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A SPATIAL STRATEGY OF DEVELOPMENT
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DISSERTATION
Presented in Partial Fulfillment of the Requirements for
the Degree of Doctor of Philosophy in the Graduate
School of The Ohio State University

By
William Vaughn Ackerman, B.A., M.A.

The Ohio State University
1972

Approved By

Adviser
Department of Geography
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ACKNOWLEDGEMENTS

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FIELDS OF STUDY

Major Field: Geography

Studies in the Geography of Development. Professor Howard L. Gauthier

Studies in Economic Geography and Location Theory. Professor Howard L. Gauthier and Professor S. Earl Brown
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CHAPTER I

INTRODUCTION

Statement of Problem

This study is concerned with the spatial inequality of regional economic growth patterns and the concomitant unequal spatial patterns of standards of living in the two provinces of Mendoza and San Juan located in western Argentina. The region has been organized into a planning space by the Argentine Government and is referred to as Cuyo. The situation in Cuyo is one of economic activity and better living conditions being concentrated around two relatively large urban centers. These centers are Greater Mendoza and Greater San Juan. Greater Mendoza has been named a "National Development Pole" by the Argentine Government. A "National Development Pole" is defined as an urban center for which new investments will cause growth not only in the city but throughout that urban place's area of influence. As a result of this designation Greater Mendoza is hypothesized to serve as the catalyst for increased regional development throughout Cuyo.

The approach taken by the Argentine planning agency raises some controversy. Friedmann argues that impulses of economic change are transmitted down the urban hierarchy from larger to smaller centers and that large cities play a key role in extending increased economic activity across the space economy. However, the tendency of large urban centers to generate increased economic opportunity and higher
standards of living throughout their surrounding regions is disputed.\(^2\) The process of concentration of economic activity and employment opportunity shows little tendency for spontaneous self-reversal in many countries.\(^3\) Without specific policy oriented strategies to decentralize economic growth, lagging peripheral areas are likely to become even poorer with relation to major urban areas.

In designating Greater Mendoza as the growth pole for Cuyo the Argentine Government did not consider the existing pattern of concentration in that area.\(^4\) The hypothesis that development poles or growth centers act as spread agents of economic activity and higher standards of living has not been empirically demonstrated. The policy presented in this study concerns designating alternate urban centers or sub-systems of cities as investment targets to alleviate the spatial inequality in national and regional economic development patterns. More precisely, the goal of dealing with this problem is to develop a policy to lessen the overwhelming spatial concentration of economic activity in the major centers of Greater Mendoza and Greater San Juan and to generate growth in smaller urban systems more proximate to the lagging regions in Cuyo.

**Objectives**

The primary objectives of this research are to delimit economically more advanced and more depressed regions in Cuyo and to determine the possible existence of viable alternative centers or urban sub-systems of the regional economy to designate as growth centers. The purpose of these objectives is to obtain the data necessary to
propose a development strategy formulated for the study area with the aim of initiating growth in urban systems closer to depressed regions. The goal of the strategy is to provide the spatial investment guidelines to increase the spread of higher standards of living and economic opportunity in Cuyo.

Introduction to the Problem

The problem in development is the existence of spatial inequality in patterns of regional economic growth as reflected primarily by the lack of economic opportunity and low standards of living. The pattern is most obvious in countries which have reached a sufficiently advanced stage of development for severe regional inequality to have become apparent. The notable factor in these countries is that other than one or a few growing urban centers and their immediate hinterlands there is little economic advancement across the national space.

The existence of a regional problem is not unexpected. Experiences throughout the world have shown that unplanned economic growth often leads to extreme degrees of centralization of economic activity and higher standards of living and results in notable congestion. The seriousness of the problem is substantiated by the number of countries, both developed and developing, which have adopted strategies to influence the spatial distribution of economic activity, population, and welfare. Some examples of the diverse array of countries involved in regional planning include Great Britain, Italy, France, Greece, Canada, Brazil, the United States, Chile, and Argentina. The concern for regional planning shown by these countries results from economic
development occurring unequally across their national spaces. This process results in regional differences in levels of welfare and usually generates urgent political and social issues.\(^8\)

**The Study Area**

Argentina was selected as the country for this study because of its over-concentration of economic activity at both the national and regional levels. It is a country which has a serious regional problem.

At the national level Argentina's population and economic activity is highly polarized around the metropolitan area of Greater Buenos Aires. This pattern of concentration is becoming increasingly apparent. In 1947 the capital city contained 30 percent of the Argentine population. By 1960 the proportion had grown to 34 percent and in 1970 36 percent of the population were residing in Greater Buenos Aires.\(^9\) The capital city has a higher quality population than the remainder of the country and also a high proportion of Argentina's economic activity and the associated higher standards of living. Table one lists a number of variables for which the percentages indicate the degree of concentration of each measure in Greater Buenos Aires.

Gilberti notes in a study of Argentine regional development that the degree of concentration has increased since 1964.\(^{10}\) Thus, at the national level, Argentina demonstrates the conditions of centralization normally associated with a regional problem. More important is the fact that the process of concentration is increasing over time. It appears that the future does not promise any spontaneous improvement of the situation.
TABLE I
MEASURES OF CONCENTRATION FOR
GREATER BUENOS AIRES

<table>
<thead>
<tr>
<th>Measure</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional and technical workers</td>
<td>1:3</td>
</tr>
<tr>
<td>Entrepreneurs</td>
<td>52</td>
</tr>
<tr>
<td>High school graduates</td>
<td>48</td>
</tr>
<tr>
<td>College graduates</td>
<td>64</td>
</tr>
<tr>
<td>Bank deposits</td>
<td>58</td>
</tr>
<tr>
<td>Value of all construction projects</td>
<td>68</td>
</tr>
<tr>
<td>Value of manufacturing</td>
<td>56</td>
</tr>
<tr>
<td>Value of services</td>
<td>62</td>
</tr>
</tbody>
</table>


A similar pattern of concentration of population and economic activity is apparent at the regional level. Actually the degree of polarization is even more extreme at the province level than at the national level.11 Within each province the concentration of population around any one city ranges from a low of slightly below 30 percent in one case to a high of 62 percent in another. The most extreme cases of centralization are found in the West-Central parts of the country where it is estimated that 85 percent of economic output originates from only three percent of the land.12

Regional Planning in Argentina

The Argentine Government is not unaware of the development problems associated with high degrees of spatial concentration of population and economic opportunity. As a result of the recognition of this prob-
lem the government has committed itself to a policy of regional economic development. In 1967 Argentina was divided into eight planning regions. These regions were established with the aim of improving regional investment opportunity. The objective is to reduce the dominance of Buenos Aires relative to the remainder of the country and stimulate development at the regional level. A regional planning office under the direction of the Consejo Nacional De Desarrollo was established in each of the eight sub-regions. These regional offices were empowered to institute a series of studies to determine the relative levels of development and the primary needs of their associated areas. The goals of the Argentine Government with respect to regional planning are clearly developed in the following translation of their stated position:

The regional structure of the Argentine economy presents serious degrees of disequilibrium that make it necessary to adopt a series of measures to decentralize economic activity and generate a better spatial integration of the economy. The level of development reached by the Humid Pampa is in sharp contrast with the relative stagnation of the remainder of the country. This inequality in growth has created a situation of gross imbalance that is becoming progressively greater. Each time period for which the Pampa grows at a rate superior to the remainder of the country the existing disequilibrium is amplified.

In order to achieve an integrated development it is necessary to reverse the historical tendency of concentration of economic activity without disrupting the process of national growth. The fundamental need is to reduce in a progressive manner the differential growth rates existing between the distinct regions of Argentina and achieve a better balanced ordering of the space economy. The basic objective is to promote the national integration of regional systems by means of concentrating the regional development in National Development Poles. Investments made in poles within geographically defined regions will permit not only the rapid and effective economic and social development of the urban center designated
as a pole, but also the area under its economic influence. The development pole serves as the motive force for growth in its entire functional region.

Argentina is divided into eight planning regions. The regional division was made based on the concept of the nodal or polarized region instead of homogeneous regions. Nodal regions allow for change in regional boundaries, whereas the homogeneous region describes only a situation of uniformity in certain selected criteria. The planning region is not considered an absolute and intangible entity. The process of economic growth over time should serve to modify its boundaries and its nature. However, regional divisions were made trying not to fragment existing political jurisdiction. The division also considered the historical aspects of economic growth, an examination of the economic structure of the regions, an analysis of commercial flows between provinces, and the polarized space around major urban centers. The cities designated National Development Poles are the larger and more important centers within each region. The various cities are selected as a result of their hypothesized ability to promote basic activities which will aid both national and regional development. Once growth is underway and the investments in new infrastructure have created sustained growth in the designated poles the effort should be to create new poles which would move the regional development process toward a more integrated national system.

The Cuyo Region

This study does not attempt to deal with all of Argentina. Instead it focuses on one of that nation's eight sub-regions of development. The area selected for this study is in western Argentina and is comprised of the provinces of Mendoza and San Juan which together form the planning space known as Cuyo. It is the sub-region of Argentina where population and economic activity are the most concentrated. It is also an area where the centralization of higher standards of living and of economic opportunity are becoming progressively greater.

The regional policy formulated by the Argentina Government is concerned with reducing national concentration to favor growth in re-
gional systems. However, no attempt is made to deal with lessening the degree of centralization at the regional level. The selection of Greater Mendoza as the "development pole" for Cuyo indicates a failure on the part of the government to appreciate that the consequences of extreme centralization, such as inequalities in economic activity and welfare, are the same at the regional as at the national scale. This study of Cuyo is made to determine if in this planning region there are viable alternatives to Greater Mendoza for designation as "growth centers" which will serve to reduce economic concentration and improve living standards for people residing in lagging regions.

Concentration in Cuyo

The population of Cuyo numbers approximately 1,357,000 inhabitants. These residents are heavily concentrated on a very small percentage of the total land area. In San Juan Province 60 percent of the population is clustered on one-half of one percent of the land. Mendoza Province is only slightly less localized with 46 percent of the population residing on eight-tenths of one percent of the land area. The city of Greater Mendoza accounts for somewhat more than 48 percent of the total population of Mendoza Province. Greater San Juan has 62 percent of the population of that province. Economic activity is even more concentrated in Cuyo than population. (Table 2)

Outside of the two major metropolitan areas the levels of economic activity and standards of living fall off rapidly. There is little indication that development from the major centers is reaching smaller
urban centers or rural areas. The evidence indicates that higher standards of living and economic opportunity are becoming increasingly polarized around the two major centers.

**TABLE 2**

**ECONOMIC CONCENTRATION IN CUYO**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Greater Mendoza</th>
<th>Greater San Juan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage value of wholesale retail and service business activity</td>
<td>75.2%</td>
<td>85.5%</td>
</tr>
<tr>
<td>Percent of value added by manufacture</td>
<td>72.8%</td>
<td>68.2%</td>
</tr>
</tbody>
</table>


There is a need for a planning strategy in this sub-region with the objective of decentralizing economic opportunity. Present planning by the Argentine Government does not deal with the problem at the regional level.

**Introduction to the Analysis**

This study presents a policy oriented spatial strategy of development for Cuyo. The strategy is based on improving economic opportunity in urban centers as near as possible to lagging regions. Knowledge of the location and areal extent of growth areas and lagging regions and knowledge of the spatial organization of the regional economy is required. From this information it is possible to determine areas most in need of investment and the urban centers most likely to
aid development of lagging regions.

Cuyo is divided into thirty-seven departments (counties) which are chosen as the units of observation for this study. In Chapter Three a number of variables which measure economic activity in terms of business, manufacturing, and agriculture and standards of living with respect to housing quality and availability of piped-in water and electricity are analyzed in a principal axis factor analysis. A study is also made in that chapter of the departmental rates of in and out migration. The results of these analyses indicate basic dimensions of departmental variation within Cuyo and allow for the grouping of departments based on factor scores and percentage migration data. The factor scores and migration data for each department are grouped in a hierarchical grouping analysis. This algorithm allows for a discrimination of combinations of departments which are then classified as leading or lagging regions depending on their particular characteristics.

In Chapter Four the spatial organization of the regional economy is studied. Data are presented which measure the functional attributes of each city, their trade areas, their interrelations with other urban centers, and interconnections between the cities and rural residents. These data allow for the determination of the spatial organization of Cuyo. The results of these analyses indicate probable investment centers and identify their spatial relationships to lagging regions.

Chapter Five presents a spatial strategy of development for Cuyo. Knowledge of leading and lagging regions and the spatial organization
of the regional economy is combined to choose viable centers for new investment to reduce economic concentration in Cuyo and raise standards of living for the inhabitants of depressed areas. Direct attention is also focused on planning for lagging regions.

**Summary**

Economic growth and higher standards of living are often concentrated in space. This situation leads to the appearance of areas which lag significantly behind the national or regional growth rates and to the existence of notable regional poverty. Many countries in the world have adopted strategies to influence the spatial patterns of economic activity to reduce differences in growth rates and eliminate regional poverty.

Argentina has a serious regional problem in that economic activity is highly concentrated around Buenos Aires. That section of the country exhibits greater rates of growth and higher standards of living than others. Argentina's economy is also highly concentrated at the regional level. As a means of spreading growth throughout the national space and stimulating investment in other regions of the country the Argentine Government has undertaken a policy of regional development. However, the spatial aspects of Argentine planning pertaining to the regional level are not clearly stated and no apparent attempt is made to reduce the existing patterns of regional concentration.

This study proposes a spatial development strategy for a two province region of western Argentina. Unlike Argentine Government planning, a major goal of this plan is to reduce concentration of eco-
omic activity at the regional level and create increased economic opportunity closer to lagging regions. The problems associated with the spatial aspects of economic growth and regional development are an area of research that has recently been receiving considerably more attention. A brief review of the pertinent literature is the topic of Chapter Two.
FOOTNOTES


10. Ibid.

11. Ibid.

12. Ibid., p. 3.


14. Ibid., pp. 33-34.


CHAPTER 2

THE CONCEPTUAL FRAMEWORK

The Regional Problem

Economic growth does not appear everywhere at once. Given that development has appeared in one or a limited number of areas there are powerful forces which tend to increase the spatial concentration of economic activity around these initial starting points. These forces for concentration are usually referred to as economies of agglomeration.

There are four basic types of agglomeration economies. These are: (1) economies of scale; (2) economies of localization; (3) urbanization economies; and (4) transfer economies. Economies of scale are a result of the lower average cost of production that results from an increased rate of production. Localization economies are the savings that accrue to firms as a result of the location of other industries of the same type at the same place. Urbanization economies are those gains resulting from the enlargement of the total economic size of any location. This includes such factors as population, income, and output. Transfer economies are the savings in transportation cost to each firm as a result of locating adjacent to other firms. Primarily the savings result from locating in proximity to existing transport networks.¹

For any economy to achieve economic development it must begin by developing one or a few regional centers of economic strength. Thus, the emergence of rapidly growing areas is to be expected and is neces-
sary in the development process. Interregional inequality of growth is an inevitable concomitant and condition of growth itself. Once underway, the process of economic development tends to cause conditions to appear which stimulate growth in other regions. The demand for raw materials, expanding markets, and the spread of technical knowledge all serve to awaken the population to investment opportunity in other areas. However, if all of the points where new economic activity is begun fall within one small area the forces that encourage the spread of growth are very weak. In many cases empirical evidence indicates that growth does not spread. While the original growth center becomes increasingly developed within one area, other regions remain outside of the growth process.  

Thus, many of the developing countries are divided into rapidly growing regions and notably lagging regions. This condition is the essence of the regional problem and has been termed dualism. It refers to the spatial dichotomy of economic growth and development within a national system. The major identifying feature of dualistic development is the prolonged coexistence of economically advanced areas with very poor regions. The resulting spatial pattern is characterized by a few economically active areas within a country surrounded by relative poverty and lack of growth.

Attempts to Moderate the Regional Problem

Almost all countries have a regional problem in the sense that there are large and lasting differences in levels of economic activity and standards of living between different areas within each country.
The problem of dualistic development is not a new one. However, attempts on the part of national governments and regional planners to solve or to alleviate the problem are new. It has only been in the last twenty-five years that national governments have become willing and have considered themselves capable of influencing the spatial distribution of regional prosperity.

The problems of regional economic growth are relevant to developed as well as underdeveloped economies. In both cases depressed areas exist which lag behind the national growth rate. These regions are of concern due to low income, lack of capital, shortage of skilled labor, and scarcity of entrepreneurial quality. Conversely, these countries also experience the phenomenon of overagglomeration of economic activity and congestion in other areas.

Preliminary attempts to deal with the regional development problem have resulted in the construction of a number of growth models. Significant among these are Hicks, Harrod-Domar, Duesenberry, and Solow. However, all of these models are based on balanced growth or steady growth and more importantly yield solutions for point economies and ignore the spatial aspects of economic development. Yet, growth occurs in space. It is influenced by spatial organization and it has an effect upon the spatial structure of the economy.

In recent years many governments have become oriented toward concepts which have more relevance to the geographical distribution of economic growth. This thrust has been primarily involved in the ideas of growth poles, development poles, or growth centers.
Growth Poles

The term "growth pole" was first used by Francois Perroux. He introduced the term in 1949 and defines a pole only in relation to abstract mathematical space. A significant aspect of Perroux's work is his definition of economic space as a field of forces. He writes that economic space consists of centers or poles (foci) from which centrifugal forces emanate and to which centripetal forces are attracted. Perroux's primary interest was with the process of growth as reflected by the appearance and development of new activities. Thus, he was most concerned with the growth rates among sectors of the economy. He believes that innovation is a major factor in the appearance and growth of various sectors or poles of the economy. He argues that development does not appear everywhere at once, but at points (poles) with variable intensity and then spreads through different economic channels to other sectors of the economy. Despite the fact that Perroux recognized growth as being concentrated in various spatial locations, his concept of the growth pole is without spatial connotation. His growth pole corresponds to a leading sector of the economy. The effects of sectoral growth are best viewed in terms of an input-output matrix, growth impulses being transmitted across the rows and columns. The dominance of the pole is expressed through forward and backward linkages to other manufacturing sectors of the regional economy. The linkages between firms are considered without geographic location. Therefore the development pole is not equivalent to an industrial zone, or other geographically concentrated phenomena.
Growth Poles in Geographic Space (Growth Centers)

Perroux's focus on the structural characteristics of growth poles and linkages between industries to the exclusion of the spatial incidence of development is a major weakness in his formulation. As has been noted, growth occurs in space. It is influenced by spatial organization and it has an effect upon the spatial structure of the economy. Therefore, in spite of Perroux's notion that poles are independent of geographic space the existence of poles in space poses interesting, although unsolved questions concerning the spatial consequences of development poles.

As a result of the interest to determine the effects of growth poles in geographic space efforts have been made to broaden the original growth pole concept to include the spatial perspective. Characteristic of this trend and much of the French planning literature is the work of Boudeville and his emphasis on the regional character of economic space. Boudeville maintains that from the development viewpoint there are three types of space: homogeneous; polarized; and planning. Homogeneous space is equivalent to the geographer's uniform region. Boudeville's use of polarized space is much like Robert Platt's concept of the functional region, the region being delimited in terms of points of focus and the intensity of relationship between these points and their surrounding area. Planning space is that area defined by a plan.

Boudeville adopted Perroux's terminology but changed his definition of economic space so that in Boudeville's formulation economic
space becomes the application of economic variables on or in geographic space. A major contribution was his adoption of the term polarized space. This polarization is based on focality and interconnection and leads Boudeville to define a growth pole as a set of expanding industries located in an urban area and capable of inducing increased development throughout their zones of influence. The pole in economic space as defined by Perroux becomes an urban center in geographic space with its associated hinterland as a result of Boudeville's formulation.

The attempt to transform growth pole concepts into a spatial theory of development has interested planners throughout the world. If poles can exist in geographic space and if they can influence development throughout the polarized space around their locations then it might be possible to induce growth poles. Growth centers could be created to stimulate development in lagging regions, to initiate new development in sparsely settled areas, and to provide alternative investment and employment opportunity to major metropolitan centers. Thus, growth and migration streams could theoretically be directed away from major cities and congested areas. The hypothesized result would be the promotion of a less centralized economic system and a reduction of interregional differentials in standards of living and economic and social dualism.

**Application of Growth Center Concepts**

In recent years a number of countries have attempted to implement growth center concepts for the purposes of stimulating lagging regions, incorporating non-developed regions into the countries growth process, and influencing the spatial pattern of development to favor centers oth-
er than major metropolitan cores. These countries range from developed to developing. Examples are Great Britain, Italy, France, Greece, Canada, Brazil, and Argentina to name only a few. Since 1950 the French have developed the most comprehensive system of regional planning in Europe. The main objectives of French planning have been to lessen the economic concentration on Paris and promote growth in other French cities outside the Paris Basin. In general, all of the countries that have implemented growth pole planning have done so to either limit concentration, spread growth to lagging areas, or some combination of the two.

To date the use of growth center strategy has not proven notably successful. Hansen argues that this is primarily a result of directing investment into too small of centers or a lack of funding in cases where chosen centers have been of adequate size. Studies concerning the ability of growth poles to spread development have been inconclusive. Boudeville has attempted to explicate the connections between a growth pole in economic space and its characteristics in geographic space. In a study of steel smelting in Brazil Boudeville was unable to demonstrate conclusively that poles generate spread effects from a definable geographic location. Most attempts to deal empirically with growth centers have been based on a regionalization of the basic Leontief type input-output model. These endeavors fail to deal explicitly with the spatial aspects of economic growth.

The Core Periphery Model

The first attempt to formulate a systematic and comprehensive
model of the growth center concept was made by John Friedmann. The "core periphery" analysis was initially used in a study of Venezuelan regional development policy. In this work Friedmann reasons that development originates in a small number of centers, urban in nature, which are termed cores. He argues that economic growth takes place in a matrix of urban regions through which the space economy is organized. Around the cores are areas lagging behind in levels of economic activity and development. These areas Friedmann calls the periphery. The process of development is said to involve the economic and social integration of the periphery with the core. The periphery is dependent on the core and its development is largely determined by institutions in the core. The dependency between core and periphery is economic, social, and political.

In a more recent formulation Friedmann argues that development occurs through a discontinuous but cumulative process of innovation. Innovations diffuse from cores to peripheries which lead to modernization of the peripheral areas. The rate of the diffusion process is a function of the potential interaction between core and periphery.

The cores are located in a nested hierarchy of spatial systems which range from the province level to the world level. A spatial system exists as a result of a decision making process being confined to a core and having influence over a surrounding area. Peripheral regions are in a dependency relation due to supply and market relations as well as administrative organization. A core exists for any given spatial system at each level of the hierarchy. Innovations are spread
from core to periphery by passing down through the settlement hierarchy and the associated hinterlands of the various centers. Growth in cores will tend to promote the development process of the spatial system for which they are the point of focus.18

Cores tend to develop well ahead of peripheries both economically and socially. However, at some point in time social and political tensions between core and periphery tend to inhibit further development in the core. This results in initiation of growth in the periphery and an increased equalization of the spatial pattern of development in the system.19

Growth Centers and Industrial Organization

A recent contribution to growth center theory is that made by Jose Lasuen. His approach is somewhat unique in that he links growth pole concepts to the study of industrial organization.20 He argues that the over use of input-output techniques has shifted attention away from Perroux's original definition which he believes is Schumpeterian development. Lasuen states that input-output techniques have failed to develop the point that the activity creating a growth pole was essentially a sectoral and geographic disturbance not because of its larger than average size, nor because of its higher multiplier, but because it was an innovation.21

For Lasuen the critical factors in economic development are those which determine the generation and diffusion of innovations and the spread of adoptions. He argues that development is primarily a problem in reorganizing to create strong interrelations between all plants across
both geographic and economic space. What is desired is a system of highly flexible multi-plant, multi-product, multi-city firms which can rapidly adopt new innovations. He also recognizes a need to increase the attractiveness of lagging regions. Lasuen notes a necessity for capital, credit, job training, services, infrastructure, and other forms of assistance to public and private firms. Under these types of conditions he expects diffusion channels to become less selective, spread of adoptions more extensive and faster, and economic development less polarized.22

Problems with Growth Pole and Growth Center Concepts

The notion of planned economic growth being generated from selected centers in geographic space has great intuitive appeal. However, it is argued that growth pole or growth center theory as presently formulated does not qualify as a viable theory of regional economic development. The approach does not provide specific criteria for the identification of probable urban areas to be designated as growth centers. Neither is there an indication of the size of population necessary to sustain economic growth in selected cities. Nor does it deal with the types of investment likely to succeed in the various urban areas selected.23 Equally as important, the empirical evidence to substantiate the transition of a growth pole from economic space to one in geographic space is entirely lacking.24

Growth pole or growth center concepts possess limited theoretical value as geographic theory for the location of industry. As presently stated the concept of growth poles in geographic space does not provide
new insights into the process of industrial location beyond those already determined by classical location theory with its emphasis on agglomeration economies. In terms of operationally feasible models it is questionable that development pole theory has contributed any new methods of analysis. Aside from the already known input-output technique the methodological approaches have been constrained to location coefficients and elementary graph theory. None of these applications are unique to growth pole theory.  

Of even greater significance in terms of influencing spatial patterns of regional economic development is that one finds no proof that spread effects from planned growth poles can significantly raise income and employment opportunity in lagging or declining regions. In fact it is possible that the focus on public works projects which usually accompanies growth center policy has actually hurt development in lagging regions by taking attention away from the more pressing problems of poor health, low quality labor, and inadequate education among the residents of depressed areas. In spite of these limitations growth center strategies have been adopted by numerous countries. The success of these countries to reduce concentration of economic activity and spread growth to lagging regions has not been notable.  

The "core periphery" model of John Friedmann and Lasuen's industrial organization approach are interesting formulations and merit increased attention. However, as presently formulated each of these conceptualizations suffers from the same serious omission. In each case they are presenting descriptions of how growth occurs or how it should
occur. Neither offers any policy or planning formulation to promote regional economic development. It seems clear that growth center approaches to regional development must involve deliberate policies. If planning is not included one is left with a description of the spatial distribution of the growth of population and economic activity.

Toward a Realistic Growth Center Strategy

It is argued that a realistic approach to the spatial aspects of development planning based on growth initiation in selected centers must be based on deliberate policy formulation. Necessary concomitants of intentional planning are the identification of probable growth centers and the types of investments to be made in these centers. A recent and very promising approach to regional planning based on growth center policy incorporates the identification of centers for investment and types of investments to be made as part of the planning strategy. This approach advocates focusing economic investments on areas which are already economically healthy and growing, rather than on areas with relatively poor growth prospects. This plan gives priority to intermediate size cities as the principal targets for regional policy planning. There is no prediction made that these centers will generate growth throughout their hinterlands. In fact, a pattern of polarization of economic activity is expected for these cities. The emphasis is not to spread growth from the centers but to encourage residents of nearby lagging regions to migrate into these urban areas.

The rationale for this policy is that intermediate size cities
have good growth potential in terms of increased employment and the problems of congestion associated with their further growth are not as serious as those of already large cities. Hansen argues that big cities do not have real economic advantages over intermediate size cities. Berry has stated that above a population of 250,000 the necessary conditions for self-sustaining growth seem satisfied. He indicates that the greatest payoff in terms of increasing employment and reducing unemployment would entail using public funds to enable centers close to this point to achieve self-sustaining growth. Thompson proposes that there is an urban size ratchet and that once the population of an urban area reaches a critical size of near 250,000 it appears that "structural characteristics, such as industrial diversification, political power, high fixed investment, a rich local market, and a steady supply of industrial leadership, may almost ensure its continued growth and fully ensure against absolute decline and may, in fact, effect irreversible aggregate growth."

Thus, the issue here is not one of optimum size, but rather of the minimum size required for investments to generate increased growth. It is argued that planned growth in a given number of centers allows for the provision of an integrated system of public services ahead of demand. Population increases resulting from in-migration can be more closely related to employment opportunity and migrants from lagging regions can become parts of a more dynamic economic system. It is not necessary that growth be limited to one city. A system of cities or towns linked by adequate transportation and communications might serve
as well or better for directed investment. Such a system of cities or towns could take the form of a cluster of urban centers or a development axis. It is argued on the grounds of economic opportunity costs that it is neither efficient nor effective to attempt major economic investments in lagging regions. However, lagging regions must be directly included in a viable strategy for regional development. One of the principal factors retarding the development of lagging regions is a relative deficiency in human resources. The disadvantages which depressed areas encounter as a result of inadequacies in education, health, and technical ability of the residents are familiar. However, the paucity of investment in human resources also has serious adverse effects on political and business leadership in depressed regions. A lack of employment opportunity has forced the young to leave the poor areas. For improvements to be effected the lagging regions definitely need vigorous political and business leadership.

Therefore, investments in depressed areas should deal primarily with the improvement of human resources. Improving the human factor serves a dual purpose. It enables people that choose to migrate to urban areas to obtain remunerative employment. Also, those that elect to stay in the lagging area become better able to influence the government to aid their problems through increased political awareness. The ability of a better educated population to perceive business opportunity is also predicted to be a factor in increased economic activity in lagging areas.
Summary

The implications of the term growth pole when placed in the context of a geographic location have caused a number of writers to believe it possible to manipulate the spatial dimension of economic growth. The growth pole or growth center is proposed as a policy instrument for regional development planning.

However, the transformation of the growth pole from economic to geographic space has not been clearly defined. Concrete research strategies and relevant criteria for determining what center to designate as a growth center and which area to focus upon have been notably lacking. The types of investment to be made in various chosen centers have also remained an unanswered question.

A recent development strategy attempts to deal with the problems of the where of investment and the general types of aid necessary to alleviate problems of lagging regions. Intermediate size cities near to lagging regions are suggested for growth center designation. Poor areas are aided by improving the human resource factor and encouraging out-migration. The policy orientation of this approach makes it by far the most promising of the growth center literature to date.

Therefore, it is argued that in western Argentina the most realistic approach to regional planning requires a careful taxonomy of the area in terms of its present level of development, the location and extent of leading and lagging regions, and the spatial organization of the region's economy. Given that over-concentration of economic activity is a problem with areas of little development and appreciable pov-
In Chapter Three some of the groundwork is begun for the formulation of a regional development plan for western Argentina. A taxonomy of the region is developed to provide information concerning the location and areal extent of leading and lagging regions. This material forms the foundation for the remainder of the analysis. The strategy developed will be directly related to solving the regional inequalities of economic activity and standards of living identified in Chapter Three.
FOOTNOTES


3. Ibid., pp. 125-126.


18. Ibid.

19. Ibid.


21. Ibid., 141.

22. Ibid., 148.


25. Ibid., pp. 7-9.


27. Ibid., p. 67.

28. Ibid., pp. 84-87.

29. Ibid., p. 81


32. Hansen, Intermediate Size Cities as Growth Centers, op. cit., p. 86.

CHAPTER 3

THE IDENTIFICATION OF GROWTH AREAS AND LAGGING REGIONS IN CUYO

Introduction

It is argued in Chapter Two that a necessary concomitant of policy oriented regional planning is a careful taxonomy of the study area to determine the location and extent of leading and lagging regions. The purpose of this analysis is to obtain an indication of the degree of concentration of economic activity. The objective of Chapter Three is to identify a spatial distribution of leading and lagging areas within the Cuyo region and to determine the degree of economic concentration. The scale of analysis is the departmental (county) level. The use of departmental data probably obscures some important and interesting intradepartmental variation. However, data for smaller area units, such as census tracts, are not available for the study area.\(^1\) The analysis presented in this chapter provides the basis for a spatial strategy of regional development for Cuyo. Knowledge of the location and geographic extent of growing and lagging regions and the degree of economic centralization are prerequisites for regional planning.

Spatial variation in economic activity and standards of living exhibit patterns that can be identified. Knowledge of these patterns improves one's ability to plan measures to influence regional economic systems. No single index, such as average income per-capita or unemployment, will isolate these patterns in all their variety due to mea-
measurement problems and averaging over large numbers of people and extensive areas. For this reason a multivariate approach is required. This approach is to analyze several variables and obtain a pattern or a number of patterns of how these variables combine to influence spatial variations of economic activity and living conditions. Inevitably in a multivariate classification problem some of the variables selected measure the same thing about the ways in which the observations differ. When several variables display a single pattern of simultaneous variation it is often desirable to isolate the patterns and use the patterns in the analysis instead of the several variables. A group of variables may contain several such patterns and any analysis is greatly simplified by reducing the dimensions of variation of the observations from the total number of variables to a lesser number of intercorrelated patterns. It is then possible to compare the relationship between the original observations and the new patterns to determine the spatial variation of the phenomena being studied.

The study region is a two province area of western Argentina which is a government organized planning space named Cuyo. This region is divided into thirty-seven departments which are the units of observation. The problem is to determine the basic dimensions of variation in economic activity and standards of living between the thirty-seven observations and to combine these departments into smaller numbers of groups which are as uniform in the level of wholesale, retail, and service business activity, manufacturing, agriculture, and standards of living as possible.
To achieve the goal of grouping observations three separate analyses are made on distinct types of departmental data to generate indices which serve as data for a fourth analysis, that being the final grouping of the departments. The first three analyses are: (1) an economic activity analysis using variables measuring the importance of manufacturing, agriculture, and wholesale, retail, and service business; (2) an analysis of standards of living, using housing quality and public service amenities as a surrogate measure; and (3) an internal migration analysis. A principal axis factor analysis is employed in analyses one and two above. The third analysis is carried out using only data for birth rates, death rates, and total population growth for each department and a multivariate technique is not necessary. Results from all three analyses are employed as the data for a final hierarchical grouping algorithm. The purpose of the grouping technique is to discriminate a small number of groups, homogeneous in their development characteristics, so that regional patterns of growing and lagging regions can be determined. This classification leads to improved knowledge of the spatial aspects of the inequalities in the Cuyo regional system and allows for a better founded planning strategy than presently exists.

**Methodology**

**Factor Analysis**

Factor analysis is a mathematical technique which allows for the identification of similarities in a set of data. The procedure reduces
several original variables to a lesser number of orthogonal dimensions each composed of highly correlated variables. The solution is performed on the data comprising an $M$ by $N$ order matrix, where $N$ is the number of observations and $M$ is the number of variables. The analysis generates a matrix $A$, of factor loadings, which are the correlation coefficients between each original variable and each new factor. The loadings identify the underlying dimensions represented by each factor. The factors can be thought of as linear combinations of original variables. Factor scores are computed for each observation on each new dimension. Each factor score ($f_{ij}$) is the score given to observation ($i$) on factor ($j$). Factor scores can be mapped to determine the spatial variation of each factor.\footnote{Mathematically the factor analysis model is as follows.

$$z_j = \sum_{r=1}^{m} v_{jr} f_r + e_j \quad \text{for } j = 1, 2, \ldots, p \quad m \leq p$$

Each observation ($z$) on variable ($j$) is expressed as a linear combination of ($m$) common factors ($f_r$) and a factor ($e_j$), specific to the particular variable. The coefficient ($v_{jr}$) represents the loading of the ($j$th) variable on the ($i$th) factor.\footnote{Hierarchical Grouping}

The hierarchical grouping analysis is indicated where an area is divided into ($n$) smaller areas which form units of observation and for which ($m$) factors are recorded. The grouping problem is to arrange the ($n$) areas into a smaller number of regions which are as uniform as pos-
sible. The hierarchical grouping analysis begins by defining each original object as a group. These (n) groups are then reduced in number by a series of step decisions until all (n) objects have been classified into one group. At each step some pair of groups is combined thereby reducing the number of groups by one. The procedure is designed to utilize the total within groups variation as the function to be minimally increased at each step in the process. As the number of groups decrease the error index will increase. The error index is the sum of the squared differences between corresponding scores in the profiles, divided by the number of objects in the potential group. As a general rule the number of groups is allowed to diminish until the error factor begins to increase rapidly. In mathematical form the error sum of squares, the function to be minimized is given by,

\[ ESS = \sum_{i=1}^{n} x_i^2 - \frac{1}{n} \left( \sum_{i=1}^{n} x_i \right)^2 \]

where \((x_i)\) is the score for the (ith) observation.\(^6\)

**Economic Activity Analysis**

The objective of this analysis is to determine the basic dimensions of economic activity in the two provinces of Cuyo and more importantly, to obtain quantitative indicators concerning the spatial patterns of variation in economic activity among the thirty-seven departments in the study area. Twenty variables which provide numerical data for primary, secondary, and tertiary activities are used for analysis.
(Table 3)

TABLE 3
VARIABLES ENTERING THE ECONOMIC ACTIVITY ANALYSIS

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Number of wholesale establishments</td>
</tr>
<tr>
<td>2.</td>
<td>Number of retail establishments</td>
</tr>
<tr>
<td>3.</td>
<td>Number of service establishments</td>
</tr>
<tr>
<td>4.</td>
<td>Number of wholesale employees</td>
</tr>
<tr>
<td>5.</td>
<td>Number of retail employees</td>
</tr>
<tr>
<td>6.</td>
<td>Number of service employees</td>
</tr>
<tr>
<td>7.</td>
<td>Wages and salaries paid: wholesale</td>
</tr>
<tr>
<td>8.</td>
<td>Wages and salaries paid: retail</td>
</tr>
<tr>
<td>9.</td>
<td>Wages and salaries paid: services</td>
</tr>
<tr>
<td>10.</td>
<td>Income from sales: wholesale</td>
</tr>
<tr>
<td>11.</td>
<td>Income from sales: retail</td>
</tr>
<tr>
<td>12.</td>
<td>Average income per-worker in commercial activity</td>
</tr>
<tr>
<td>13.</td>
<td>Number of manufacturing establishments</td>
</tr>
<tr>
<td>14.</td>
<td>Number of employees in manufacturing</td>
</tr>
<tr>
<td>15.</td>
<td>Wages and salaries paid in manufacturing</td>
</tr>
<tr>
<td>16.</td>
<td>Value added by manufacture</td>
</tr>
<tr>
<td>17.</td>
<td>Average income per-worker in manufacturing</td>
</tr>
<tr>
<td>18.</td>
<td>Value of agricultural production</td>
</tr>
<tr>
<td>19.</td>
<td>Value of mineral production</td>
</tr>
</tbody>
</table>


Numerical data for the variables listed in Table Three are subjected to a factor analysis. Three basic dimensions of economic activity are identifiable. (Table 4). Factor one associates those variables which measure levels of tertiary activity. Those variables which indicate large scale tertiary activity, such as high total income and high total wages paid, are especially strong in the weighting on factor one. Factor one is identified as a linear combination of those
data indicating importance in wholesale, retail, and service business.

**TABLE 4**

**FACTOR STRUCTURE FOR THE ECONOMIC ACTIVITY ANALYSIS**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Factor 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Loadings</td>
<td>Loadings</td>
<td>Loadings</td>
</tr>
<tr>
<td>1. Wages &amp; salaries pd., services</td>
<td>.97971</td>
<td>.05679</td>
<td>.06174</td>
</tr>
<tr>
<td>2. Income from sales, wholesale</td>
<td>.97812</td>
<td>-.01554</td>
<td>.03354</td>
</tr>
<tr>
<td>3. Wages &amp; salaries pd., wholesale</td>
<td>.97614</td>
<td>.01947</td>
<td>.01820</td>
</tr>
<tr>
<td>4. Wages &amp; salaries pd., retail</td>
<td>.97581</td>
<td>.08039</td>
<td>.01709</td>
</tr>
<tr>
<td>5. Income from services</td>
<td>.97293</td>
<td>.14033</td>
<td>.08349</td>
</tr>
<tr>
<td>6. Income from sales, retail</td>
<td>.96735</td>
<td>.18659</td>
<td>.05102</td>
</tr>
<tr>
<td>7. No. of employees, wholesale</td>
<td>.95305</td>
<td>.18122</td>
<td>.07716</td>
</tr>
<tr>
<td>8. No. of estab., wholesale</td>
<td>.95289</td>
<td>.24195</td>
<td>.01839</td>
</tr>
<tr>
<td>9. No. of employees, services</td>
<td>.95129</td>
<td>.27684</td>
<td>.10253</td>
</tr>
<tr>
<td>10. No. of employees, retail</td>
<td>.91656</td>
<td>.36978</td>
<td>.08014</td>
</tr>
<tr>
<td>11. Value of ag. prod.</td>
<td>-.18828</td>
<td>.76896</td>
<td>.21865</td>
</tr>
<tr>
<td>12. No. of employees, manuf.</td>
<td>.59915</td>
<td>.76514</td>
<td>.19087</td>
</tr>
<tr>
<td>13. Value added by manuf.</td>
<td>.18718</td>
<td>.33564</td>
<td>.83415</td>
</tr>
<tr>
<td>14. Value of mineral prod.</td>
<td>-.12424</td>
<td>-.02694</td>
<td>.56625</td>
</tr>
<tr>
<td>15. No. of estab., retail</td>
<td>.77629</td>
<td>.57578</td>
<td>.10529</td>
</tr>
<tr>
<td>16. No. of estab., services</td>
<td>.84896</td>
<td>.19659</td>
<td>.13812</td>
</tr>
<tr>
<td>17. Avg. income per-worker, coml.</td>
<td>.69189</td>
<td>.57338</td>
<td>.37642</td>
</tr>
<tr>
<td>18. No. of estab., manuf.</td>
<td>.72359</td>
<td>.65318</td>
<td>.11377</td>
</tr>
<tr>
<td>19. Wages &amp; salaries pd., manuf.</td>
<td>.66878</td>
<td>.57338</td>
<td>.37642</td>
</tr>
<tr>
<td>20. Avg. income per-worker, manuf.</td>
<td>.24712</td>
<td>.19733</td>
<td>.62108</td>
</tr>
</tbody>
</table>

The second basic dimension associates those original variables measuring importance in agricultural production, number of employees in manufacturing, and the number of manufacturing establishments. It is identified as a dimension of the agro-industrial sector of the economy. Activity of an agricultural nature and manufacturing are combined on this factor. Although this factor is highly correlated with manufacturing activity it is not closely associated with variables indicating high average income per-employee in manufacturing nor high
value added by manufacture. This indicates relatively low wage rates and low value added in the agriculturally based manufacturing industry. (Table 1). Factor three is identified as a dimension of relatively high value added manufacture of a non-agricultural type. It associates variables of high value added by manufacture, high average income per employee in manufacturing, and the value of mineral production. This factor is a measure of the importance of the non-agricultural sector of the manufacturing industry in Cuyo. (Table 1). Factor scores are generated by the analysis for each of the original observations on each of the new dimensions or factors. These factor scores allow for the determination of patterns of spatial variation of each of the dimensions. The scores resulting from the economic activity analysis are incorporated into a hierarchical grouping algorithm, the results of which are discussed later. The grouping analysis is performed to reduce the original thirty-seven observations to a smaller number of sub-sets having maximum internal homogeneity in terms of the factor scores generated for the three dimensions identified.

In the economic activity analysis twenty original variables are reduced to three basic dimensions which are linear combinations of the original variables. The spatial variation of these factors over the thirty-seven departments in Cuyo is determined by the factor scores which are given for each observation on each factor. The three factors identified account for 87 percent of the total variance among the original twenty variables.
Analysis of Housing Quality and Public Services

The level of economic activity is not always indicative of welfare due to inequalities in income distribution. Therefore, a concurrent analysis of other types of data concerning the identification of leading and lagging departments is necessary. To complement the economic activity analysis an attempt is made to determine the relative standard of living for the various departments in the study area. Indices such as per-capita income and unemployment are not available for the study area. For this reason, a surrogate measure of living standards is generated from an analysis of housing quality, availability of public services, family size, and household crowding conditions. The variables included in this analysis are listed in Table five.

TABLE 5

VARIABLES ENTERING THE ANALYSIS OF HOUSING QUALITY AND PUBLIC SERVICES

1. Percent of dwellings with piped-in water
2. Percent of dwellings without piped-in water
3. Percent of dwellings with flush-type toilet
4. Percent of dwellings with alternate type toilet
5. Percent of dwellings without toilet of any type
6. Percent of dwellings with electric lighting
7. Percent of dwellings with kerosene or gas lamp lighting
8. Percent of dwellings with no lighting
9. Percent of dwellings with pasteboard roofing
10. Percent of dwellings with straw roofing
11. Percent of dwellings with dirt floors
12. Number of persons per-dwelling
13. Number of persons per-room
14. Average family size

Numerical data for the variables in Table Five are analyzed in two separate factor analyses. One deals with the rural households and the other urban households. In the rural housing analysis three major dimensions are identified. Factor one associates those variables measuring large family size, high average numbers of persons per household, lack of piped-in water, non-flush type toilet, and kerosene or gas lamps for lighting. It is identified as a dimension of relatively poor rural housing conditions. (Table 6)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Factor 1 Loadings</th>
<th>Factor 2 Loadings</th>
<th>Factor 3 Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Average family size</td>
<td>.93685</td>
<td>.06739</td>
<td>.27162</td>
</tr>
<tr>
<td>2. Avg. no. of persons per-home</td>
<td>.91429</td>
<td>.30040</td>
<td>.21903</td>
</tr>
<tr>
<td>3. Avg. no. of persons per-room</td>
<td>.83713</td>
<td>.04974</td>
<td>.39466</td>
</tr>
<tr>
<td>4. % of homes without piped-in water</td>
<td>.71902</td>
<td>-.51704</td>
<td>.29353</td>
</tr>
<tr>
<td>5. % of homes with non-flush toilet</td>
<td>.71817</td>
<td>-.40070</td>
<td>.33965</td>
</tr>
<tr>
<td>6. % of homes with kerosene or gas lts.</td>
<td>.66693</td>
<td>-.60397</td>
<td>.21327</td>
</tr>
<tr>
<td>7. % of homes with indoor toilet</td>
<td>-.09137</td>
<td>.91144</td>
<td>-.31383</td>
</tr>
<tr>
<td>8. % of homes with piped-in water</td>
<td>-.11648</td>
<td>.87820</td>
<td>-.12267</td>
</tr>
<tr>
<td>9. % of homes with elec. lights</td>
<td>-.08403</td>
<td>.86365</td>
<td>-.34572</td>
</tr>
<tr>
<td>10. % of homes without lighting</td>
<td>.12224</td>
<td>-.11307</td>
<td>.89764</td>
</tr>
<tr>
<td>11. % of homes with straw roofs</td>
<td>.14528</td>
<td>-.13391</td>
<td>.86998</td>
</tr>
<tr>
<td>12. % of homes without toilet</td>
<td>.14194</td>
<td>-.35268</td>
<td>.72311</td>
</tr>
<tr>
<td>13. % of homes with dirt floors</td>
<td>.52044</td>
<td>-.37791</td>
<td>.63758</td>
</tr>
<tr>
<td>14. % of homes with pasteboard roofs</td>
<td>.04157</td>
<td>.11528</td>
<td>.00636</td>
</tr>
</tbody>
</table>

Factor two combines variables concerning homes with indoor toilets, piped-in water, and electric lighting. This dimension is identified as advanced rural standards of living in Cuyo. (Table 6). The third ba-
sic dimension associates those variables of houses without any lighting, with straw or branch roofs, without any type of toilet, and with dirt floors. This is clearly a factor which isolates the poorest rural conditions in the study area. It is identified as a dimension of extremely poor rural standards of living. Of the total variance among the original fourteen variables 80 percent was explained by the three factors identified.

In the analysis of urban housing quality and public services two major factors are identified. The first dimension consists of variables which measure very low quality living conditions. Associated on factor one are those variables such as no toilet of any type, no lighting, dirt floors, and straw roofs. Variables denoting large numbers of persons per-household are of moderate importance in the structure of this factor. Factor one is identified as a dimension of low to very low quality urban housing. (Table 7). Factor two incorporates those variables which measure much higher quality housing. Such variables as houses with indoor toilets, electric lights, and piped-in water are associated with this dimension. Factor two is identified as a dimension of relatively high quality urban housing and living standards. The total variance among the original fourteen variables explained by factors one and two is 83 percent. (Table 7).

Factor scores are generated for both the urban and rural analyses. These scores are assigned to each observation on each factor. They allow for the determination of the spatial patterns of variation of living conditions among the thirty-seven departments in Cuyo. In order
to combine the housing quality analysis with the economic activity analysis the factor scores for each are combined in the same hierarchical grouping algorithm. The grouping procedure is performed to reduce the original thirty-seven observations to a lesser number which are homogeneous in terms of economic activity and living conditions. The results of the grouping analysis are discussed later in this chapter.

**TABLE 7**

FACTOR STRUCTURE FOR THE ANALYSIS OF URBAN LIVING CONDITIONS

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<tr>
<th>Variables</th>
<th>Factor 1 Loadings</th>
<th>Factor 2 Loadings</th>
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<td>12. Avg. no. of persons per home</td>
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<td>.69670</td>
</tr>
<tr>
<td>13. Avg. no. of persons per room</td>
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<td>14. Average family size</td>
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**Internal Migration Analysis**

To complement the results of the economic activity analysis and the study of living conditions an analysis of the internal migration of population is made for Cuyo. In developed countries population
tends to flow from low-wage to high-wage areas. In less developed or
developing countries the flow of population is from areas of little
economic opportunity and unemployment to regions exhibiting greater
opportunity for remunerative work. The tendency to leave poor areas
is so strong in some cases that migration persists in spite of urban
unemployment rates as high as 10 or 15 percent. Given that migration
streams tend to flow from lagging to leading regions, an identification
of the areas of out-migration and in-migration should add important in-
formation to the total knowledge of growth areas and lagging regions
in Cuyo.

Numerical data for internal migration by origin-destination is
not available for the study area. In the absence of such data, birth
rates and death rates are collected by department for two time periods;
per-department are also collected. These data are analyzed by a simple
mathematical formulation to determine what percentage of the 1960 and
1970 populations in each department resulted from in-migration or con-
versely to find what percentage of total population growth was negated
by out-migration. The formulas are,

1. \[ \frac{(\text{change in population } 1960-1947) - (\text{births} - \text{deaths }1947 \text{ to } 1960)}{\text{population } 1960} \]

2. \[ \frac{(\text{change in population } 1970-1961) - (\text{births} - \text{deaths }1961 \text{ to } 1970)}{\text{population } 1970} \]

The percentage rates of in-migration or out-migration determined
for each department are included in the hierarchical grouping analysis
with the factor scores generated in the economic activity analysis and
those resulting from the study of living conditions. The objective is to group the thirty-seven departments on the factor scores and the migration data. The purpose is to generate a lesser number of homogeneous groups of departments which can be mapped to provide patterns of leading and lagging regions in Cuyo. The results of the final grouping analysis should indicate not only those departments with little or no economic activity but also those relatively poor areas and areas with high rates of out-migration. Conversely, departments with high levels of economic activity, high standards of living, and in-migration should be combined to indicate the more advanced areas of Cuyo.

The Hierarchical Grouping Analysis

The problem dealt with by the hierarchical grouping algorithm is as follows. We have derived nine basic dimensions of variation based on economic activity, living conditions, and migration for the thirty-seven departments in the Cuyo region. Dimensions one through seven are the result of direct factor analysis and consist of factor scores which are generated for each department on each dimension. The eighth and ninth dimensions are percentages of in or out migration by department for the time periods 1947-1960 and 1961-1970. The factor scores plus the migration data allow for the identification of patterns of spatial variation of relatively advanced versus relatively depressed areas. The objective of the grouping analysis is to combine the thirty-seven departments into a smaller number of groups which are as uniform as possible with regard to their characteristics of economic activity,
living conditions, and migration statistics. The dimensions included in the analysis are listed in Table Eight.

TABLE 8
DATA DIMENSIONS
ENTERING THE GROUPING ANALYSIS

1. Wholesale, retail, and service business activity
2. Agro-industrial activity
3. Non-agricultural manufacturing and mineral activity
4. High quality rural living conditions
5. Very poor rural living conditions
6. Very poor urban living conditions
7. High quality urban living conditions
8. Percentage of in or out-migration, 1947-1960

The purpose of the grouping of departments is to obtain a classification of levels of development for Cuyo which can be used to identify those departments most in need of development aid and those departments most capable of serving as centers for new growth and increased investment. The results of the taxonomy serve as the basis for a spatial development strategy for the regional system.

Eight groups of departments are discriminated in the grouping analysis. The formation of groups is based on minimizing within group variance and maximizing the difference between groups. With each reduction in the number of groups one obtains a new error factor. The error factor is the sum of the squared deviations about the group mean. The error increases as a function of increments in the within group variance. The number of groups is allowed to decrease in a step-wise fashion until the error factor begins to increase rapidly. In this case
eight groups are allowed. A listing of group membership is included in Table Nine. Also shown are the factor scores and migration data on which the grouping analysis is based. Spatial Variation of Development in Cuyo

The eight groups of departments discriminated from the hierarchical grouping analysis are mapped to determine the patterns of spatial variation of development in Cuyo. Figures One and Two show the results for Mendoza and San Juan Provinces respectively. These maps are constructed so that the patterns cover only those areas of human settlement. Areas where population is either very sparse or absent are left unshaded.

A careful study of Figures One and Two reveals a pattern of polarization of the relatively highly developed departments around the two province capitals. In each province those departments which are relatively advanced and exhibit important economic activity, better living conditions, and in-migration are found contiguous or very near to the province capitals. In each case as one moves from core city toward the periphery the level of development declines. As the map patterns indicate, the decline is not constant and is more rapid in some directions than others. It is possible to distinguish three major axes of development in the Cuyo region. The first and economically most important extends south and east of Greater Mendoza for approximately fifty-five kilometers in each direction. (Figure 1). The second axis of development extends to about thirty-five kilometers south of Greater San Juan. (Figure 2). The third axis connects San Rafael with General
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| TABLE 9 |

DEPARTMENTS BY GROUP AND DATA DISPERSION
Note: For key to patterns see bottom of Figure 2.
FIGURE 2

SPATIAL PATTERNS OF DEVELOPMENT IN SAN JUAN

Note: For description of groups see text pages 51-58.
Alvear. This zone of relatively advanced economic conditions is located in southern Mendoza Province. (Figure 1).

Groups one through four in Table Nine comprise the twelve departments classified as probable growth areas and are highly concentrated in Mendoza Province. Nine of the twelve are in Mendoza and eight of those nine are either contiguous or very near to Greater Mendoza. In San Juan Province the three probable growth areas are either part of or contiguous to Greater San Juan. Groups five through eight manifest important economic problems and are classified as lagging regions in need of development aid. It is notable that twenty-five of the thirty-seven departments in Cuyo fall into this category of less developed.

A Description of Groups by Characteristics

Group One

This group is composed of only one member, the capital of Mendoza Province. It is without doubt the most economically advanced department in the Cuyo region. As a commercial center it is more than two and one-half times more important than the next most active center. More than 90 percent of the homes in this group have piped-in water, electricity, and non-dirt floors. Above 85 percent of the homes have indoor toilets. There is no rural zone in this group. The category is characterized by a slight importance in non-agricultural manufacturing. The lone member of group one has witnessed a slight out-migration. Between 1947 and 1960 the rate of out-migration was -4.2 percent. In the 1961-1970 period this rate slowed to -1.4 percent. The bulk of
this population movement is attributed to suburban relocation of central city inhabitants.

Group Two

The second group is also limited to one member which is the department containing the capital city of San Juan Province. This is the second most important commercial center in the Cuyo region. Group two is further characterized by an important amount of agricultural processing. There is no apparent importance in non-agricultural manufacturing nor minerals. Living conditions in the urban section are well above average. More than 80 percent of the urban dwellings have piped-in water and electricity. Seventy-three percent of the homes have indoor toilets. However, a notable 17 percent of urban dwellings in group two have dirt floors. The rural dweller in San Juan, Capital is better housed on the average than those in the city. In the rural zone 100 percent have piped-in water and electricity, and 86 percent have modern toilet facilities. Only 5.6 percent of rural homes have dirt floors. The reason for this seemingly reverse dichotomy is that group two has a very small rural population. The people in this category tend to be owners of vineyards and wineries making them more affluent than the average population. The city also has its poor sections which lower the mean level of housing quality. Group two experienced an out-migration of -4.2 percent between 1947 and 1961. During the 1961-1970 period this rate increased markedly to -10.8 percent. A portion of this movement is attributed to suburban shift. However, it is submitted that it is indicative of the inability of San Juan's capital city to provide an
adequate labor market for the population and the in-flow of migrants.

**Group Three**

Group three is made up of nine member departments. With the exception of San Rafael, all of these are contiguous or very near to either the capital city of Mendoza or the capital city of San Juan and actually form the immediate hinterlands of the two cities. San Rafael is a large department in southern Mendoza Province which is exhibiting characteristics of rapid growth. The major city in the department of San Rafael, also known as San Rafael, is the third largest city in Cuyo with a population near 60,000.

Commercial activity in this group varies considerably. The two departments located in closest proximity to Mendoza's capital exhibit notable importance. The other departments in this category are of little comparative importance in commercial activity. Agriculture and agricultural manufacturing are very significant. San Rafael is the most important department in the Cuyo region in terms of agricultural output and the processing of agricultural products. Three departments located in the capital city area are also of notable importance. This group is the second most important in non-agricultural manufacturing and minerals. Housing standards are lower among these departments than groups one or two. Urban homes are characterized by more than 50 percent with piped-in water and indoor toilets. Above 80 percent have electricity and non-dirt flooring. In the rural zone only 12 percent of the homes have piped-in water and 30 percent have indoor toilets. However, nearly 50 percent have electricity and 68 percent have non-
This group is characterized by a high rate of in-migration. Between 1947 and 1960 the rate of in-migration averaged 11.4 percent. In the years 1961-1970 the average for the group fell to 2.3 percent. However, the three departments of this group which surround the capital city of Mendoza Province continued to experience in-migration at the rate of 10 percent for the latter time period. The trend is for those departments located closest to the major core cities of Mendoza and San Juan to continue to attract important numbers of in-migrants while those departments which were migrant destinations between 1947 and 1960, and located farther away have begun to experience out-migration since 1961. Thus, the process of concentration of population seems to be continuing and the focus seems to be narrowing to a smaller target area.

Group Four

The fourth group identified has only one member. There is no notable importance as a commercial center nor comparative significance in agriculture or agricultural manufacturing. However, this is by far the most important department with regard to non-agricultural manufacturing. This group is comprised of the single department of Lujan, located south of Mendoza's capital city and contiguous to the Greater Mendoza Metropolitan Area.

Above 65 percent of the urban dwellings have piped-in water and indoor toilets. More than 85 percent have electricity and non-dirt floors. The rural dwellings average 40 percent with indoor toilets and
electricity. Only 17 percent have piped-in water but more than 70 percent have non-dirt flooring.

Lujan is a destination point of moderate importance for in-migrants. The rate of in-migration between 1947 and 1960 was 1.6 percent. This figure increased to 2.4 percent in the 1961-1970 period.

**Group Five**

The twelve member departments comprising group five exhibit no importance as commercial centers. Neither do they have relative importance in agriculture, agricultural manufacturing, non-agricultural manufacturing, nor minerals.

Living conditions are considerably poorer than groups three and four. An average of urban dwellings indicates that 29 percent have piped-in water, 39 percent have indoor toilets, 62 percent have electricity, and 31 percent have dirt floors. The average for the rural zone is even poorer. Only 8 percent of homes have piped-in water. Fewer than 21 percent have indoor toilets and electricity. A notable 32 percent of the rural dwellings in this class have dirt floors.

The average member department of group five is experiencing significant out-migration. Between 1947 and 1960 the average rate of out-migration for the group was -7.6 percent. It should be noted that during this period two member departments registered important in-migration. The in-migration was noted for Chimbás and Santa Lucía departments in San Juan Province. The rates were 15 percent and 3.7 percent respectively.

In the 1961-1970 period the average rate of out-migration for this
group increased to -12.4 percent. However, in this case three departments experienced in-migration. These were Chimbas with 10.2 percent, Tupungato with 5.3 percent, and Nueve De Julio with 3.6 percent.

It is suggested that the positive rates of in-migration to Chimbas and Santa Lucia during the 1947-1960 period are primarily a consequence of the location of these departments contiguous with Greater San Juan. The process of in-migration continued for Chimbas during the 1961-1970 period. This is probably because of proximity to Greater San Juan and not due to any increase in economic activity or employment opportunity. More remarkable is the in-migration into Tupungato and Nueve De Julio during the 1961-1970 period. This in-migration is related to new economic opportunity in the form of improved and expanded irrigation systems.

Group Six

The seven departments which comprise group six are not important commercial centers. Neither do any of these departments have importance in agriculture nor agricultural manufacturing. Non-agricultural manufacturing and mineral activity are of no significance to this group. Only two of these seven departments have urban centers larger than 2,000 population.

Urban dwelling standards are similar to group five. An average of 40 percent of homes have piped-in water. Another 38 percent have indoor toilets. Significantly, 73 percent of these homes have electricity, however, 35 percent have dirt floors. Conditions in the rural sector are notably worse. The average number of dwellings with piped-
in water is only 5.5 percent. Fewer than 11.5 percent of the rural homes in this group have indoor toilets or electricity. More than 60 percent of these dwellings have dirt floors.

Out-migration from this group of departments is very high and increasing. During the 1947-1960 period the average rate of out-migration was -15.2 percent. The rate of out-migration increased to an average of -29.8 percent between 1961 and 1970.

The member departments of group six are situated away from the major cities in the Cuyo region. The general pattern of development characteristics is one of polarization with the less advanced areas located farther and farther from the major cores of Mendoza and San Juan.

Group Seven

The seventh group has three member departments. None of these are important commercially, nor do they have any significance in agriculture, minerals, nor manufacturing. This group incorporates the lowest quality urban housing conditions in Cuyo. Fewer than 6 percent of the urban dwellings have piped-in water and less than 15 percent have electricity. A remarkably high 89 percent are without indoor toilets and 59 percent have dirt floors. Conditions in the rural zone do not vary notably from the urban sector.

Out-migration from these departments is of an important magnitude and increasing. In the 1947-1960 period the average rate of out-migration was -11.4 percent. During the ten years from 1961-1970 the percentage of out-migration increased to -28.2 percent. The departments
comprising this group are all in the Province of San Juan and situated peripherally to the more heavily settled area surrounding the province capital.

Group Eight

The final group discriminated in the analysis has three members. As with the preceding three groups, group eight has no comparative importance in commercial activity, agriculture, agriculturally based manufacturing, non-agriculturally based manufacturing, nor minerals. Only one of the three member departments has a town larger than 2,000 inhabitants. In this urban center only 4.2 percent of the homes have piped-in water. However, 30.5 percent have indoor toilets and 53 percent have electricity. A notable 4.9 percent of these homes are with dirt floors. The rural living conditions of this group comprise the poorest in the entire study area. An average of 97.9 percent of the rural homes are without piped-in water and 94.5 percent have no indoor toilet. Fewer than 11 percent have electricity and 89 percent have dirt floors.

Out-migration is a notable factor in these departments. However, the percentage of out-migration is decreasing. Between 1947 and 1960 the out-flow of population averaged -39.5 percent. The rate slowed to -17.9 percent in the 1961-1970 period. The decreasing rate of out-migration is not due to increased economic activity in these departments. Rather, it represents a lesser number of persons capable of migrating from the lagging regions.
Summary

The analysis of Cuyo presented in this chapter results in the discrimination of eight groups of departments. The groupings are obtained from the application of a hierarchical grouping algorithm to three basic sets of data comprising nine data dimensions. These data are: (1) factor scores resulting from an economic activity analysis; (2) factor scores from an analysis of living conditions; and (3) percentage figures of in-migration and out-migration. Data for each of the above types of variation are generated for each of the thirty-seven departments in Cuyo.

Groups one through four are found to be relatively advanced or showing signs of continued growth. The departments comprising these groups are without exception either the major core areas of the two provinces or are located in the immediate vicinity and usually contiguous to the major cities. Groups five through eight show a more peripheral location with the departments comprising group eight situated the greatest distance from the core cities.

It is argued that as a result of existing economic conditions and living conditions that groups five through eight represent significant problem areas and are classified as lagging regions. It is important to note that twenty-five of the thirty-seven departments in Cuyo are incorporated into what are termed problem areas. Plans for improving the level of development and reducing the spatial inequalities in standards of living must deal with the populations of these twenty-five departments.
The objective of Chapter Three was to determine the location and spatial patterns of leading and lagging areas in Cuyo. The results of this analysis indicate that there are twelve departments in Cuyo which exhibit characteristics of further growth and development. These departments, excepting San Rafael, are spatially concentrated in a polarized fashion and surround the major core cities of Greater Mendoza and Greater San Juan. This leaves twenty-five departments classified as lagging regions. An important problem which remains is how do we deal with the lagging regions now that their locations are known.

In Chapter Two it is argued that investments in lagging regions are probably not beneficial in terms of the amount of economic growth and welfare generated by them. It is also noted that investments in the poorer areas are uneconomic due to the existence of better investment opportunities in the more advanced areas. Therefore, the goal is to determine viable investment centers which will serve to reduce economic concentration around the capital cities and aid lagging regions without being totally uneconomic. To achieve this objective it is necessary to identify alternate investment centers for Cuyo which are neither too near the major centers nor in lagging regions. Thus, the objective is to isolate urban places capable of reducing economic concentration in and near the capital cities and also be able to influence conditions to improve for residents of lagging regions. This requires knowing not only the location of leading and lagging regions but also their spatial relations and spatial organization. An analysis of the spatial organization of Cuyo forms the topic of Chapter Four.
FOOTNOTES

1. Census tract data is collected in Cuyo but it is not in published form and is not available in unpublished form.


CHAPTER 4

THE SPATIAL ORGANIZATION OF CUYO

Introduction

In Chapter Three the location and areal extent of leading and lagging regions were determined for Cuyo. To complete the information needed to provide a spatial strategy of development for the region it is necessary to identify probable urban centers or urban systems to serve as targets for new investment. The objective of directing investments to the cities or urban systems identified is to lessen the degree of economic concentration around major core cities and to increase economic opportunity and improve living conditions for the residents of lagging regions. An urban system is defined as two or more interrelated cities and their respective hinterlands. The proposed centers or systems should be located so as to provide spatially separated investment opportunity to the province capitals and also be as near and closely interconnected to the lagging regions as possible. Therefore, the goal is to determine not only the location of probable growth centers but their spatial relations with other centers in the urban system, their areas of economic influence, and their situation with regard to lagging areas.

The objective of Chapter Four is to determine the spatial organization of Cuyo. From this analysis it should be possible to identify sub-systems of the economy consisting of urban places and respective
hinterlands of economic influence. For this study an urban place is defined as any town or city with more than 2,000 inhabitants. However, information is gathered for all centers larger than 500 population. These results serve to indicate alternate investment centers or development axes and to demonstrate the spatial relations between the probable growth centers and their situations with regard to lagging regions. A growth center is defined as an urban place or system which is capable of experiencing increased economic growth.

Urban places usually exert some dominance over the territory surrounding their location. This zone of dominance or hinterland varies in extent depending upon the focus of the activity concerned; be it economic, cultural, or political.¹ The dominance pattern of a city defines a functional region. A functional region is the spatially integrated area around a given center which depends on that city for some part of its needs. The varying sizes of urban places lead to a hierarchy of centers which exhibit different degrees of influence over differing sized areas at diverse levels.²

Within any hierarchically arranged system of urban places and associated trade areas the presence of upper level goods and services can be thought of as causes and effects of the process of polarization. It is the extent of the journey to obtain required and/or desired goods, services, cultural amenities, or to carry out relations with the government that leads to the spatial integration of areas surrounding any urban center. The level of the hierarchy and the areal extent of the hinterland will differ with the good, service, cultural activity, or
level of government agency to which the consumer aspires. The func-
tional region can exist at any scale and the concept is understand-
able within the general framework of central place theory. Smaller
regions are organized around smaller cities and tend to nest within
the hinterlands of larger urban nodes. Patterns of spatial interac-
tion and economic dominance between urban centers at varying hierar-
chical levels identify sub-systems of the regional economy. 3

Analysis of the Urban System in Cuyo

An analysis of the spatial organization of Cuyo will identify
the sub-systems of the regional economy with their respective urban
centers and associated hinterlands. Given this knowledge, the selec-
tion of probable growth centers to lessen economic concentration and
improve the standard of living of people now located in lagging areas
can be accomplished. The situation of the sub-systems with respect to
both major centers and lagging regions is necessary information to pre-
dict the future influence of increased sub-system development on present
patterns of economic activity and living conditions.

To accomplish the determination of the spatial organization of
Cuyo, four sets of data are gathered. These include: (1) an inventory
of functions for each town or city larger than 500 inhabitants; (2) an
analysis of the economic interconnections between cities as measured
by consumer shopping trip behavior; (3) the delimitation of the average
trade area of each urban place; and (4) an analysis of the rural-urban
interconnections between rural residents and various cities. This data
is also comprised of consumer shopping trip patterns.
The Analysis of Urban Functions by City

As a result of previous work done in central place theory one expects larger centers to have more functions and occupy higher levels in the urban hierarchy. Therefore, to determine the hierarchy of towns and cities in Cuyo an inventory of functions was made for all urban places larger than 500 inhabitants. The results of this analysis allows for the ranking of centers by the number and type of function and is indicative of the position of these cities in the urban hierarchy.

The data for this analysis was gathered by completing an inventory of the existence or non-existence of 106 distinct types of retail and service functions for forty-seven towns and cities in Cuyo with populations exceeding 500 inhabitants. The information gained from the inventory forms a matrix of order M by N, where M is 106 distinct types of functions and N is forty-seven urban places located in Cuyo for which the inventory was made. (Table 10). This data matrix of the incidence of functions by cities is analyzed in a hierarchical grouping algorithm. The objective of the analysis is to discriminate a ranking of cities by the number and type of functions. One would expect centers with larger numbers and less ubiquitous functions to occupy the highest positions in the urban hierarchy and exhibit notable dominance over centers with fewer and more ubiquitous functions. A listing of the types of retail and service business included in the inventory is shown in Appendix A.

Eight groups of cities are discriminated as a result of the appli-
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**TABLE 10**

**PARTIAL LISTING OF INCIDENCE MATRIX**
cation of the hierarchical grouping algorithm to the data matrix. Each group of urban places is homogeneous with respect to the number and type of functions and the rank order indicates their relative positions in the urban hierarchy. A comparison of these hierarchically arranged groups of centers with the leading and lagging departments identified in Chapter Three indicates that no department ranks among the more developed if it does not incorporate at least one center with seventy or more distinct functions. In Cuyo this includes eleven departments and nine urban places. The unequal number of cities and departments results from the urban agglomerations of Greater Mendoza and Greater San Juan spreading into surrounding departments and greatly influencing levels of economic activity and standards of living. Of the nine cities which comprise groups one and two of the urban hierarchy and possess seventy or more functions two are located in departments classified among the less viable. Thus, larger numbers of functions do not automatically guarantee economic prosperity for an urban system. In Cuyo, nine of forty-seven cities have seventy or more functions. Seven of these nine centers are located in what have been classified as economically viable departments. These cities are identified in Table Eleven. This table indicates groups one and two as discriminated in the analysis. The complete results of the grouping of centers by number and type of functions are included in Appendix B.

The spatial pattern formed by the locations of the seven cities classified as high order centers in economically viable areas is moderately concentrated. Only one city in San Juan Province is included in
TABLE II
HIGHER ORDERED CENTERS IN CUYO

<table>
<thead>
<tr>
<th>Group Number</th>
<th>City</th>
<th>No. of Functions</th>
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<tbody>
<tr>
<td>1</td>
<td>Mendoza</td>
<td>106</td>
</tr>
<tr>
<td></td>
<td>San Juan</td>
<td>101</td>
</tr>
<tr>
<td></td>
<td>San Rafael</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
<td>San Martin</td>
<td>84</td>
</tr>
<tr>
<td></td>
<td>Rivadavia</td>
<td>83</td>
</tr>
<tr>
<td></td>
<td>Tunuyan</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>General Alvear</td>
<td>92</td>
</tr>
<tr>
<td></td>
<td>Lujan</td>
<td>73</td>
</tr>
<tr>
<td></td>
<td>Maipu</td>
<td>84</td>
</tr>
</tbody>
</table>

* Cities located in departments classified among the less viable.
** Cities which are either part of or contiguous to the major cores of Greater Mendoza or Greater San Juan.

This category. It is the capital city of San Juan. Of the six centers remaining, three are either part of or contiguous with Greater Mendoza. This leaves San Rafael, San Martin, and Rivadavia as viable higher ordered centers moderately removed from the areas of the capital cities. At the same hierarchical level but less important in economic activity and standard of living are the cities of Tunuyan and General Alvear. Thus, San Rafael, San Martin, and Rivadavia are cities which should be considered for major attention as target centers for new investment. These cities have the functional attributes, the already growing economies, and the location away from major cores to merit increased investment. General Alvear and Tunuyan, because of their positions in the urban hierarchy, are worthy of attention. These are centers which might be capable of stimulating increased regional development.
We are not concerned with the hierarchy of cities only as isolated units but are interested in determining how these hierarchically arranged centers interact to form sub-systems of the space economy. Therefore, the next phase of the analysis involves determining the urban sub-systems of the Cuyo economy.

Sub-Systems of the Cuyo Economy

In the analysis of the hierarchy of urban places in Cuyo it was found that there is an important relationship between the hierarchical level of any city and the level of economic activity and living conditions of the department in which it is located. Of the higher ordered centers located in viable departments only San Rafael, San Martin, and Rivadavia are moderately removed from the major core cities of Greater Mendoza and Greater San Juan. In the same hierarchical group but less developed in terms of level of economic activity and housing conditions are the urban places of General Alvear and Tunuyan. These five centers are recommended as the best probable choices for designation as growth centers. The purpose of these growth centers is to reduce economic concentration around the core cities of Mendoza and San Juan and increase economic opportunity nearer to lagging regions.

As noted earlier, we are not interested only in the hierarchy of centers in isolation. We are concerned with determining how these hierarchically arranged centers interact with other centers to form urban systems. The dimensions of the sub-systems are important because it is not necessary that growth center designation be limited to one city. A system of cities or towns, linked by adequate transportation
and communications, might serve as even better growth centers. Such a system could take the form of a cluster of urban centers or a development axis. Therefore, it is important to know not only the hierarchical level of centers but their interrelations as well.

It is argued in Chapter Two that to avoid wasting scarce resources investments should be focused on areas which are already economically healthy and showing signs of viability. Thus, our interest in determining sub-systems for development in Cuyo involves those centers which are located in the more economically advanced departments. Within these departments are included the cities of San Rafael, San Martin, and Rivadavia. Of lesser importance but of possible growth potential are the urban centers of General Alvear and Tunuyan.

To determine the organization of urban sub-systems a one percent sample was made of the shopping trip behavior of urban families in the study area. In urban places larger than 50,000 inhabitants the sample size was reduced to one-half of one percent of the urban dwellings. The number of families surveyed in the study area totaled 1,000. The questionnaire form was delivered by and completed in the presence of the author. This data was collected for all nodes larger than 500 population. The primary interest here concerns cities which have been identified as possible growth centers. Therefore, we are most concerned with identifying the sub-systems organized around San Rafael, San Martin, and Rivadavia. Of somewhat less importance are General Alvear and Tunuyan. The questionnaire form employed in this analysis is included in Appendix C.
The direction of economic interconnection is determined from the urban household sample. In this survey the travel behavior of urban residents to obtain various goods and services, public services, and entertainment is measured. The travel patterns and lines of interconnection resulting from this analysis indicate that there are three major sub-systems of economic interconnection in Cuyo. All of these are located in Mendoza Province. Two of these systems are organized around cities which have been identified as likely investment centers. The third sub-system is organized around a center situated in a department which ranks among the lagging. This city has been identified as a possible growth center. It is in the most advanced group of the less affluent areas. As a result of the possible development influence of Tunuyan its sub-system will be examined.

The sub-system organized around San Rafael includes eight urban nodes in three departments in southern Mendoza Province. It incorporates five centers in San Rafael, one in Malargue, and two in General Alvear. More important, it indicates a major development axis between the cities of San Rafael and General Alvear. As was noted earlier these two cities are identified as probable growth centers. The fact that they exist in the same interconnected sub-system of the space economy makes them an even more attractive development system. The lines of urban interconnection in the San Rafael sub-system are shown on Figure Three.

A second sub-system is identified which centers on San Martin. This system includes eleven urban centers under its zone of influence
and has dominance over six departments. The most important relationship is that between San Martin and Rivadavia. These two closely associated cities have been identified as probable growth centers and form a major axis of development in the sub-system. Importantly there is an economic interrelation between this sub-system and the lagging departments of Santa Rosa, La-Paz, and Junin. (Figure 3).

The third sub-system identified does not contain a department which ranks among the more viable in Cuyo. However, the major city in this system is incorporated into the same group in the urban hierarchy as San Martin and Rivadavia. This center is situated in a department which has been included with the most advanced of the lagging areas. The system is focused on Tunuyan and includes three smaller urban centers. The zone of influence of this sub-system involves three departments.

The locations of all three sub-systems and their patterns of interconnection are developed on Figure Three. It is important to note that these sub-systems are highly interconnected not only within themselves but also to Greater Mendoza within whose area of dominance they nest.

From the analysis of the economic interconnections of urban centers for Cuyo three sub-systems of the space economy are identified. Two of these systems are recommended as probable growth centers and should serve to reduce economic concentration and create economic opportunity in closer proximity to lagging regions. A third system is considered of sufficient importance to warrant consideration as a pos-
FIGURE 3

URBAN SUB-SYSTEMS IN CUYO

Mendoza
Tunuyan
San Martin
Rivadavia
San Rafael
General Alvear
Mendoza
sible growth center. To determine the relationship between these systems and their situation with regard to lagging regions it is necessary to delimit the areas of economic influence of the sub-systems identified. Therefore, the following analysis is to determine the hinterlands of these systems.

**Trade Areas In Cuyo**

The trade area is that spatially integrated region around any given city which depends on that center for some part of its needs. The size and shape of trade areas is based on the range of a good and the threshold population for a good. The range of a good delimits the zone around an urban place from which persons travel to the center to purchase the good. The upper limit of the range is the maximum possible radius of sales. Beyond the upper limit the price of the good is too high for it to be sold, either because of the increase in price with distance until consumers will no longer purchase the good or because of alternate and more proximate competing centers. The range also has a lower limit. This limit is defined by that radius which encloses the minimum number of consumers necessary to provide an adequate sales volume for the good to be provided profitably from the city. The population at which the lower range is just met is termed the threshold population. It is the upper and lower limits of this range as measured by the extent of the journey of consumers to obtain goods and services that causes the polarization of space surrounding any urban center and determines the extent of the center's trade area. The size of the trade area of any center or sub-system indicated the area
over which it exercises major economic influence. It is argued that the zone of influence of these centers indicates the spatial situation of various cities with regard to lagging regions. This information is necessary to estimate the impact of new growth centers on the space economy.

To determine the average trade area of the forty-seven towns and cities in Cuyo with more than 500 inhabitants a questionnaire analysis was made. Information concerning trade area size was solicited from a total of 325 retail and service business establishments in the study area. The questionnaire was delivered by and completed in the presence of the author. The business questionnaire asked each establishment surveyed to estimate their sales radius around their respective locations. A map of the area was furnished to aid in the exact estimation of distance in each direction. An example of the questionnaire form used is included in Appendix D.

The number of individual business surveys made depend upon the number and type of establishments represented in each center. An attempt was made to survey those retail and service establishments which have a strong relationship to the consumer and require that the consumer make a journey to the store to purchase the good or service desired. The results of all the surveys made for each center are averaged and mapped to provide the mean trade area of each town or city. In no case are more than twenty nor fewer than five business types included. The most frequently contacted business types in each center are listed in Table Twelve.
TABLE 12

LIST OF THE MOST FREQUENTLY SURVEYED BUSINESS TYPES

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<tbody>
<tr>
<td>1</td>
<td>Bank</td>
<td>11. Womens and Girls clothing</td>
</tr>
<tr>
<td>2</td>
<td>Sale of agricultural implements</td>
<td>12. Department store</td>
</tr>
<tr>
<td>3</td>
<td>New car sales</td>
<td>13. Post Office</td>
</tr>
<tr>
<td>4</td>
<td>Optician</td>
<td>14. Office machines</td>
</tr>
<tr>
<td>5</td>
<td>General Store</td>
<td>15. Veterinarian</td>
</tr>
<tr>
<td>6</td>
<td>Jewelry</td>
<td>16. Office supplies</td>
</tr>
<tr>
<td>7</td>
<td>Appliances</td>
<td>17. Dry cleaning</td>
</tr>
<tr>
<td>8</td>
<td>Mens and Boys clothing</td>
<td>18. Newspaper circulation</td>
</tr>
<tr>
<td>9</td>
<td>Furniture</td>
<td>19. Supermarket</td>
</tr>
<tr>
<td>10</td>
<td>Dry goods</td>
<td>20. Bulk fuel sales</td>
</tr>
</tbody>
</table>

The trade areas of the major centers are mapped to illustrate their spatial patterns of economic dominance in Cuyo. These patterns help to identify the relationships between urban centers and lagging regions. The resulting patterns are shown on Figures Four and Five. A careful study of the size of trade areas on these maps isolates those trade centers of major importance. The urban centers of Greater Mendoza and Greater San Juan have the largest zones of influence. In southern Mendoza Province San Rafael is a center of notable spatial dominance. The city of General Alvear, also located in the south, has a relatively large trade area.

Nested wholly within the trade area of Greater Mendoza are two identifiable sub-systems of notable size and spatial extent. East of Greater Mendoza is a system organized around San Martin. South of the capital city is another sub-system based on Tunuyan. San Martin incorporates the larger and more impressive of these two systems in
FIGURE 4

URBAN HINTERLANDS IN MENDOZA
FIGURE 5
URBAN HINTERLANDS IN SAN JUAN
terms of population and focal area. In northern Cuyo, Greater San Juan is the only urban system of major importance. It serves as the point of focus for the Province of San Juan.

The size and spatial extent of the trade areas of the major centers and sub-systems organized around San Rafael, San Martin, and Tunuyan are important in aiding the identification of the spatial relationships between these probable growth centers and the lagging regions in Cuyo. To complement the trade area analysis and to gather further information concerning the nodality of the various towns and cities in Cuyo a study was made of rural shopping trip behavior.

Rural-Urban Economic Interconnections

A survey of business types to estimate trade areas provides data which indicate the average area of economic influence around any center. To gain further information into the relationships between people in lagging regions and the probable growth centers another questionnaire was employed. The objective of this analysis is to determine the interaction between urban centers and the surrounding rural population. When the rural resident happens to be located in a lagging area the resulting pattern of interconnection indicates the urban area with which the depressed region maintains a relatively high degree of spatial interaction. This relationship is important to estimate the probable influence of various growth centers on lagging regions.

The rural shopping trip analysis was made for 235 rural households in Cuyo. The procedure involved delivering the questionnaire to the dwelling and obtaining the necessary information while there. Because
good areal coverage was desired a sample was generally conducted at approximately six kilometer intervals in the more densely populated areas. In sparsely settled rural zones a questionnaire was solicited where there were people residing. An example of the questionnaire form employed is included in Appendix C. The basic questions concerned consumer destinations to obtain twelve types of goods or services, seven types of public services, and four types of recreation. The results of the rural-urban relationships are developed on Figure Six.

Careful analysis of Figure Six reveals the existence of three primary centers of notable focality in Cuyo. Greater San Juan is the only important point of focus in San Juan Province. Greater Mendoza is the major city of attraction for all of Cuyo. However, in Mendoza Province there are identifiable sub-nodes with notable rural-urban interconnections. In southern Mendoza Province the city of San Rafael is a notable focal point. Of moderate focality in southern Mendoza is the city of General Alvear. Earlier in the chapter it was noted that these two cities are part of the same sub-system of the space economy. Another sub-center which can be identified in Mendoza Province is San Martin. This city is located east of Greater Mendoza and also serves as the point of focus of an important sub-system. The city of Rivadavia which is a moderately significant nodal area for rural residents forms part of the San Martin sub-system. In Mendoza Province there is another city which exhibits notable interconnection with rural areas. This is the city of Tunuyan. It is also the center of a moderately important sub-system of the regional economy as was noted previously.
FIGURE 6
RURAL-URBAN RELATIONS.
Summary

In Chapter Four the spatial organization of the economy of Cuyo is determined. The objective of this chapter is to identify the hierarchy of urban centers in Cuyo, to determine how these cities interact to form urban sub-systems of the economy, and to delimit the respective hinterlands of economic influence of the various centers and sub-systems. The data gathered for this chapter includes: (1) an inventory of functions for each town or city larger than 500 inhabitants; (2) an analysis of economic interconnections between cities as measured by consumer shopping trip behavior; (3) a delimitation of the average trade area of each urban place; and (4) an analysis of rural-urban interconnections measured by the shopping destinations of rural residents.

The analyses presented in this chapter result in the identification of three major alternative investment centers to the city of Greater Mendoza. One urban system of probable growth capacity is identified. A relationship is discovered between the number of functions in a center and the viability of that center. No center with fewer than seventy distinct urban functions is located in what is classified a leading department. (Chapter Three). Of the nine cities which possessed seventy or more functions, seven are situated in economically advanced departments. Three of these are either part of or contiguous to Greater Mendoza. Another is the capital city of San Juan Province. The remaining three urban centers are located in Mendoza Province but removed from the immediate area of Greater Mendoza. These are the cities of San Rafael, San Martin, and Rivadavia. Two other cities in Mendoza
Province have more than seventy functions but are situated in what are classified as the highest level of lagging region. These cities are considered worthy of continued attention as possible growth centers.

Further analysis into the interrelations among cities and between cities and rural areas indicates that there are two major interconnected urban sub-systems in Cuyo. San Rafael and General Alvear form a development axis as do San Martin and Rivadavia. Tunuyan is not interrelated with either of these systems but does form the nucleus of a moderately large urban system. Each of these systems and the city of Greater San Juan have large trade areas and are strongly related to rural areas. They would seem to be logical alternative investment nodes for Cuyo.

It is argued in Chapter Two that the development of a policy oriented planning strategy requires knowledge of the spatial organization of Cuyo. The goal is to determine viable investment centers which will serve to reduce economic concentration around the major city of Mendoza and also create economic opportunity nearer to lagging regions. To achieve this objective it is necessary to identify probable investment centers for Cuyo which are neither too near Greater Mendoza nor situated in lagging regions.

The results of the analysis performed in Chapter Four indicate the existence of viable alternate investment centers and axes of development in Cuyo. The spatial relations between the probable growth centers and their locations with regard to lagging regions are determined. The strategy of employing the cities and systems of urban centers identified in Chapter Four to aid the development of lagging regions and reduce
existing concentration is the topic for the following chapter.
FOOTNOTES


CHAPTER 5

A SPATIAL STRATEGY OF DEVELOPMENT FOR CUYO

Purpose

Chapter Five combines data concerning the location and areal extent of leading and lagging regions with knowledge of the spatial organization of the economy and the delimitation of the urban hierarchy for Cuyo. The objective is to develop a spatial strategy of development for the provinces of Mendoza and San Juan.

The goals of this investment strategy are to locate investments to increase regional welfare and reduce extreme degrees of economic concentration rather than attempt to satisfy the conditions of location dictated by marginal economic analysis. Many economists argue that considerations of efficiency resulting from economies of agglomeration require continued investment emphasis on regions that have already demonstrated a capacity for sustained economic growth. No consideration is made of the effects of extreme concentration and the resulting congestion. The welfare argument originates from the need to accelerate growth in certain regions which exhibit low levels of economic activity and notable poverty. Given that the ultimate justification for economic growth should be the welfare of the population and knowing that the equalization of incomes in developing countries is not an automatic process, some positive public action is necessary.¹
Need for Planning

The Argentine Government recognizes a need for planning to reduce the spatial concentration of economic activity in that country. However, the plan presented by that government is based on the assumption that investment can be directed to major cities away from Buenos Aires and growth will spread from these "development poles" throughout their respective regions of influence. Friedmann suggests that growth is transmitted downward through the levels of the urban hierarchy to successively lower ordered centers. This would indicate that the Argentine Government is correct in their planning strategy and that continued growth in large cities will lead to the extension of higher levels of development throughout the entire economic system. However, empirical evidence suggests that instead of development diffusing from large urban centers and spreading downward through the spatially organized systems of various centers at decreasing levels of the urban hierarchy it tends to polarize in one or a few large cities. Therefore, rather than increased articulation of economic space there appears increased concentration of economic activity and population. Berry has stated that the failure of growth to spread from leading to lagging regions is a result of poorly developed urban nodes occupying positions in the settlement hierarchy between the metropolis and the village level. This would indicate a lack of intermediate size cities in the urban hierarchy. However, data for western Argentina indicates that intermediate size cities do exist and in terms of their population and functional attributes they occupy a position in the hierarchy whereby they form viable alternative investment centers. In spite of the existence
of these centers, polarization around the two major cities continues in the Cuyo region. Empirical evidence for Cuyo shows that since 1947 the concentration of population, economic activity, and higher standards of living has been increasingly centered on the capital cities of the two provinces.

In developed countries the effects of growth and development as reflected by higher standards of living seem to be downwardly mobile. For this reason the major problem associated with concentrated growth is congestion. However, in the less developed and developing nations neither growth nor better living conditions exhibit any tendency to diffuse unaided into lower orders of the settlement hierarchy nor to rural areas. The resulting pattern is one of the centralization of economic activity and welfare. Continued investment in present core cities will only add to the already extreme degrees of polarization noted in the Cuyo region. It is for these reasons that the need for planning investments to be made in alternate centers with regard to their location in space and interrelations with space are critical.

**Background to the Selection of Growth Centers**

Unfortunately, the existing state of expertise in urban economics does not allow us to say with any degree of accuracy at what size or even if large cities become too large. However, most large cities are probably too big in terms of alternatives available to individuals and firms in smaller urban areas. Recent studies indicate that large cities experience significant diseconomies of scale in providing public services. The evidence available indicates that it is economic in the long run to avoid the growth of very large cities. A remaining consideration is to
determine the lower population threshold to satisfy conditions for self-sustaining growth. How large must centers be to transform new investment into expanding development?

Again we are faced with an unsolved problem. Existing studies concerning this question support the contention that a lower population limit of 100,000 to 200,000 is necessary to sustain growth investments. Evidence concerning the provision of public services have indicated a definite cost benefit in urban centers between 50,000 and 100,000 inhabitants. Berry concludes in a recent study that above a population of 250,000 the necessary conditions for self-sustaining growth seem satisfied. He argues that a wise strategy to increase economic opportunity and reduce unemployment would encourage directing public funds to centers near this size to help those cities achieve self-sustaining growth.

Thompson suggests that there is an urban size ratchet so that once an urban area reaches a critical population of near 250,000 the structural characteristics appear which almost ensure its continued growth. Beyond this size absolute decline is not anticipated. The conclusion reached by participants at a recent conference sponsored by the International Economic Association in response to the question, "How large must a successful growth point be?", was that world-wide experience indicates that successful nodes are generally closer to 100,000 population than 10,000. A major consensus is that centers should be large enough to provide the main services of education, medical facilities, banking, shopping, an infrastructure of public utility services, and permit at least limited external economies for local industry.
a general summary of the urban size problem Hansen writes that the range can probably be extended from 50,000 to one million population.\textsuperscript{12}

The issue is not one of optimum size, but rather of the minimum size required for investments to generate increased growth. Experience indicates that economic investment made in centers too small or in badly lagging regions has zero or near zero marginal productivity in terms of providing lasting employment and justifying the opportunity cost of alternate locations.\textsuperscript{13}

The problem which remains is that of directing investment away from the major metropolitan areas where it adds to concentration and congestion. At the same time an attempt must be made to create economic opportunity nearer to depressed areas and avoid placing investments in too small of centers or lagging regions as this is generally non-economic. This is a situation which requires the identification of viable cities which offer a spatial alternative to the major core cities and are neither too congested nor too lacking in their ability to maintain growth. An important consideration is their location with respect to lagging regions.

**Spatial Alternatives For Investment in Cuyo**

**San Juan**

The northern province of the Cuyo region is in a circumstance which does not allow for the selection of alternative investment centers, especially with regard to larger scale activities. There do not exist sub-systems of the San Juan economy large enough to justify major economic investment. The largest center other than Greater San Juan
contains slightly fewer than 7,000 inhabitants and has an area of influence which includes no more than 22,000 persons. This city is located 150 kilometers north of the capital. The results of the above discussion concerning size thresholds for self-sustaining growth indicate that a population of 22,000 is too small to be successful.

Planning for northern Cuyo must be organized around the major core city of San Juan. Greater San Juan with a 1970 population of 240,000 is at a good size to continue as the major development center and also serve as the city for large scale investments which might be made in that province. The Consejo Nacional De Desarrollo through its Cuyo office located in Mendoza should designate San Juan a growth center and direct investment there to improve employment opportunity for in-migrants from the many lagging departments in that province. The immediate hinterland of Greater San Juan includes a large majority of the population nodes in that province. The population in that part of Cuyo is heavily concentrated in the major urban core or in smaller towns and cities immediately surrounding the capital city. (Figure 7)

Mendoza

The province of Mendoza is significantly better developed than San Juan in terms of the existence of sub-systems of cities in the space-economy. It is a finding of this study that there are two major urban sub-systems of the Mendoza economy which should be considered as viable alternatives to investment in the capital city. A third system is identified. However, it is considered too small for large scale investment in productive activities. It is recommended as a logical target for small scale manufacturing and increased social overhead capital
FIGURE 7
DEVELOPMENT SUB-SYSTEM: SAN JUAN

Greater San Juan
investments. These types of investments serve to create a larger and more viable system in the area in question. The objective of recommending investment in these sub-systems of cities is to reduce concentration of economic activity on Greater Mendoza and to generate increased economic opportunity in urban systems closer to large lagging regions.

In each of the alternate investment centers or systems of cities suggested for Mendoza Province we are dealing with urban matrices or axes of development which were identified in Chapter Four. The terms urban matrix or axis of development mean that the sub-system identified is composed of two or more interconnected urban nodes and their respective areas of economic dominance. Of the two primary alternate investment targets one is based on two major cities and the other on four. The third, and less populated system, is organized around three centers.

In all cases the urban sub-systems noted are at some distance from the immediate vicinity of the capital city. In the cases of those recommended for large scale investment they appear to satisfy the population size requirements and functional attributes to maintain growth. The third system is probably not large enough in population to warrant large scale economic investments. However, this is a system what could be strengthened with attention given to smaller scale manufacturing activities and increased social overhead investment projects.

All of the recommended investment nodes are existing sub-systems of the space economy for which the extent of their trade areas is determined in Chapter Four. Each of the primary targets for increased
investment is the focal point of its respective sub-system and is highly interconnected within the area of its dominance. Each of the major centers is at least one position below Greater Mendoza in the urban hierarchy. (Chapter Four).

The first of the development axes is centered on the city of San Rafael and consists of an axis between that center and the city of General Alvear. This system is located approximately 225 kilometers southeast of the capital city. (Figure 8). The area under the economic influence of this sub-system has a population of about 170,415 persons. The city of San Rafael is larger than 60,000 inhabitants and the department in which it is located, also known as San Rafael, already possesses significant activity of an agro-industrial nature. This planning space combines the leading region of San Rafael with a lagging region, General Alvear. Importantly, it is nearest to Mendoza's most serious poverty area, Malargue. (Chapter Three).

The major urban centers of San Rafael and General Alvear have increased their populations at the average annual rate of 1.8 percent and 2.4 percent respectively since 1960. Out-migration from this sub-system averaged less than one percent per year between 1960 and 1970. Between 1951 and 1961, this area suffered a loss relative to the province total of 2.9 percent in retail, wholesale, and service business. This sub-system's proportion of the province total of the value added by manufacture also declined from 15.2 percent in 1951 to 11.4 percent in 1964.

In spite of the small loss of importance in economic activity this is a system of considerable economic significance. It is a major sub-system of the Mendoza economy. By assisting growth in this area the
FIGURE 8

DEVELOPMENT SUB-SYSTEMS: MENDOZA
the department of General Alvear should gain important economic activity and employment opportunity. This will simultaneously improve the welfare of the residents. Out-migration from the area should diminish which will reduce population pressure on Greater Mendoza. In-migration into this region is expected and should be encouraged especially from Malargue. There is every possibility of creating a stronger and more rapidly growing economic system in the south of Mendoza province based on the San Rafael, General Alvear development axis. The effects of creating increased growth and employment opportunity in this area will benefit the region as a whole.

The second sub-system for planned investment is organized around the city of San Martin. This axis includes the major populated centers of San Martin, Palmira, and Rivadavia. The small city of Junin completes the more important nodes of this group. This system is located approximately forty kilometers southeast of Greater Mendoza. (Figure 8) It is a region which has shown relatively high rates of population growth since 1960. The average annual rates of population increase for San Martin, Rivadavia, and Palmira were 3.7 percent, 2.3 percent, and 2.0 percent respectively between 1960 and 1970. The average rate of out-migration for the three departments was less than one percent per year between 1960 and 1970. This region has lost relative importance between 1954 and 1964 in the percent of total wholesale, retail, and service business. However, the decline was only 0.4 percent over the entire ten year period. More significant is that this area's percentage of Mendoza's value added by manufacture declined from 11.8 percent in 1954 to 11.6 percent in 1964. This decline indicates increased cen-
tralization on Greater Mendoza and the relative paucity of new investment in the San Martin system. Like San Rafael, this system once had a larger percentage of total economic activity. Given proper development assistance this sub-region should demonstrate considerable growth and improved ability to decentralize the economic activity in Mendoza Province.

The San Martin sub-system combines the two relatively advanced departments of San Martin and Rivadavia with the less developed department of Junin. Junin ranks in the highest category of the lagging areas as classified in Chapter Three. With new investment directed to this sub-system Junin should gain measurably in economic opportunity and its residents should experience improved standards of living. Out-migration from the entire region should diminish and in-migration is expected from the lagging departments of Santa Rosa and La Paz located to the east of this system. The added development in this area will reduce the concentration of economic activity and population in Greater Mendoza. The increased opportunity for employment around San Martin will improve conditions for migrants from Santa Rosa and La Paz and will encourage them to leave lagging regions for alternate employment without adding to congestion in the capital city.

A third area recommended for planned investment is located about seventy-five kilometers southwest of Greater Mendoza. (Figure 8) Due to the population and current level of economic activity in this sub-system it is of secondary importance. However, with attention given to small scale manufacturing and increased social overhead capital investments it could develop into a major alternative for larger scale activity. This area is organized around the major city of Tunuyan with the
smaller cities of Tupungato and La Consulta forming the remainder of the urban matrix.

Although the population of the organized space of this sub-area is only 58,750 persons, it is a region that has experienced considerable population growth since 1960. The three major cities of this region, Tunuyan, Tupungato, and La Consulta have increased their populations at the average annual rates of 2.7 percent, 2.4 percent, and 1.2 percent respectively since 1960. Future investment in small scale activities and social overhead projects will give this region a strong possibility of economic growth of important magnitude.

The level of economic activity as measured by the percent of retail, wholesale, and service business in this region compared to the province total was unchanged at 2.3 percent between 1954 and 1964. However, the relative importance of value added by manufacture fell from 6.0 percent to 1.4 percent during the same ten year period. This indicates once again that departments capable of considerably higher levels of manufacturing activity are losing ground to the centralization process resulting from unplanned growth. Out-migration for the departments of San Carlos (La Consulta) and Tunuyan averaged less than one percent per year between 1960 and 1970. However, during that same time period Tupungato experienced an annual rate of in-migration of 0.5 percent.

Smaller scale investment and social overhead projects in this sub system will reduce out-migration. Tupungato, which experienced out-migration between 1947 and 1960 is a good example of the effect of new economic opportunity on population flows. An investment in social overhead capital which expanded and improved the irrigation system in
Tupungato reversed the population flow and the area is presently experiencing slight in-migration.

The Tunuyan sub-system incorporates three departments which are all classified in Chapter Three among the highest level of lagging areas. Increased investment in this area would measurably benefit living standards for the residents. The sub-region represents a large area of decreasing economic activity which could be converted into a dynamic system of the regional economy capable of considerably increased growth.

**Spatial Influence of the Strategy**

Including the immediate hinterland of Greater Mendoza, the addition of the three recommended sub-systems and their respective trade areas incorporates 95.2 percent of the population of the province in the strategy to decentralize economic activity and generate economic growth in centers more closely associated with lagging regions. This plan also provides three alternative targets to migrants from lagging regions. Given the goal of increased regional welfare this approach promises to take development to viable centers nearer to lagging regions. Residents of the depressed areas are expected and encouraged to migrate into the areas of new employment opportunity. The result will be an improved standard of living for those persons who choose to leave the depressed regions. An important question remains. What recommendations are made to improve conditions for those persons that remain in the lagging regions?
A Strategy for Lagging Regions

The major problems in the very poor regions are the lack of investment opportunity and the concomitant low level of human resources. The best possible short run solution is to reduce the population in the lagging regions by resettling many of these people in the urban areas planned for increased investment and employment opportunity. Given the appearance of new economic opportunity in urban systems closer to the problem regions a number of people should be encouraged and are expected to migrate from the poorer regions. Evidence collected for lagging regions in the United States supports the contention that persons residing in depressed areas will readily move to alternate areas of improved economic opportunity or increased wages.\textsuperscript{11}

Appraising this problem from within the lagging region indicates that one of the major factors impeding economic growth in these areas is the relative deficiency of human resources. Disadvantages in terms of education, health, and poorly trained laborers are only part of the total problem. A major scarcity in these regions is local political and business leadership to push development programs and to recognize economic opportunities when they do arise.\textsuperscript{15} Whether the inhabitants migrate or choose to remain in lagging regions, education must play a very important role in the strategy to aid depressed areas. Education prepares those that choose to migrate for more remunerative employment in their destination areas. A better education also provides the person that remains in the lagging region with an improved capability to deal with the problems in poor areas and to recognize local economic opportunity.
In the lagging regions of Cuyo education beyond the eighth grade is the exception. There is a paucity of high schools in smaller centers. In many cases where schools are close to students attendance is poor and the government offers few incentives, such as the provision of transportation, to improve enrollment levels. In this respect a dual problem exists. There is a definite need for improved educational opportunity at the secondary level and a necessity to motivate school age population to attend.

As an example, the Province of San Juan has ten of nineteen departments without a secondary school. For many students to reach a secondary school requires a journey of more than sixty kilometers one way. Conversely, one department with a population of near 13,000 inhabitants has one secondary school. This school has two teachers and only thirty regular students. Mendoza has at least one high school in each department. However, these are usually located in the larger urban centers and are not accessible to rural residents. As a general rule few rural children attend educational institutions beyond grade eight. One rural grade instructor, interviewed by the author, estimated that only one in ten of her students went on to attend at least some portion of secondary school. In this instance attending a secondary school would require a daily round-trip journey of forty kilometers.

A major goal of the Consejo Nacional De Desarrollo in Cuyo should be to improve educational opportunity by placing schools in smaller and more isolated towns and cities. Where the location of a school is improbable, due to sparse population, provisions should be made to guar-
antee students accessibility to an existing educational facility. A program should also be adopted to encourage attendance beyond grade eight. The improved job opportunity resulting from better education should be emphasized to younger students to encourage their continued enrollment through the secondary grades.

The strategy of increasing educational opportunity proposed for the lagging regions is directed at two major problems. First, to prepare the persons that choose to migrate from the poor areas for full employment in their chosen areas of new residence. Second, to improve the levels of education for those that remain in the less developed areas. In the long run the lagging regions can increase their demand for investment projects by generating political power and business leadership. This cannot occur unless Argentine regional planning is made more amenable to the needs and problems of the lagging regions.

**Summary**

This chapter incorporates information concerning the locations and areal extent of leading and lagging regions and spatial organization to propose a spatial strategy of development for Cuyo. It is determined that there are viable alternative investment centers to Greater Mendoza in Cuyo. These centers are identified as a result of the analyses made in Chapters Three and Four. The situations of these centers with respect to their locations in leading or lagging regions are known as are their positions in the urban hierarchy and their spatial interrelations within the regional economy.

In San Juan Province the capital city is recommended as a center
for increased economic investment. It is a center of intermediate size and is highly interconnected throughout the major populated areas of that province. San Juan Province, in agreement with Berry's observation, is an area which lacks cities occupying positions between the metropolis and the village level. There are no centers of adequate size for increased investment in that province other than the capital city.

Mendoza Province has more cities of the necessary size and with an adequate functional base to serve as alternate investment centers. In Mendoza, three urban systems are suggested for increased investment. Each of these includes more than one interconnected center and each forms a development axis. The alternate systems identified are San Rafael-General Alvear, San Martin, and Tunuyan. San Rafael-General Alvear and San Martin are of adequate size to receive major scale investments and sustain economic growth. Tunuyan is a system that can become of major importance with wise use of social overhead capital and smaller scale manufacturing investments.

The incorporation of these urban systems into the Argentine planning strategy for Cuyo will greatly improve the effectiveness of their plan. It will allow for decentralization of economic activity and the creation of employment opportunity and higher standards of living in specific areas throughout the regional system. Although the location of new investment is subjugated to welfare criteria rather than to marginal economic analysis the selection of only viable cities of adequate population and functional attributes as growth centers should reduce
the possibility of non-economic investment.

The regional plan proposed by the Argentine Government fails to deal specifically with the lagging regions. The strategy developed in Chapter Five attempts to reduce the problems of poverty found in lagging regions in two ways. First, to reduce the population now residing in those areas by encouraging out-migration to the planned investment systems, and second, to improve the level of human resources in lagging areas by increasing educational opportunity in those areas.

The Argentine Government is committed to reducing regional inequalities in growth rates between regions in the national space and also to improving regional welfare. This study represents a major improvement to present government planning for the Cuyo region. By adopting the strategy presented in Chapter Five the Argentine Government can greatly influence levels of welfare in Cuyo and also reduce the extreme degree of economic concentration presently focused on Greater Mendoza.
FOOTNOTES


2. Ibid., p. 31.


4. Ibid., p. 289.


13. Ibid., p. 8.


15. Ibid., p. 71.
CHAPTER 6

SUMMARY-CONCLUSIONS

Summary

This study represents a relatively new direction in geographic literature. Attempts by geographers to appraise the effectiveness of planning strategies as they concern the spatial distribution of phenomena are not plentiful. Exceptions are the recent work of Gauthier and Wolpert. Yet geographers have the training to offer important guidance to the solution of spatial distribution and location problems. Planning to increase economic development by influencing the spatial distribution of economic activity and welfare in lagging areas of national systems is an area of research where geographers should direct more attention. The present study is concerned with the spatial inequality of economic activity in western Argentina and an evaluation of Argentine regional planning as it affects that part of the nation.

The Argentine Government became involved in regional development planning in 1967. Their goal was to lessen the degree of concentration of economic activity around Greater Buenos Aires and to progressively reduce the differential in intra-regional growth rates in that country. An important part of their objective was to increase levels of welfare in lagging regions. The strategy which they adopted involves directing investments to selected cities in various regions of Argentina which are situated away from the Buenos Aires area. The cities selected for in-
vestment are designated "National Development Poles" and are hypothe-sized to spread economic growth throughout their respective zones of influence. The strategy is probably adequate to reduce concentration at the national level if strictly adhered to. However, as formulated, the Argentine policy serves only to compound extreme degrees of economic concentration at the regional level.

The cities designated "National Development Poles" are the larger and more economically advanced centers in the various development regions. The selection of these types of cities indicates that the Argentine Government fails to appreciate that the effects of extreme concentration at the regional level incorporate the same problems, such as inequalities in welfare and lack of employment opportunity, as concentration at the national level. In Cuyo, one of Argentina's eight development regions, the government has proposed Greater Mendoza as the "Development Pole." The degree of concentration already existing in the Cuyo region which is focused primarily on Greater Mendoza makes that city an unwise choice.

This study was made to determine if there exist viable alternative cities or systems of cities in Cuyo that could be designated growth centers. These alternative urban systems need to be situated in the region so as to provide a spatial alternative to investment in the capital city and yet be large enough to sustain economic growth. The primary function of directing investment to centers other than Greater Mendoza is to reduce the degree of economic concentration around that city and stimulate economic opportunity in urban areas more proximate to depressed regions. The major goal of the location of new investment is improved
regional welfare without completely ignoring the marginal economics of location decisions.

The first part of this analysis involved a taxonomy of the Cuyo region to determine the location and areal extent of leading and lagging regions. It was found that only twelve of the thirty-seven departments (counties) which comprise Cuyo could be classified as economically advanced. A careful analysis of the spatial patterns formed by the more advanced departments revealed that they are moderately concentrated around the province capitals. Of the eleven departments classified as probable growth areas, eight are in Mendoza Province and three are in San Juan. Seven of the eight found in Mendoza are either contiguous to or near the capital city. In San Juan all potential growth areas are either part of or contiguous to the capital city. Twenty-five of the thirty-seven departments in Cuyo were classified as less developed.

A second part of this study involved an identification of probable urban centers or urban systems to serve as areas of investment to reduce concentration and create economic activity nearer to lagging regions. An analysis was made of the spatial organization of Cuyo to determine the positions of the various towns and cities in the urban hierarchy, their relationships with other centers, their trade areas, and their economic interconnections with rural areas. From these data it was possible to identify probable investment centers consisting of urban places and their respective hinterlands of economic influence. These results were combined with the classification made in Chapter Three to indicate alternate investment centers or development axes and to iden-
tify the spatial relations between these probable growth centers and the lagging regions.

In Cuyo seven of the forty-seven towns and cities are classified among the economically viable. One of these is the capital city of San Juan Province. Of the six remaining centers three are either part of or contiguous to Greater Mendoza. This leaves San Rafael, San Martin, and Rivadavia as viable higher ordered centers spatially separated from the core city of Mendoza. At the same level in the hierarchy but located in what are classified as the highest level of lagging regions are the cities of General Alvear and Tunuyan.

The urban centers of San Rafael, San Martin, and Rivadavia were found to have the functional attributes, the already growing economies, and the locations away from major cores to merit increased investment. General Alvear and Tunuyan, because of their relatively high positions in the urban hierarchy, were determined to be worthy of attention.

Further analysis into the interrelations between these centers indicated that among these cities three major urban sub-systems could be discriminated. It was determined that there exist high degrees of interconnection between San Rafael and General Alvear, and San Martin and Rivadavia. Tunuyan was not found to be interrelated with any of the other centers identified as probable growth centers but it too was found to be the core of a relatively important urban system. The trade areas of these centers were determined to illustrate the spatial relationship between them and lagging areas.

The urban systems of San Rafael-General Alvear, San Martin, Tunu-
Illian, and Greater San Juan were recommended as viable alternative investment centers to improve economic opportunity nearer to lagging regions and to reduce the extreme degrees of concentration on Greater Mendoza. The lagging regions are aided in two ways. The short run plan involves reducing the population in these areas by encouraging out-migration to the nearest growth center. The long run solution involves increased educational opportunity for lagging areas to prepare those persons that choose to remain there for the business ability and political awareness necessary to perceive new economic opportunity when it arises and to influence the eventual development in those areas.

**Conclusions**

Regional development planning requires knowledge of the location and areal extent of problem areas and knowledge of the economic organization of space. Only if these data are available can an effective, policy oriented, spatial strategy of regional development be formulated. The regional plan suggested by the Argentine Government is not well devised with respect to existing conditions at the regional level. At the national scale the strategy employed by the government should serve to reduce differentials in growth rates between regions of the country. However, their policy will only serve to increase concentration within the various regions.

This study concludes that there are viable alternative investment centers in the Cuyo region which should merit major attention by the Argentine Government. Increased investment in these centers will serve to reduce the extreme degree of economic concentration and also to create
growth and employment opportunity nearer to lagging regions. Investment in these centers, although guided primarily by welfare goals rather than marginal economic analysis, should not prove uneconomic. The cities selected as probable growth centers are in the intermediate population size range and appear to satisfy the size requirements and contain the necessary functions to sustain economic growth.

Argentina's regional strategy is based on the assumption that economic growth and therefore higher standards of living will diffuse from major centers into the surrounding hinterlands. Empirical evidence presented in this study leads to the conclusion that in the Cuyo region economic activity is not diffusing outward from the major centers nor downward through urban hierarchies. This suggests that assisting the mobility of economic investment and social overhead capital projects through space is necessary. The objective is to create economic opportunity, increased employment, and higher standards of living in urban centers away from the major core cities and reduce the hyperfocalization of the regional economy on one major center.

This study has presented no data to support the belief that investments made in the recommended urban areas of Cuyo will spread economic opportunity and higher standards of living throughout their nonurban areas of influence. Rather, one should expect a process of polarization to occur around the planned investment centers. However, instead of economic concentration around one major core it would exist at spatially separated foci and with the effect of increasing spatial interaction and articulation within the system. Higher degrees of spatial
interaction will set in motion the economic forces of supply and demand for new materials which will stimulate economic opportunity in other areas of the region hopefully leading to the further possibilities of new growth in other areas.

Policy oriented planning is necessary to lessen existing degrees of economic concentration. It is concluded that new investment be concentrated in viable sub-foci of the regional system which then serve as important centers for further growth and lead to a more complete articulation of the regional economic system. Investments are not recommended for badly lagging regions because they seldom result in continued growth. However, educational improvements can be made in such areas and are suggested. Only after the major centers are interacting economically will the rural areas begin to be affected by the higher levels of economic activity generated throughout the system. With the proper educational programs these rural areas will then have the human resource capability to perceive the new economic opportunity resulting from increased regional demand and gain economically by meeting that demand.

The spatial development strategy proposed for Cuyo will allow for the appearance of a better interconnected system which is less concentrated on Greater Mendoza. In terms of planning investment decisions to avoid the two major problems of regional inequalities in welfare and over-congestion this strategy is more realistic than that presently followed by the Argentine Government. It is a more reasonable alternative than recommending that investment be concentrated in the Greater
Mendoza Metropolitan Area and waiting for some eventual "trickle down" effect to carry economic activity and higher standards of living to the remaining parts of the regional system.
FOOTNOTES

### APPENDIX A

**INVENTARIO DE FUNCIONES**

<table>
<thead>
<tr>
<th>Provincia y Departamento</th>
<th>1. Ramos Generales</th>
<th>38. Artículos de Segundo Uso</th>
</tr>
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<tbody>
<tr>
<td>Ciudad</td>
<td>2. Quioscos y Golosinas</td>
<td>39. Máquinas Industriales</td>
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<td></td>
<td>3. Almacen y Despensa</td>
<td>40. Armería y Cuchillerías</td>
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<td>4. Bebidas Envasadas</td>
<td>41. Cerrajería</td>
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<td>44. Equipos para Deportes</td>
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<td></td>
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<td>45. Corralones</td>
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<tr>
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<td>9. Frutería y Verdulería</td>
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<td>47. Casa de Comida</td>
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<tr>
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<td>11. Lechería</td>
<td>48. Confitería, Bares, y Pizzería</td>
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<td>49. Heladería y Lacteo</td>
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<td>13. Vestidos: Bebes y Ninos</td>
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<td>55. Cabaret y Boite</td>
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<td>20. Muebles</td>
<td>57. Almacenaje</td>
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<td></td>
<td>21. Librería</td>
<td>58. Garajes y Estacionamiento</td>
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<td>22. Artículos para Oficina</td>
<td>59. Tintorería</td>
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<td>23. Farmacia</td>
<td>60. Lavadero</td>
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<td>64. Arrendamiento de Máquinas</td>
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|                          | 36. Veterinario     | 73. Reparaciones: Muebles, etc.
|                          | 37. Implementos de Granja| 74. Estudios Fotográficos   |
APPENDIX A---Continued

75. Medico
76. Dentista
77. Abogado
78. Agente de Seguros
79. Imprenta
80. Casa Editora
81. Oficina de Telegrafo
82. Bolsa de Cambios
83. Casa de Cambio
84. Banco
85. Iglesia
86. Casa de Correos
87. Billar
88. Bolos
89. Bienes Raices
90. Pomeria
91. Drive-In Restaurant
92. Oculista
93. Tramatologo
94. Venta y Reparacion: Radio
95. Estacion de Omnibus
96. Taxi
97. Empresa de Mudanzas
98. Venta de Discos
99. Repuestos Electricos
100. Empresa de Construccion
101. Gobierno Municipal
102. Estacion de Radio
103. Estacion de Television
104. Repuestos de Impl. de Agro
105. Oficina Regional
106. Gobierno Provincial
APPENDIX B

THE URBAN HIERARCHY IN CUYO

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<td>Goudge</td>
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<td>25 De Mayo</td>
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APPENDIX C

ENCUESTA SOBRE VIVIENDAS

I. Parte Primera: Información General
1. Provincia y Departamento
2. Ciudad o Localidad
3. Dirección de la Persona Encuestada
4. Fecha

II. Parte Segunda: Ciudad, Frecuencia, y modo de Transporte para obtener los Bienes y Servicios Siguientes.

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<th>Ciudad</th>
<th>Frecuencia</th>
<th>Modo De Transporte</th>
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<td>1. Comestibles</td>
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<td>2. Vestidos</td>
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<tr>
<td>3. Muebles</td>
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<tr>
<td>4. Nafta</td>
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<td>5. Aparatos de Uso Dom.</td>
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</tr>
<tr>
<td>6. Banco</td>
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</tr>
<tr>
<td>7. Tintorería</td>
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<tr>
<td>8. Peluquería</td>
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<tr>
<td>9. A. Damas</td>
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<td></td>
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<tr>
<td>10. Hombres</td>
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<tr>
<td>11. Medico</td>
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</tr>
<tr>
<td>12. Dentista</td>
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<td>13. Abogado</td>
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<td>14. Hospital</td>
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III. Parte Tercera: Servicios Publicos. De que Ciudad obtiene los Servicios siguientes:

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<td>2. Correos</td>
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<td>3. Electricidad</td>
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<td>4. Gas: para uso domestico</td>
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<tr>
<td>5. Estacion de Radio</td>
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<td>6. Canal de Television</td>
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<td>7. Educacion</td>
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<td>A. Primario</td>
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<td>B. Secundario</td>
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IV. Parte Cuarta: Diversion. A que Ciudad o Ciudades prefiere para las diversiones siguientes:

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<td>2. Boites</td>
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<td>3. Restaurantes</td>
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<td>4. Cine</td>
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APPENDIX D

ENCUESTA SOBRE NEGOCIOS

I. Parte Primera: Informacion General

1. Ciudad o Localidad ________________________________
2. Provincia y Departamento __________________________
3. Dirección del Negocio Encuadrada ____________________
4. Fecha ____________________________
5. Negocio Encuadrada ________________________________

II. Parte Segunda:

1. Por favor estime en el siguiente diagrama la zona en la cual están ubicados sus clientes. Importa especialmente determinar hasta donde se extiende su influencia en la zona rural.
APPENDIX D—Continued

TRADE AREA DELIMITATION CHART

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<td>BUSINESS SURVEYED:</td>
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Diagram of trade area delimitation chart with coordinates.
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