

COOPERATIVE AGREEMENT ON HUMAN SETTLEMENTS
AND NATURAL RESOURCE SYSTEMS ANALYSIS

A CRITICAL ANALYSIS OF FUNCTIONAL INTEGRATION
AS A PLANNING CONSTRUCT

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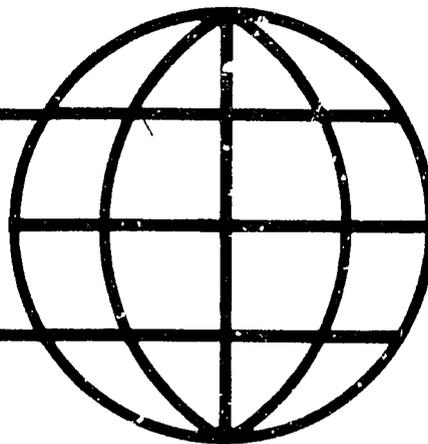
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PREFACE

There are many ways of interpreting any single event. In this paper an attempt is made to interpret and assess an approach to regional spatial planning (the functional integration approach) that has been applied in India, Kenya, Brazil, and Ghana and by the U.S. Agency for International Development in Cameroon, Upper Volta, Guatemala, Bolivia, and the Philippines. The interpretation here is based on a uniquely geographical perspective. In the process of developing this paper and sharing its basic argument that central place theory is at the heart of the functional integration approach, many have reacted to this interpretation. Geographers have for the most part agreed with it, while others, some of whom were key figures in the development and application of the approach, have categorically stated that the approach has little to do with central place theory. Some have even said that a conscious effort was made not to base the approach on central place theory.

The authors respectfully recognize that there is considerable difference of opinion on what perspective best accounts for and makes sense of the concepts, methods, and applications of the functional integration approach. It is for the reader to ultimately decide whether the arguments made in this paper are or are not the best way of understanding the material presented.

ACKNOWLEDGEMENTS

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In addition to these individuals, we would like to acknowledge Eric Chetwynd of USAID and Dennis Rondinelli of Syracuse University. Though neither of them agree entirely with the conclusions of this paper, both were gracious enough to discuss their differences at great length. Their knowledge of the functional integration approach is great and though our conclusions differ, we learned a great deal from them. We appreciate the support and enthusiasm that they have brought to this assessment.

CHAPTER ONE

Introduction

The problem of uneven distribution of growth and development among regions of a country has plagued politicians, planners, and development theorists around the world for many years. The issue of regional inequality has become particularly urgent in the Third World, where the disparities in the levels of development and the quality of life between predominantly rural regions and urban areas have been increasing at an alarming rate. Stagnation of the economies of these rural areas has been the source of great poverty and misery.

In an effort to respond to the need to develop rural regions, the World Bank, the U.S. Agency for International Development (USAID), and the United Nations began, in the 1970s, to concentrate their activities on investments that directly benefit the poor in rural areas. In order to use these investments to maximum advantage, they sought innovative approaches to planning. Integrated rural development (IRD) was one of these innovative approaches. However, perceiving flaws in the integrated rural development approach, as evidenced in several completed projects, an alternative approach, the functional integration approach, was promulgated (Bendavid Val 1983 and Rondinelli 1984).

While the integrated rural development approach focuses almost exclusively on agricultural development, the functional integration approach reaches beyond concerns for the development of the natural resource base to include the settlement system and activities located in settlements. The IRD approach

tends to discount the role of settlements in the rural development process, whereas the functional integration approach takes it as its point of departure.

The functional integration approach considers the problem of regional development from the perspective of the interrelationships between urban and rural places. It adopts the view that settlements are the places where a set of functions critical to agricultural development are located (e.g., marketing, credit, technical inputs), and the settlement system is the most effective vehicle for delivering those functions to a dispersed rural population. In other words, the settlement system is the skeleton around which the space economy is organized.

This approach derives from a large body of literature which has a distinctive spatial perspective, and has been developed by geographers and regional scientists who have a longstanding concern about how an economy is organized in space. According to the literature, by acting as the conduits through which trade takes place, urban networks organize and integrate the regional economy by serving as the location of central functions for the regions surrounding them, and providing commercial, retail, and social service functions, as well as acting as points of innovation).

To those trained in these disciplines, the integrated rural development approach lacks theoretical depth because it ignores the spatial structure of a region and the critical role which urban centers play in the development process. As the name implies, IRD involves the formulation of an "integrated" multi-sectoral investment package designed to increase the productivity and incomes of small, independent landholders. Usually, investment packages are planned around and enhance a large-scale resource management project, such as irrigation, flood control, or rangeland management (Saha and Barrow 1981;

Carroll 1982). The theory underlying this indicates that development of the agricultural base of a rural region, through coordinated investment, is the most effective way to achieve regional development.¹

The functional integration approach draws on many of the concepts and methods of central place theory, particularly those set forth by Walter Christaller (1933). Although Christaller deduced his model to explain the number, size, and distribution of central places in Southern Germany, theorists since (Losch 1954) have rationalized this model as describing a spatially optimal arrangement of functions among central places.

Christaller's model has two dimensions. The logic of the model explains the existence, ordering, and distribution of central places. This logic states that the location of any central place activity is determined by demand, and where sufficient, supports the activity. Market forces ensure that the combined locations of central activities efficiently meet the demands of a dispersed rural population. The other dimension of the Christaller model is the form or geometry evolved from the logic. It is derived under a given set of assumptions and reflects the free market forces which he believed determined central place distributions in Southern Germany.

Over fifty years have passed since Walter Christaller published his seminal work on central place theory. When Christaller's model of central place organization is taught in universities, what tends to remain in students' memories is the form of the model; the geometric pattern of nested hexagonal market areas for central place goods and the neat regularities of a hierarchically structured city system. What tends to escape from memory, however, is

¹ For a detailed description and analysis of the integrated rural development approach from the perspective of the development practitioner, see Hondale, et al. 1980. For a Marxist perspective, see De Janvry (1981).

the logic underpinning the model and informing the pattern and structure of the central place system.

In similar fashion, development planners, in the process of adopting Christaller's model as the conceptual framework for a planning approach also have disassociated the logic behind Christaller's model from its form. The implications of this oversight for the utility and appropriateness of the functional integration approach are profound because the relevance of the form of Christaller's model to the Third World is, in the authors' view, limited. The central place geometry depicted by Christaller is only valid where the following conditions hold: purchasing power is evenly distributed in space; forces of pure competition operate and generate a spatially optimal structure of settlement organization; and the role of settlements is to serve the needs of rural regions. Because these conditions are not generally found in the Third World, it is argued here that adopting only the form of Christaller's model is a mistake. The misapplication of the form of Christaller's model to development planning instead of and divorced from its logic is the subject of this paper.

The functional integration approach has been applied to planning in a number of regions worldwide. The most notable of these development efforts have been made in India (Roy and Patil 1977; Misra and Sundaram 1978; Shah 1974), Brazil (Enders 1980; Babavoric 1978), Kenya (Obhudo and Taylor 1979), Ghana (Grove and Huzar 1964), and by USAID (Rondinelli and Evans 1983; Chetwynd 1980).

This discussion critically examines the functional integration approach, finding it a somewhat misguided, if well intentioned, effort at resolving the

issue of regional inequality in the Third World. This critical assessment intends to accomplish three goals: to urge careful attention to the theoretical flaws underpinning the approach; highlight the fact that functional integration as a planning approach is essentially a descriptive approach that has been used prescriptively in the developmental context; and provoke attention to an important question functional integration leaves unanswered: What is the most effective way to provide functions critical to development so that dispersed populations can avail themselves of these functions? This question remains as urgent today as in the early seventies when it was first asked by development planners.

CHAPTER TWO

The Evolution of the Functional Integration Approach

The functional integration approach is based on the idea that a well-integrated and well-articulated settlement hierarchy is conducive to (if not a precondition for) development and that it represents an appropriate normative planning goal. A well-articulated hierarchy is one that has a large number of settlements at several hierarchical levels, each serving regions of respectively larger sizes and with a range of central functions. A well-integrated hierarchy is one in which settlements are well linked physically through a transport network as well as linked economically and socially through regular exchange (trade) and interaction.

The development of this idea has a long history. The concept can be traced from the first formulations of central place theory made by Walter Christaller (1933); to critical reformulations by geographers (Berry 1967, Berry and Garrison 1958, Berry and Pred 1961); to the first formulation of the concept in a development context made by John Friedmann (1966); to the work of E.A.J. Johnson (1970), an economic historian who first advanced the concept of functional integration; to the work of a number of planners around the world who have tried to operationalize the concept (Kuklinski 1978; Hansen 1972; Renaud 1981; Mathur 1982; Rondinelli (1980).

Christaller's Model: The Form and the Logic²

Christaller intended that his seminal work accomplish two goals. One was to argue that settlements emerge to perform "central functions" for a dispersed rural population -- that the existence of settlements can be explained by their role as central places. In Christaller's own words: "The chief profession -- or characteristic -- of a town is to be the center of a region" (1966: 3). Christaller's goal was to deduce a model to explain the geography of settlements -- the "facts of sizes, numbers, and distribution of towns" (p. 4). Christaller theorized that the "ordering principle heretofore unrecognized that governs the (settlements') distribution" (p. 2) is centrality. The centrality or the "surplus importance" of a central place is determined by the number and the ubiquity of the central functions it performs. The more functions and the less ubiquitous the functions, the greater its centrality.

Christaller's central place model comprises two dimensions: a logic explaining the existence and ordering of settlement systems, and a form (pattern and structure) of settlement system organization. Based on his logic, Christaller deduced the form so that it could be compared to the settlement structure found in Southern Germany, and hence the correctness of his logic could be empirically verified. In this discussion, the form and the logic of Christaller's model are emphasized as distinct and separate concepts because the two have unfortunately become divorced from one another in the functional integration approach to regional development.

² The form and the logic discussed in this paper are only one of three such pairs Christaller considered to determine the creation, growth, location, and functional structure of central places. The other two pairs are the form and the logic associated with what he called the administrative and transport principles. In this discussion attention is given only to Christaller's market principle as it is this form which underlies the functional integration approach.

Central place theory lies at the heart of the methodologies that have been developed to implement the concept of functional integration. More specifically, it is the central place model developed by Christaller that forms the base upon which the functional integration approach is constructed.

The Demand-Driven Logic. We argue that the logic of Christaller's model is based on the hypothesis that central places exist to meet the service needs of a dispersed rural population in the most spatially optimal arrangement possible -- optimality here defined as minimum distance cost for consumers and appropriate demand levels for suppliers agglomerating in central places. Driving this logic are two factors which determine where and when a function will be provided. Christaller identifies one of these determining factors as demand. The other, which he does not explicitly identify, is the operation of free market forces.³

According to Christaller, "for the creation, development, and decline of towns to occur, demand must exist for the things which the town can offer" (p. 3). Christaller specifies the factors which determine the level and composition of demand itself. These are: (1) the social and cultural characteristics of the population; (2) the purchasing power of the population, which is, in turn, determined by the levels of income of the population and the number of people willing and able to travel to a function (its accessibility); (3) the supply of the function; and (4) the price of the function, which is, in turn, determined by its supply and the demand for it.

The fact that demand must exist for a central place activity if the activity itself is to exist, however, does not explain how meeting demand leads to an optimal spatial arrangement of central functions. The force that converts

³ Christaller used the expression "the market principle" to denote the operation of free market forces.

the satisfaction of demand into the efficient spatial structure implied by Christaller is the "invisible hand" of the free market. In order for the model to achieve its predicted outcome, it was necessary for Christaller to assume that free market forces operate. Haggett (1972: 288) has noted that in order for the model to work, Christaller had to assume that central place goods will be purchased from the nearest central place, that consumer movement will be minimized, and that all parts of the plain will be served by a central place. The "rational economic" behavior that is associated with the free market is assumed here for both consumers and suppliers. Consumers are expected to seek the nearest center to purchase a good or service, and suppliers are expected to locate so that the distance consumers must travel will be minimized. To insure that independent actions of consumers and suppliers, will, over time, lead to Christaller's market form, perfect competition also must be assumed, because there must be equal entry of firms onto the economic landscape.

The Form. Christaller applied this demand-driven logic to deduce a geometrical pattern of settlements. In applying this logic, Christaller made the following important simplifying assumptions: (1) an isotropic plain; (2) evenly distributed purchasing power; (3) free competition; and (4) economically "rational" behavior on the part of the suppliers of central functions and the consumers of central functions. According to Plattner:

Christaller's model is predicated on the existence of a featureless landscape It is further assumed that all the population's commercial activities are economically motivated . . . that traders are freely competitive, so that markets can arise anywhere in the landscape in response to purely economic factors. The effect of these assumptions is that a constant demand for goods and services is evenly distributed across the featureless landscape. The assumptions also insure that every member of the population will shop at the nearest market; as a result the markets that do arise in response to demand will be evenly spaced (1975: 66).

The specific form of Christaller's model has two components. One is the idealized spatial pattern and the other is the idealized hierarchical structure implicit in that pattern (see Figure 1). By the idealized hierarchical structure we mean the existence of discrete levels of centers by functional characteristics implied by the spatial form of the marketing principle. A discrete hierarchy is one in which all centers in a level perform approximately equivalent sets of functions (ordered by rank as in Figure 2).

As Berry and Garrison have explained:

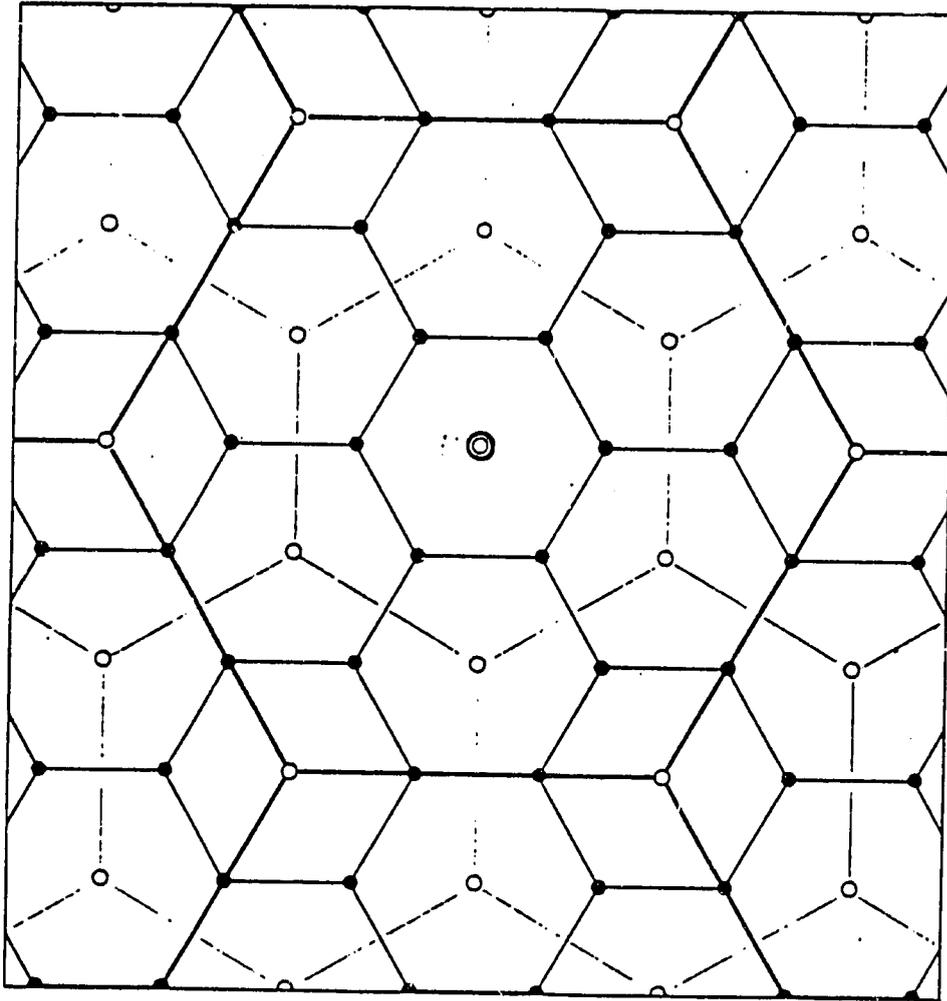
The hierarchical class-system implication is an integral part of the spatial model of central places developed by Walter Christaller The model states that central places belong to one or another of class subsets Note that . . . classes are arranged one to another in a hierarchy such that central places of functionally more complex classes possess all the groups of functions of less complex classes plus a group of functions differentiating them from the central places of less complex classes (Berry and Garrison 1958: 146-7).

Christaller's idealized hierarchy, then, "consists of several fixed tiers in which all places in a particular tier have the same size and function, and all higher order places contain all functions of the smaller central places" (Haggett 1972: 292-3).

Christaller believed that the idealized settlement geometry that he deduced obtained universally in some close estimation of this ideal form,⁴ and that his geometry was an optimal spatial arrangement of central functions in towns. It is important to point out, however, that both the universality of Christaller's model and its optimality only hold if Christaller's assumptions prevail. If not met, then distortions from the ideal form can be expected to be so great that the settlement structure cannot be adequately explained by the

⁴ It is important to distinguish between the idealized form posited by theory and that expected in reality. At one extreme the form is idealized as a regular pattern of towns with embedded, hexagonal hinterlands, conforming exactly to the theorized pattern and hierarchical structure.

Figure 1
Idealized Spatial Form of Christaller's Model



ELABORATED MARKET HIERARCHY is of the same kind outlined on the preceding page. Each *B* center (black circle inside small black hexagon), the lowest category, lies inside a triangle (not shown) connecting three centers of a higher category. The trade area of each *A* center (colored circle inside larger colored hexagon), the first higher category, encloses a *B* center and its hinterland and also one-third of the hinterland of each of the *B* centers tangent to the first. Each center in the next higher category (black and colored circles inside the largest black hexagon) encloses an *A* center and its hinterland and also one-third of the hinterland of each *A* center tangent to the first. No higher categories are shown in the diagram. The upward progression, however, can be continued indefinitely.

Source: Plattner, 1975.

Figure 2

STEPS OF THE URBAN HIERARCHY

Order of function	Level of center						
	Hamlet	Village	Town	Small city	Regional city	Regional Metropolis	National Metropolis
Lowest	*	*	*	*	*	*	*
2		*	*	*	*	*	*
3			*	*	*	*	*
4				*	*	*	*
5					*	*	*
6						*	*
7							*

-12-

Source: Brian J. L. Berry, Geography of Market Centers and Retail Distribution (Englewood Cliffs: Prentice Hall, 1967), p. 16.

model. For instance, where free market forces do not operate there is no guarantee that functions will naturally locate in an optimal arrangement for meeting demand. Similarly, where purchasing power is not evenly distributed, serious distortions in Christaller's predicted pattern can be expected.

Friedmann and the Concept of Spatial Integration

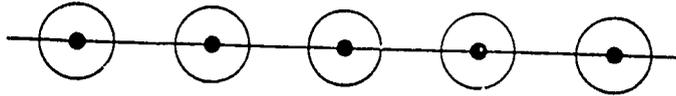
John Friedmann was among the first to imply that the urban hierarchy described by Christaller could be used as a normative goal for regional planning. In Friedmann's book on regional development in Venezuela (1966), he described what amounts to a staged-growth development model in which settlement systems go through a natural evolution towards an integrated and articulated hierarchy as part of the process of healthy development (see Figure 3). By describing a Christallerian-type central place hierarchy as the most mature and advanced settlement structure yet achieved and the one most conducive to development, Friedmann established it, if unintentionally, as an appropriate planning goal. According to de Souza and Porter:

Friedmann's . . . model of spatial organization applies Christaller-Losch principles of central place [theory] as a planning tool for underdeveloped countries. Friedmann devised a descriptive four-stage model of spatial evolution [which] . . . draws on the 19th century North American experience to impose stages onto the continuum of economic growth which underdeveloped countries are supposed to experience as they develop (1974: 62-63).

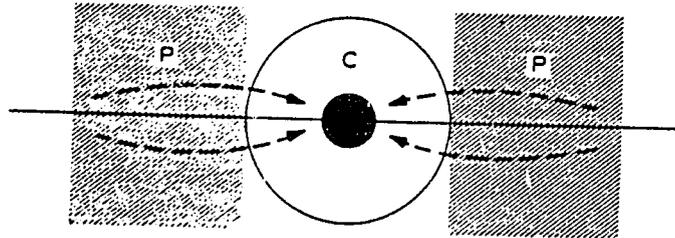
Friedmann believed that "a functionally interdependent system of cities" was conducive to development because it promotes "national integration, efficiency in location of individual firms, maximum potential for further growth, and minimum essential interregional imbalances" (1966: 37). Through the

Figure 3
Friedmann's Model of Sequenced Spatial Organization

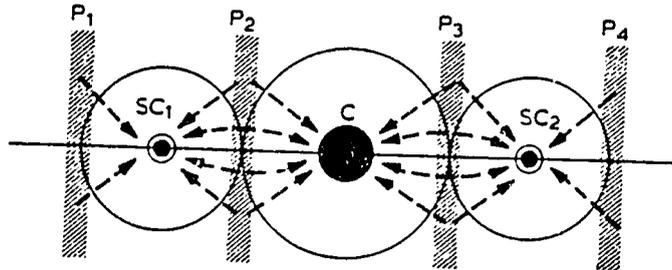
1. Independent local centres, no hierarchy



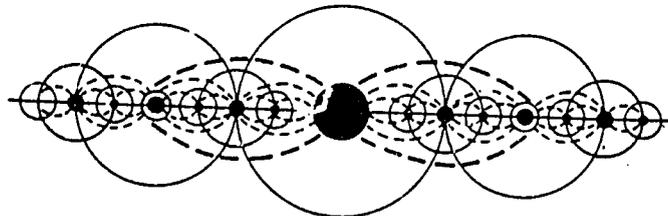
2. A single strong centre



3. A single national centre strong peripheral subcentres



4. A functionally interdependent system of cities



(After Friedmann)

Source: Gilbert and Gugler, 1981

settlement system, Friedmann argued, the space economy is organized and growth and innovation are diffused.⁵

Johnson and the Concept of Functional Integration

The first scholar to articulate the concept of functional integration and to forge the link between central place theory and the concept of spatial integration was E.A.J. Johnson. He advanced this concept in his seminal work published in 1970, The Organization of Space in Developing Countries. Basing his argument on the economic history of Europe and on empirical evidence from India, Johnson asserted that the absence of a well-integrated and well-articulated central place hierarchy was a major constraint to development and, therefore, integrating and articulating this hierarchy was an important development goal for Third World nations. Clearly influenced by the notion of spatial integration and linking this to central place concepts, he states:

It is not that underdeveloped regions lack central places, for some have too many! What is amiss is that they rarely constitute a functional hierarchy, and for this reason they fail to provide an intermeshed system of exchange that will provide the requisite incentives for increased application of labor, capital, and human skills (pp. 70-1) [U]nless there is a graduated, inter-linked, and functionally integrated market system which covers all of nation's space, . . . serious handicaps inevitably result (Johnson 1970: 418) (emphasis added).

Also influenced by the growth center concept, Johnson asserted:

[T]he first tasks must be identify the number of central places that will be needed, to set up proper tests for the selection of promising growth points . . . which can become coagulated into the nuclei for new agro-urban communities (p. 170) What can be done . . . is to coagulate programmed investments, both private and public, into new, well-located capital clusters that can become nuclei around which the 'powerful forces of spontaneity' can gradually begin to exert influence (Johnson 1970: 212) (emphasis added).

⁵ Curiously, Friedmann makes no mention of Christaller, although his concept of spatial integration is related to a distinctly Christallerian vision of a central place system. Instead, the settlement system is taken as a given and its role in development is rationalized.

The roots of Johnson's argument in central place theory are clearly evident. Although Johnson never explicitly stated that arguing for the transformation of the spatial structure in Third World regions into an "intermeshed" and a "functionally integrated" system of central places was tantamount to a replication of the form of Christaller's model, this is certainly implied. At one point, Johnson (1970: 18-27) discusses the role of a hierarchy of markets in the organization of economic landscapes and describes, in almost identical fashion to Christaller, the logical outcome of the operation of the market principles on an isotropic space.

The foregoing discussion of the evolution of the functional integration concept reveals that by the time the model was adopted by development planners, the form of the model had long since become disassociated from its logic. Further, the fact that the specific form of settlement system that the functional integration approach sought to construct originated in Christaller's model became obscure. Nevertheless, the relationship between Christaller's model form and the functional integration approach is direct. Subsequently we will argue that the rationale behind selecting certain methods to operationalize the functional integration approach can only be understood by recognizing this relationship and elaborating its logical implications for the formulation of a methodology.

CHAPTER THREE

Application of the Functional Integration Approach: The UFRD Case

The Urban Functions in Rural Development (UFRD) Project is used here as a case study to examine the kinds of projects that have been designed and the kinds of methodologies that have been implemented to operationalize the functional integration approach. Following the argument developed in the last chapter that the form of Christaller's model underpins the approach, we now explain how the selection of analytical techniques and the nature of the UFRD methodology are logical outgrowths of the adoption of the form of Christaller's model as a normative goal for development planning. Understanding the nature of a functional integration approach methodology is a prerequisite for fully comprehending the assessment of the appropriateness of the approach to Third World planning presented in the next chapter.

Applications of the functional integration approach in projects in the Third World (in Kenya, India, Brazil, and in the five field applications of UFRD) have shared a common methodology. There are two essential features of this common methodology: (1) techniques of central place analysis are used to describe functional structure of the settlement system and the space economy of a project region; and (2) this description is used to formulate regional plans and recommend investments in urban activities. In other words, a description of the settlement system is used for prescriptive locational planning for urban activities.

This common methodology raises two important issues. First, the fact that the focus of descriptive analysis is the settlement system in its entirety

while actual plan recommendations are for the location of specific urban activities begs the question: What is the more important concern of the methodology -- the activities located in settlements or integrated regional planning for settlement systems? And second, the fact that descriptive techniques of central place analysis are used for prescriptive planning begs another question: How and why are descriptive techniques used for prescriptive planning?

The answers to both of these questions can be found in the rootedness of the functional integration approach in the form of Christaller's model. By answering these questions using UFRD as a case study, it can be seen that the use of the Christaller model form has certain important implications for how the functional integration approach is operationalized.

Background

The UFRD Project is a suitable case from which to make general statements about the application of this approach because it has the following features in common with other projects adopting this approach: (1) UFRD, like the others, was developed in the early seventies to respond to the need for more effective development planning for depressed rural regions; (2) UFRD, like the others, focused upon the settlements in a region in order to plan for their "integration" and "articulation;" and (3) the UFRD Project methodology was characteristic of those implemented by the other projects. In fact, the methodology implemented by the UFRD Project was so close to those implemented by other functional integration projects that it employed many of the same analytical techniques developed or employed in these other projects.⁶

⁶ Rondinelli (1980) recognizes the contribution to the UFRD methodology of techniques developed and employed in earlier efforts at functional integration planning. He notes that some of the techniques used by UFRD had been previously applied in Brazil, the Philippines, Thailand, Sri Lanka, and India.

The UFRD Project was designed by the Office of Urban Development of USAID. This project was precipitated by the 1973 congressional mandate that U.S. foreign assistance focus on the basic needs of the poor in developing countries. This comprised a "new directions" mandate, interpreted by USAID to mean that assistance should focus on rural development because the majority of the poor were located in rural areas. Prior to this mandate the agency had focused its activities more in urban areas and on industrial development.

In order to remain viable in this changed institutional environment, the Office of Urban Development had to demonstrate that urban activities contributed to rural development. To specify the nature of the relationship between urban and rural development, the Office of Urban Development turned to the literature on the role of settlements in the development process. Drawing heavily on the theoretical and empirical work of geographers, regional scientists, and development economists, a state-of-the-art review of the literature was conducted in 1974. Later published as a monograph by Miller (1979), this study found that there was a wealth of conceptual and empirical work on the subject. The Office began to suspect that development was constrained by the over-concentration of urban functions in a very few (primate) locations. The lack of these critical central functions and, where present, their uneven distribution on the landscape reflected a poorly developed urban hierarchy characterized by an inadequate number of settlements at the intermediate level. Miller criticized the "trickle down" model of development on the grounds that without a well developed middle-level in the urban hierarchy, the diffusion of growth and development could not take place. Commenting on the paper Chetwynd states:

the paper described a model of spatial economic development in which: "economic growth and development are initiated and reach their highest levels at a few centers which offer advantages for industrial location and have a high capacity to generate and adopt

innovations. Growth impulses, in the form of market demands for goods, and development-inducing innovations diffuse from these centers to the rest of the space economy through a hierarchy of urban industrial centers, and through a network of smaller central places which serve as marketing and service centers for the rural population. Diffusion from these centers into the surrounding rural hinterlands occurs in a wave-like process which is subject to considerable distance and time delay." This [growth center] model is important to the UFRD projects However, the projects are directed at the weaknesses inherent in this model as much as it draws on its strengths. The principal weakness of the model, as observed in practice, is that the beneficial impacts that flow from the few privileged centers at the top of the urban hierarchy often are limited to their contiguous areas and do not penetrate significantly into rural hinterlands Without a well-developed regional system of cities, towns and smaller centers to form an integrated marketing and distribution system, the rural farmer who is not within commuting distance of a major center must depend upon the village as periodic markets for marketing and other basic services (Chetwynd 1980: 38).

Hence, early in the Office's development of UFRD, the contribution of settlements to rural development was conceived in spatial terms (diffusion, "trickle down") and in terms of central place systems (small, intermediate, and metropolitan settlements serving central place functions).

Convinced that there was a need to apply these concepts and to introduce information on the relationship between urban and rural development into the planning process, the Office asked two consultants to consider how it could be generated in a rapid and cost-effective manner, and how this information could be used by planners. They were also asked to examine the then prevalent integrated rural development approach in order to determine how information on urban-rural linkages could be introduced.

The consultants, Rondinelli and Ruddle (1978), concluded that IRD projects could be improved by treating urban and rural issues simultaneously, and proposed a strategy for introducing urban-rural information to regional development planning. This strategy was based almost entirely on Johnson's work and his concept of functional integration. As advanced, however, this strategy

went beyond Johnson's work by including a methodology to operationalize the functional integration concept.

Functional Integration and UFRD

The concept and strategy that was advocated for UFRD was called "integrated spatial development" (Rondinelli and Ruddle 1978; Rondinelli 1980).⁷ As Bromley (1983) has noted, however, this concept is really a variant of Johnson's concept of functional integration. In a state-of-the-art review conducted as a front-end study for UFRD, Rondinelli and Ruddle, quoting heavily from Johnson, explain this concept:

The problem of [income] disparity [between regions] has arisen because most developing nations have poorly articulated and badly integrated spatial systems Human settlements are not linked together in a mutually beneficial system of production and exchange, and the spatial system as a whole is not conducive to fostering development or equitably distributing the benefits of growth (p. 39) Self-sustaining economic growth cannot occur without a well-articulated spatial system composed of dispersed and interlinked central places, performing specialized and diversified production, distribution, consumption and exchange functions (p.52) [P]oorly integrated spatial systems provide little opportunity for interaction between villages, market centers, intermediate cities, and metropolitan areas, for linkages to be created among their activities (p. 57) The failure of developing countries to achieve growth-with-equity . . . can be attributed largely to their poorly articulated spatial systems. Development is handicapped both by the lack of market towns and intermediate cities and by a spatial distribution of existing centers that is not conducive to creating an integrated system of production and exchange (Rondinelli and Ruddle 1978: 175).

Clearly, there is a close association between the concept of integrated spatial development and Johnson's conceptualization of the role of a settlement system in the development process.

Taking Johnson's concept, the UFRD project advanced a strategy of integrated spatial development and an operational methodology for implementing this

⁷ In the literature relating to UFRD, the strategy is also called the integrated regional development approach (Evans 1982; Rondinelli and Evans 1983). The two terms are synonymous.

strategy -- "a methodology for bridging the gap between idea and action, for translating the concept of integrated regional [spatial] development into specific plans and projects" (Evans 1982, Part I: 2).

The strategy consisted of two key elements: the articulation of the urban-rural settlement system; and the integrated development of functional economic areas based on their productive potential. According to Evans, the resident advisor to the UFRD project in Bolivia:

The articulation of the urban-rural system involves strengthening the hierarchy of settlements, particularly smaller towns and villages; improving linkages between them and their rural hinterland; and up-grading the distribution of urban-based facilities and infrastructure to aid production and serve the population. The integrated development of selected areas, which are defined through spatial analysis, starts with the principal economic activities of each locality, on the basis of which are designed coordinated project packages to stimulate production, raise rural productivity and improve access to social services and other amenities (Evans, Part II: 2).

Settlement Systems or Settlement-Based Activities?:
Confusion from the Christaller Legacy

There is a confusion in this strategy between what are related, but in actuality are two very different, planning tasks. On the one hand, the strategy seeks to plan for the integrated development of a region around the settlement system. On the other hand, it focuses on activities located in rural areas, particularly marketing and tertiary activities (called "urban functions" by the UFRD project), and on locational planning for these tertiary activities. It therefore becomes confusing whether the focus of attention in the functional integration approach is on settlement systems or on the activities that usually (but not always) are located in urban centers.

This confusion mirrors a similar one that is evident in Christaller's model. On the one hand, Christaller represented his theory as one capable of explaining the creation, location, and structure of settlement systems. His

concern was with settlement systems in their entirety. On the other, it is generally recognized that his theory does not adequately explain any of these, but rather that his "market principle" does effectively explain the locations of tertiary activities (Berry 1961). Here the focus is on the tertiary activities themselves and the factors which determine their location. Because, as we have argued, the functional integration approach is ultimately based on Christaller's model, it is understandable that while the approach seeks to analyze the urban system and plan for its articulation and integration, it frequently ends by recommending specific tertiary activities ("urban functions") needed and where they should be located.

Like Christaller's model, the functional integration approach puts the cart before the horse: urban centers and the settlement system before the location of tertiary activities.

Description for Prescription: The Implications of Christaller's Model for UFRD Methods

The UFRD strategy does not explicitly state that the form of settlement pattern that best achieves "functional integration" and "articulation" is based on the form of Christaller's model. In fact, a discussion of central place theory is conspicuously absent in the literature related to UFRD. Nevertheless, the selection of this strategy involves embracing, whether implicitly or explicitly, the whole evolution of the concept of functional integration which, as we have indicated, is very much based on central place theory and on Christaller's model. However, the rationale behind formulating a methodology, which simply describes the spatial structure in a region even though prescriptive planning is the goal can only be understood in terms of the fact that the functional integration approach is based on the form of Christaller's model (even though this was not recognized by those who implemented it).

Once this critical point is understood, it makes sense within its own logical framework that all that is necessary in order to effectively plan the location of urban activities is to define a functional urban hierarchy. By defining and describing such a hierarchy it is possible to assess the extent to which the existing hierarchy, when compared with a norm, is "integrated" and "articulated." A methodology designed to operationalize this concept, therefore, logically is comprised primarily of techniques for describing the urban hierarchy so that its adequacy can be assessed. In UFRD this was accomplished through a ten-step methodology: six steps were devoted to analysis, two for plan-making, and two for implementation and institutionalization (see Table 1). The project hinged on steps two through six, for not only were most of the project's resources expended on these steps (Horwood 1978; Chetwynd 1981; Evans 1982), but the formulation of plans (steps seven and eight) for implementation (step nine) was supposed to be based on the analyses performed in these five steps. The architects of UFRD hinted at the central importance of these steps in the UFRD methodology:

At the heart of the project is an analytical process which looks first at what exists already, including also urban-rural linkages and complementarities. This analysis will provide the basis for plan formulation (USAID 1976: 18).

Essentially, the techniques applied in UFRD establish a functional classification scheme⁸ so that the degree to which the settlement system conforms to a

⁸ The techniques of functional classification employed by UFRD have long been encapsulated in geography as techniques of central place analysis. They were used heavily in the 1950's and early 1960's to describe central place systems (Berry and Pred 1961). Berry and Horton (1970, pp. 110-11) have noted that the objectives of functional town classifications are obscure: "Perhaps more important than mere procedure is the question of purpose The objectives of an overwhelming majority of the functional classification of towns rarely extend beyond the pedagogic. Geographers usually are content simply to report their results verbally and almost always cartographically." It is unfortunate that the purpose to which these descriptive techniques were put under the functional integration approach was prescriptive planning.

Table 1

The UFRD Methodology

1. An overall regional resource analysis and socio-economic demographic profile of the Basin.
2. An analysis of the existing spatial structure, describing elements of the settlement system, the functional complexity and centrality of settlements, the hierarchy of central places, and the distribution of, and patterns of association among, functions within the region.
3. Description and analysis of the major socio-economic, organizational, and physical linkages among and between settlements.
4. Mapping of information obtained from the functional complexity, settlement hierarchy, and spatial-linkages analyses to determine "areas of influence" or service areas.
5. Delineation of areas where linkages are weak or non-existent, and of marginal areas in which rural populations are served by or accessible to central places.
6. Comparison of information from steps one through five to regional development plans and objectives to (a) determine the adequacy of the spatial system to meet development needs and facilitate the implementation of equitable growth policy, and (b) identify major "gaps" in the spatial system.
7. Translation of the spatial analyses into an investment plan that identifies the projects and programmes.
8. Integration of projects identified through spatial and economic analyses into spatially and functionally coordinated "investment packages" for different locations within the region.
9. Creation of an evaluation system for monitoring the implementation of projects and programmes.
10. Institutionalization of the planning procedures in local and regional public agencies charged with investment decision-making.

Source: After Rondinelli, 1980.

predicted model (Christaller's) can be ascertained. This is accomplished by first taking inventory of the functions in all settlements. Using this data, "centrality" scores for each function and each settlement are computed. The centrality of the function depends on its ubiquity, the less ubiquitous functions being weighted more heavily and thus scoring higher. The centrality of the settlements is then determined by summing the scores of the functions they contain. The data from the inventory are depicted in a manual scalogram, and a hierarchy is thus delineated. The hierarchy is further refined by using a modified Marshall's threshold rule to group settlements into discrete functional classes. Next, the degree of interaction between settlements is measured to determine the extent and the nature of the linkages between towns. This is accomplished by measuring the marketing movements of either people or products between centers, by mapping the transport network, and by studying the spatial manifestations of the government/administrative function. In addition, an accessibility study is conducted which surveys a sample of rural households in order to determine how much distance a household will travel, and at what cost, to gain access to an urban function.

The application of these techniques yields a clear description of the central place system. Settlements are classified by their centrality and grouped into levels of a discrete functional hierarchy. In addition, the interactions between places and the transport network linking them is described. This enables the degree of "articulation" to be determined -- the extent to which the settlement system is organized into a discrete functional hierarchy with an adequate number of settlements at each level and the extent to which the settlements act in concert as an integrated system structured so that the needs of a rural population can be met through the hierarchy. In addition, the information on the interaction between places is used to define

areal units linked by strong internal interaction and combined with information on the economic base of these regions (collected in step one), thus defining the degree of "functional integration" -- the extent to which the hinterlands of settlements and the settlements themselves function as integrated spatial economic units.

But the utility of assessing the degree to which an urban hierarchy is articulated and integrated with its region when compared to some idealized case is unclear, and how to transform this assessment into recommendations for actual projects was left obscure. Rushton, a consultant to one of the UFRD projects, noted that: "Nowhere, in the literature related to the project, does there exist an analytical framework for relating the results of the first two phases [of analysis] to achieving the third phase [of plan formulation]" (Rushton 1977: 6). On another project, the USAID project manager noted that "the mission and the local (Cameroonian) authorities did not comprehend how recommendations were arrived at and the extent to which they did comprehend it, felt it lacked analytical rigor" (Belsky 1983: 3). And on still another project, a consultant reported that:

For some reason or another, it is sometimes assumed that the 'urban functions in rural development' approach is something which can be used by itself to prepare plans and identify projects in a comprehensive manner and thus much is expected of it. This assumption is false and the expectations are exaggerated (Fass 1980a: 10).

Indeed, how a descriptive analysis and qualitative assessment of the urban hierarchy lead to plan recommendations is not clear. From the literature on the project it would appear that it involves a "gap analysis" and the analysis of map overlays. The members of the project team in Upper Volta expressed their dissatisfaction with the overlay technique. They felt that "it was not evident that the discovery of an empty space on a map was sufficient informa-

tion upon which to suggest the possibility of a program or project" (Fass 1980b: 3).

The other prescriptive tool used by UFRD was the gap analysis of a manual scalogram. This is a data matrix in which, on one axis, settlements are listed in order of functional complexity, and on the other axis the functions are listed in order of their ubiquity (see Figure 4). By scanning the scalogram, spaces can be discerned. These spaces indicate that a settlement does not have a particular array of functions, and that settlement is unlike others containing a similar set and number of functions. These spaces are considered gaps.

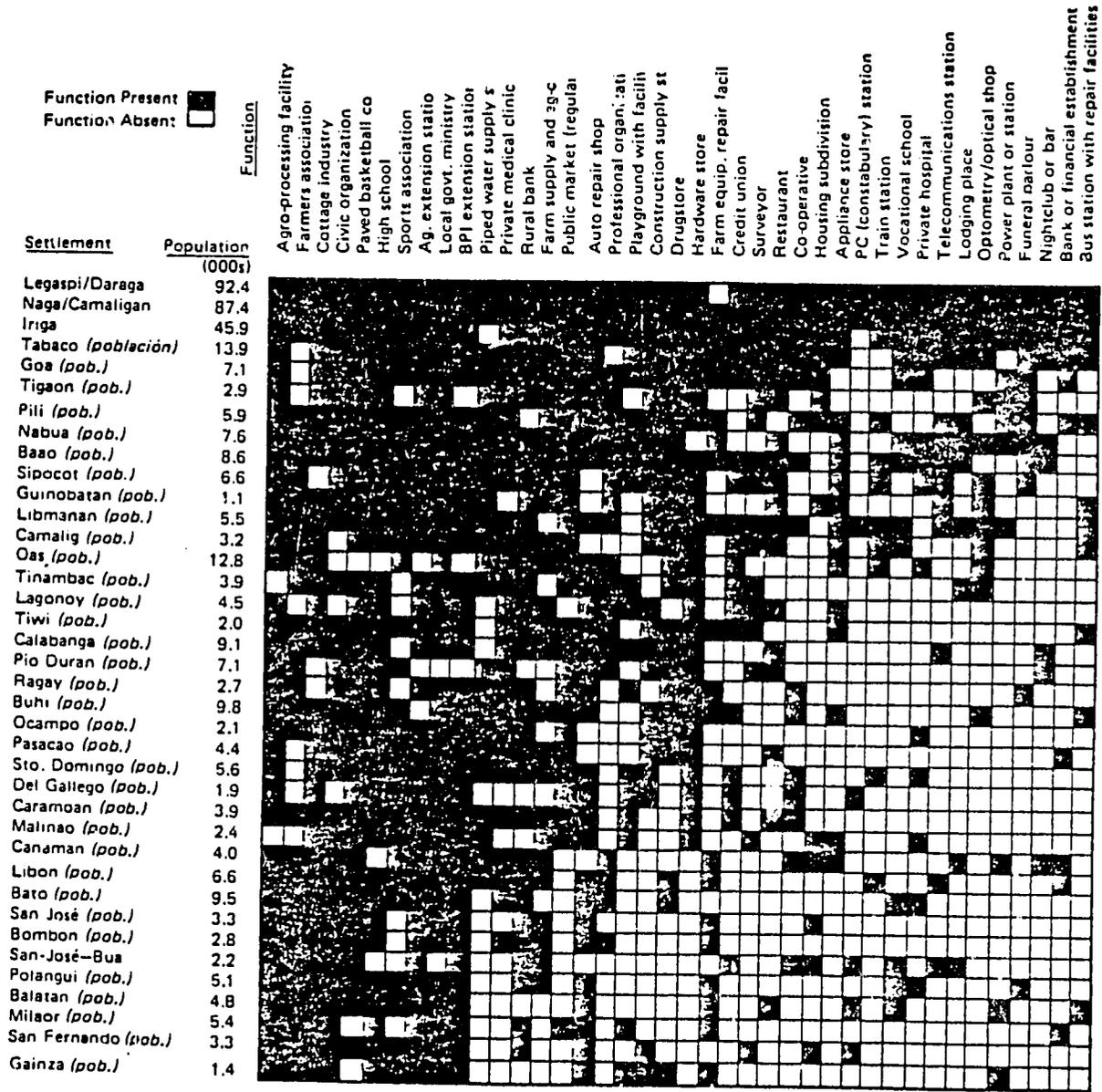
It is significant that the scalogram depicts data on the supply of functions only. It does not include any data on the demand for functions. As such, it is incapable of determining whether or not a gap once identified is actually needed by the population. In addition, a gap analysis based on a scalogram is aspatial -- the data in the matrix is not spatially arrayed. The question then becomes, how can a scalogram be used to identify where and when to provide a function? As Rushton and Yapa have enquired:

The question is whether 'gap analysis' (as identified from a scalogram analysis of the presence or absence of a function) is the more appropriate way to identify which functions should be added to which places in order to improve access to urban services or whether geographical accessibility analyses should be used for this purpose (Rushton and Yapa, 1983: 4).

If a functional integration methodology like the one conducted by UFRD does not measure demand for urban functions and does not incorporate techniques of locational analysis to implement locational planning, then what lies behind the selection of its supply-side descriptive methods? The answer to this question is: the form of Christaller's model, though obscured. We already have explained why adopting this form leads to a descriptive methodology (a hierarchy must be described so that it can be compared to a normative ideal).

Figure 4

A Manual Scalogram



Source: Rondinelli, 1980, p.28.

Here the issue is how this description is used to recommend potential locations for functions. The approach bases its recommendations on a descriptive analysis of the urban hierarchy by implicitly transforming the manual scalogram into a symbolic representation of Christaller's idealized hierarchy (see again Figure 2, and Figure 4). It compares the actual distribution depicted in the scalogram with the ideal case and identifies discrepancies (or gaps) between the two. Assuming that Christaller's idealized hierarchical structure is an appropriate normative ideal for Third World planning (a position that will be argued against in the next chapter), it can then be assumed by UFRD practitioners that filling the gaps in the existing hierarchy as depicted in the scalogram is an appropriate method of spatial planning. The appropriateness of this technique, however, is seriously cast in doubt when one considers the problems with adopting the form of Christaller's model for prescriptive planning application in the Third World.

CHAPTER FOUR

Problems with Adopting the Form

Problems arise in the application of the the functional integration approach because this approach has tended to accept the form of Christaller's model without the corresponding logic upon which the model was built. The logic of Christaller's model is based in the first instance on the assumption that settlements evolve to meet the service needs of a region's population in an economically rational and spatially optimal way. The operation of this logic under free market conditions should lead to Christaller's predicted form.

Studies of settlement systems in the Third World have revealed that the system which Christaller described in Southern Germany does not, in fact, obtain in most Third World nations. Rather, a "primate" and "dendritic" settlement structure has been found as the general Third World form (Mabogunje 1980; De Souza and Porter 1974). In contrast to the nested and articulated hierarchy predicted by Christaller, Third World settlement systems tend to have one large primate city which contains most or all important central functions, dominating the space economy. Below this city in the hierarchy, usually -- but not always -- there is a dearth of medium-sized places performing regional functions, and a disproportionately large share of small urban places, each providing far fewer goods and services than are considered necessary for development. This structure contrasts the healthy and strong urban system and economy that are generally found in developed countries. Measurement of the

interaction among these settlements has shown that the nature of their interaction can be described as "dendritic," akin to a stream drainage system wherein water flows in one direction from the branches through the main channel towards the river's mouth. In the analogous economic system, products (water) flows from the rural areas and towns (branches) by means of primary roads (main channel) toward the primate city (river mouth). The dendritic nature of this interaction is quite different from that implied by Christaller's model, where the settlements operate as a symbiotic system to meet the demands of many dispersed rural consumers.

That Third World settlement systems do not conform to Christaller's model can be explained by the fact that conditions in the Third World fail to satisfy the most basic of Christaller's principles and assumptions. It can be argued that in the Third World:

1. Settlements did not evolve spontaneously to meet the needs of a dispersed rural population.
2. The behaviors of the consumers and the suppliers of central functions are not determined by the operation of free market forces.
3. Purchasing power is extremely low and is not evenly distributed in space.

Indeed, the violation of any of the Christaller assumptions results in distortions of the pattern and structure that he predicted. The implications of these Third World characteristics vis-a-vis application of Christaller's model to planning in the Third World must therefore be addressed. The operation of this logic under free market conditions should lead to Christaller's predicted form. Yet there is a preponderant amount of empirical evidence, amassed over the past twenty-years, which confirms that primate and dendritic systems are the dominant forms in the Third World (Davis 1961; Renaud 1979).

To explain why these settlement patterns depart from Christaller's predicted form, another explanatory model has been formulated. Like Christaller's

model, this alternative model attempts to explain settlement formation and structure through economic principles. From this perspective, which we shall call historical materialism, development issues are viewed in a way that is fundamentally different from the neo-classical perspective of Christaller, Friedmann, and Johnson. While the difference between these two perspectives is on economic issues, in general, we raise two differences between them which bear on development issues for the purposes of our discussion.

The neo-classical school of development perceives the issue of Third World development in terms of stages of growth, while the materialist school perceives the issue in terms of a unique historical experience in which Third World nations came to be controlled by colonial powers. Although most neo-classical theorists have backed away from the Rostovian idea that the history of the developed world represents stages of growth which all nations will inevitably pass through (Fairbank, Eckstein and Yan 1960; Singer 1971), staged growth logic underlies the works of both Friedmann (1961; 1966; 1971) and Johnson (1970). This kind of thinking is especially obvious in Johnson's book; he draws heavily on the history of the First World to support his argument that developing countries were constrained by the lack of articulation and integration in their settlement systems. Historical materialists, such as Gunder-Frank (1967), Wallerstein (1979), and Baran (1957), argue that to understand Third World development one must analyze the history of the nations in the Third World, especially in terms of how their integration into a capitalist world system has affected the internal dynamics of these nations. Based on historical studies of Third World nations, they have refuted the staged growth concept. They argue that Third World nations are not in some early stage of development, but are, in fact, also at an advanced stage of capitalist develop-

ment; the difference not being the stage they are in, but the role that each plays in a global capitalist system.

The other important difference between the two perspectives is that neo-classicists tend to focus on how the free market system operates to spontaneously achieve economic rationality and optimality, while materialists tend to focus their analysis on how colonialism created underdevelopment, and how the global capitalist system has perpetuated it. Hence, on the one hand, we have regional development planners adopting Christaller's model which is based on free market logic, and on the other, materialists, such as Santos (1977) and Slater (1973), explaining Third World settlement patterns by relating them to the evolution of dependent capitalism.

The "Export-Driven" Logic in the Third World

The explanation of settlement structure based on the materialist school identifies the principles alleged to govern the distribution of settlements in the Third World (Castells 1977); Logan 1972; Mabogunje 1968; Slater 1977). According to this explanation, whatever natural evolutionary process settlement systems in the Third World may have been undergoing prior to contact with the colonial powers was disrupted by the imposition of colonial rule. Further, it is argued that those settlement systems came to be shaped by the political and economic imperatives of the colonial powers, which included the control and/or subjugation of indigenous peoples and the promotion of an export-oriented economy. The interests of colonial rule have been shown to be in conflict with domestic needs, such that the development of local productive capacity and domestic markets was given little or no priority. These interests, the model contends, manifested themselves in a settlement system with a pattern and structure quite different from that of Christaller because it was based on a

very different logic -- it was achieving the deliberate ends of the colonial system and not the spontaneously expressed demand of the local population. Hence, the settlements in the Third World reflect an export-oriented economy and exist not to serve the dispersed rural population but to facilitate the flow of raw materials out of rural regions, and, to a far lesser extent, to provide the limited middle income markets in these areas with goods and services. Many have argued that it is precisely this lack of attention to the needs of the rural and lower income groups by the formal sector⁹ that has resulted in the emergence of the informal sector and the economic and social importance of periodic markets.¹⁰

Under the weight of a convincing array of historical cases, we argue that Christaller's assertion that settlements evolve to meet the needs of a region to be supplied with functions through nodal points is invalid in the Third World; those settlements evolved to meet the needs of colonial control and export. The settlement systems in the Third World evolved within an economic and political system that was designed to promote export and not within an economic system shaped by the emergence of free market forces, as in the cases which Johnson used to support his functional integration concept. Indeed, it is because settlements are not meeting the needs of the rural populations that the functional integration approach was put forth in good faith.

9 The term "formal sector" is used here to describe those activities which have fixed locations and/or employ western methods of organization (Bromley 1978; Hackenberg 1980).

10 There is a great deal written on the subject of periodic markets and their role in the economies of Third World countries. Recent studies suggest that even periodic markets, which were long thought to be primarily a distributive function evolving to meet the needs of a domestic economy, aid in the bulking function for export as well. Such conclusions tend to reconfirm the pervasiveness of dependency and the argument that the dual economies, so-called, are not separate but rather interact and define one another.

The problem, however, is not really one of whether or not the functional integrationists adhere to this model of explanation for settlement structure; rather, only at issue are the implications of this model, and the very real historical facts it is based upon, for a strategy of functional integration and the planning methods used to implement it.

One important implication is that the staged growth assumption does not hold much force in explaining Third World development. It has been persuasively argued that the evolution of settlements has not gone through the predicted stages, and that there is very little empirical evidence and theoretical justification for arguing that they should (Haywood 1982; Doherty 1977). After examining Puerto Rico as a case, Doherty concluded:

The prevailing primate configuration of Third World urban systems is not a reflection of the involvement of these countries in a transition stage of development, but rather is a symptom of the external orientation and dependent nature of their economies (1977: 36).

If anything, the evidence suggests that there is little correlation between economic growth and city size (which can be used as a very rough estimation of functional complexity) (Berry 1961; Mera 1964; Richardson 1981; Mills 1972); primacy is continuing, and the different role settlements have and continue to play in the post-colonial period is resulting in an evolution that will not proceed in the directions suggested by the functional integration school. Because of the lack of evidence relating any particular form of settlement pattern to economic growth, to assume a priori that a settlement system should be developed according to the Western model is ill-advised.

An implication of more serious proportions is that the planning methods developed for the functional integration approach inadvertently build on the logic of existing Third World settlement systems; this, in spite of the fact that the approach was advanced to ameliorate these settlement systems and build

instead on the logic of Western systems. To understand this paradox, it is necessary to examine functional integration approach methodologies. As the UFRD case clearly demonstrates, the functional integration approach leads to measuring the supply of existing central functions so that the settlement system in a project region can be described and compared with Christaller's norm. Policy and plan recommendations are then based on an analysis of those existing functions.

To give an example of how these supply-side methods can lead to building on the logic of the existing system in practice, consider the analytical tool called a manual scalogram which was used both in the UFRD projects and in India. A scalogram simply depicts the existing, spatial, settlement structure by describing what activities and functions are found in each town in the format of an array (see again Figure 4). The analysis of the scalogram then leads to the recognition of "gaps," allegedly indicating that a town, because it is "missing" a function possessed by other towns next to it in the array (those with a similar degree of functional complexity), should have that function. Hence, it is deemed appropriate to invest in or at least study further the possibility of providing that function.

From a geographical perspective the use of such a technique is disquieting because it is strictly aspatial, for each town's position in the scalogram is not related to its location. Far more serious, however, is the fact that the process of gap identification is tantamount to declaring that the logic inherent in the structure of the existing system is sound and should be built upon. Put another way, functional integration adopts only the form of Christaller's model and assumes that there is a sound logic to the existing location of functions in a certain set of towns. It goes even further to say that where the majority of towns with a certain level of functional complexity have a

similar set of functions (i.e., expresses a certain logic), all the towns at that level should have those functions.

Another implication of adopting the form of Christaller's model -- under the mistaken assumption that it will naturally lead to a central place system that serves regional needs in an optimal way -- is that it leads to rigid, top-down planning. The essence of Christaller's model is that given the free play of market forces, a rational settlement structure will emerge from the bottom-up based on rural demand and its satisfaction by urban suppliers. In stark contrast to this bottom-up logic, is the "top-down" character of the functional integration approach. It does not measure the demand for a function or set of functions in an area, nor does it examine how this demand is being spontaneously met by the system. Rather, it assumes these issues away and instead measures the supply of functions, and it mechanistically suggests how to plan for the settlement system so that it evolves towards the ideal of a functionally interrelated and integrated system. As will be demonstrated below, the adoption of the Christaller logic would lead to a markedly different and much more sound approach.

Imperfect Competition and The Uneven Distribution of Purchasing Power

Two additional factors contribute to the failure of Christaller's model to adequately predict the settlement structure and pattern in the Third World: (1) purchasing power is unevenly distributed, and (2) competition is imperfect, so that consequently the behaviors that would spontaneously lead to Christaller's pattern and structure under the operation of free market forces are non-existent.

These two violations fall into a different category than the violation discussed previously -- which is a violation of the basic principle underlying the Christaller model. Distortions in the predicted settlement pattern and structure resulting from its violation can only be accounted for by formulating an entirely new explanatory model (as was done by the historical materialists). It is theoretically and methodologically possible, however, to account for these other two transgressions because these are violations of operating assumptions, and these assumptions can be relaxed without having to reformulate the entire model. Hence, the distortions in the predicted form of Christaller's model created by these violations can be predicted. Indeed, this kind of analysis has been applied successfully to accurately predict distortions caused by the violation of Christaller's assumption of an isotropic plain (Skinner 1961) and to predict distortions created by imperfect competition.

The argument that the lack of free market forces has resulted in the primate and dendritic urban structure, though interesting, is not a particularly strong one. While imperfect competition in the production and sale of goods between multinational organizations and parastatals, on the one hand, and local small producers, on the other, tends to thwart the efforts of the latter in primary and secondary productive economic activities, its effect on tertiary services is not as great. The very existence and persistence of periodic markets demonstrate that in rural areas competition does exist, is fierce, and that market traders do emerge spontaneously to meet the demands of rural people (Iowa State University 1983). The issue, therefore, is not really whether or not the behavior of consumers and suppliers in the Third World diverges from the behavior of "economically rational man" in a context of imperfect competition (for the continued importance of periodic markets indicates that this

concept is as meaningful in the Third World as it may be anywhere else).¹¹ The real question is: Why are rural needs met through a periodic rather than a fixed set of commercial and retail services and why are the number and ubiquity of functions among settlements so limited in rural areas?

In this regard, the fact that purchasing power is unevenly distributed explains a great deal. Admittedly purchasing power even in the United States is not perfectly distributed, but uneven distribution of income (purchasing power) in the Third World is quantitatively so great that it represents almost a qualitative difference in kind.¹² When this fact is added to the fact that the information necessary to make an informed decision as to whether or not it is economically feasible and profitable to supply a function at any given location, it is small wonder that there are so few functions in the rural areas. It also helps to explain the existence of periodic markets. Periodic markets can be viewed as an adaptation to the great risk presented by low and uncertain levels of demand. The periodic market structure offsets this risk by making it possible for traders to move from area to area to draw on a larger demand surface (Berry 1967; Hay 1971; Webber and Symanski 1973).

Although purchasing power may be low in rural areas, it does exist. According to the logic of Christaller's model, in order to determine the true optimal distribution of functions among settlements, or at least a workable

¹¹ Spatial choice and behavior in the Third World tend to be influenced by cultural and social variables. But again, many argue that the same occurs in the First World. For instance, decisions on where to shop may involve frequenting locations because other social activities occur there, or decisions on where to locate a shop may be based on where an entrepreneur wishes to raise children.

¹² It can be argued that the goods and services provided through fixed facilities primarily meet the demands of a group of middle to upper income urban dwellers who represent a very small percentage of the total population. Hence, a definition of an urban hierarchy based on an inventory of fixed facilities tends to represent the satisfaction of the demand of only a few. Yet it is the demand of the majority, and not those of the few, that should determine the character of the functional hierarchy.

distribution, the composition and distribution of purchasing power (demand) must either already be known or must be measured. Christaller did not directly measure the composition and distribution of demand, but he did deal with it by assuming it to be evenly distributed in space. And indeed, where all of Christaller's assumptions are met, it can be assumed, by definition, that the exact distribution of demand is known. Under such conditions, the form of Christaller's model does represent the optimal distribution of functions among settlements.

Where purchasing power is clearly not distributed evenly and settlements have not emerged to meet the demands of a regional population, as evidence suggests is the case in the Third World, demand must be measured. Measuring the supply and location of functions and using this as the basis for planning, results in a sub-optimal distribution of functions and, for all intents and purposes, a potentially unworkable and irrational one. Yet it is precisely the latter approach which functional integration adopts and the former which it ignores. The failure to seek an optimal, or at least workable, distribution of functions among settlements based on the measurement of demand is the principal methodological flaw in the functional integration approach.

To summarize, then, the difficulties encountered when applying the form of Christaller's model to Third World planning identified in the foregoing critique are:

1. Its application is based in large part on the staged growth approach to planning that has been largely renounced.
2. It leads to top-down planning in which changes in the structure of the settlement system are proposed in a rigid and a priori fashion and not to the more desirable approach in which demands expressed from the bottom-up are met and the structure changes accordingly.
3. The techniques used by the functional integration approach can easily lead to building upon the logic of the existing settlement system. It has been demonstrated that this logic does not meet the development needs of a region's population.

4. It leads to a planning methodology that is supply-sided and not only ignores but does not measure the force (demand) that determines where goods and services can and should be located.

CHAPTER FIVE

The Bottom-Up Approach: Adopting Christaller's Logic

While serious problems are associated with the manner in which central place theory has been applied to development planning, it is important to identify the reasons for these problems. In previous discussion we suggested that the fault lies not with central place theory, in general, but in the specific way in which it was adopted. The form of Christaller's model was adopted as a normative planning guide, and methods were developed to apply it as a guide. Abandoning the logic and failing to grasp the full implications of Christaller's simplifying assumptions made it possible to focus on the supply-side only, to the extent that no explicit consideration was given to demand and purchasing power, and how together, the effective demand surface which they define determines feasible sites for the location of certain functions.

There is an alternative to the functional integration approach, which also builds on Christaller's model but does so in ways which are more appropriate to the constraints encountered in Third World planning. We argue here that the logic of Christaller's model is appropriate to Third World planning and, in fact, offers guidance in formulating a planning approach for the location of functions.

The Logic as a Guide

The first step in developing an approach based on the logic of Christaller's model is to recognize that Christaller's principle (that central

places exist to provide goods and services to a region's population) is actually only an assumption, it can nevertheless be considered a useful normative principle. This is quite different from assuming it as a fact of settlement evolution. This involves simply accepting the underlying principle that goods and services should be provided in settlements so that consumers can take advantage of economies of scale efficiently. Unless this principle is accepted, arguments can be made that functions need not be located in central places and that settlements should not be treated as the only places through which functions can be provided, because they can be scattered across a dispersed region. While this is certainly a tenable position, there is a marked tendency for marketing and service functions to agglomerate in settlements and a desire on the part of Third World governments to develop the service capacity of existing towns. Further, there are reasons, such as multi-trip shopping behavior and economies of scale, which suggest that it is reasonable to restrict the set of possible locations from which to choose a site for providing a function to existing settlements.

The only other principle that must be adopted in order to accept the demand-driven logic of Christaller's model as an appropriate theoretical framework for developing a planning methodology is that for a good or service to be provided, a sufficient level of effective demand must exist for that good or service. Indeed, except for functions that are subsidized by government, a retail or service function is only economically viable where there is a demand sufficient for the supplier or marketer to make a profit from the economic activity. The demand-driven approach to development planning is, therefore, a rational and practical guide to planning the location of goods and services.

Once the demand approach is accepted, the next question that can be posed relative to developing a prescriptive planning methodology are: (1) what

variables must be measured to determine effective demand, (2) how are they to be measured, (3) what techniques of analysis can then be applied to determine the appropriate settlement for providing a function, and (4) to what end?

Measuring Demand. Christaller's model offers considerable guidance to decide what constitutes "demand" for a good or service, what variables determine it, and hence what should be measured to compute it. Recall that Christaller noted that the following comprise demand and determine its character:

1. social and cultural aspects (consumer preferences and behaviors governing spatial choice);
2. purchasing power (effective demand);
3. income level (the kinds of goods and services purchased, i.e., luxury vs. staple);
4. accessibility (cost and willingness to travel to obtain a good or service);
5. supply (where occurrences of a good or service already are; the quantity of the service of goods available in the system);
6. price (what people can and are willing to pay).

As a shopping list of what must be measured to determine the demand for a good or service, the above is complete. Much of this information can be ascertained from a household survey (consumer preferences by income level, distance willing to travel to obtain a good or service, and what price a consumer is willing to pay for a good or service). This kind of information is little different from the kind collected for market surveys which businesses in the developed countries routinely conduct and, with modifications for development data collection and sampling procedures, is the kind of survey that can be conducted in the Third World.

The other variables which must be measured are the supply and the cost of travelling to obtain a function. The supply variable can be measured by the

inventory techniques used in the functional integration approach, namely, a count of facilities. To this, it might be added that goods and services provided through the periodic market system should also be measured. The cost of travel can be adequately approximated by an accessibility model like that used in a field project of UFRD in Bolivia (Evans 1982).

Techniques of Analysis. In order to choose among the wide array of functions and services that are potentially needed in the Third World and might conceivably be provided, either through the private sector for profit or by the government, the data on consumer preference and a ranked list of those most needed can be used with little but descriptive statistical analysis. Once the field is narrowed, data on the other variables may then be collected and appropriate and feasible sites determined based on their analysis.

Up to this point, the consideration of what variables to measure and how to analyze them, though based on Christaller's logic, has been largely aspatial. But what Christaller demonstrated is: given a known distribution of demand for goods and services and that the suppliers of these goods and services will locate in centers, an efficient spatial distribution of goods and services can be deduced. Indeed, his $K=3$ market settlement structure represents an efficient, even optimal, marketing and retail distribution system in the sense that distance cost for consumers is minimized and demand levels are sufficient to support all suppliers.

The use of spatial methods of analysis improves the theoretical and empirical outcomes of the planning process. Using location-allocation methods, for example, it is possible to deduce optimal spatial distributions of a good or service even under multiple constraints and with multiple objective functions. Using this model, what at one time could only be computed if such simplifying assumptions as evenly distributed purchasing power and "economically rational"

behavior on the part of consumers and suppliers were made, can now be computed even where purchasing power is not evenly distributed and different forms of consumer behavior are manifested. Hence, planners can now address the kinds of issues which Christaller pointed to as the determining factors in the location of a good or service without having to reduce them to unrealistic simplifying assumptions.

Location-allocation algorithms make use of computer-assisted methods of analysis, using alternative locational arrangements of an activity. Rushton (1984) has succinctly described the techniques of location-allocation:

Beginning in the 1960's and becoming widely applied in the 1970's, location-allocation methods are the only formal methods that have been developed to find optimal locations when many alternative locations exist. These methods evaluate alternative combinations of feasible locations and select the combination that performs best with respect to a defined objective (1984: 1-2).¹³

By specifying an objective functions, such as distance-cost minimization, the algorithm can solve for the optimal spatial pattern to satisfy that objective function. However, it should be pointed out that location-allocation algorithms already have been applied to the problem of determining the best configuration of public services to meet demand. By including demand data as part of a place specific data set, Fisher and Rushton (1979) were able to derive "solution spaces" for demand patterns in a study region.

Location-allocation techniques only recently have evolved to the point where they are useful to the kinds of Third World planning problems discussed here. It is even more recently that micro-computer algorithms make it possible to utilize location-allocation in the field, in the Third World. Further research must be conducted and the tools of location-allocation refined before a demand-driven planning approach to the location of services and goods can be

¹³ Others describing this methodology include: Hansen, Petter, and Thisse (1983); and Hodgart (1978).

adopted on a wide basis, but it is this kind of research that can improve regional planning in the Third World. Our ability as planners to collect demand information and to process it with location-allocation techniques for the purposes of spatial planning in the Third World has progressed to the point where we already can use it effectively. The next logical step is to evolve more effective algorithms based on experience and incorporating new technologies.

The Demand-Driven Approach
A Bottom-Up, Rural-Based, Basic-Needs Planning Strategy

Location-allocation techniques may, when first used, appear to be a "black box" technology until local planners are trained to develop their own algorithms. But depending on the kinds of information used, location-allocation techniques are capable of facilitating a kind of planning that is bottom-up, rural-based, and basic needs oriented, in spite of, and largely because of, the analytical sophistication of the methodology.

There are two ways in which employing Christaller's demand logic through location-allocation algorithms can be used to plan for development in rural areas to achieve the approach to development that is bottom-up and will benefit the rural poor directly. One is in planning for the location of publicly-provided human services and the other is in planning for investments in privately-provided goods and services oriented to low-income, domestic markets.

Human Services. The former has already been accomplished in the developed countries and, on a more limited basis, in the Third World. As Rushton explains:

The kinds of locational decisions that have generally been made in developed countries in the past decades for public services have been different from those made in the developing countries. In the

developed countries there have been many applications of location optimizing methods for "emergency services": fire, emergency medical services, police. They have also been used to study the closing of service sites, such as schools. They have rarely been used to determine new service sites for basic human services. This is the location problem which is most critical in developing countries (1984: 1-2).

The ability of location-allocation algorithms to solve simultaneously for the optimal arrangement of different service facilities, given many possible alternatives, makes it uniquely suited to answer the question of where to locate a finite number of service facilities so that accessibility to these functions for dispersed rural farmers, laborers, and landless peasants is maximized. It already has been used for this purpose in Columbia (Bennet, Eaton and Church 1982), Upper Volta (Mehertu, Wittock and Pigozzi 1983), and India (Rushton 1983).

Private Enterprise Development. Location-allocation techniques can also be used to determine feasible locations for goods and services provided by the private sector. It is likely that although purchasing power in rural areas is low, there is a sufficient effective demand to support small marketing and retail services if these enterprises are located properly. Although it has yet to be demonstrated, it is within the capacity of location-allocation algorithms to determine (given the demand for a good or service) where and at what price it can be provided. This could be accomplished by comparing an effective demand surface with the existing occurrences of a good to determine which portions of the demand surface are not being served and analyzing where new occurrences of the good could be located. By incorporating spatial choice behavior data including data on what distances and at what distance-cost consumers are willing to purchase the good, economically feasible sites can be determined. Government and commercial loans can be granted to entrepreneurs to

implement projects compatible with the development scheme; projects which are credit-worthy and meet the demands of rural consumers.

Once these projects are identified, even though conscious and deliberate investments are made from the top, the location of the good or service is actually responding to demand expressed from the people themselves. In a sense, the same process which Christaller assumed would occur spontaneously, namely, the satisfaction of consumer demands by suppliers through a spatially and economically efficient system, can be facilitated by strategic planning.

Projects identified by this method are also self-supporting. Government subsidies of goods and services can, therefore, be restricted to only those areas which truly need it. Hence, a process of self-reinforcing development is initiated.

Such an application of the demand-driven approach to private enterprise development could also easily be targeted at lower income groups. If the objective is to meet the needs and satisfy the demands of the rural poor, demand information on just these groups can be analyzed and investments thus targeted for goods and services which low-income groups can and will use. In a similar fashion, planning can be targeted for any group, for example, small farmers, who have specialized commercial needs for increasing their productivity.

The Settlement Pattern and Structure of the Demand-Driven Approach

The settlement pattern and functional structure that would ultimately result from applying the demand-driven approach to locational planning cannot be assumed a priori. Rather, because the pattern and nature of demand is different from region to region and the level of purchasing power in a region

varied both from place to place and over time, the settlement pattern and structure can be expected to vary from region to region.

What can be generalized, however, is that the resulting settlement system will reflect the actual levels of demand in a region. It will be the physical manifestation of demand patterns. Settlements which grow to greater importance will do so because they are situated in areas where demand for a variety of goods and services is greater than in other regions, not, as with the functional integration approach, because a colonial legacy has left them as the centers of upper-income, urban-based demand. Other goods and services will be located where populations can realistically support them or where the government has chosen to subsidize these activities. Hence, the system can expect to be both workable and rational.

One of the greatest virtues of the demand-driven approach to planning described above is that it is dynamic. It can respond to and account for changes which take place over time. As the functional structures of settlements change as a result of planning, and as demand surfaces change, this new information can be inputted into location-allocation algorithms and new planning solutions generated.

To illustrate, let us take the settlement system at four times: t , $t+1$, $t+2 \dots t+n$. At time " t ", decisions on where and what functions to provide are made based on the first demand-driven application of a location-allocation algorithm. At some time in the future, $t+1$, (this could be a year, two years, or more later), the actual utilization of the functions provided as a result of time " t " plans is measured and is compared to time " t " predictions. If the time " t " algorithm was sound and there are no changes in demand levels, the level and nature of the utilization of these functions should conform to the

predictions made by the time "t" algorithm. If there are significant differences, it can be assumed that either or both demand levels have changed or spatial behaviors have changed. At time t+1, a second round of planning then takes place. At this time, problems with the algorithm revealed from monitoring are rectified and new locational plans are generated that respond to changes in the level and distribution of demand and any changes in spatial behavior that might have occurred in the region. At time t+2, the success of the time t+1 algorithm is assessed and changes in demand and spatial behaviors are again accounted for in new planning solutions. This process can be repeated indefinitely, or as it might be mathematically expressed, t+n times.

CHAPTER SIX

Conclusions

The goal of encouraging economic development in rural regions in the Third World is not one that will be easily achieved. Efforts to effect this goal have thus far proven inadequate and, indeed, efforts in this direction are seriously constrained by deteriorating terms of trade for the produce that rural regions offer, the continued degradation of the resource base in many areas, and the persistent unemployment and underemployment in these areas. The functional integration approach boldly emerged on the scene in the 1970's as a planning method with the potential for facilitating rapid, broad-based, and self-sustaining regional development. When it came to be applied in the field, however, its inability to identify catalytic investments and its lack of conceptual and methodological rigor became immediately apparent.

In this paper, we have drawn a distinction between the form and logic of Christaller's central place model in order to explain the functional integration concept, how it evolved, and how it has been used in the field. We also have tried to demonstrate that the functional integration approach is destined to be inappropriate for Third World planning because, from its inception, it draws only on the form of Christaller's central place model, divorced from its logic. In the previous section, we demonstrated that a viable alternative to the functional integration approach exists; one which is based on the more insightful theoretical logic of that model.

In sum, the functional integration approach has one great virtue and one fatal flaw. Its virtue is that it draws much needed attention to the fact that

"rural" development is in fact synonymous with regional development, wherein sectors (i.e., agriculture, mining, manufacturing, marketing, and retail distribution) and places (rural and urban) cannot be treated separately; in fact, development in one effects development in the other. That the functional integration planning model went even further and underscored the need to expand the provision of commercial, personal, and social goods and services and to plan for their location in rural regions is to the credit of the proponents of the functional integration approach.

But in the main, the problem with the functional integration approach, and the one which renders it unable to effectively address the very issues that it is designed to address, is that it fails to recognize that the conditions that exist in the Third World militate against the use of the form of Christaller's model as a basis upon which to formulate a Third World planning approach. This failure derives from both the faulty staged-growth reasoning which is used to rationalize the acceptance of the form of Christaller's model as a normative goal appropriate for Third World settlement development, and from the failure to implement (and perhaps understand) the logic which lay behind the very form which it elevated to an ideal and normative status. Borrowing from the descriptive techniques designed in the 1950s and 1960s to validate Christaller's hypotheses, methodologies characteristic of the functional integration approach measured only the supply of functions, missing the fundamental truth that it is in measuring the demand for goods and services and the distribution of this demand that the logic of Christaller's model and its applicability to Third World planning are to be found.

The rationality of the Christaller model stems from its form and the logic that underpins it; this is the fundamental truth which must be preserved from Christaller's model. It is his demand-driven logic that can and should inform

locational planning for goods and services in the Third World. Beyond effective locational planning, Christaller's model holds little else for the problems of development. Development in rural regions remains and will continue to remain difficult; further, the process of economic development in rural regions remains an elusive phenomenon. Unfortunately, easy answers and/or "quick fix" prescriptions such as those suggested by the proponents of the functional integration approach do not yield theoretically sound solutions to the problems of regional development. However, stronger planning models can be constructed in the future by building on the experience of past approaches.

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