stated above, were not considered as regional growth centers. This did not mean they should not receive attention, but simply that in the context of a

national spatial development policy, an area designated as a local growth center should not receive the highest priority in programming investments.

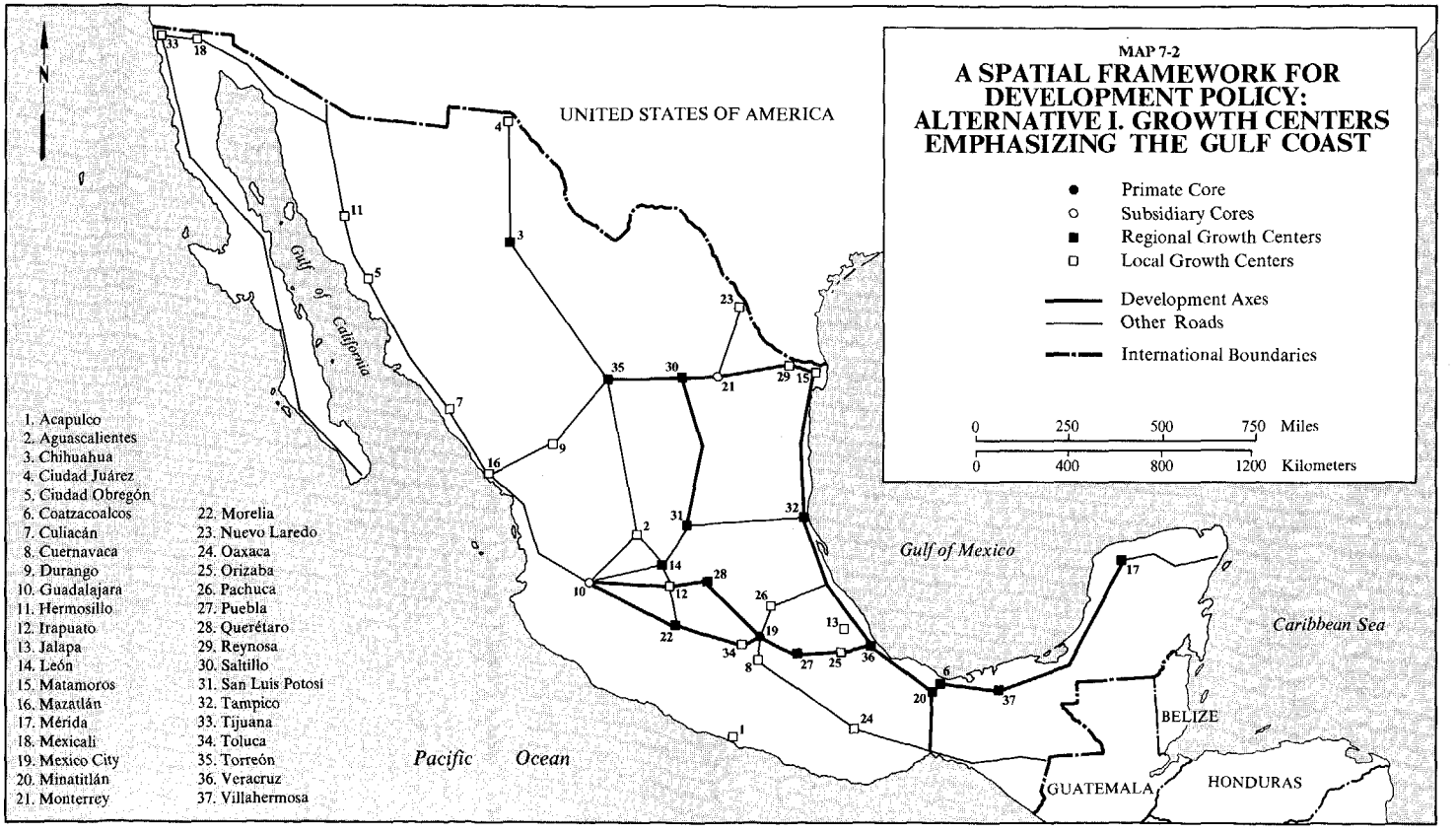
In addition to the principal core regions and growth centers, Map 7-2 shows four major development axes as well as primary and secondary road networks. Development axes are highways that connect the three designated core areas and that pass through as many regional or local growth centers as possible. The one exception is the development axis which joins Mexico City with Veracruz and represents an extension of the main Guadalajara-Mexico City axis. Development axes are likely to be the most heavily traveled long-distance routes of a national highway system. They are highly urbanized and provide access to the principal domestic markets. Because of this they can be expected to induce industrialization in important cities between the core areas, such as the Querétaro-Irapuato industrial corridor, Morelia, San Luis Potosí, Saltillo, and Puebla. Development axes should be thought of as multilane, limited-access highways, capable of carrying a heavy and growing volume of traffic. The shorter the traveling time between large cities along these axes, the greater the prospects that they will grow into the spatial scaffold of the Mexican economy. Map 7-1 also shows distances between major cities in kilometers.

The primary road network connects every regional growth center with at least one other growth center or core area, and every core area to at least one port or border city. (If a development axis already provided for a larger highway, the criterion was satisfied.) The development axes and the primary road network define the main physical structure of the spatial system.

In light of this analysis the spatial system can be divided into two main developmental subsystems. The northern subsystem focuses on Monterrey and links up with Saltillo, Torreón, and Chihuahua to the west; with Nuevo Laredo to the north; and with Reynosa and Matamoros to the east. (Except for Chihuahua, all of these cities fall directly within the area of influence of the Monterrey metropolis.) The central subsystem concentrates on the Guadalajara-Mexico City-Veracruz development axis. To the southwest it joins the ports of Manzanillo and Acapulco, and to the east the main road along the Gulf of Mexico at Tampico and Pozo Rico (Veracruz).

The northern and central subsystems are joined in two places: along the north-south development axis between Mexico City and Monterrey and along the primary road network between Irapuato-Querétaro and Torreón.

This model of a spatial framework for future development did not include a consolidated subsystem for the southern zone, chiefly because that area lacked a subsidiary core through which to articulate such a system. The coastal highway from Mérida to Tampico could, however, eventually define a linear subsystem of some importance. The Gulf Coast states of Quintana Roo, Yucatán, Campeche, Tabasco, Veracruz, and Tamaulipas,


MAP 7-2
A SPATIAL FRAMEWORK FOR DEVELOPMENT POLICY: ALTERNATIVE I. GROWTH CENTERS EMPHASIZING THE GULF COAST
Primate Core
Subsidiary Cores
Regional Growth Centers
Local Growth Centers
Development Axes
Other Roads
International Boundaries
0 250 500 750 Miles
0 400 800 1200 Kilometers
UNITED STATES OF AMERICA
Gulf of California
Gulf of Mexico
Caribbean Sea
Pacific Ocean
BELIZE
GUATEMALA
HONDURAS
1. Acapulco
2. Aguascalientes
3. Chihuahua
4. Ciudad Juárez
5. Ciudad Obregón
6. Coatzacoalcos
7. Culiacán
8. Cuernavaca
9. Durango
10. Guadalajara
11. Hermosillo
12. Irapuato
13. Jalapa
14. León
15. Matamoros
16. Mazatlán
17. Mérida
18. Mexicali
19. Mexico City
20. Minatitlán
21. Monterrey
22. Morelia
23. Nuevo Laredo
24. Oaxaca
25. Orizaba
26. Pachuca
27. Puebla
28. Querétaro
29. Reynosa
30. Saltillo
31. San Luis Potosi
32. Tampico
33. Tijuana
34. Toluca
35. Torreón
36. Veracruz
37. Villahermosa

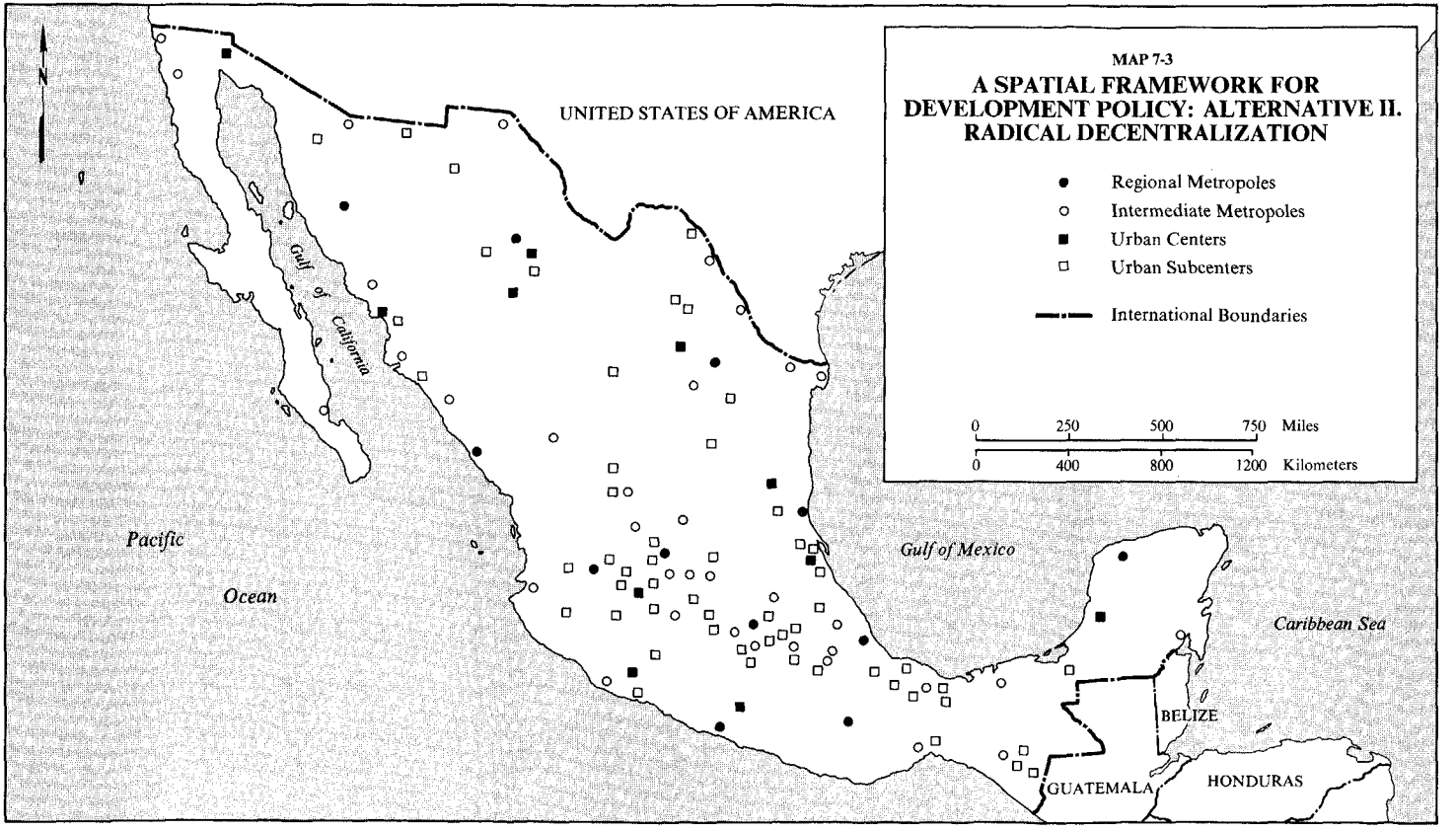
which it connects, have considerable potential for development and are likely to experience accelerated growth through the end of the century.

Indeed, a variant of this strategy would shift the main center of development from the central to the Gulf Coast states (Map 7-2). This approach would combine agricultural with urban-industrial programs, further diversifying the economy of the Gulf Coast. It would concentrate economic expansion in areas with a surplus, rather than a deficit, of water. It would help to internalize the multiplier effects of export-oriented industries, including petroleum, in the area. It would open a vital new frontier for Mexico's development, less hampered by tradition than some of the older areas of the central zone. It would help to reduce population pressures in the depressed agricultural regions of Chiapas, Oaxaca, Hidalgo, and San Luis Potosí. And it would help to integrate the economy of the southeast, one of the most depressed and relatively isolated regions of the country, but at the same time, one of the best endowed with natural resources, by providing export outlets for agricultural and manufactured products through the ports of Coatzacoalcos on the Gulf and possibly Salina Cruz on the Pacific. In view of the long-term need to expand and diversify exports, this point carries considerable weight.

Such an emphasis is implicit in the expansion of port facilities and industrial plants at Coatzacoalcos and the development of new oil fields in the Tabasco-Chiapas region. But the confirmation of this spatial policy framework would also emphasize the improvement of highway connections between the principal coastal activities in the area, the development of urban infrastructure and agriculture, resource conservation, pollution abatement, and the promotion of physical planning.

ALTERNATIVE II: RADICAL DECENTRALIZATION. Map 7-3 illustrates an approach to spatial policy that was temporarily adopted by the Mexican government in the early 1970s.[9] This had a four-level hierarchy of "poles" and other cities that appeared to be more or less evenly distributed over the national territory. Lacking the equivalent of a subsidiary core area category (probably because of the view that Monterrey and Guadalajara were already too large), the strategy had thirteen regional metropolitan areas and forty intermediate metropolitan areas. Among the former were such cities as Mexicali, Hermosillo, Acapulco, and Oaxaca, which, given the criteria developed in this chapter for the selection of growth centers, were specifically excluded from the growth center category under Alternative I. However, five cities, identified in Alternative I as regional growth centers (Irapuato-Querétaro, San Luis Potosí, Puebla, and Coatzacoalcos), were assigned to the lower category of intermediate metropolitan areas. In

9. Map 7-3 is derived from a map published by the Ministry of Public Works in 1973.


MAP 7-3
A SPATIAL FRAMEWORK FOR DEVELOPMENT POLICY: ALTERNATIVE II. RADICAL DECENTRALIZATION
Regional Metropoles
Intermediate Metropoles
Urban Centers
Urban Subcenters
International Boundaries
0 250 500 750 Miles
0 400 800 1200 Kilometers
N
UNITED STATES OF AMERICA
Gulf of California
Pacific Ocean
Gulf of Mexico
Caribbean Sea
BELIZE
GUATEMALA
HONDURAS

addition, this strategy did not attempt to identify either development axes or primary and secondary road networks. As a result, it did not provide a well articulated system.

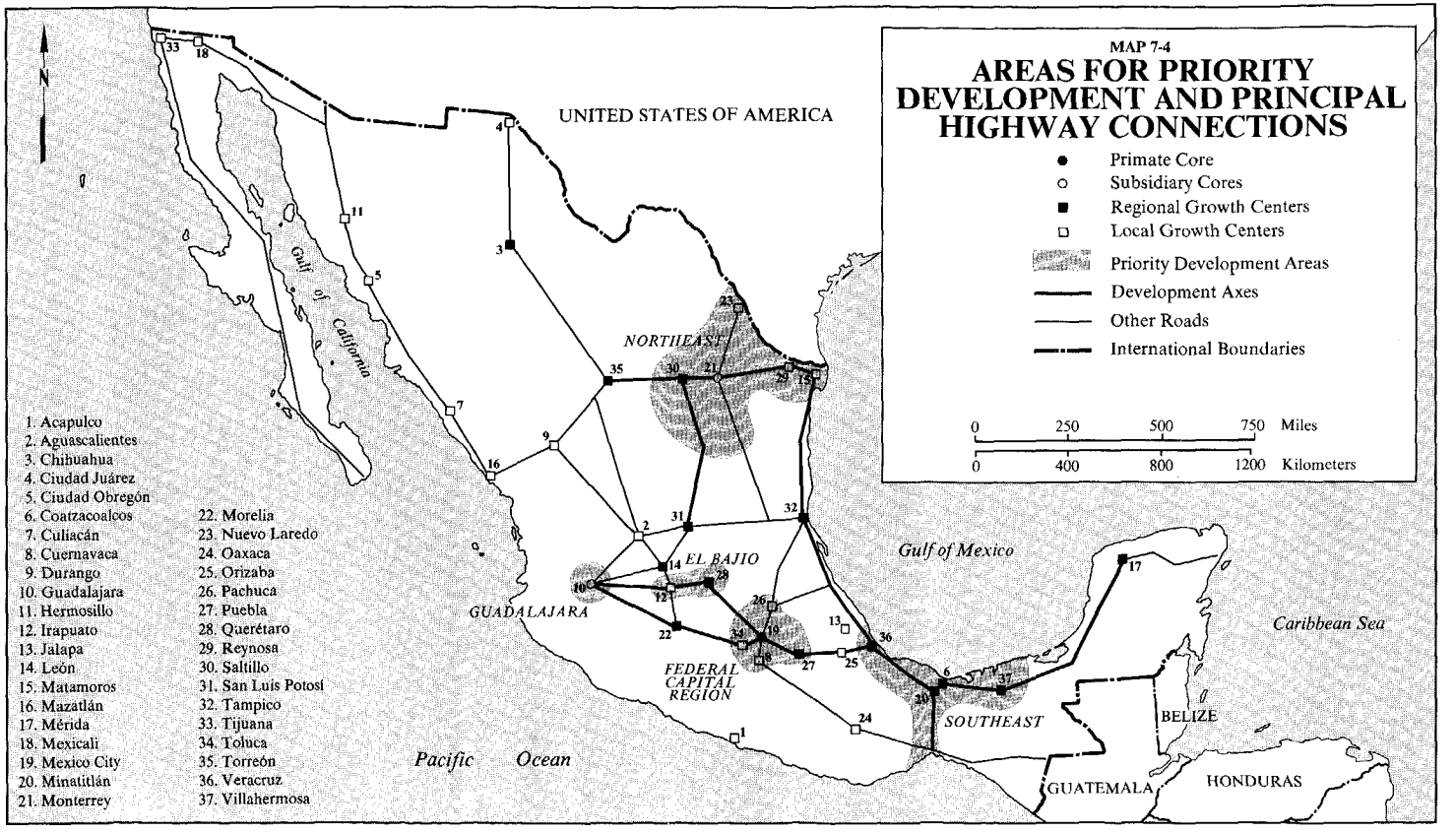
If such a strategy were used as a guiding framework for spatial policy it would probably result in a very different pattern of spatial organization and would imply a quite different spatial allocation of resources than those implied by Alternative I or its Gulf Coast variant. It would tend to distribute public investments over a much larger cross-section of cities. Because it would involve more growth centers (fifty-three, excluding Mexico City, compared with thirteen), each city would receive only a small share of the resources available for public investment.

Moreover, because these resources would be scattered over a much larger area, they would probably fail to bring about a spatial structure that was significantly different from that which would emerge without an explicit spatial policy. This would mean continued long-term rates of above-average growth for a few large cities, below-average growth for a larger number of cities, and a spontaneous spill-over of growth into areas adjacent to the Mexico City metropolis, such as Puebla, Tlaxcala, Pachuca, Querétaro, Toluca, and Cuernavaca. Such a pattern might be realized without such investments as the industrial parks that were built in the early 1970s, but it would do little to promote regional spread effects. Indeed, the opposite would probably occur, and many areas would be drained even further by the inexorable expansion of Mexico City's urban field. Because much effort would then be concerned with accommodating this explosive growth, the process of decentralization would be weakened, and the growth of the region would continue uninhibited by countervailing forces.

The growth centers strategy would also have to face the problem of overspill, and the kind of selectivity that is intended may not be acceptable. But overspill can be dealt with more effectively if there is a manageable number of alternative centers and if the hierarchy of growth centers recognizes the existence of main core areas. The further sustained growth of these areas may help alleviate the many urban problems of the national metropolis, while giving structure and cohesion to the two main spatial subsystems of the Mexican economy.

Areas for priority development

Given the shortcomings of an indiscriminate approach such as that of Alternative-II and the attractions of a more selective approach based on growth centers, a further step in preparing a spatial policies framework was to identify priority areas for development. This implied a regional focus, the regions in this case not being the river basins traditional to Mexican planning, but regions defined by, and articulated through, the system of


MAP 7-4
AREAS FOR PRIORITY DEVELOPMENT AND PRINCIPAL HIGHWAY CONNECTIONS
Primate Core
Subsidiary Cores
Regional Growth Centers
Local Growth Centers
Priority Development Areas
Development Axes
Other Roads
International Boundaries
0 250 500 750 Miles
0 400 800 1200 Kilometers
UNITED STATES OF AMERICA
Gulf of California
NORTHEAST
EL BAJIO
GUADALAJARA
FEDERAL CAPITAL REGION
SOUTHEAST
Gulf of Mexico
Caribbean Sea
Pacific Ocean
BELIZE
GUATEMALA
HONDURAS
1. Acapulco
2. Aguascalientes
3. Chihuahua
4. Ciudad Juárez
5. Ciudad Obregón
6. Coatzacoalcos
7. Culiacán
8. Cuernavaca
9. Durango
10. Guadalajara
11. Hermosillo
12. Irapuato
13. Jalapa
14. León
15. Matamoros
16. Mazatlán
17. Mérida
18. Mexicali
19. Mexico City
20. Minatitlán
21. Monterrey
22. Morelia
23. Nuevo Laredo
24. Oaxaca
25. Orizaba
26. Pachuca
27. Puebla
28. Querétaro
29. Reynosa
30. Saltillo
31. San Luis Potosí
32. Tampico
33. Tijuana
34. Toluca
35. Torreón
36. Veracruz
37. Villahermosa

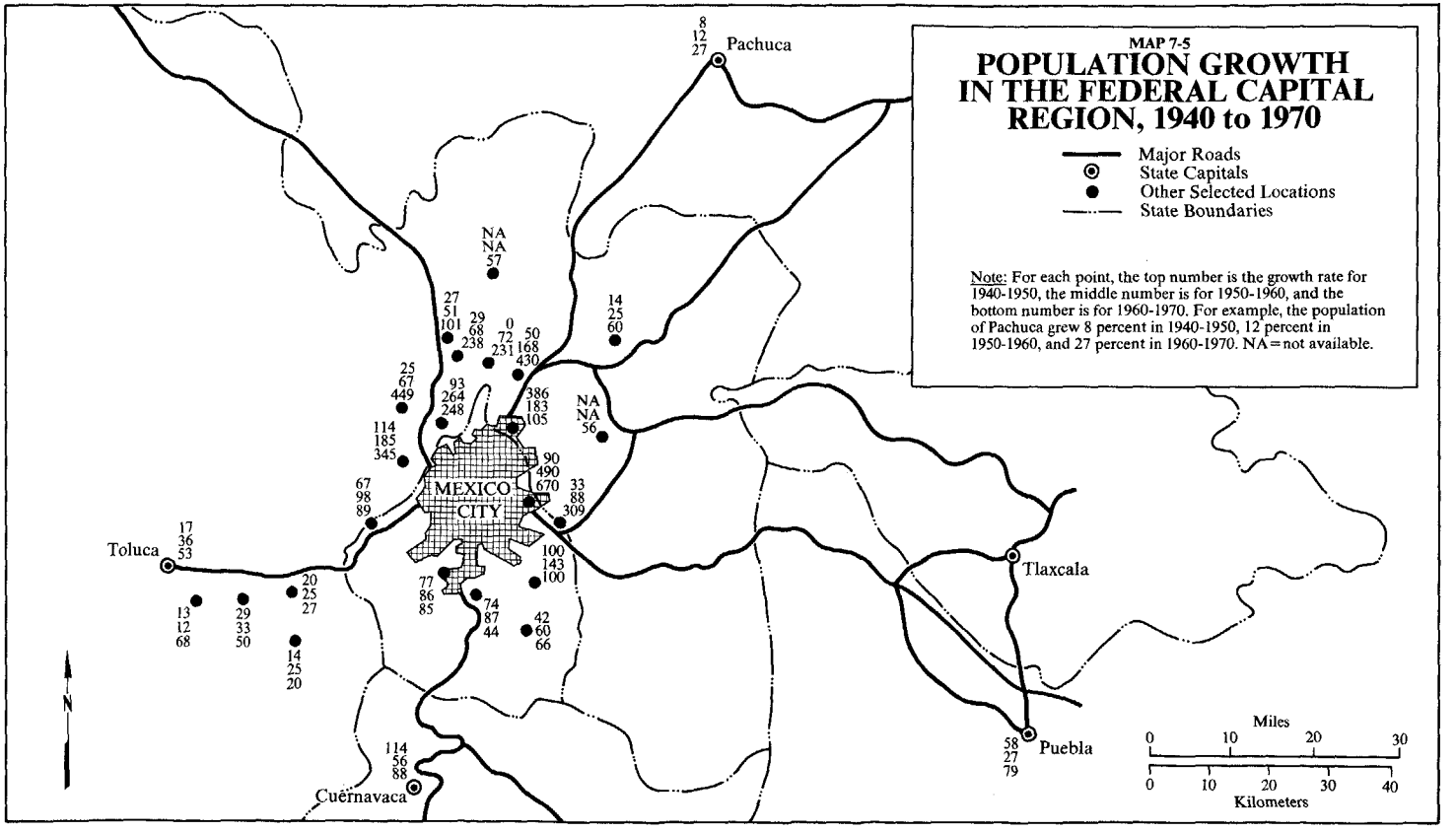
cities and large metropolitan areas. This exercise therefore focused attention on a limited number of areas that presented special conditions or opportunities for development. In the following discussion five such areas are identified: the Federal Capital region; the Guadalajara metropolitan region; the Northeast region centered on Monterrey; the Querétaro-Irapuato corridor, and the Isthmus of Tehuantepec (Map 7-4). Although the reasons for including them varied, these five areas seemed, on the basis of the evidence available, to merit special emphasis as development regions, although the nature of their development potential was seen to vary from one to another.[10]

The first region was the Federal Capital region and included, in addition to the already built-up areas of the Federal District and the municipalities in the state of México immediately adjacent to it, an "urban field" that extended outward from Mexico City about 100 kilometers. This vast metropolitan region will probably contain more than 30 million people by the end of the century and covers, besides the Federal District, portions of the states of México, Hidalgo, Tlaxcala, Puebla, and Morelos.

Map 7-5 shows how waves of population growth moved steadily outward from the Federal District after 1940, first to the north and, by 1970, to the south, east, and west. A general pattern emerges: relatively slow growth in the beginning, succeeded by a period of very rapid expansion of from 200 to 300 percent in the course of a single decade during which the area fills up, followed by a gradual decline in population growth in succeeding decades.

A study of this pattern suggested that the next wave of explosive urban growth might expand beyond the mountain barriers that surround the Valley of Mexico into the outlying cities of Tlaxcala, Puebla, Cuernavaca, and Toluca which, during the 1960s, reached expansion rates of 70 percent or more. Growth in the direction of Pachuca is impeded by Texcoco Lake.

10. The National Urban Development Plan (1978) (see footnote 5, above) recognizes thirteen regions. Ten of these are priority regions, and the other three (corresponding to those identified here as the Federal Capital, Northeast, and Guadalajara regions) are identified as special regions requiring control. The status accorded to the Northeast and the Guadalajara regions in the plan may be questioned since it can be argued that they do not belong in the same category as the Federal Capital region. Two of the other ten regions (the Bajio and the Isthmus of Tehuantepec) coincide with the other two identified here. Most of the remaining eight derive their priority status in the plan from the growth prospects of cities that have been identified earlier in this chapter as regional growth centers or in some cases as local growth centers. Although the larger number of special or priority regions identified in the plan points to the use of certain criteria not considered here, the main difference is that the plan identifies several priority regions associated with relatively small cities, without ranking them differently from those based on larger (regional) cities. There are, however, inevitable contrasts between the urban development that can be expected in the Rio Ameca region (where the largest city is Puerto Vallarta) and the Rio Panuco region (whose largest city is Tampico).


MAP 7-5
POPULATION GROWTH IN THE FEDERAL CAPITAL REGION, 1940 to 1970
Major Roads
State Capitals
Other Selected Locations
State Boundaries
Note: For each point, the top number is the growth rate for 1940-1950, the middle number is for 1950-1960, and the bottom number is for 1960-1970. For example, the population of Pachuca grew 8 percent in 1940-1950, 12 percent in 1950-1960, and 27 percent in 1960-1970. NA=not available.
Pachuca
8
12
27
NA
NA
57
27
51
101
29
68
238
0
72
231
50
168
430
14
25
60
25
67
449
93
264
248
386
183
105
NA
NA
56
114
185
345
90
490
670
33
88
309
MEXICO
CITY
67
98
89
17
36
53
Toluca
100
143
100
77
86
85
74
87
44
42
60
66
20
25
27
13
12
68
29
33
50
14
25
20
Tlaxcala
N
114
56
88
Cuernavaca
58
27
79
Puebla
Miles
0
10
20
30
0
10
20
30
40
Kilometers

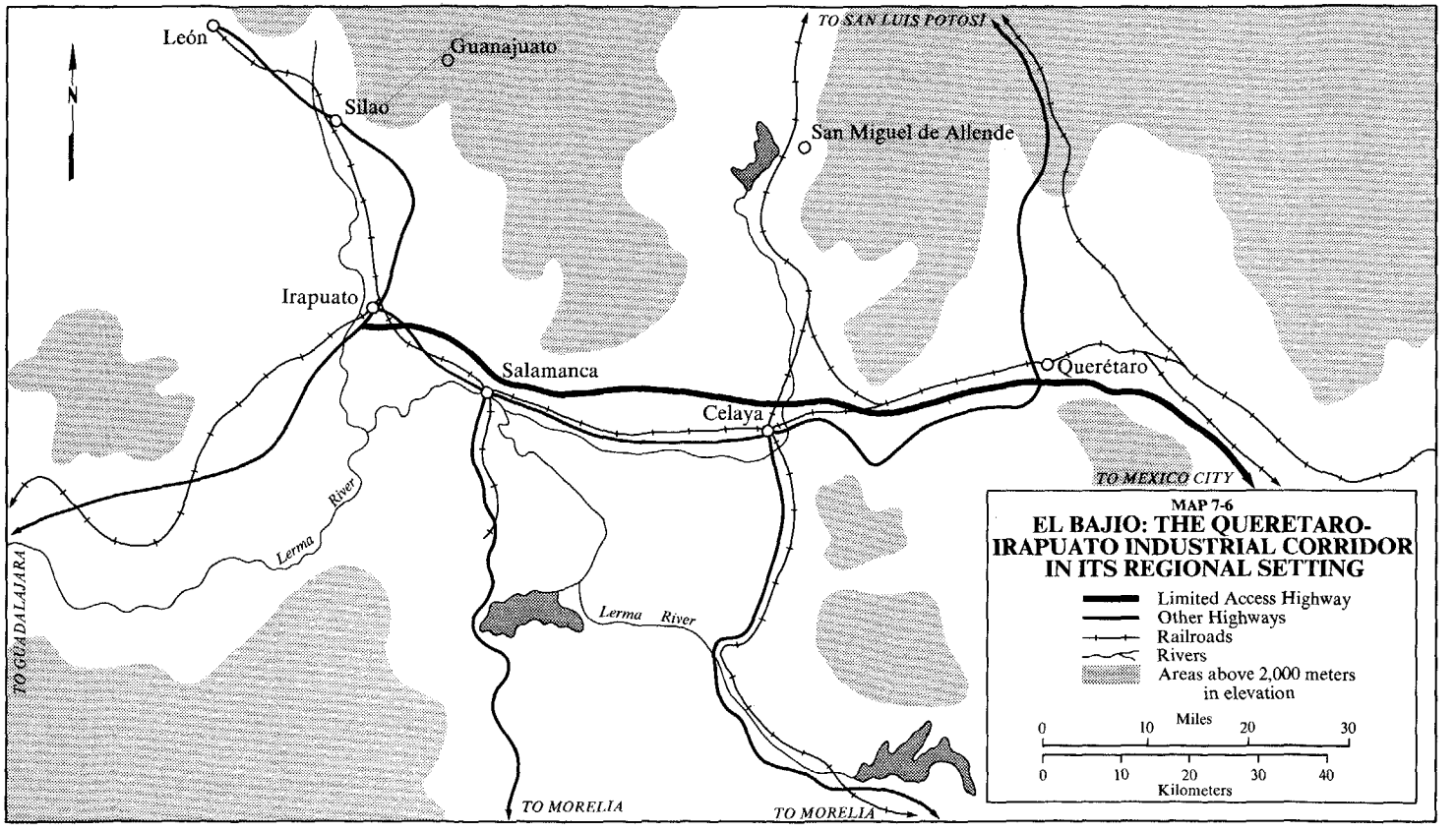
But the lake is drying up and will eventually give way to urban-industrial expansion northeast of the Federal District. The main problems of this enormous region include articulating its territorial expansion, integrating subcommunities within it, housing, pollution abatement, location of physical facilities, land use, and water and sewage systems; in short, a panoply of physical planning problems attending the emergence of one of the great urban regions of the world.

The second region comprised the metropolitan area of Guadalajara. Guadalajara lacks a peripheral urban system since this is a rather tightly bounded area. A significant problem concerns the future of Chapala Lake to the south of the city, because it is not only a large recreational resource but, in the early 1970s, began to experience rapid industrialization along with urbanization. If the lake is to serve the multiple demands being made on it, land use as well as water quality problems will have to be given close attention.

The third region was centered on Monterrey and included the border cities of Nuevo Laredo, Reynosa, and Matamoros; as well as Saltillo, the capital of the adjoining state of Coahuila; and cities to the southeast of Monterrey, such as Montemorelos and Linareas. This is the most important development area in northeastern Mexico. It has very high growth potential, is strategically located with respect to U.S. markets, and presents challenging problems in allocating activities to serve the region in public sector industries, transport development, water supply, and industrial location.

The fourth region comprised the emerging industrial corridor between Querétaro and Irapuato (Map 7-6). As pointed out earlier, this was one of the most promising new development zones in central Mexico and, by the end of the 1970s, was receiving overspill industries from Mexico City. Its future population may well exceed 1 million, and its connections with the principal core areas of the country underlie its key role as an area of intermediate location. Major problems included water and waste disposal, the resolution of rural-urban conflicts in land use, industrial location, and service facilities. These problems will become increasingly severe as the growth rate rises.

The fifth region, in the southeast, was focused on Coatzacoalcos-Minatitlán and the Isthmus of Tehuantepec, but extended farther along the Gulf Coast to Veracruz in the west and Villahermosa in the east. The region offers unusual opportunities for economic growth. In the states of Veracruz and Tabasco, it includes some of the best remaining land for agricultural development in Mexico; in Chiapas there are large reserves of hydroelectric power; and in Veracruz, Tabasco, and Chiapas there are large petroleum resources. It also contains two large ports, a heavy industrial complex at Coatzacoalcos-Minatitlán, and reasonably good connections (although they need to be improved) to the center of the country. Across


León
Guanajuato
Silao
San Miguel de Allende
TO SAN LUIS POTOSI
Irapuato
Salamanca
Celaya
Querétaro
TO MEXICO CITY
Lerma River
Lerma River
TO GUADALAJARA
TO MORELIA
TO MORELIA
N
MAP 7-6
EL BAJIO: THE QUERETARO-IRAPUATO INDUSTRIAL CORRIDOR IN ITS REGIONAL SETTING
Limited Access Highway
Other Highways
Railroads
Rivers
Areas above 2,000 meters in elevation
Miles
0 10 20 30
0 10 20 30 40
Kilometers

the Isthmus, it also had access to the Pacific Coast port of Salina Cruz, which would gain importance if Mexico were to expand to its trade with the Far East.

These five regions—the Federal Capital region, the Guadalajara region, the Northeast region, the Bajio region, and the Southeast (Isthmus) region—were tentatively seen as the bases for spatial planning in Mexico through the end of the century, each of them playing different roles in the evolution of the spatial system. These contrasts are important inasmuch as the rationale for focusing attention on the Federal Capital region differed from that for concentrating resources on the Southeast. A fully comprehensive scheme of regional priorities would not end with these regions, however, and would encompass other regions with good prospects for growth, such as those centered on Tampico and Torreón. It would also eventually include specific strategies for the development of the whole spatial system and not only for those cities and regions that had the greatest potential for demographic and economic growth. The reason for limiting this analysis to five regions is to emphasize the regions that appeared to deserve particular priority on the basis of events and trends up to the mid-1970s.

Implementing spatial policies

Given the conclusion that a selective strategy for urban and regional development seems an appropriate choice under conditions of resource constraint, two further sets of conclusions arise. One refers to the administrative framework for spatial policy implementation. The other refers to the instruments used to facilitate implementation.

ADMINISTRATIVE FRAMEWORK. In 1975 Mexico still lacked the basic underpinnings for the administrative framework needed to tackle effective spatial planning (which implies that at the national level, every branch of government should consider the locational aspects of its activities). In practice, each ministry or public agency produced its own assumptions about where growth and development should occur, where it should be supported, and also where it should be allowed to proceed without public assistance.

There was, moreover, little guidance for development activities at the local level. Large metropolitan areas, such as Guadalajara, Monterrey, and the Federal District, had their own planning staffs, and several states had started to do some physical planning for localities within their jurisdictions. The outstanding example was the state of México, which created a semiautonomous institution, AURIS, for this purpose. But elsewhere, the level of technical capacity was still low. Consequently, municipalities were, for the most part, passive recipients of benefits from the federal and state governments, and their suitability to receive benefits was decided elsewhere with-

out the benefit of municipal counsel. Local priorities were neither systematically studied nor developed. A project, such as a new circumferential route or an industrial park, may obviously set off a series of chain reactions throughout an urban system that may impose financial burdens on a municipality, but there was no systematic way to analyze the possible effects of such a project. Further, especially in rapidly growing areas such as Tijuana, Coatzacoalcos-Minatitlán, and Cuernavaca, the lack of technical capacity in the municipalities made it impossible to guide growth into spatially harmonious and efficient patterns that allowed for the possible effects of expansion.

There is no doubt that spatial policy is a peculiarly difficult area of public intervention: first, because spatial systems are characterized by inertia, spatial processes are slow, and spatial policies cannot be expected to have immediate effects; and second, because these characteristics of spatial change mean that policy objectives must be few in number, which means in turn that a growth centers strategy must focus on a limited number of cities and associated regions.

The argument put forward in this chapter in favor of a rational and national approach to spatial planning advocates a selective strategy for the spatial allocation of resources, and it stresses the powerful and inherent disadvantages of a less discriminate approach. This argument has been based on the empirical evidence of Mexico's own historical experience and is consistent with the conceptual framework outlined at the beginning of this book. It would, however, be unrealistic to suppose that the achievement of a spatial strategy such as this could be easily managed or would produce quick results.

Yet the prospect of allowing a spatial structure, such as that which had evolved in Mexico by 1975, to continue its evolution without direct and consistent countervailing efforts to modify its more disturbing aspects seemed untenable. It seemed further that the contemplation of that prospect could ultimately provide the strongest argument for attempting to produce marginal change in the further evolution of the spatial order—difficult and frustrating though that task would be.

POLICY INSTRUMENTS. A workable planning framework is an obvious prerequisite to such an attempt. But that attempt is also conditioned on the adoption of workable and mutually consistent policy instruments designed to produce change in the desired direction.

In the Mexican case it seems clear that the implicit spatial policies of the past, whose spatial characteristics often were unrecognized, had a much larger effect on the evolution of the spatial system than the relatively smaller number of explicit policies which were introduced from time to time. It is also clear that a comprehensive assessment of policy instruments

should refer to the spatial dimensions of each and every instrument of economic policy and not merely to those with an evident and formal spatial purpose. Finally, it is clear that achieving consistency between spatial policies is exceedingly difficult because it ultimately implies nothing less than the coordination of sectoral policy instruments from a spatial point of view.

The achievement of such coordination is, to say the least, daunting, and for that reason the potential instruments of explicit policy deserve continuing review and appraisal. Unless they are coordinated, they will not be effective. But even if they are coordinated they will not be effective unless they are well chosen and well calibrated. As shown by Mexico's own experience (Chapter 3), these instruments may often have uncertain effects, although the experience of other countries may provide relevant guidance to policymakers in Mexico.[11] In reviewing alternatives, it may be helpful to take account of the known effects of different instruments as they have been applied elsewhere, not only with respect to their efficacy but also with regard to how long they have taken to become effective.

A review of these alternative instruments for implementing future spatial policy does not belong in this book, which has sought to explain how Mexico's spatial structure has evolved and what major options are open to it in the future. Nonetheless, it is evident that the task of devising a coherent long-term spatial strategy will be much easier than that of giving it life and substance through the definition and application of specific policy measures.

Although the analysis on which this book is based was undertaken in terms of data from the early and mid-1970s, there is no reason to believe that the fundamental issues that it has addressed have altered since that time. As has been shown, spatial processes are slow, and spatial policies inevitably take time to produce effects. Nonetheless, the Mexican authorities have been conspicuously active since 1976 in devising ways and means of coming to terms with the issues, and there is no doubt that the approval of the National Law on Human Settlements (1976), the establishment of a new Ministry of Human Settlements and Public Works (SAHOP) in 1977, and the publication of a National Urban Development Plan (1978) represent important advances toward establishing an effective framework for making and carrying out urban and spatial policy in Mexico. This new structure grew out of more tentative measures taken in the early 1970s, which included the creation of a Regional Development Office in the Ministry of the Presidency, and the establishment of Regional Development Commissions in the Isthmus of Tehuantepec and Baja California and of Development Committees in most of the states.

11. In this regard, such reviews as those by Richardson (1977) and Renaud (1979) contain useful comparative assessments of the effects of different instruments.

The new planning structure may not represent a final step in evolving an appropriate framework for spatial policy planning, but is nonetheless a noteworthy example of how a country may organize itself to confront the issues arising from the spatial dimensions of economic development. Although the interpretation of spatial policy will continue to represent a compromise between what is technically desirable from a national point of view and what is politically, culturally, and socially feasible from a regional and local point of view, the new planning structure may be one within which these compromises can be consistently and systematically worked out.

Appendixes

APPENDIX A

Definition of Urban Places

SOME STUDENTS OF MEXICAN URBAN DEVELOPMENT have argued that the census definition of an urban settlement—2,500—is unrealistically low. Favoring a definition which regards urban places as those with populations of 15,000 or 20,000, some have argued that part of the so-called urban population captured by the census is really rural in economic and cultural terms (Unikel and Torres 1970). They have also argued that the administrative map of Mexico reflects past rather than present reality. In 1970 there were 571 municipios in Oaxaca but only 52 in Nuevo León, because Oaxaca had a large indigenous population in the sixteenth century. Generally, the south of the country has more municipios than the north. Consequently, urbanization has been more easily achieved in the south than the north, despite the fact that the south is, in general, much less developed.

These are important arguments. But in deciding to work with the urban definition corresponding to that of the census several factors were weighed. First, there is the fundamental but unsettled question of the difference between what is rural and what is urban. If the difference were economic, urban areas would, by definition, have no agricultural activities. If the difference were cultural, urban areas would have a different way of life. If the difference were a simple matter of size, there is no reason why a nuclear population of 2,500 people could not be an urban population. It is argued, however, that an urban nucleus becomes more urban the larger it grows.

These factors led Unikel and Torres to propose a definition of urban places in Mexico as those areas having at least 20,000 inhabitants. The cities thus defined have little agricultural activity and are almost entirely concerned with the urban functions of the secondary and tertiary sectors.

The use of the urban municipio or urban census tract as a statistical base has certain conceptual advantages. It is possible to measure the process of urban change within a census tract over time by analyzing the changing structure of economic activity as revealed by employment data from one year to another. There is moreover no certainty that agriculture may not be an urban activity in the sense that some of the economically active popula-

tions of large cities may tend to work outside the city. From a cultural standpoint there is less justification in Latin America for arguing that urban ways of life are markedly different from rural ways of life. Many migrants—particularly those who go to large cities—recreate rural ways of life in new urban environments and thus may continue to live in a "rural" environment long after they have joined the urban population. The nominally rural populations of areas near cities are associated with the city; they may even work there regularly or occasionally and will probably visit more often than those who live beyond the city's immediate sphere of influence.

In short, any definition of what is urban and what is rural is arbitrary. Although the census definition is unsatisfactory on some grounds, it is the best thing available.

The second question is methodological rather than conceptual. Unikel and Torres have published data for 1940, 1950, and 1960, adjusting the urban census tracts to cities, but their information concerns only urban population size and the economically active population. This book, however, refers to many other characteristics of urban populations, notably those derived from the industrial, commerce, and service censuses; fiscal data; savings and loan data; and many series of current statistics—all of which are only available in terms of municipios. As a practical matter, the conversion of these data into a base something like Unikel's cities would have been impossible even if it had been unambiguously desirable on conceptual grounds—which (for reasons already cited) was not the case.

Third, there is the question of the particular focus of this book. The concern here is with the past, present, and future of the country's large cities. Therefore, the set of urban places that in 1970 had more than 100,000 people is the main focus, and interest in the general process of urbanization is limited to analyzing the framework of urban size growth—both at the country and the regional levels—as a background to analyzing the development of the largest cities.

Finally, what difference does it make? The best answer is that at the national level the ratio of the urban population defined by the census to the urban population as defined by Unikel falls from 1:1.20 in 1940 to 1:1.11 in 1970.

These differences are not insignificant. But whether one definition or the other is used, the conclusions either about urban development or about other processes (including industrialization and economic growth) do not change. Nor does this change the trends of the urban development process or produce a different rank order of cities in terms of any indicator of urban development. In terms of results, it does not make much difference, but it makes more difference in some places than in others. For example, whereas the urban population of Oaxaca in 1960 was 78,639 according to

the municipal census tract and 75,196 according to Unikel, the population of Mexicali (the worst case of distortion) was 281,333 according to the census but only 179,539 according to Unikel.

The analysis in this book therefore refers to the municipal census tract, or municipio, except where it is useful to introduce a different definition.

APPENDIX B

Analysis of Population Growth

THE THIRTY-SEVEN LARGEST CITIES USED IN THIS STUDY were divided into six regional groups for two reasons: because vital statistics and data on migration consist of estimates that are subject to serious error, and therefore grouping municipalities statistically decreases the error factor; and because population characteristics affect entire regions rather than individual cities or municipalities.

Three factors were taken into account: whether a state had experienced net immigration or net emigration during the previous three decades (1940-70); whether it had experienced a relatively high or a relatively low rate of natural increase during the previous three decades; and whether two or more states had common borders. Eighteen states fell into the following groups:

a. Baja California, Colima, Morelos, Nuevo León, and Sonora had net immigration and high rates of natural growth.
b. Aguascalientes, Campeche, Coahuila, Durango, Querétaro, San Luis Potosí, Tlaxcala, and Zacatecas had high rates of natural growth but were net emigration states.
c. The Federal District had net immigration and a low rate of natural growth.
d. Chiapas, Oaxaca, Puebla, and Veracruz had low rates of natural growth and net emigration.

The other fourteen states fell into different groups in different decades, so they were classified by the situation in 1960-70.

a. Baja California (Territory), Sinaloa, and Tabasco had high natural growth and net immigration.
b. Chihuahua, Nayarit, Yucatán, Guanajuato, Guerrero, Michoacán, and Jalisco had high natural growth and net emigration.

c. México, Quintana Roo, and Tamaulipas had low natural growth and net immigration.
d. Hidalgo had low natural growth and net emigration.

The following groups thus emerged based on the situation in 1960-70:

a. Baja California, Baja California (Territory), Sonora, and Sinaloa, all of which had a high rate of natural growth and net immigration.
b. Chiapas, Oaxaca, Puebla, Veracruz, and Hidalgo, all of which had a low rate of natural growth and net emigration.
c. Aguascalientes, Coahuila, Durango, Querétaro, San Luis Potosí, Zacatecas, Chihuahua, Nayarit, Guanajuato, Guerrero, Michoacán, and Jalisco, all of which had a high rate of natural growth and net emigration.
d. México and Mexico City, with net immigration and low rate of natural increase.

This grouping left out the states of Tabasco, Morelos, Nuevo León, Campeche, Tlaxcala, Yucatán, Quintana Roo, Tamaulipas, and Colima.

Because of the number of states in group (c) that group was divided by taking out Guanajuato, Guerrero, Michoacán, and Jalisco because of their geographic proximity and somewhat similar characteristics in the three decades. Guanajuato, Michoacán, Guerrero had low natural growth and emigration in 1950-60, whereas in the other two decades these states had high natural growth rates and emigration. The states of Tabasco and Yucatán were added to group (b) because of their geographic location. For the same reason Morelos was added to group (d). Nuevo León and Tamaulipas were joined into a single group because of their physical proximity.

The final regions were:

Region 1: Federal District, México, and Morelos
Region 2: Jalisco, Guerrero, Michoacán, and Guanajuato
Region 3: Nuevo León, and Tamaulipas
Region 4: Puebla, Yucatán, Veracruz, Tabasco, Oaxaca, and Hidalgo
Region 5: Coahuila, Chihuahua, San Luis Potosí, Aguascalientes, Durango, Coahuila, and Querétaro
Region 6: Baja California, Sonora, and Sinaloa

The other seven states—Nayarit, Zacatecas, Campeche, Tlaxcala, Chiapas, and the Territories of Baja California and Quintana Roo—were not assigned to any region because they did not have cities of 100,000 or more population in 1970 and thus were not important for this analysis.

APPENDIX C

Analysis of Relative Accessibility

THIS ANALYSIS WAS BASED ON AN INDEX of relative accessibility between twenty-five of the cities that dominated the urban system in both 1940 and 1970. Twenty-five rather than thirty-seven cities were used because some of the thirty-seven cities were close together (such as Mexico City and Toluca) and thus were in almost the same geographic location.

All of these cities were at least 100 kilometers apart. It was assumed that each mode of transport operated under normal conditions, implying different assumptions about average modal speeds and efficiency. Different weights were used to reflect qualitative and quantitative contrasts in transport conditions.

The analysis showed that the cities that had the highest levels of connectivity in 1940 grew more rapidly than others during the next three decades. Thus, places that grew most in relative as well as in absolute terms had the greatest initial advantages at the beginning of the period.

In 1940, 53 percent of the twenty-five largest cities had accessibility indexes of 51 points or more on the basis of the scale shown in Table C-1 (Table C-2). Most of Mexico's large cities were equipped with a minimum level of transport facilities, but there were only six interurban connections (2 percent of the total number) with index values ranging from 60 to 70, indicating that very few cities had regular airline service with a large number of other cities. Mexico City had regular air services only with Guadalajara, Torreón, Tampico, Veracruz, and Aguascalientes. Some remote cities, such as Mérida and Ciudad Juárez, also had scheduled air services to the capital. At this time the best connected cities had railroad and two-lane highway linkages with other cities. Some 3.7 percent of all cities had index values of from 40 to 50, indicating intercity connections by all-weather paved roads and either railroad or scheduled air services involving less than three flights a week. On this basis Mexico City had an accessibility index of 40 or more with twenty cities out of the other twenty-four. By comparison, five cities had index values of from 60 to 70, twelve cities had an index

Table C-1. *Scale of Accessibility Values*

1. 30 points	Made up of 20 points for a two-lane paved dry weather road and 10 points for local train service.
2. 35 points	Made up of 35 points for a two-lane all-weather paved road.
3. 40-50 points	Signifies connectivity by a two-lane all-weather paved road and either railroad connection or air connection.
4. 51 points	Made up of 16 points for rapid or express railroad service and 35 points for a two-lane all-weather paved road.
5. 60-70 points	Made up of 35 points for a two-lane all-weather paved road, 16 points for rapid or express railroad service, and 10 to 16 points for less than seven jet or turbo prop flights a week.
6. 71 points	Made up of 35 points for a two-lane all-weather paved road, 16 for rapid or express railroad service, and 20 points for seven jet flights a week.
7. 72-80 points	Made up of 35 points for a two-lane all-weather road, 16 points for rapid or express railroad service, and 21 to 29 points for eight to thirteen jet flights a week
8. 81 points	Made up of 35 points for a two-lane all-weather paved road, 16 points for rapid or express rail service, and 30 points for fourteen or more jet flights a week.

value of 51, and three cities had index values of from 30 to 40. Torreón, Tampico, San Luis Potosí, and Veracruz also had high accessibility values, implying that they were important regional traffic nodes. Large regional centers, such as Monterrey, Mérida, Ciudad Juárez, and Chihuahua, were relatively isolated. Medium-size cities, such as Irapuato, Pachuca, and Toluca, which were located close to Mexico City, had relatively high levels of accessibility compared with these large regional centers.

By 1970 more than 93 percent of the twenty-five cities had accessibility indexes of 51 or more, meaning that 279 out of 300 interurban connections were equipped with facilities that included a two-lane paved road and rapid train services but lacked scheduled air services (Table C-3). Regardless of distance, all of the twenty-five cities were now within twenty-four hours journey time of one another. All cities that had grown at a higher than average rate had accessibility values of more than 71 points, and all of the regional centers that in 1940 had still been spatially isolated had, by 1970, been fully integrated by all modes.

Mexico City had the highest accessibility index. It was connected with all of the twenty-four other cities by an index value of 51 points, and was connected to eleven cities with accessibility values of from 80 to 90 points. This implied connectivity by two-lane paved roads, rapid express rail lines, and more than fourteen scheduled flights a week. Mexico City thus had the

Table C-2. *Distribution of City-Pairs in Relative Accessibility Index, 1940*

	Distribution ranges				
	80-90	*72-79*	*71*	*60-70*	*52-59*
Mexico City	–	–	–	5	–
Guadalajara	–	–	–	1	–
Monterrey	–	–	–	–	–
Torreón	–	–	–	2	–
Puebla	–	–	–	–	–
Mérida	–	–	–	–	–
Tampico	–	–	–	1	–
Aguascalientes	–	–	–	–	–
León	–	–	–	–	–
Toluca	–	–	–	–	–
San Luis Potosí	–	–	–	2	–
Culiacán	–	–	–	–	–
Orizaba	–	–	–	–	–
Chihuahua	–	–	–	–	–
Morelia	–	–	–	–	–
Veracruz	–	–	–	1	–
Saltillo	–	–	–	–	–
Querétaro	–	–	–	–	–
Mazatlán	–	–	–	–	–
Durango	–	–	–	–	–
Villahermosa	–	–	–	–	–
Irapuato	–	–	–	–	–
Fresnillo	–	–	–	–	–
Pachuca	–	–	–	–	–
Ciudad Júarez	–	–	–	–	–
Total, minus duplication	–	–	–	6	–
Percentage distribution	–	–	–	2.00	–

— Not applicable.

Source: World Bank calculations based on Mexican government information and air, train, and bus schedules for 1940.

most accessible location in the country. Guadalajara and Tijuana were the next most accessible locations. Both were connected with nine cities with index values of 60 or more, whereas Monterrey and Hermosillo were connected with eight cities with index values of 60 or more.

51	*40-50*	*31-39*	*0-30*	*Total city-pairs*
12	3	4	–	24
16	1	4	2	24
17	–	5	2	24
15	–	5	2	24
17	–	5	2	24
–	–	3	21	24
16	–	5	2	24
17	–	5	2	24
17	–	5	2	24
17	–	5	2	24
15	2	3	2	24
–	–	22	2	24
17	–	5	2	24
–	4	18	2	24
17	–	5	2	24
16	–	7	2	24
17	–	5	2	24
17	–	5	2	24
3	3	16	2	24
3	1	18	2	24
–	–	3	21	24
19	–	3	2	24
19	–	3	2	24
19	–	3	2	24
–	4	18	2	24
153	11	88	42	300
51.00	3.67	29.33	14.00	100.00

Table C-3. *Distribution of City-Pairs in Relative Accessibility Index, 1970*

	Distribution ranges				
	80-90	*72-79*	*71*	*60-70*	*52-59*
Tijuana	2	2	3	2	–
Mexicali	–	–	1	3	–
La Paz	–	–	–	2	1
Nogales	–	–	–	–	–
Hermosillo	2	–	4	2	–
Guaymas	–	–	–	2	–
Culiacán	2	1	1	–	–
Mazatlán	1	2	1	3	1
Tepic	–	–	–	–	–
Guadalajara	5	1	1	4	–
Colima	–	–	–	2	–
Acapulco	–	–	–	1	2
Ciudad Juárez	2	–	1	–	–
Ojinaga	–	–	–	–	–
Chihuahua	2	–	5	–	–
Torreón	1	–	2	–	–
Zacatecas	–	–	–	–	–
Aguascalientes	–	–	2	–	–
San Luis Potosí	–	–	2	–	–
Irapuato	–	–	–	3	–
Querétaro	–	–	–	3	–
Federal District	16	1	4	11	–
Piedras Negras	–	–	–	–	–
Matamoros	–	–	–	1	2
Monterrey	2	–	5	3	1
Nuevo Laredo	1	–	1	1	–
Victoria	–	–	–	1	–
Tampico	1	–	2	–	–
Morelia	–	1	–	1	–
Puebla	–	–	–	3	–
Veracruz	1	–	2	2	–
Oaxaca	1	–	–	2	–
Coatzacoalcos	1	–	2	–	1
Salina Cruz	–	–	–	2	–
Tapachula	–	–	–	2	1
Tuxtla	–	–	–	1	3
Villahermosa	1	–	2	1	1
Campeche	–	–	1	1	–
Mérida	1	–	1	4	–
Total minus duplications	21	4	22	32	6
Percentage distribution	2.83	0.54	2.97	4.32	0.81

— Not applicable.

Source: World Bank calculations based on Mexican government information and air, rail, and bus schedules for 1970.

51	*40-50*	*35*	*0-30*	*Total city pairs*
25	1	2	1	38
30	–	2	2	38
–	3	30	2	38
34	–	3	1	38
26	–	3	1	38
32	1	2	1	38
28	1	2	1	38
27	–	2	1	38
34	–	3	1	38
24	–	2	1	38
32	–	3	1	38
–	3	31	1	38
31	–	3	1	38
–	–	–	38	38
27	–	2	2	38
31	–	3	1	38
34	–	3	1	38
32	–	3	1	38
32	–	3	1	38
31	–	3	1	38
31	–	3	1	38
5	–	–	1	38
34	–	3	1	38
32	–	2	1	38
23	1	2	1	38
31	–	3	1	38
33	–	3	1	38
31	–	3	1	38
32	–	3	1	38
31	–	3	1	38
29	–	3	1	38
31	1	2	1	38
31	–	2	1	38
33	–	2	1	38
32	–	2	1	38
–	1	32	1	38
29	–	3	1	38
32	–	3	1	38
28	1	2	1	38
519	7	90	40	741
70.04	0.94	12.15	5.40	100.00

APPENDIX D

Demographic Components of Urban Growth

DIFFERENCES BETWEEN STATES IN THE NUMBER OF WOMEN in the age group 15 to 44 provide a general indication of reproductive potential. The differences between states in 1940 ranged from 51.9 percent of women in this group in the Federal District to 41.3 percent in Tabasco. In 1960 the average level was lower (41.9 percent as opposed to 45.7 percent in 1940), and the range extended from 44.9 percent, again in the Federal District, to 38.9 percent in Tlaxcala.

However, the highest birth rates in 1940 occurred in Coahuila (61.4 per 1,000) and Guanajuato (55.5 per 1,000), and the lowest were in the Federal District (33.6 per 1,000) and Tamaulipas (35.4 per 1,000), which suggests that factors other than the age structure were important in determining fertility. By 1960 the highest birth rate occurred in Zacatecas (54.4 per 1,000) and the lowest in Quintana Roo (32.5 per 1,000). Again, there was not a close relation between the birth rate and the number of women between 15 and 44 years old.

A 1970 study of mortality differences by the Colegio de México allocated each of the states to one of eight groups in terms of three indicators of mortality—the gross mortality ratio, life expectancy at birth, and infant mortality (Colegio de México 1970). Two groups of states scored higher than the others on two out of three indicators (the exception being infant mortality). A group comprising states in the south had the lowest rank on each of the indicators. Another group containing the Federal District and the state of México did not score very highly in 1940 and 1950, but its rank improved greatly between 1950 and 1960.

These data refer to each state as a whole rather than to urban fertility or mortality within each state. Research findings from earlier censuses suggest that in Mexico there may be fewer differences between rural and urban fertility than in other Latin American countries. It also appears there was no

consistent pattern between crude birth rates and relative urbanization. Thus, in 1960, for example, Chiapas, Oaxaca, Zacatecas, and Tabasco were among the least urbanized states, but birth rates in these states were not particularly high except for Zacatecas.

There is a much closer pattern of association between urbanization and migration whereas variations in natural increase seem to have been closely related to migratory movements among states.

There were wide disparities between states with large numbers of migrants and those with relatively few migrants. In 1950 and 1960, over 60 percent of the population of Baja California were migrants; by 1970, the importance of migrants had greatly diminished. In many states, 95 percent or more of the total population was born in that state during the period.

There was a close relation between the relative importance of migrants in state populations and differences in the rate of urbanization between states. Thus, the most rapidly urbanizing states in 1940-50 and 1950-60 were those in which the migrant population at the end of each intercensal period was of greatest importance. In 1950, Baja California had the largest relative (interstate) migrant population and the fastest rate of urbanization. The Federal District, Colima, Tamaulipas, and Morelos also had large migrant populations and were among the states that urbanized most rapidly in 1940-50. Guerrero, Tlaxcala, and Chiapas are apparent anomalies, since they urbanized rapidly in 1940-50, but interstate migrants did not represent a large share of the state populations. It is inferred that migration within the state was a key to rapid urban population growth.

In 1950-60 a similar pattern prevailed, but there were fewer anomalies, and the relation between urbanization and the size of the migrant population was stronger and remained strong in 1960-70. The states that had positive net migratory flows were those in which migration played the most important role in population growth, and there was a strong association between net migration and the level of urbanization.

Comparing the relative level of urbanization in 1960 with net migration in 1950-60, the highly urbanized states of the Federal District, Baja California, Colima, and Nuevo León were areas of net immigration. Conversely, the states with the lowest levels of urbanization in 1960 (Chiapas, Guerrero, Hidalgo, Oaxaca, and Tabasco, all of which were less than 25 percent urbanized) had the highest levels of net emigration in 1950-60. This pattern also occurred in 1960-70. The most urbanized states in 1970 (those more than 70 percent urbanized) were Baja California, Coahuila, the Federal District, Morelos, and Nuevo León, and these were also the states with the highest levels of net migration in the preceding decade.

Migration was, however, a less important component of urbanization in 1950-60 and 1960-70 than it was in 1940-50. Fewer states (seventeen compared with twenty-one) experienced net emigration in 1960-70 as compared

with 1950-60. In 1950-60 there were 1.7 million interstate migratory movements, whereas the total population increased by 9.0 million—a ratio of 1:5. In 1960-70 the corresponding ratio was 1:7, reflecting a total of 1.9 million interstate migratory movements and a total population increase of 13.3 million.

APPENDIX E

Water Resources

MEXICO'S WATER RESOURCES ARE SCARCE and are concentrated in a relatively small area. Historically, development has not corresponded closely to the availability of water resources. Although water is abundant in many areas where economic development has lagged far behind that of the rest of the nation—specifically in the southeast—there is little water in areas where important industrial and agricultural developments have taken place and where population growth has been concentrated in recent decades.

The southeast accounts for 40 percent of the known water resources of the country, but covers only 7 percent of the national territory and in 1970 contained only 8 percent of the national population. The central plateau and the north cover 51 percent of the national territory, contained 60 percent of the national population in 1970 but have less than 12 of the nation's water resources. More than 85 percent of all of Mexico's water is found in areas below 500 meters, whereas 70 percent of the population and 80 percent of the nation's industrial activities are located at altitudes above 500 meters. More than 50 percent of the arable land is in the arid north and 25 percent of it is at altitudes of more than 500 meters. Moreover, population growth, urbanization, and industrialization are endangering the already-scarce water resources by polluting river systems. This problem is already serious in the Central Plateau and in some parts of the Gulf Coast and it can be expected to worsen as urban and industrial development proceed.

Mexico has achieved rapid economic growth without confronting serious water constraints. In time, however, many cities, especially Mexico City, will face increasingly severe water shortages. Irrigation districts which are based on groundwater development will experience critical reductions of available water, although it is necessary to distinguish between water withdrawal and water consumption. Water withdrawn from surface or ground sources for such activities as the production of hydropower, is not consumed to any significant extent and most of it is returned to streams or groundwater aquifiers. Other economic activities, especially agriculture,

Table E-1. *National Water Balance, by Sector, 1970 to 2000*
(millions of cubic meters)

	1970		*1980, withdrawal*	*1990, withdrawal*	*2000, withdrawal*
	Withdrawal	*Consumption*			
Domestic and municipal	2,370	1,100	3,600	7,600	11,000
Industry Electric energy	2,630 75,300	700	4,600	9,500	22,700
Agriculture	44,700	36,200	54,800	74,400	95,200

Source: Plan Nacional Hidraúlico (1975).

consume a high percentage of the withdrawn water through evapotranspiration or evaporation. A certain percentage of the withdrawn water may be returned, but usually to a different location and with a different quality, which may limit its usefulness.

Table E-1 compares water withdrawal and consumption in different sectors. Agriculture, households, and urban public services are the main sectors that consume water. The data show, however, that agriculture accounts for by far the highest percentage of total consumption (95 percent in 1970). The water requirements of the agricultural sector are expected to more than double from 1970 to 2000. Those of the domestic and municipal sectors are expected to quadruple over the same period, and those of the industrial sector are expected to increase as industry acquires an increasingly important role in the Mexican economy. An overall comparison between the volume of water supply (400,000 million cubic meters annually) and water demand, may lead to the conclusion that no real water shortage exists. The regional differences are so marked, however, that water shortages could be detected in some parts of the country by the mid-1970s.

In Table E-2 and Map E-1, water consumption in different regions is shown as a percentage of annually recurring water within each region. The figures for regions I, VI, and XIII show that by 1970 consumption exceeded availability. The excess demand was met by mining groundwater reserves and transferring water from other regions.

Although the most arid regions are in northern Mexico, the increasing concentration of population in the center is causing the greatest water scarcity at a regional level. However, subdivision of region XII (Lerma), which includes parts of the Santiago basin, shows that a critical situation will arise there too.

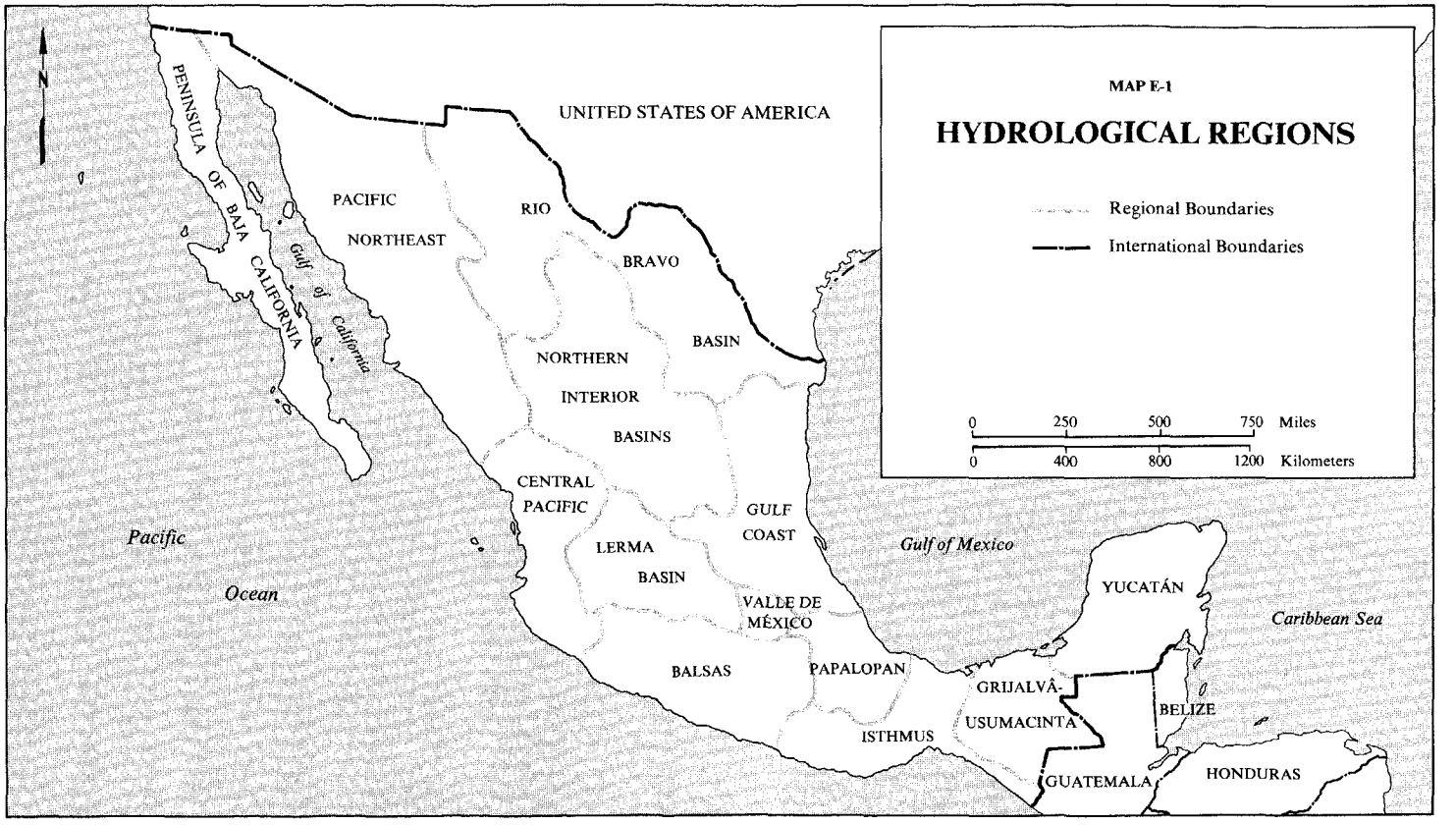

MAP E-1
HYDROLOGICAL REGIONS
Regional Boundaries
International Boundaries
0 250 500 750 Miles
0 400 800 1200 Kilometers
N
UNITED STATES OF AMERICA
PENINSULA OF BAJA CALIFORNIA
Gulf of California
PACIFIC NORTHEAST
RIO BRAVO
BASIN
NORTHERN INTERIOR BASINS
CENTRAL PACIFIC
GULF COAST
LERMA BASIN
VALLE DE MÉXICO
BALSAS
PAPALOPAN
ISTHMUS
GRIJALVA-USUMACINTA
YUCATÁN
BELIZE
GUATEMALA
HONDURAS
Pacific Ocean
Gulf of Mexico
Caribbean Sea

Table E-2. *National Water Balance, by Region, 1970 to 2000*

Region	Area (square kilometers)	1970 population (thousands of persons)	Annually recurring water (millions of cubic meters)	Total consumption (percentage of recurring water)			
				1970	1980	1990	2000
I Peninsula of Baja California	143,789	602.0	278	155	192	205	226
II Pacific Northwest	316,586	2,951.2	23,482	76	92	93	94
III Central Pacific	116,931	2,108.6	28,451	8	15	15	15
IV Balsas	151,889	6,416.4	55,326	7	11	12	13
V Isthmus	88,032	2,550.6	60,711	1	2	2	2
VI Rio Bravo Basin	329,927	4,011.5	5,021	105	121	124	129
VII Gulf Coast	158,111	4,767.3	45,903	3	8	8	9
VIII Papaloapan	56,550	3,173.3	60,675	2	8	9	9
IX Grijalva/Usumacinta	85,385	1,675.6	84,665	0.2	4	4	4
X Yucatán	139,626	1,090.7	30,129	0.2	1	1	1
XI Northern Interior Basins	269,400	2,043.6	3,728	88	110	112	115
XII Lerma Basin	89,332	8,074.1	6,632	62	75	79	85
XIII Valle de México	22,470	9,642.6	1,856	136	209	233	252
Total	1,967,948	49,101.5	406,850				

Source: Plan Nacional Hidraúlico (1975).

APPENDIX F

Technical Notes

THE FOLLOWING CONCEPTS HAVE BEEN USED in this study and are explained below.

Rank-Size Rule

Auerbach (1913) first described the regular relations between the size of towns and their ranks. The rank-size rule is given by the formula:

$$P_n = P_1(n)^{-1},$$

where P_n is the population of the nth town in a series 1-2-3 . . . n, in which all towns in a region are arranged in a descending order by population, and P_1 is the population of the largest, or primate, town or city. The fifth largest town would have a population one-fifth that of the largest town. Stewart and Warntz (1958) have shown that the rank-size rule is an empirical finding rather than a theoretical notion. Regularity is greater, however, in the lower than in the upper "limbs" of urban hierarchical systems.

Coefficient of Specialization

This is given by the formula:

$$\frac{e_i}{e_t} \Big/ \frac{E_i}{E_t} \quad \text{or} \quad \frac{e_i}{E_i} \Big/ \frac{e_t}{E_t},$$

where e_i = local industry or sector employment; e_t = local total employment; E_i = industry or sector employment in nation or set of places or areas; and E_t = all employment in nation or set of places or areas. A variation of this coefficient is used here.

Index of Surplus Workers

This is given by the formula:

$$S = \frac{e_i - e_t}{E_t} E_i,$$

where S represents the absolute number of surplus workers or employees in industry or sector i. The upper limits of the index approaches e_i asymptotically. The lower limit is

$$\frac{e_t}{E_t} E_i.$$

A form of this index is used here as a general indicator of "export" or basic activity in an urban economy.

Gini Coefficient

This is given by the formula:

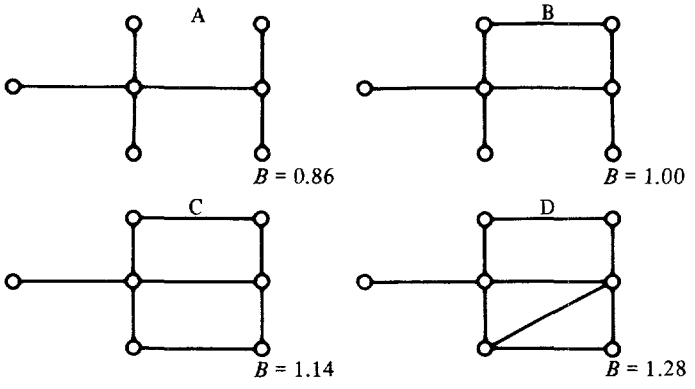
$$G = 1 - 2\int_0^1 f(x)\,dx,$$

where $f(x)$ (Lorenz curve) is the fraction of total income earned by a given fraction of the population (x), starting at $x = 0$ with the poorest segment of the population and incorporating further segments in a strict order of increasing income per capita.

Graph Theory Analysis

One approach to the measurement of transport networks is based on the mathematical theory of graphs. By reducing networks to their simplest forms it is possible to measure their basic characteristics in terms of connectivity and centrality. The application in Chapter 3 refers to the measurement of connectivity through the beta index.

Any transport network may be reduced to an abstract formulation of routes (edges) and junctions or cities (vertexes). In the following example, the number of vertexes remains constant (at seven) but the number of edges rises from six to nine. As the number of edges increases, connectivity between the vertexes is increased, and the beta index changes from 0.86 to 1.28.



Applying this measure to the development of the transport network of Mexico from 1900 to 1970, the index of connectivity can be seen to have remained almost constant from 1900 (1.61) to 1940 (1.60) and then to have fallen (to 1.40) by 1970, thus suggesting that after 1940 transport developments were less critical to urban and regional development.

Graph theory may also be used to measure centrality in transport networks. One measure of centrality refers to König Numbers and describes the maximum number of edges (e) from any vertex to any other vertex in the network. This measure of topological distance suggests that vertexes (cities) with low König Numbers occupy central places in the transport system.

Location Quotient

This was devised by Florence (1948) and it measures the degree to which a particular industry or sector is concentrated in an area relative to the extent to which all activity is concentrated there, on the basis of employment data. It is given by the formula:

$$\frac{\text{Numbers employed in industry or sector in an area as a percentage of the total in nation or set of places}}{\text{Numbers employed in all industries or sectors in an area as a percentage of the total in the nation or set of places.}}$$

A variation of this formula is used in this book.

Nearest Neighbor Analysis

This analysis is based on the mesurement of the actual straight line distance separating points (cities) as compared with the hypothetical distance separating them. The hypothetical distance is derived from the relation between the area of the country and the number of cities included in the observation. Once both actual and hypothetical distances have been established, actual distance is compared as a percentage of hypothetical distance. A rising percentage over time implies improvements in a transport network.

Principal References

The word "processed" describes works that are reproduced from typescript by mimeograph, xerography, or similar means; such works may not be cataloged or commonly available through libraries, or may be subject to restricted circulation.

Agricultural Census (1970) 1972. Dirección General de Estadística. México, D.F.

Anuario Estadístico Compendiado, 1970 1971. Dirección General de Estadística. México, D.F.

Anuario Estadístico de los Estados Unidos Mexicanos 1930, 1940, 1950, 1960, 1970. Dirección General de Estadística. México, D.F.

Atlas de México 1972. México, D.F.: Porrua Editores.

Auerbach, F. 1913. "Das Gesetz der Bevölkerungs Koncentration." *Petermann's Mitteilungen*, vol. 59.

Barkin, David, and King, Timothy 1970. *Regional Economic Development: The River Basin Approach in México*. Cambridge: Cambridge University Press.

Barraza, Luciano, and Solís, Leopoldo 1973. "Agricultural Policies and the Role of the Sectoral Model." In *Multi-level Planning: Case Studies in México*. Edited by L. M. Goreux and A. S. Manne. New York: American Elsevier, pp. 463–75.

Bassoco, Luz María, and Rendón, Teresa 1973. "The Technology Set and Data Base for CHAC." In *Multi-level Planning: Case Studies in México*. Edited by L. M. Goreux and A. S. Manne. New York: American Elsevier, pp. 339–71.

Borts, George H., and Stein, Jerome L. 1964. *Economic Growth in a Free Market*. New York: Columbia University Press.

Cabrera, Gustavo 1965. *Indicadores Demográficos de México a Principios de Siglo*. Processed.

Carrillo Arronte, Ricardo 1970. *An Empirical Test of Inter-regional Planning: A Linear Programming Model for Mexico*. Rotterdam: Rotterdam University Press.

Censo Comercial (1965) 1968. Dirección General de Estadística. México, D.F.

Censo de Servicios (1965) 1969. Dirección General de Estadística. México, D.F.

Censo General de la Población, Volúmenes VI(1940), VII(1950), VIII(1960), IX(1970) 1942, 1952, 1962, 1972. Dirección General de Estadística. México, D.F.

Censo Industrial (1970) 1974. Dirección General de Estadística. México, D.F.

Chenery, Hollis B. 1959. *The Allocation of Economic Resources*. Stanford, California: Stanford University Press.

Colver, Anthony Wayne, and Stevick, Rober D. 1963. *Composition and Research: Problems in Evolutionary Theory*. Indianapolis: Bobbs-Merril.

Derossi, Flavia 1971. *The Mexican Entrepreneur*. Paris: Development Centre, Organization for Economic Cooperation and Development.

El Colegio de México 1970. *Dinámica de la Población de México*. México, D.F.

Estadísticas Sociales del Porfiriato (1877–1910) 1956. Dirección General de Estadística. México, D.F.

Family Income Survey (1969–70) 1971. Secretaría de Industria y Comercio. México, D.F.

Florence, Philip Sargant 1948. *Investment, Location, and Size of Plant: A Realistic Inquiry into the Structure of British and American Industries*. Cambridge: Cambridge University Press.

Hagen, Everett 1962. *On the Theory of Social Change*. Homewood, Illinois: The Dorsey Press Inc.

Hansen, Roger 1971. *The Politics of Mexican Development*. Baltimore, Maryland: The Johns Hopkins Press.

Hirschman, Albert O. 1958. *The Strategy of Economic Development*. New Haven, Connecticut: Yale University Press.

Hoffman, Walter G. 1958. *The Growth of Industrial Economies*. Translated from the German by W. O. Henderson and W. H. Chaloner. Manchester: Manchester University Press.

Iturriaga, José E. 1951. *La Estructura Social y Cultural de México*. México, D.F.: Fondo de Cultura Económica.

Lavall, Allan 1972. "Industrial Development and the Regional Problem: A Case Study of Central México." *Regional Studies*, vol. 6.

Leimone, John Edward 1971. *Patterns of Long-run Inter-regional Economic Growth and Development in México, 1895–1960*. Ph.D. dissertation. Vanderbilt University, Nashville, Tennessee.

López Malo, Ernesto 1960. *Ensayo sobre la localización de la industria en México*. México, Universidad Nacional Autónoma de México.

Myrdal, Gunnar 1967. *Rich Lands and Poor: Road to World Prosperity*. New York: Harper.

Nacional Financiera 1973. *Industrial Decentralization in México*. México, D.F.

Navarrete, Ifigenia Martinez de 1967. *Los Incentives Fiscales y el Desarrollo Económico de México*. México, D.F.: Universidad Autónoma de México.

Peñafiel (1902) 1965. Cited by Cosío Villegas, Daniel, ed., *Historia Moderna de México*, vol. 7, El Porfiriato-la vida económica, books 1 and 2. México, D.F.: Editorial Hermes.

Plan Nacional Hidraúlico 1975. Secretaría de Recursos Hidraúlicos. México, D.F.

Presidencia de la República y United Nations Economic Commission for Latin America (various years). *Producto Geográfico Bruto a Precios Corrientes de las Entidades Federativas*. México, D.F.

Renaud, Bertrand 1981. *National Urbanization Policies in Developing Countries*. New York: Oxford University Press.

Richardson, Harry 1977. *City Size and National Spatial Strategies in Developing Countries*. World Bank Staff Working Paper no. 252. Washington, D.C.

Romero Kolbeck, Gustavo, and Urquidi, Victor L. 1952. *La Exención Fiscal en el Distrito Federal Como Instrumento de Atracción de Industria*. México, D.F.

Secretaría de Recursos Hidraúlicos 1973. *Crecimiento Agropecuario Comparativo de las Entidades Federativas del País, 1940–70*. México, D.F.

Solís, Leopoldo Manjarrez 1970. *La Realidad Económica Mexicana: Retrovisión y Perspectiva*. México, D.F.: Siglo XXI Editores.

Stewart, J. Q., and Warntz, W. 1958. "Macrogeography and Social Science." *Geographical Review,* vol. 48.

Torres, Federico, and Unikel, Luis 1970. "La población económicamente activa en México y sus principales ciudades, 1940–60." *Demografía y Economía*, vol. 4, no. 1, pp. 1–42.

Tucker, William Pierce 1957. *The Mexican Government Today*. Minneapolis: University of Minnesota Press.

Unikel, Luis 1968. "El Proceso de Urbanización en México: Distribución y Crecimiento de la Población Urbana." *Demografía Economía*, vol. 2, no. 2, pp. 139–82.

Unikel, Luis, and Victoria, Edmundo 1970. "Medición de algunos aspectos del desarrollo socioeconómico de las entidades federativas de México, 1940–60." *Demografía y Economía*, vol. 4, no. 3, pp. 292–316.

Wilkie, James Wallace 1967. *The Mexican Revolution: Federal Expenditure and Social Change since 1910*. Berkeley: University of California.

World Bank 1973. *The Economy of México: A Basic Report*. Washington, D.C. Restricted circulation. Processed.

Yates, Paul Lamartine 1962. *El Desarrollo Regional de México*. México, D.F.: Banco de México, Departamento de Investigaciones Industriales.

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