PLANNING APPLICATIONS OF A GAMING SIMULATION OF REGIONAL DEVELOPMENT

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by

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CHAPTER I

THE PLANNING TASK IN REGIONAL DEVELOPMENT

Efforts to understand the processes of regional development in the United States have, like many attempts to increase our knowledge of the world, been beset with problems of integrating the parts into the whole. The urgency of such regional problems as transportation, depressed areas, river pollution, and population migration has brought various social and physical scientists together. To consider such a complicated and aggregative process as regional development requires that serious thought necessarily be given to contributing fields of study, such as geography, sociology, economics, political science, engineering, and city planning. However, the approach to understanding the process has been, in the words of Friedmann and Alonso, more a mere fading of the traditional boundaries separating these disciplines than a deliberate inter-disciplinary thesis:

> Urbanization, for example, is studied by the geographer with a view to discovering the reasons for city location, by the regional scientist for evidence of the systemic arrangements of cities within a country, by the sociologist with a concern for patterns of urban social structure and their influence on regional integration, by the economist with a view to discovering the bases of urban economy and the pattern of emerging growth poles, and by the city planner with an eye to the requirements for investment in urban infrastructure and the optimal

arrangements of urban land-use patterns.[1] However, such incremental contributions of knowledge about the regional process do provide bases for our present understanding of regional development problems.

It is appropriate at this point to suggest what is meant by the term "regional development process." A "process," as defined in Webster's Dictionary,[2] is "a natural progressively continuing . . . development marked by a series of gradual changes that succeed one another in a relatively fixed way and lean toward a particular result or end." The word "development" implies the state reached by the process. This state is not necessarily the result of growth, however. Growth, especially economic growth, can only be crudely defined as to its nature and direction of change. As commonly measured, in terms of economic activity, growth means improvement in per capita real income, increases in population, increases in total employment, or in total income. Thus, growth carries the implication of some increase in size whereas development could mean more efficiency in the process of concern, more acceptable quality, or increase in size. Criteria for judgement of the quality of development might depend upon particular public goals. The term "regional" process

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[1] John Friedmann and William Alonso, "Introduction: Regional Development as a Policy Issue," Regional Development and Planning: A Reader, ed. John Friedmann and William Alonso (Cambridge: The M. I. T. Press, 1964), 8.

[2] Webster's Third New International Dictionary (Unabridged), 1961.

specified, according to Webster's Dictionary, that the process relates "to a geographical region . . . (or) the peripheral parts of a district as distinguished from its central or major part . . . (or) . . . to a region of a country." Therefore, the definition of "regional development process" implies that further analysis must consider theories, propositions, and the structure of the process. This structure will rely heavily upon economic activity.

Contributions to the Theory of Regional Development

The principles of location and space economy have contributed much toward the understanding of the theory of regional development. Isard and Reiner,[3] using the criterion of economic efficiency traditional to the field of location economics, suggest synthesized regional patterns of development, as an illustration. As a first step, specific locations of representative but hypothetical metropolitan regions are determined for the Eastern U. S. using basic Weberian principles of the transport resource of some sites and labor-orientation of others. Secondly, Lösḧian principles more sharply define each metropolitan region by introducing scale economies and transportation costs. By substituting various factors in a cost-revenue computation, the optimum scale can

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[3]Walter Isard and Thomas A. Reiner, "Regional Science and Planning," Papers of the Regional Science Association, VIII (Philadelphia: The Regional Science Research Institute, 1962), pp. 1-5.

be determined for the metropolitan area, using these principles.[4] Thirdly, within the urbanized portion of the metropolitan region, the high industrial concentration is projected in the illustration according to the localization and urbanization economies of Weber, Phelander, Hoover, Ohlin, and others. Localization economies are generally obtained when plants within a given industry congregate. An example is the garment trade complex of New York City where economies are derived from use of a common pool, accessibility to buyers and fuller utilization of special facilities. Similarly, urbanization economies emerge from the congregation of plants around a site, but the plants are unlike each other. Economies might be derived from use of optimum power plants or administrative facilities by the different industrial plants.[5] As a fourth step, in considering the space between these regions, agricultural land use patterns can be projected on the basis of Thünen-Dunn principles. The final considerations are a combination of spatial-juxtaposition economies with the substitution and rent principles of Predohl, Thünen, and Dunn. Urbanization economies, combined with localization economies, represent spatial-juxtaposition economies.[6] The internal land use pattern of a metropolitan region is projected from this combination as the final step in the illustration. A more

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[4] Walter Isard, Methods of Regional Analysis (Cambridge: The M. I. T. Press, 1960), p. 401.

[5] Ibid., p. 404.

[6] Ibid., p. 405.

complete summary of this illustration is given by Isard.[7] However, the significant principle of this synthesis is the ever-present practice of substituting factors to arrive at an optimum outcome. The limitation of location theory itself, in not being able to consider the possible substitution of other economic and non-economic factors, is realized by Isard and Reiner:

> Such theory when unduly refined to achieve both rigour and depth too often leads to patterns which are socially, politically, and even economically undesirable and at times infeasible. As an example, the widespread costs of congestion, air and water pollution plus similar social and third party costs afflicting mankind lie for the most part outside the framework of location theory. Also, because of the inability to treat the dynamic processes of metropolitan growth, these processes have been assumed away.[8]

Another approach to the theory of regional development, conceived by Friedmann and Alonso,[9] considers directly the problem of spatial, or regional, differentiation of economic growth in the regional development process. They ask how economic growth is differentiated spatially and what accounts for differing patterns of growth. This question of the spatial differentiation of economic growth involves activity patterns composed of the flows of capital, labor, commodities and communications linked in space. These patterns are primarily responsible for the existence of a spatial

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[7]Walter Isard, Location and Space Economy (Cambridge: The M. I. T. Press, 1956), pp. 254-287.

[8]Isard and Reiner, op. cit., p. 6.

[9]Friedmann and Alonso, op. cit., pp. 9-11.

structure of the development process in a particular region. In considering what accounts for differing patterns of growth among various regions, the immobility of certain natural resources, the dynamics of urban growth, and the analysis of internal migration are the key links, according to the authors. This approach recognizes that the dynamics of the development process, in regard to certain critical resources, determine regional patterns. Again, this approach is limited in its consideration of economic resources only. However, the significance of the dynamic and critical-factor character of the development process must not be under-estimated.

Regional Planning in Regional Development

The evolution of regional planning as applied in practical situations in the United States is a continuing attempt to integrate the various approaches to the problem of understanding regional development. While development suggests the state reached by the region, planning is a process which can give direction to the development process. According to Chapin, "the planning process must play an important role in supplying policy alternatives and pressing for decisions from the earliest and broadest level of policy formulation on down to the more detailed levels of policy determination."[10] But, in spite of the inadequacy of the theoretical approaches considered previously, the regional planner has had to tackle

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[10] F. Stuart Chapin, Jr., Urban Land Use Planning (Urbana: University of Illinois Press, 1965), p. 349.

certain very comprehensive tasks by necessity: development and management of resources, guiding the total growth of metropolitan cities, planning for public facilities, and planning to foster economic development. An accurate description of the task of regional planning would be that of providing a framework for resolving problems in economic and resource development.[11]

Perloff traces the history of regional and state planning briefly in three stages: before 1933, when unrelated beginnings occurred; several years after 1933, when state and federal planning units were set up to solve physical, economic, and social problems in a comprehensive approach; and the post-war period, when comprehensive state and regional planning was extensive but lacking a well-recognized focus.[12] The term "state and regional planning" is significant in Perloff's statements because by including the word "state", the writer recognized the inherent variabilities in regional delineation, as well as governmental organization for planning and development.

The problem for the planner in understanding and replicating regional development is more basic than this, however. In his attempts to become comprehensive, he has strained his approach to the point where essential goals may

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[11] Harvey S. Perloff, Education for Planning: City, State, and Regional (Baltimore: The Johns Hopkins Press, 1957), p. 68.

[12] Ibid., pp. 73-82.

not be recognized.[13] Frequently, the consideration of the total process, from the formulation of goals and determination of policies, to the establishment of programs and presentation and evaluation of alternative plans, has been forgotten. Obviously, a more convenient framework for dealing with the process of regional development would allow the regional planner concerned with its problems to assess his approach and role more effectively.

A Methodology for Simulating Regional Development

An attempt to simplify the process of regional development into some sort of framework for understanding by planners may be a noble goal but this does not preclude a serious consideration of the general methodology to be used. If the utility of a model, such as the one to be described herein, "depends on how helpful it is in gaining new knowledge" and the value of the knowledge obtained "depends on how much more effective, efficient, and economical it makes a practitioner in doing his job," then, according to Fein,[14] a methodology must include certain elements. Not only must there be a model and a modeled system of interest (such as regional development),

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[13] See the article by Alan Altshuler, "The Goals of Comprehensive Planning," Journal of the American Institute of Planners, XXXI (August, 1965), pp. 186-195, and the subsequent rebuttal by John Friedmann, "Response to Altshuler: Comprehensive Planning as a Process," Ibid., pp. 195-197.

[14] Louis Fein, "The Structure and Character of Useful Information-Processing Simulations," (Synnoetic Systems, Palo Alto, California, n.d.), p. 2. (Mimeographed.)

but there also must be hypothesized new knowledge about the system by the model, as well as feasible experiments on the system.

The process of modeling, or simulating, a system must involve four interdependent elements as explained by Fein.[15] (1) a simulator, otherwise known as the investigator; (2) the simulate, or the instrument employed to depict the system; (3) the simuland, or the phenomenon of interest to the simulator; and (4) the simulation, or the process of accomplishing the previous three elements. The importance of these distinct elements in any attempts at modeling emphasize the fact that the utility of a simulation depends upon the extent to which the desired knowledge about the simuland was gained.

In light of these statements about the methodology and process to be used to study regional development, a certain format for a report on the simulation process is suggested by Fein.[16] Applying this to the problem at hand, the following general outline is established:

1. Verified knowledge about the structure, properties, and theorems of the simuland, the regional development process. Included here also must be the specific question to be answered, the hypothesis, as well as the acceptable form of the answer.

2. The purpose and use to which knowledge gained in the simulation might be put.

3. Description of the elements of the simulate, as they relate to the simuland.

4. Design of an experiment to test the hypothesis of the simulate.

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[15] Ibid., p. 4.

[16] Ibid., p. 5.

Verified knowledge about the regional development process, as well as the specific questions to be answered, are considered in Chapter II, "The Regional Development Process." The possible utility and value of such information is presented in Chapter III, entitled "The Regional Development Simulation Process." Chapter IV, "The Regional Development Game," presents the proposed type of gaming simulation framework that could be of use in regional planning, while a preliminary test of the hypothesis by a survey of professional planners concludes the present study in Chapter V, "Evaluation."

CHAPTER II

THE REGIONAL DEVELOPMENT PROCESS

Two approaches to a theory of regional development were presented in the previous chapter. One illustrated synthesized patterns of regional development based upon accepted principles of location economics, especially the substitution of factors. The other approach considered differing patterns of growth through certain critical links of activity patterns. However, it must be remembered that if the concern is with regional development as a process, then the analysis must seek basic characteristics about the process in order to provide a more sound basis for regional planning tasks. This chapter will attempt to explain regional development in terms of verified knowledge concerning the theory, propositions, and structure of the process.

The concern for theories of the regional development process, as well as those regarding the planning process as one approach to regional development, warrants some clarification here. It can be assumed from the previous definition of regional process that the region may include one or several urban processes at work. Theories about the urban process have some bearing upon those of the regional process. An

urban theory focus, in relation to planning theory, provides a more defineable and analogous relationship for the present purpose. Urban theory tends to be more descriptive and predictive of the urban process whereas, at the opposite end of the continuum, planning theory is concerned with administration and weighing and choosing of alternatives regarding the urban process. Friedmann and Alonso[17] see urban theory as a second level of explanation (after location theory) toward an understanding of regional development. The theory considers "such problems as the minimum critical mass required to push an urban economy into self-sustaining growth, the changing urban social structure and its influence on surrounding areas, and the institutional bases for national integration."

Spatial and Non-spatial Theory-building

It is difficult at this early stage of our understanding of the regional development process to state any general theorems, or propositions. Chapin[18] contends that "it is premature to identify schools of thought in theory-building (for urban growth and development), and there may be some question as to the meaningfulness of classifying tendencies in the work emerging today." However, certain writers have contributed such propositions in a continuing effort to approach the problem. Approaches concerned with patterns of development have been introduced already. It is necessary at

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[17] Friedmann and Alonso, op. cit., p. 10.

[18] Chapin, op. cit., p. 76.

this point in our consideration of the regional process to examine more closely two broad categories of approaches which are suggested--those of a non-spatial nature and those of a spatial nature.[19] According to Webster, spatial means "occupying, occurring in, or conditioned by space." However, since all activity occurs in space, a more definitive statement would be that spatial means conditioned by space while non-spatial would imply that the matter of concern was not conditioned, or affected, by space.

Process Theories

A broad non-spatial approach to the theory of growth has been summarized by Hoover.[20] It is his thesis that adequate planning must recognize the interrelationship of social, cultural, economic, physical, and other needs. Rather than dealing with each particular need, program objectives must relate each into an overall strategy. But each need represents a process characterized by integrative growth and decay. Dimmocks, an administrative expert, observed four stages of organizational growth and concluded that in general all institutions experienced these four stages:

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[19]For efforts to bridge the gap, conceptually, between spatial and non-spatial approaches to metropolitan planning, see Donald L. Foley, "An Approach to Metropolitan Spatial Structure," Explorations into Urban Structure (Philadelphia: University of Pennsylvania Press, 1964), pp. 21-78.

[20]Robert C. Hoover, "A View of Ethics and Planning," Journal of the American Institute of Planners, XXVII (November, 1961), pp. 294-296.

> First, the germination period in which we defined our goals . . ., The second period was one of settling down into adult operation and of getting on top of the problems . . . Then in the third period we explained again, developing sidelines which had to be added to the main work of the organization . . . Finally, in the fourth period we began to be confronted with the problems of most organizations that live to maturity, . . . the problems of . . . vitality, of offsetting the inclination to fall into a rut instead of into a smoothly operating groove . . .[21]

Rostow, the economist, begins from the traditional society and describes four stages of economic growth: (1) first, the "preconditions for take off," during which it is judged that economic progress has been good; (2) secondly, a "take off," firmed by the establishment of a strategy for progress; (3) thirdly, a "drive to maturity," in which it is demonstrated that the economy can move beyond its original industries and apply modern technology efficiently to absorb its resources, and (4) finally, the "Age of Mass Consumption." In a similar vein, Riesman considers the changing American character with respect to the process of growth of a society. The base line is "tradition-direction" during which people accept as binding the very simple traditions of a simple social order. In the next stage of "inner-direction," the ethic becomes established so that social attitude is determined in advance. Thirdly, a new stage of "other-direction" occurs and finally, as the vitality of original goals deteriorates and is not replaced, navigation of society is accomplished by taking

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[21] Ibid., p. 295, quoting Marshall Dimmocks, A Philosophy of Administration (New York: Harper & Bros., 1958), Chap. 4, p. 20.

bearings on other objects, rather than more fixed and dependable objects. The historian, Mumford, develops Geddes' outline of a similar growth curve, in which the stages are: (1) eopolis, (2) polis, and (3) metropolis. Beginning with a simple pastoral landscape, the agricultural village (eopolis) emerges, becoming the initial and simplest goal setter for urbanization. The "polis" follows, in which intellectual and institutional urban growth is emphasized. "Metropolis" experiences a great drive toward goals and strategy previously established, and sees the practical realization of these. Finally, a coherence is established between the vision of "eopolis," the strategy of "polis," and the resulting physical expression of "metropolis." This stage reaches a state of maximum release of cultural energy--the flowering of religion, drama, and literature and the fusion of philosophy and art. As a final comment or observation on these process theories, Hoover warns that only the qualitative aspects can be considered at this point. However, it is significant that qualitative theories of the growth process with similar elements do exist for organizational, economic, social, and cultural processes. The regional planner must be aware of these common stages, if only in concept.

Spatial Interaction Theories

A more spatially-oriented approach toward a theory of regional development is considered by Chapin.[22] The

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[22]Chapin, op. cit., pp. 75-96.

implication of a causal relationship between human behavior and physical structure and form is conceptual and considers urban spatial structure only. Emphasis is upon patterns and channels of activity, a "second antecedent area of theoretical significance" as Chapin puts it, rather than the process itself. Proceeding toward this end, he considers several approaches to urban growth. For one, Meier attempts to find a common element among various perspectives of urban development and concludes his studies by indicating that the desired element is "human communication." Conceptually, the city becomes a system of interaction energized by the need to communicate. Chapin recognizes that this theory is more descriptive (what and why) rather than normative (what ought to be). In another approach Webber views interaction as the basic concept in a system of two related perspectives: place communities, where interaction occurs in a particular metropolitan community, and non-place communities, where interaction extends to widely scattered places. The emphasis is in the city as a "dynamic system in action." By establishing linkages between elements, the spatial counterpart of these is given three perspectives: patterns of human interactions (flow of communications, people, goods), physical form (space for activities), and configuration of activity locations (spatial distribution of activities). Similarly to Meier, however, this theory is primarily explanatory. As a third approach, Lynch and Rodwin likewise consider human interaction, but only that in relation to urban form.

A recognition of the interrelationships of various social needs and the effects of those needs upon the urban and regional landscape pattern can serve the planning effort well. However, the exact relationship of processes to patterns has yet to be determined.

Growth Propositions

Certain propositions associated with the regional process must necessarily be discussed in order to further appreciate regional development. These may be properties, indicating a characteristic quality of a thing, or ingredients, or just simple propositions. However, they are more descriptive of a process rather than quantitative. Perloff[23] suggests several general propositions about regional economic growth. A discussion of certain of these in light of the previously introduced theories of growth is informative.

He refers to differential regional economic growth as one property which is an intimate feature of our open, highly dynamic economy. With variations in supply and demand conditions, as well as regional variations in advantages for production, regional growth differences are just part of the system. And in such an economy, continuing adjustment for change is unavoidable. It is recognized that these forces of adjustment are extremely complex. However, the existence of

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[23]Harvey S. Perloff, How a Region Grows: Area Development in the U. S. Economy, Supplementary Paper No. 17 of the Committee for Economic Development (New York: The Committee, 1963), pp. 137-143.

forces of adjustment implies some equilibrium being attempted; in this case, it is an economic one. In Rostow's theory, the progression from "drive to maturity" state to that of "Mass Consumption" must be made by some adjustment of the growth process. Thus, this adjustment process is one obvious aspect of a not-so-well defineable regional system that seeks its own equilibrium.

Another proposition set forth by Perloff is that the same elements that comprise national economic growth play similar roles at the regional level. He includes the roles of natural resources development, manpower skills and human resources development, aggresive entrepreneurship, infrastructure, and associated external economies, as well as the ability of a region to accept new technological developments. In addition, the regional level sees the role of amenity resources and attractiveness of living as becoming more and more significant. The implication of this proposition is that the development process exists in its significant elements at both the national and regional scale of analysis. If a general theory of growth exists for any process, especially regional development, it would seem logical that it can exist on several scales.

The capacity for growth of regions is measured by their ability to attract export industries, according to Perloff. Equally important, however, is the capacity of regions to substantially develop their "internal" economy in terms of

a linked effect on local industry and consumers. Referring again to Rostow, the performance of the region in its "drive to maturity" is significant. The capacity of the region can impose some constraints on its functional efficiency and growth.

A very important ingredient in the regional development process might be called "selective decentralization." Perloff notes that the spread of industry across the country has been caused by the attraction of resource opportunities and more so by growing regional markets. This decentralization has been most selective, however, multiplying growth in regional production centers at the expense of more rural areas. Production has spread geographically across the United States and consolidated into regional production centers. The hierarchy of cities that tends to build up in such areas only lends more focus on the efficiency and attractiveness of such centers as a significant part of regional development.

As a consequence of the complexity of regional economic development, Perloff suggests that it is particularly important to define public policies that attempt to accompany the constantly changing development scene. Effective policy-making requires good information, an awareness of specific goals, and a continuing research program. "Taking the pulse" of the development process is necessary.[24]

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[24] Ibid., p. 144.

Structure of a Region

The complexity of the regional development process is no more obvious than when one attempts to discern its structure. A general notion of the structure of a process can be obtained from the previous definition of process, in which it was stated that it was "marked by a series of gradual changes that succeed one another in a relatively fixed way . . ." The implication is that this relatively fixed method of succession of changes is indicative of the structure of the system. More specifically, structure is "something having a definite or fixed pattern of organization" so that it is implied that the organization has established lines of authority and responsibility for decision-making. Levy[25] makes a distinction between societies, social systems, organizations, and the individual as being "various sets of structures . . . of social action involving a plurality of interacting individuals." Therefore, a region will involve a multiplicity of formal and informal types of arrangements having varying jurisdictions and policies.

Public Organization

Public organizational arrangements are one broad and complex component of the structure for decision-making in a region. Various levels of government and their agencies comprise these more formal arrangements. Although the present

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[25]Marion J. Levy, Jr., Modernization and the Structure of Societies, I (Princeton: Princeton University Press, 1966), p. 4.

structure must be accepted and utilized, it is interesting to introduce the subject by considering what pattern of organization of government is possible given the values and goals of the people as they have evolved through policy decisions since the founding of the United States. Ylvisaker[26] has attempted to develop a theory of the areal division of governmental powers by first, identifying values which are to be realized by the division and secondly, suggesting a few criteria for establishing the division in order to realize these values. He begins by assuming an established democratic and industrialized state much like the United States but with areal institutions to be allocated to realize certain values. These basic values are liberty, equality, and welfare. This state has a relatively mobile and undifferentiated society, a balance of social and economic power elements, a tradition of the rule of law, political maturity, and even an economic capacity that affords the waste of several governments. For our present purpose, it is important to realize the values and goals of the nation as they relate to the total governmental process and its changing structure. In fact, this process is illustrated with respect to the evolution of metropolitan government:

> For here, as in the physical world, we are dealing with forces in flow, with continuous adjustments and counter-

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[26]Paul Ylvisaker, "Some Criteria for a 'Proper' Areal Division of Governmental Powers," Regional Development and Planning: A Reader, ed. John Friedmann and William Alonso (Cambridge: The M. I. T. Press, 1964), pp. 519-524.

> adjustments, with successive imbalances, the resolution of one precipitating the next--all told, a process of equilibrium, but never a state of equilibrium.
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> So it is with the development of metropolitan government.[27]

Realizing the dynamic nature of government, its complex and rather traditional basic structure can be more readily appreciated. Perhaps the greatest stress has come upon the shoulders of local government. Fixed and set during the nineteenth century, these governmental units have seen sweeping changes occur in the nation which have been reflected only to a small degree in local government. Most of these changes have stemmed from the process of urbanization: declines in farm population, growth of metropolitan areas, faster growth of fringe areas, and technological change. Many units of local government can be described.

Municipalities.--These are generally incorporated places which assume, or are chartered by the state, governmental powers as well. As a matter of choice, they can provide various urban services. Often internal structures allow a separation of policy-making and administrative decisions. Municipalities vary in size, however, causing heavy financial burdens on the resident population in small ones and finding a serious handicap of confining land area in the larger ones. The suburban trend merely results in fragmentation of functions and popular confusion. Some 18,000 municipalities in the United States contain two-thirds of the population and

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[27] Ibid., p. 535.

only one-third of all local outlays.

Counties.--These have functions of administration of justice, assuming official documents, and assessing property, as directed by the state. To some degree, they have involved themselves in newer functions but have been prevented by the lack of legal power. Giving home rule to counties has affected few of them due to their archaic structure. Also, their size is generally too small for current needs. Some 3,000 counties in the United States spent $9 billion in 1962.

Townships.--These exist primarily in the Midwest and only in five states[28] do they perform significant functions. In 1962 townships in these states spent almost $600 million on highways, utilities, sanitation, and police and fire protection.

Independent School Districts.--Two types of school districts exist: dependent and independent. The dependent systems have boundaries coterminous with the county, township, or city and are controlled in their taxing or bonding power by the local government. These number 2,300 and are concentrated in the eastern states. Some 25,000 independent school districts exist and spent $15 billion in 1962. Having their own areas of jurisdiction for school matters, these can levy taxes and issue bonds subject to state law. Generally, school districts need further consolidation, having too few school children for modern and efficient education.

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[28]Michigan, New Jersey, New York, Pennsylvania and Wisconsin.

Special Districts.--The rapid growth of special districts for water, sewage treatment, health services, parks, and the like has resulted from important changes in needs required of government. The result has been unprecedented overlapping of local governments. Many special districts can tax and issue bonds but their revenue is mostly from charges and fees. In 1962 about 18,000 of these existed to spend $3 billion.[29]

The proliferation of local governments has been marked by the increasing reliance on state and federal government alike to meet area-wide needs. In metropolitan areas, highway and park commissions have provided needs in the absence of a metropolitan agency. Increasingly, the federal government is being called upon under urban renewal programs, the interstate highway program, and many others to give financial and technical assistance. The total effect has been that decisions having area-wide and regional priorities have been the result of conflict among special purpose, region-wide, and state and federal agencies.[30]

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[29]Committee for Economic Development, Modernizing Local Government, A Statement on National Policy by the Research and Policy Committee (New York: The Committee, 1966), pp. 25-32.

[30]Committee for Economic Development, Guiding Metropolitan Growth, A Statement on National Policy by the Research and Policy Committee (New York: The Committee, 1960), p. 29.

Private Organization

Another broad and complex component of the structure for decision-making in a region is the various private organizational arrangements. Like the governmental arrangements, these private groups are dynamic and always changing. In this regard, Wheaton[31] reviews the literature on the subject and finds that one writer believes that private networks of power make most public decisions. He refutes this by stating that, rather than a monolithic structure of power, most cities have a "multiplicity of lesser concentrations of power, relatively independent of each other, competing for influence at times and in certain subject-matter areas, cooperating at other times . . ., occasionally engaged in outright conflict, . . ." These systems of power and influence are generally open to newcomers and based upon economic, business, or political or civic interests. Communication between groups is generally intermittent. Perception of interests vary with the group and time. Thus, to an even greater extent, private organization is in a continual state of change, in its intimate relationship with the public organization in the regional structure. A firm conclusion as to the identity of either public or private organization is neither forthcoming nor necessary, however; the important characteristic to be realized by the regional planner is potential of the private and public

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[31]William L. C. Wheaton, "Public and Private Agents of Change in Urban Expansion," Explorations into Urban Structure (Philadelphia: University of Pennsylvania Press, 1964), p. 182.

resources.

CHAPTER III

THE REGIONAL DEVELOPMENT SIMULATION PROCESS

Certain knowledge concerning the regional development process has been presented, as well as the problem that it poses for planners in realizing their function. Assuming that new knowledge will be obtained through a process of simulating regional development, what is the utility and value of having such a model? It will be recalled that the utility of a model is measured by its ability in gaining new knowledge, and the value of this knowledge depends upon its contribution to the practitioner in the performance of his job.

But what is a model? Intuitively, some idea may be had in a quotation from Harmer Davis when he said, "a model is a smaller copy of the real thing, as the woman said about a model husband." Disregarding any overtones of impotency, the word "model" is not always a copy of something, as Harris[32] points out about a linear programming model. More specifically, he considers a model to be "an experimental design

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[32]Britton Harris, "The Uses of Theory in the Simulation of Urban Phenomena," Journal of the American Institute of Planners, XXXII (September, 1966), 265.

based on a theory." Meier and Duke[33] see a model as a set of criteria for selecting the appropriate information. In the context of this study, the model, or the regional gaming simulation (the simulate), is a copy of the essential elements, structure, and process of regional development.

In assessing the value of new knowledge about the regional development process, another process must be related--the planning process. The intention is that such contribution be evaluated in relation to this planning process. Chapin's definition of the function of the planning process has been presented previously. A more definitive statement of process is required here. We recall from Webster's Dictionary that a process is "a natural, progressively continuing . . . development marked by a series of gradual changes that succeed one another in a relatively fixed way and lean toward a particular result or end." The inclusion of a "particular result or end" in the definition suggests that its elements consciously require a consideration of values, goals, policy, programs, and plans in achieving the result. The term "value" is useful because it indicates "status in a scale of preferences." These preferences may result from an evaluation made from an individual or specific point of view or in a specified situation. A "goal" is the end toward which effort or ambition is directed. This assumes that values are reflected in the goal.

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[33]Richard L. Meier and Richard D. Duke, "Gaming Simulation for Urban Planning," Journal of the American Institute of Planners, XXXII (January, 1966), 3.

A "policy", then, is merely "a definite course . . . of action selected from among alternatives and in the light of given conditions (or goals) to guide and usually determine present and future decisions." In a narrower context, a "program" is "a plan of procedure . . . toward a desired goal," usually involving a certain schedule or system of the total organization function. Finally, the "plan" implies "mental formulation of a method . . . or a graphic representation of one," as a part of the program.

Utility of Regional Simulation

The types of new knowledge to gain in the proposed simulation of the regional development process may be speculated upon from the very limited experience to date with gaming simulation in planning. The need for such knowledge has been pointed out by several writers. Berry,[34] in discussing research frontiers in urban geography, sees a need for a general urban simulator. Meier, in considering urban systems, says:

> The growth in complexity provides a strong justification for preventing mistakes in rational calculation. The simulation can serve as a device for "learning by doing" which would be particularly valuable when

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[34]Brian J. L. Berry, "Research Frontiers in Urban Geography," The Study of Urbanization, ed. Philip M. Hauser and Leo F. Schnore (New York: John Wiley & Sons, Inc., 1966), p. 424.

experiments on the real system need to be undertaken.[35]

Providing that the regional development process can be realistically simulated, this technique may be able to inform the participants of the dynamic nature of actual resource-committing decision processes and their relation to patterns of development. Such information would allow the participant in the simulation to view the consequences of a previous decision over a given time span. In observing these events, the participant can evaluate his decision from the larger perspective of the other participants. The areal and quantitative effects on resources would also inform the participant of their relative sensitivity to decisions. If the simulation allows, it may involve certain participants in testing new decision techniques. Finally, and not the least important, a realistic simulation forces the participants to evaluate their particular value structure, goals, and policies.

In a more aggregative sense, a realistic regional simulation would be valuable in specifying changes in quantities of important resources. From this information, the regional planner could evaluate efficiency in the use of resources, pinpoint critical problem areas stemming from poor allocation of resources, and obtain an overall situational effect. In terms of data collection for making decisions

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[35]Richard L. Meier, "The Gaming Simulation in Urban Planning," Planning 1965, Selected Papers from the Joint Planning Conference of the American Society of Planning Officials and the Community Planning Association of Canada, Toronto, Canada, April 25-29, 1965 (Chicago: American Society of Planning Officials, 1965), p. 287.

within the simulation, the model could give a prescription for the provision of data to actual decision-makers in a region.

Value of Simulation in Planning Decision-making

Many attempts at modeling for use by planners have been established. The value of these attempts may be conveniently summarized by comparison under a classification system developed by Lowry.[36] He lists three classes of models: descriptive models, predictive models, and planning models. Descriptive models merely replicate the significant features of an environment or process of change while predictive models attempt to explain some causal relationship to satisfy demands for information about the future. A planning model employs conditional prediction to suggest outcomes which are evaluated according to planning goals set outside the model. While the utility of a model depends upon a particular planning need, generally the planning model is most useful in its evaluative characteristic. However, a comparison of model purposes and designs derived by the author indicates a decided lack of planning models (Table 1). If a planning model must be required to evaluate outcomes based upon set planning goals, then only Schlager's model for land use plan design enters this category. It minimizes total investment in land use plan design as a particular goal. Chapin's simulation

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[36]Ira S. Lowry, "A Short Course in Model Design," Journal of the American Institute of Planners, XXXI (May, 1965), 158-166.

TABLE 1

A COMPARISON OF URBAN DEVELOPMENT MODELS AS TOOLS FOR PLANNING[a]

Model	Originators	Use	Level of Aggregation	Specific Function
Opportunity-Accessibility Model for Allocating Regional Growth	George T. Lathrop and John R. Hamburg	Predictive	Macro-analytic	Allocates future activity to small geographic areas
Land Use Plan Design Model	Kenneth J. Schlager	Planning	Micro-analytic	Minimizes total investment in land use plan design
Growth Allocation Model for the Boston Area	Donald M. Hill	Predictive	Macro-analytic	Allocates regional activity totals to sub-areas
Model for Simulating Residential Development	F. Stuart Chapin, Jr.	Descriptive	Micro-analytic	Simulates the residential development process
Simulation Model for Renewal Programming	Ira M. Robinson, Harry B. Wolfe, and Robert L. Barringer	Predictive	Micro-analytic	Simulates alternative public renewal programs
Retail Market Potential Model	T. R. Lakshmanan and Walter G. Hansen	Predictive	Macro-analytic	Estimates market potential of retail centers
Pittsburgh Urban Renewal Simulation Model	Wilber A. Steger	Predictive	Micro-analytic	Measures and predicts urban renewal decisions over time

[a]Source: Derived by the author from the Journal of the American Institute of Planners, XXXI (May, 1965).

of residential development is merely descriptive but it does simulate the process with a focus on the individual decision-maker. Its scope is greater than Schlager's model, although the decisions are indicated by activity patterns, the agglomeration of behavior. A question arises as to whether or not such models must necessarily become more agglomerative in considering behavioral decisions as they become more comprehensive. Britton Harris comments in this regard:

> Thus this article (by Chapin), in conjunction with others, illustrates a remarkable convergence between research starting at the level of individual decision units and coming to consider the larger framework, and research starting from gross changes in the metropolitan configuration coming to give increasing consideration to the actual decision process.[37]

The comprehensive regional gaming simulation framework proposed in this study attempts to incorporate these basic decision processes in a logical and useful manner.

Assuming that the simulation provides potentially useful knowledge concerning the regional decision processes and reasonable aggregate outcomes of these decisions over time, the question to be answered is to what extent is this new knowledge able to make more effective, efficient, or economical the job of the practicing planner? More specifically, can the decision process of the planner, in concerning himself with the future of a region, be improved? If planning is a decision-making process, with a concern for the

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[37]Britton Harris, in his editorial introduction to the article by F. Stuart Chapin, Jr., "A Model for Simulating Residential Development," Journal of the American Institute of Planners, XXXI (May, 1965), 120.

realization of values, goals, policies, programs, and plans, then the total effect of the technique must be measured in terms of improvement upon this process. In an actual regional planning situation, the nature of the planning process is apt to be more coordinative, rather than being assumed by one planning agency primarily. However, decision-making is still required at all levels, even in plan effectuation.

The process of decision-making is central to any process such as planning concerned with attaining specified goals through choice and evaluation. According to Davidoff and Reiner,[38] decision-making theory has focussed largely "on ways to make the best choice from among given alternatives in response to set criteria." It is significant that such theory assumes that the criteria, or goals, and alternatives are predetermined. The writers express the hope that the task of planning does include the establishing of goals and alternatives as well. But if the selections of goals and alternatives involve some exercise of choice, then, according to Dyckman,[39] this evaluation will involve decision-making also. In fact, he regards centralized planning to be itself a type of decision-making, which, due to gaps left by other decision-making means, involves special requirements. The goals are

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[38]Paul Davidoff and Thomas A. Reiner, "A Choice Theory of Planning," Journal of the American Institute of Planners, XXVIII (May, 1962), 115.

[39]John W. Dyckman, "Planning and Decision Theory," Journal of the American Institute of Planners, XXVII (November, 1961), 335.

relatively arbitrary: equity, legality, social acceptability, and efficiency. Therefore, the simulation of regional development may possibly provide more than a choice among given alternatives.

In studying decision-making it is important that two major categories be identified. Normative decisions deal with what the quality of the act ought to be whereas behavioral decisions are more objective, concerning themselves with the location of the actor in the system. Although planning is more normative than behavioral as a management art, Dyckman admits that the establishment of appropriate norms relies on studies of the nature of the decision made. He singles out economics as having made a major contribution to the normative as a "science of rational action." On the other hand, sociology and psychology are more behavioral. The contribution of the behavioral sciences is then a "focus on the sphere of competence for decision, on position or authority, on the communication of information to decision-makers, and on the motivation of decision-makers." The regional gaming simulation, therefore, can provide a framework for the contribution of knowledge about decision-making affecting planning and thereby improve normative decision-making in planning by establishing norms.

How decisions are actually made is also important to any evaluation of the effect of the technique in improving the

job of the practicing planner. Bross[40] lists three basic types of decisions: personal, administrative, and group decisions. It must be assumed that, in general, the planning process will involve each of these in any given planning effort. He points out that effective personal decisions, made under the guise of "common sense," actually involve some unconscious consideration of probabilities and desirabilities. This requires good data and suggests a personal philosophy for intellectual growth:

> What we need is a filter. . .
> We must develop in ourselves . . . the capacity to sort out the incoming information, to determine what is incomplete, unreliable, biased, or irrelevant.[41]

Administrative decision, according to Bross, requires prediction of future situations, but there is often a decided lack of good data. If a technique (a decision-maker) is employed by the administrator in making decisions, the use of that technique is limited to more usual situations. In those critical situations where a balancing of values is required of the administrator, intuitive judgement will be employed. Group decision-making is important in a democracy, and the planning effort relies on it more and more. The new problem that arises here, in attempts to quantify decision-making, is the interaction of decisions made by a number of individuals toward a single decision, a group decision. Bross submits

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[40] Irwin D. J. Bross, Design for Decision (New York: The Macmillan Company, 1953), pp. 256-264.

[41] Ibid., p. 258.

that the need for an objective method of inference is critical in problem-solving. More specifically, he lists two devices for uncoerced group decision-making as being (1) voting procedures and (2) verbal bargaining. Voting is effective in non-technical decisions while verbal bargaining is a powerful mechanism if only verbal snags can be avoided in the bargaining. In summary, effective decision-making in planning seems to hinge upon individual decision, and the elementary consideration of probabilities and desirabilities. This would seem to be true in administrative decision-making, where the choice of the use of the decision-makers is the decision of the administrator himself, and in group decision-making, where the effect of verbal bargaining depends upon a "referee" to guide the discussion toward desired ends.

CHAPTER IV

THE REGIONAL DEVELOPMENT GAME

The emphasis upon the importance of decision-making in the planning process has been intended as a basic justification for the proposed type of simulation to be presented here. If such a simulation can provide a framework for the contribution of knowledge about decision-making vital to planning efforts, it will be useful and valuable in planning decision-making. Further, the ability of the simulation to evaluate alternatives according to some criterion will allow it to function as a planning model. The regional development simulation described is a gaming simulation; that is, it is a model of a process which involves "the use of human decision-makers in the simulation of a real-life situation which concerns conflicting interests."[42]

The theory of games, or decision-making in conflicting situations, is related to regional science by Isard and

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[42]Notes from the course entitled "Urban and Regional Development Systems (UA269)," Graduate School of Public and International Affairs, University of Pittsburgh, Pittsburgh, Pennsylvania, Fall Semester, 1965.

Reiner,[43] and gives an insight into this particular gaming simulation. The inadequacy of the theory for projecting behavior is pointed out in the particular situation of industrial location. An industrialist is assumed to have four courses and four probabilities associated with each alternative in a basic location investment decision. The game is comprised of the following units: nation X, major industrialist, national planning units, regional planning units, and urban planning units. Also, there are exactly four stages of the environment. However, certain questions arise about this matrix:

1. How does the industrialist determine the courses of action available to him?
2. How does he determine probabilities?
3. What about the feedback between the industrialist and the environment?
4. What motivates the industrialist?
5. How does he internalize his probabilities?
6. Does he have a complete set of relevant, if not accurate, information?

Isard and Reiner point out, however, the importance of this approach over the traditional comparative cost, industrial complex analysis, and linear programming, all of which discount the element of uncertainty. More importantly it is shown that the attitude of the industrialist must be

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[43] Walter Isard and Thomas A. Reiner, "Aspects of Decision-making Theory and Regional Science," Papers and Proceedings of the Regional Science Association, IX (Philadelphia: The Regional Science Association, 1962), pp. 25-31.

identified before his behavior can be projected. After all, he may be a conservative-bank type and operate under the minimax philosophy, or perhaps a 100% pessimist, a 100% optimist, a calculating strategist, a mixer of pessimism and optimism, or even a regreter of minimization. In short there are six possible attitudes which indicate that the behavioral aspect must be considered. And attitude not only affects the measurement of satisfaction and the calculation required for a decision, but it also affects what the decision-maker sees as relevant for variables and techniques. A conservative banker would tend to shy away from such techniques as input/output and more likely go with comparative cost. In closing, Isard and Reiner observe that:

> . . . this approach makes it possible to partition planning into directives which have values as their focus, and those which are primarily directed to enlarge or modify the subject's fund of information.[44]

The regional development game is a behavioral gaming simulation in that the role player's attitude is connected to the outcome of the game. In a similar fashion, Metropolis, an urban land use game used for educational purposes only, has considered player attitude.[45] In the regional game, roles are assigned to represent each strategic resource and the interaction of these roles is staged to arrive at an outcome. The

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[44] Ibid., pp. 32-33.

[45] Richard D. Duke, Gaming Simulation in Urban Research (East Lansing, Michigan: Institute for Community Development and Services, Michigan State University, 1964), p. 14.

attitude and particular decision techniques used by the role players are left to their discretion. The relationship of the game to the regional environment, its construction and procedure of play, and typical outcomes are indicated in this chapter, according to a "test" game staged on an actual region.

Abstracting the Regional Process

The complexity of the regional development process has been described in terms of definitions, theories of growth, growth propositions, and structure. It is important at this point to attempt to abstract only significant elements of the regional environment for the framework of the regional development game.

Regional development has been defined as the state of a natural process, measured most commonly by the quality of the environment. It is a dynamic process, determined by certain critical resources which may not be entirely economic in their influence. A typical region could be a multi-city area or a metropolitan area. From the theories of growth, both general and those applied to urban growth (as the focal point in a region), a realization is obtained of the growth of any process in stages. The critical stage occurs when the process has built up the momentum with which to sustain itself. Actually, several processes combine their effects to comprise the regional process. From the spatially-orientated theorists it is indicated that links exist between the behavioral processes and the physical pattern of a region. However, more

exact relationships have yet to be determined.

Properties of the regional process, which render it a unique one, are summarized by Perloff. The regional process is recognized as being highly dynamic, having differential growth as an intimate feature. As such, continuing change and adjustment about some equilibrium is inevitable. Further, it is recognized that elements of national growth play similar roles at the regional level. These elements are natural resources, manpower skills, human resources, aggressive entrepreneurship, infrastructure, amenity resources, and the ability to accommodate change. Capacity for growth is a third important proposition about a region and imposes some sort of constraint upon efficiency. Finally, the efficiency and attractiveness of the regional center is recognized as a significant aspect in regional development.

The structure, or pattern of organization of the region, operates basically under a democratic governmental system and capitalistic economy. A multiplicity of formal and informal types of arrangements exist, having varying jurisdictions and policies for various goals. Public organization is characterized by a traditional governmental structure attempting to meet the demands of a rapidly changing nation. The stress has been the greatest on local governments and their ability to supply changing needs can be examined in the game. Private organizational structure is even more dynamic and undefineable and may only be considered in terms of its resource impact upon the region.

Creating the Simulated Environment

The interaction of the environment and role players is most important to the game. The environment must, therefore, be simulated in a manageable but realistic way. The general approach to the construction of the game-type of simulation is reviewed by Meier and Duke.[46] Space and time must be compressed so that the operation of the game may be consistent with the intense interchange of decisions required. In compressing time, the players, once they have become used to gaming the cycles, require some time for absorbing relevant information, recognizing shifting relationships, and bargaining between players. The resultant compression is approximately one year to one hour, or 10,000:1. Coincidentally, Meier and Duke found the compression of spatial coordinates to be approximately the same, although they soon realized that the reduction in area was actually a hundred million to one. In considering player reduction, the actors are accepted with particular self attributes. Based upon the number of transactions that may transpire in a city and a round of play, they view the amount of reduction to be ten million to one.

The particular regional development game examined here was conceived for an eight-county area in eastern Kansas. The reduction of time varied slightly from the previous ratio (10,000:1), with cycle lengths set at five years. However, any cycle length of two to five years would have seemed

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[46]Meier and Duke, op. cit., pp. 7-8.

suitable for the operation of the game. The eight-county area measured 102 miles from east to west and was reduced to approximately four feet on the base map. This represented a reduction in linear dimension of about 135,000:1, and in areal dimension, therefore, of about eighteen billion to one. Some idea regarding transaction reduction is obtained when it is considered that sixteen players were employed during an intense two hours of play to represent some 300,000 people during a cycle of five years. By an elementary calculation, the ratio of the representation of players per unit of time was 8:1 for the game (16 players:2 hours) and 7:1 for the actual region (300,000 players:43,800 hours). The correspondence, within a similar decimal place, indicates at least a reasonable transaction reduction relationship.

Factors in the selection of the regional environment were not considered critical to the game. In the case of the region in eastern Kansas, the eight-county area was bisected by a large river. The state capital and two other major cities were focal points of the region. Infrastructure ran quite parallel to the river and so there was an obvious east-west orientation. However, the orientation tended to become more dominated by a great metropolitan center as one proceeded eastward and so an arbitrary judgement was made as to the limits of the region. Actually, the region had been predetermined as a part of a regional planning laboratory course in the Department of Regional and Community Planning at Kansas

State University. Obviously, almost any region could have been used, and the selection of the particular area was not crucial as long as certain data were available. In this particular case certain background data had been gathered previously which aided the progress of the project.

The key to providing a workable environment is in the selection of appropriate "stage props" and keeping the level of detail manageable. Since the sources of information in any area are innumerable, it becomes a problem to abstract only that information which is meaningful (a problem not new to most planners). The following "stage props" emerged after a few rounds of play and much consideration:

1. Base Map of the region was posted for each round, showing the industrial, commercial, residential, and institutional land uses only. Rivers, major highways, railroads, lakes, and county boundaries as well as topography were indicated (Plate I).

2. Control Chart was posted for each round, showing the significant roles in order of game decision-making, and flow of the resulting effects. The net effect was evaluated as predominately a scattering or consolidation of resources. Scattering meant random line settlement, further wasteful sprawl, or obsolescence of central areas while consolidation meant utilization of partially developed resources, new towns, industrial estates, or urban renewal (Plate II).

3. Gazette . . . the Regional Breeze newspaper was given to players at the beginning of the round to give clues to business climate, social problems, industrial prospects, and the general political situation. National, state, regional, and local news was integrated into the paper together with extraneous material in order to make the player sort out materials thought to be important (Plate III).

4. Role Instructions were given separately to each role player and were consistent with the material in the newspaper. General financial constraints, operational pressures, and role problems were indicated to give incentive and control to the action.

5. Information Chart was posted for each round and updated by rounds. It contained statistics on employment, labor force, population, housing, schools, and major public facilities.

Player resource roles merit some explanation at this point. These roles were, in many cases, multi-purpose roles because of the temptation for the number of players to quickly get out of hand. The relationship of the different players to resources and to each other are shown in Plate IV. For example, the farm-industrial developer, in attempting to locate a new fertilizer plant, may seek out the banker for credit, the young labor force for employment, the regional planning commission for a particular policy toward fertilizer plants, and in turn visit several locations in quest of the best site. The characteristics of each role, in the order of the required initial decisions, are as follows:

1. Banker who handled the private credit in the region. He was constrained by the general economic situation and the predetermined interest rate. Generally credit was made available to the various developers.

2. Farm-Industrial Developer who was responsible for proposing new industries or additions in the region, giving type, employment required, utilities required, and the preferred location environment. The availability of credit was the only constraint and this player could propose to buy any number of sites for new industries he deemed reasonable.

PLATE I

BASE MAP

ROUND

PLATE II

CONTROL CHART

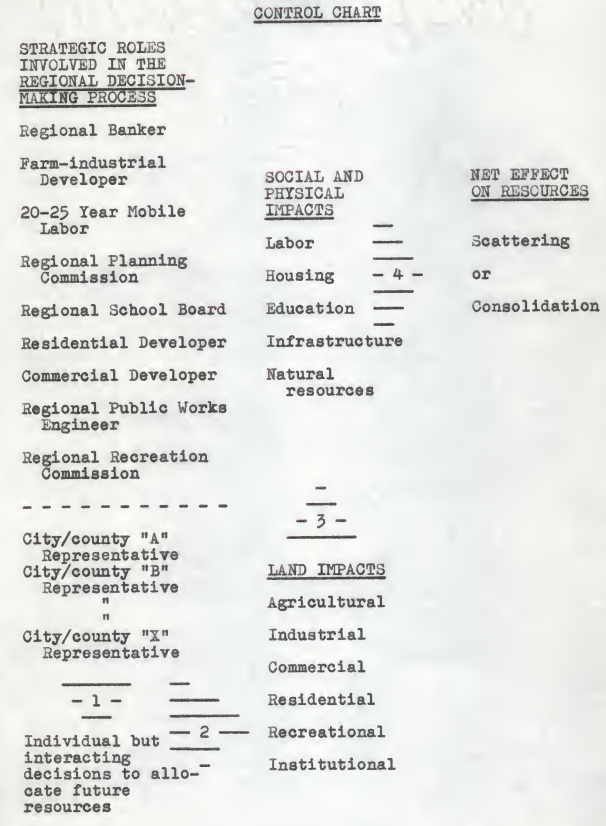

PLATE III

GAZETTE ----- THE REDICAL BREEZE

Vol. 1		Round 1 1905
J. Miller, Editor	D. Stavros, Reporter	J. Miller, Printer

KANSAS A GREAT EDUCATION EXPORTER
says H. H. H.

TOPEKA POLICE DEPARTMENT REPORTS --
Low Crime Rate Among High School Grads,
Teen Rates Remain High

K-State is Title Choice in NCAA

Private CONSTRUCTION Expenditures UP in Region

Auto Sales Will Pass 7,000,000 Mark: Henry Ford II

Senator Fulbright Attacks Plan to Send Surplus Wheat to China

PROMINENT MANHATTANITE RETURNS FROM VACATION IN CALIFORNIA, FINDS MUCH FUN IN THE SUN

*** Viet War Continues; Peace Overtures Fade ***

Hints from Heloies

Kansas Losing Share of Federal Payrolls!

Retail Sales Tax Collections Way Up in Automotive, Food, and Personal Service Business

FLAPPERS JIG TO NEW MORALITY

Tennis Playing Profs Keep Physically Fit

BULLETIN:
KKK TO SELECT NEW OFFICERS

U.S. Farm Bureau Says Total Acreage Decreased While Total Production Increased in Agriculture

Apes Yield Their TV Set To Humans

Per Capita Income in Kansas Below National Average, New Jobs Needed: Governor Avery

Electrical Machinery, Primary Metals Show Gains in State

FLASH***Livestock Sales Up 13% in Region

Brewster Fashions Hit Manhattan

GAZETTE ----- THE REGIONAL BREEZE

Vol. 2		Round 2 1965-70
J. Miller, Editor	D. Stavros, Reporter	J. Miller, Printer

LATEST KANSAS CENSUS SHOWS SURPRISING DISPARITIES IN REGION:

County	1965 pop.	gain 60-65
Topeka	118,900	3600
Lawrence	46,600	900
Manhattan	42,800	900
Junction City	31,500	2900
Holton	11,200	900
Wamego	17,300	5400
Valley Falls	12,600	1350
Alma	7,700	0

Fairchild Exhibits Specimens -Reptiles, Aves, Mammals-

Governor Avery Hails Completion of Milford and Perry Reservoirs

Housing Shortage in Topeka Acute; Many Businesses Affected. Taxes Delinquent; School Financing Threatened

Viet War Loses Intensity -- Peace Hopes Grow

ANN LANDERS SOLVES ALL TEEN AGE PROBS.

U.S. Selling Huge Amounts of Wheat and Grains to China and India; Future Demand UNCERTAIN

Computer Brains Save Time

FLASH -- Volvo For Sale

HOLTON HUNTING PRESERVE ACCLAIMED AS ONE OF FINEST IN THE NATION

Local Acute Shortages of Office Space; Rents Climb

Winter Considers Southern Cal Foot

Kansas River Being Kept Clean by Complete Treatment Plants, say F.H.S. Officials.

Today in--
STUDENT HEALTH

Some Builders in Trouble; Failure Ascribed to Lack of Reference to Regional Plan and Population Changes

PLATE IV

GAMING ROLE RELATIONSHIPS

3. Young Labor Force who was responsible for indicating the preferred migrations for each location. Gross figures of intra-migration and inter-migration of young laborers were assumed in the Kansas game. Any unemployment was considered a problem for the local areas. Constraints were the lack of mobility and limited labor participation.

4. Regional Planning Commission was assumed to have some sort of goals, policies, and programs in mind for the region. The role could involve the distribution of certain federal monies, but no other power for the commission was specified.

5. School Board was responsible for plans and policies of secondary and higher education, including vocational education. It was constrained by the level of its assessments, as an independent type of school district.

6. Residential Developer who was concerned with locating major new housing developments by type, either single or multiple family. He was constrained by the availability of credit and a generally volatile housing market.

7. Commercial Developer who was concerned with major types of service and commercial developments. He was constrained by the availability of credit and the market for such development.

8. Public Works Engineer who was responsible for the types and locations of major public works, using some Federal monies if desired. He was constrained by the availability of funds.

9. Regional Recreation Commission who was concerned with plans and policies for types and preferred locations of major recreational developments. He was constrained by the availability of funds.

10. County Representatives who typically were responsible for securing improvements to their own local environment by attempting to attract the initiatives of the other resource-owning players. They were constrained by recent budget strengths, property tax collections, and the extent of local indebtedness.

Sequence of Play

The sequential decision-making of the regional development game gives it a dynamic character. By adding the time dimension to the static regional relationships, a game results. It is played as a series of cycles, each representing two to five years; in actual play, the cycles are more or less continuous to the particular target year. The program sequence for each round is as follows:

1. Posting of the Base Map of the region, in view of the players.
2. Posting of the Information Chart of the region, in view of the players.
3. Distribution of the Gazette . . . the Regional Breeze to each of the players.
4. Distribution of the Role Instructions to allow decisions to be noted for each player.
5. Proposals of plans or policies are made by each role player in the order given.
6. First initiatives are followed by the final decision required of each role player in the round. Overlays of the Base Map are employed in the process.
7. Evaluation by referee of decisions using the Control Chart and collected decisions and overlays. Feedback results in new constraints, pressures, and problems for the next round.
8. Re-cycle, starting with step 1, until the target year is met.

Trial Run

To give an idea of the types of outcomes that resulted from the playing of this type of gaming simulation, Table 2 is presented. It is a summary of the first trial run for the

TABLE 2

SUMMARY OF FIRST TRIAL RUN GAMING SIMULATION OF AN EIGHT-COUNTY KANSAS REGION 1960-1970

County	Population			New Industries		Housing Units	Remarks
	1970	Increase	% Increase	Plants	Workers		
Shawnee	153,000	12,600	8.9	6	2900	9000	Surplus employment in services, housing surplus and school shortage
Douglas	48,300	4,600	10.5	3	880	2350	General labor surplus, housing and school shortage
Riley	45,300	3,400	8.1	3	805	1200	Labor shortage curtails growth, housing shortage
Geary	33,100	4,500	15.8	1	660	400	Labor shortage curtails growth, consolidation of schools
Jackson	11,800	1,500	14.6	1	285	565	General labor surplus, school consolidation
Potta-watomie	19,550	7,650	64.2	4	995	1200	Shortage of labor curtails growth, housing shortage and school consolidation
Jefferson	13,800	2,550	22.7	1	410	400	General labor surplus, school consolidation
Wabaunsee	7,700	None	None	1	100	100	Labor shortage curtails growth

eight-county Kansas region game 1960-70 which was completed in April, 1966. The players were graduate planning students enrolled in a regional planning laboratory course in the Department of Regional and Community Planning at Kansas State University. Play began in the game year 1960 with a relatively stable or equilibrium situation, and the "Remarks" column indicates the resultant problems that absorbed the players after only two cycles of play. This situation for all the counties had been much worse at the end of the first round due to unfamiliarity with the game; the "Control Chart" indicated much scattering of resources, implying that the role players were not properly taking into account each others decisions. However, the second round of play yielded a strong tendency toward consolidation of resources and allowed the players to recoup some of their losses. Various projects, such as urban renewal, "demonstration cities", industrial parks, highways, reservoirs, treatment plants, and the like were also specified in the game but are not enumerated on the chart.

The process of game play, in which new knowledge about decision-making might be evidenced, was important both to the participants and the observer, the regional planner. It is evident that the role players generally found it desirable to cooperate more in the succeeding round. This action was to be justified since, although the game was somewhat competitive, it was generally intended to be a non-zero sum game;

that is, what one player lost was not necessarily gained by another. As such, cooperation among certain players was meant to be encouraged. To the observer, several things were to be learned from the game procedure. The improvement of interaction among player decisions has already been mentioned. This effect of group education seemed to justify the importance of human decision-makers. An inspection of "Role Instructions" and notes made by each player in coming to his decision indicated the calculations, relevant data, and attitude experienced by each participant. It was possible to make some assessment as to the effectiveness of certain props, and the individual role players actions. Thus, the process of game play, like the regional development process, was characterized by a dynamic and adjusting action, growing by stages toward some end. The importance of resource roles, the effects of regional center attraction, and the limitation of resource constraints were evidenced as being vital to the game process.

CHAPTER V

EVALUATION

The particular course taken in providing new knowledge about the regional development process has now been explained in some detail in this study. It is seen that the proposed gaming simulation can provide a framework for the study of decision-making and its effects on a region. The value of this new knowledge will depend upon the extent to which it is able to make the planner, especially the regional planner, more effective in the performance of his job. This chapter seeks to provide a preliminary evaluation of the gaming simulation of regional development in planning. A method considered appropriate was a survey of practicing planners most likely to be familiar with regional development and planning.

The basic rationale for the evaluation of this model warrants some explanation here. If the outcome of the game is hypothesized to be a valid indicator of the effectiveness and efficiency of the regional plan itself, what is the true indicator of the effectiveness of a regional plan? Some frame of reference is obviously required if one is to evaluate the game. The ultimate answer would be the degree of conformity with which the plan projects future development and the

knowledge it provides the planner about needed land use controls in the process of its formulation. However, there is a definite lack of such calibration of regional plans, or even considerations as to levels of conformity that are required. At this stage in the development of the planning profession, the perceived critical nature of problems has demanded that plans be created and effectuated. Thus, regional plans can only be evaluated "before the fact," by the more traditional methods of cost/benefit analysis, opportunity loss, or functional acceptance. Therefore, in proposing that gaming simulation is effective in planning, either in providing new knowledge about decision-makers or in choosing alternatives, the only conclusion is that the proposal can only be evaluated "before the fact;" it cannot hope to yield any decision rules for a specific determination of the utility of such knowledge or the value of such a simulation framework in planning. An appropriate test of the model, at this point, would seem to be the degree of acceptance of the technique by those most likely to be aware of the utility and value of such knowledge in the total planning process.

Questionnaire Construction

A survey of practicing planners in the United States was conducted with the purpose of eliciting their response upon the value of the technique. Responses were indicated for not only the general approach to gaming simulation but also the particular procedure of this regional game and its

types of outcomes.

The population selected for the survey, from which the sample was taken, was assumed to be most aware of the requirements of the planning process, and would be able to give an authoritative opinion on the gaming approach. Certain membership grades in the American Institute of Planners were polled, an organization which, since 1917, has served as "a national professional society devoted to the study and advancement of the art and science of city, regional, state, and national planning." It was decided that the members most likely to be able to evaluate the regional gaming simulation in relation to regional planning and the regional development process would be those of the rank of Member or Associate Member. The membership requirements of the Institute are quoted from its Handbook and Roster: 1966:

> To be a MEMBER, a person must have had at least eight years of professional planning experience, five of which must have been in positions of relatively high responsibility in direct charge of significant planning work. To be an ASSOCIATE MEMBER, a person must have had four years of planning experience at the professional level, where independent initiative, substantial technical knowledge, and a professional level of training is required. For each of these categories, completed higher education may be substituted for a portion of the required professional experience, with maximum credit (three years) being given for a Master's or PhD degree in planning from a planning school recognized by the Institute.[47]

From the list of some 2400 planners in these two categories, a sample of 10% was taken in a random fashion. The counting technique was merely the choosing of every tenth planner in

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[47]American Institute of Planners, Handbook and Roster: 1966 (Washington: The Institute, 1966), p. 7.

the alphabetical listing who qualified as a Member or Associate Member. It was this sample of names which received a questionnaire entitled "Evaluation of the Regional Gaming Simulation" (Plate V). The cover letter contained a statement from a letter to the author by Mr. Robert L. Williams, Executive Director of the American Institute of Planners, in a further attempt to elicit response from the recipients. Also enclosed was a copy of the "Control Chart" to give an indication of the roles, resources, and their relationships.

The limitations of this type of questionnaire were evident from the beginning, but it was recognized that some useful and very necessary information could be derived from it for later use. The most obvious limitation on the utility of the questionnaire was the lack of education in applying the technique to planning; the need for communication of the idea of gaming simulation was greater than would be required for more common techniques. Even if the idea had been communicated, the lack of general experience with various examples of the technique might have led a respondent very experienced with one type of gaming simulation to raise many questions and give a non-conclusive opinion. Marquis, in response to the questionnaire sent him, indicates this limitation:

PLATE V

EVALUATION OF THE REGIONAL GAMING SIMULATION

Purpose of Gaming Simulation:

Gaming simulation is one way to approach the decision-making framework in any multi-city region. This is done by assigning roles representing each strategic resource and staging their interaction to arrive at an outcome.

1. Please evaluate this approach by checking the item that most closely corresponds to your opinion of the approach:

(a)____	(b)____	(c)____	(d)____	(e)____
Very helpful for planning	Somewhat helpful for planning	Not certain	Somewhat hinders planning	Very much hinders planning

2. Why do you feel this way?_____ _____

_____

A Procedure for Regional Gaming Simulation:

Play occure by rounds, each compressing 2-5 years into about two hours, using the last available data:

A. The first step begins with each resource role player considering the following data: base map of the region, supporting economic and social data, regional newspaper, and his individual role instructions.

B. Plans and policies are presented by each player in the order specified on the Control Chart(see next page).

C. They discuss these plans and policies and then arrive at final decisions for the round.

D. Each round is evaluated on the Control Chart and changes are then fed into the next round through altering the base map, newspaper, and role instructions.

E. The above process is repeated until the target year is met.

3. Please evaluate this procedure by checking the item that most closely corresponds to your opinion of the procedure:

(a)____	(b)____	(c)____	(d)____	(e)____
Very realistic for planning	Somewhat realistic for planning	Not certain	Somewhat unrealistic for planning	Very unrealistic for planning

Using this procedure, the outcome of the game (1) shows the tendency for scattering or consolidation of resources, (2) discloses critical problems requiring attention, (3) determines future gross land use areas, and (4) produces a future changed situation of the region.

4. Please evaluate this outcome by checking the item that most closely corresponds to your opinion of the outcome:

(a)____	(b)____	(c)____	(d)____	(e)____
Very useful for planning	Somewhat useful for planning	Not certain	Somewhat detrimental to planning	Very detrimental to planning

Please answer the following general questions:

5. Have you had previous experience with gaming simulation? Yes___No___

6. What is your original field of training? Planner___Architect___ Engineer___Other_____

7. What is your age? Under 25___ 25-34___ 35-44___ 45-54___ 55-64___ Over 65___

> Actually, I cannot adequately answer any of your questions . . . I suspect that this may be partly because I am too familiar with the operational gaming or gaming simulation approach, having been close to Dick Duke at Michigan State University over the last several years as he has developed his Metropolis and M.E.T.R.O. gaming instruments. Thus, each one of your very general questions raises in my mind too many specific, pragmatic questions which would have to be answered . . .[48]

Thus, under these conditions, the questionnaire could only be expected to evoke opinions based upon the best judgement of the individual regarding its use, and, as such, would be expected to yield a low return. The five-unit scale of preference, used in the three opinion questions, was constructed to allow a diversity of opinion from positive to negative response. Thus, this survey was considered to be only a preliminary test of the utility and value of gaming simulation in regional planning.

Survey Results and Analysis

Of the 10% sample of planners in the United States who were sent questionnaires, the proportion of the response of the sample was 46%. Therefore, by an elementary calculation, the actual response to the questionnaire evaluation represented a sample of approximately 4.6% of the senior membership of the American Institute of Planners. However, a diversity of experience was represented, as well as locale; some thirty-one states and the District of Columbia were represented, with the state of California comprising almost

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[48]Letter from Stewart D. Marquis, Institute for Community Development, Michigan State University, January 9, 1967.

19% of the sample.[49]

The "Composite Detailed Summary" (Table 3) indicates the total responses to the opinion questions and general information questions. It is obvious that there was at least a mild acceptance of the utility and value of gaming simulation in planning. However, the positive response was slightly greater with the general approach (50%) than with the particular procedure (44%) while the negative response was greater for the procedure (15%) than with the general approach (5%). Thus, the figures indicate that, of those who voiced a definite opinion, the acceptance of the approach was greater than the particular procedure, although both were quite acceptable. It is also quite evident that there was much uncertainty toward the technique; the percentage of responses given as "not certain" or "no opinion" was 41-45% of the total responses for each of these questions. In comparison to the percentage of respondents who had not had previous experience with gaming simulation at all (67%), a high degree of uncertainty, even among those with experience, could be expected. Planners comprised 58% of the respondents, while the modal age was about 40 years of age. From this table it can be concluded that there was at least a mild acceptance of the technique, but that the respondents were slightly more willing to accept the general approach than the particular procedure outlined in the questionnaire.

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[49]California contained 17% of the senior membership of AIP in 1966.

TABLE 3

COMPOSITE DETAILED SUMMARY OF RESULTS OF THE EVALUATION OF THE REGIONAL GAMING SIMULATION

Question and Subject	Choices	Response	Per cent of Question Response
1. Helpfulness of the approach in planning	(a) Very helpful	21	20
	(b) Somewhat helpful	32	30
	(c) Not certain	48	45
	(d) Somewhat hinders	4	4
	(e) Very much hinders	1	1
3. Realism of this procedure for planning	(a) Very realistic	4	4
	(b) Somewhat realistic	42	40
	(c) Not certain	44	41
	(d) Somewhat unrealistic	12	11
	(e) Very unrealistic	4	4
4. Utility of outcomes for planning	(a) Very useful	13	11
	(b) Somewhat useful	40	38
	(c) Not certain	46	44
	(d) Somewhat detrimental	5	5
	(e) Very detrimental	2	2
5. Previous experience with gaming simulation	Yes	35	33
	No	71	67
6. Original field of training[a]	Planner	61	47
	Architect	25	19
	Engineer	14	11
	Other	30	23
7. Age	Under 25	1	1
	25-34	29	27
	35-44	50	47
	45-54	17	16
	55-64	3	3
	Over 65	2	2
	Unknown	4	4

[a]Several respondents were evidently trained as both planners and architects or engineers. Therefore, the total responses to this question are substantially more than the number of respondents. However, respondents who were at least trained as planners numbered 58% of the total.

It is also revealing to examine the opinions given in the survey with regard to whether or not the respondents had had previous experience with gaming simulation. Also, differences in opinion might be related to the particular type of original field of training: planner, designer, or other. "Categorical Summary #1" (Table 4) gives the variation of responses to the opinion questions in relation to experience with gaming simulation and field of training. Again, of those who indicated a definite opinion, the consensus was in acceptance of the technique. However, it is rather interesting that previous experience with the technique did not seem to affect, significantly, the proportion of those who found the approach, procedure, or outcomes acceptable for planning. It is not surprising, though, that the lack of experience with it produced the largest difference in percentage of uncertainty among total respondents with 33% (53%-20%) for question #1, and this difference dropped to 16% with question #3 and to a mere 6% with question #4. Correspondingly, the figures for planners were 35%, 10%, and 3%, seemingly insignificant in regard to all respondents. In summary, this table seems to reveal that the field of training, especially in planning, is not significant in evaluating this game; however, the degree of uncertainty seemed to be indicated by the question of whether or not previous experience with gaming simulation had been had. Thus, previous experience with the technique allowed the respondents to make a more definite evaluation of

TABLE 4

CATEGORICAL SUMMARY #1
THE VARIATION OF RESPONSES WITH EXPERIENCE AND FIELD OF TRAINING IN THE EVALUATION OF THE REGIONAL GAMING SIMULATION

Question and Choices	Previous experience with gaming simulation?											
	Yes						No					
	Total		Planner		Designer		Total		Planner		Designer	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
1. Helpfulness of the approach												
a or b	24	69	18	70	3	--	29	43	17	47	5	--
c or n.o.	7	20	4	15	2	--	36	53	18	50	11	--
d or e	4	11	4	15	0	--	3	4	1	3	2	--
3. Realism of the procedure												
a or b	18	51	12	45	3	--	28	41	15	42	5	--
c or n.o.	10	29	8	32	1	--	31	45	15	42	11	--
d or e	7	20	6	23	1	--	9	14	6	16	2	--
4. Utility of the outcomes												
a or b	18	51	13	50	2	--	35	52	20	55	6	--
c or n.o.	13	38	10	39	2	--	30	44	15	42	10	--
d or e	4	11	3	11	1	--	3	4	1	3	2	--

the approach, but less of a definite evaluation of this particular procedure, and even less or no difference with the outcomes.

"Categorical Summary #2" (Table 5) indicates the differences in opinion responses and in experience with gaming simulation with respect to the age of the respondent. At first hand there seemed to be no significant difference in the exposure to gaming simulation with age; over 55, the sample was too small to allow comparison, even at this elementary level. There was a significant trend in uncertainty with age, however; question #1 attracted a greater proportion of uncertainty with increased age groups, while questions #3 and #4 allowed a more definite opinion with age increase. Of those respondents who ventured a definite opinion, the proportion of acceptances for all questions increased markedly and gradually with increased age groups, indicating the marks of maturity and experience.

Conclusions

This study suggests that the technique of gaming simulation can be of definite utility and value to the practicing planner, especially the regional planner, in attempting to accommodate regional development. By simulating the critical elements of the actual regional environment, a game framework is possible which allows the planner to view his region or resource area "in the laboratory." The extent to which such a game framework of regional development might be used will

TABLE 5

CATEGORICAL SUMMARY #2
THE VARIATION OF RESPONSES WITH AGE IN THE EVALUATION
OF THE REGIONAL GAMING SIMULATION

Question and Choices	25-34		35-44		45-54		Over 55	
	No.	%	No.	%	No.	%	No.	%
1. Helpfulness of the approach								
a or b	17	57	24	49	10	59	0	--
c or n.o.	10	33	22	45	7	41	4	--
d or e	3	10	3	6	0	0	1	--
3. Realism of the procedure								
a or b	12	40	21	43	12	71	0	--
c or n.o.	11	36	22	45	3	18	4	--
d or e	7	24	6	12	2	11	1	--
4. Utility of the outcomes								
a or b	14	47	25	51	12	71	0	--
c or n.o.	12	40	22	45	5	29	4	--
d or e	4	13	2	4	0	0	1	--
5. Previous experience								
Yes	12	40	15	31	7	41	1	--
No	18	60	34	69	10	59	4	--

depend upon the depth at which the planning problem is perceived by the planner. In this regard the potential of the game in planning education will be realized as greater insight into the game of life is perceived; it cannot be overstated that the key word in education is perception.

The technique of gaming simulation as described herein seems to be quite useful in the planning process in providing a very workable and comprehensive framework for the study of actual decision-making in a region, or in any environment concerned with resource planning. This environment allows the decision-makers to recognize their relationship to resource patterns of development. Consequences of decisions over time can be realized, as well as the sensitivities of resources to decisions. The framework would even allow the testing of new decision techniques as part of the play of the game. More research into the more critical relationships of decision-making and the regional pattern is warranted within the scope of this particular game framework.

To the practicing planner who must carry on regional planning, in particular, the technique seems to provide a method of testing the reasonableness of plan alternatives by comparison to outcomes very likely to result in the actual region. Thus, as a decision-making tool, the technique allows a framework for evaluating effects of certain problems and solutions, as well as data that comprised those solutions. Perhaps, comparative norms can be established from much play

of the game, which would lead to more realistic criteria for planning. Research in this regard is warranted, especially at the scale of regional development where goals tend to be very general.

The technique of behavioral gaming simulation, generally, has much to offer in this age of concern for problem-solving. The growth of computer simulations has relieved man of the drudgery of routine calculations; however, it does not necessarily follow that such formulations have clarified his perspective in approaching solutions to such vital problems as transportation, air and water pollution, and depressed economies. These require the knowledgeable and flexible intimacy of human perception. By providing a realistic environment for the interaction of human decision-makers who control vital resources, be they economic, social, physical, or political, such intimacy should reward one's best efforts to guide this interaction process toward desired ends. It is to this end toward which this study is dedicated.

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PLANNING APPLICATIONS OF A GAMING SIMULATION OF REGIONAL DEVELOPMENT

by

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The various approaches to understanding the process of regional development, especially in performing regional planning studies, have been characterized more by a fading of the traditional boundaries which separate contributing disciplines than a deliberate inter-disciplinary thesis. Although the regional development process is complex, certain economic theories have been proposed which attempt to explain the dynamic aspects of the regional development process: location theory and theories of the spatial differentiation of economic growth. The regional planner, in his task of providing a framework for resolving problems in economic and resource development, requires a more workable focus for this task, if his role is to be more effective. A gaming simulation of regional development is proposed toward this end; the utility and value of this model will depend upon its ability to provide new knowledge about regional development and to what extent the knowledge it provides makes the regional planner more effective in his job.

The use of the gaming simulation technique in planning for regional development requires a more complete understanding of the theory, propositions, and structure of the development process. Descriptions of economic, social, political, and other processes suggest that these processes have common stages of growth. Further, it is recognized that critical linkages exist between activities resulting from these processes and growth patterns. Among important

propositions about the regional development process are its dynamic and inherently adjusting character, the important role of resources, the effect of regional capacity, and the growth of regional centers. The public and private structure for developing a region involves a multiplicity of formal and informal organizational arrangements; their total effect is such that region-wide decisions arise out of conflict among agencies of varying jurisdictions. For the regional planner, a realization of regional resource potentials is most important.

In simulating the process of regional development, the effective use of new knowledge obtained from this model can aid in making decisions for planning. Although planning models are few, the proposed type of regional development simulation is needed in regional planning efforts to allow a framework for selecting the best plan among given alternatives in response to set criteria. In fact, in studying regional decision-making, the game can also contribute knowledge about this as it affects planning and thereby establish norms which will set criteria. The making of important decisions, whether they be regional decisions under study in the game or planning decisions as a result of the game, ultimately rest with the individual in the position of responsibility. The simulation framework can give the regional planner a workable focus for the consideration of such decisions.

The regional development game, theoretically, is based

upon the concept of decision-making in conflict situations. The influence of the attitude of the decision-maker in measuring his satisfaction, calculating for a decision, or even in seeing what is relevant, cannot be overestimated. In abstracting the regional process to create the simulated environment of the game, a compression of time and space is obviously required. A trial run of the game was made on an eight-county region in eastern Kansas and employed the following "stage props:" base map, control chart, regional newspaper, role instructions, and comprehensive data chart. Role players, representing limited resources, were employed to make decisions for each round of play of the game. These players assumed somewhat conflicting roles and included bankers, developers, regional officials, local officials, and a regional planning commission. The sequence of play for each round allowed ample opportunity for the interaction of decisions. Final decisions were summarized on the control chart and their results fed into the next round of play until the target year was met. The need for cooperation among certain players became evident to participants in the trial run.

An appropriate but preliminary method for evaluating the regional development gaming simulation was a survey of practicing planners likely to be most familiar with regional development and planning. A questionnaire was sent to a sample of senior members of the American Institute of Planners in order to allow an evaluation of the general approach, the

particular procedure, and outcomes of the game. An analysis of the results indicated that, although there was much uncertainty as to the usefulness of gaming simulation in planning, there was at least mild acceptance among those who voiced an opinion.

This type of framework for a gaming simulation of regional development seems to be promising for use in regional planning education, research, and practice. It provides not only a convenient environment for studying decision-making in a region in relation to resource patterns and the development process, but also it allows a realistic method of testing alternatives of a regional plan. Further research is proposed for the calibration and identification of critical game elements, based upon the actual regional environment.