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ECONOMIC RESEARCH PROBLEMS AND LONG-RUN RESEARCH NEEDS IN RURAL DEVELOPMENT

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ECONOMIC RESEARCH PROBLEMS AND LONG-RUN RESEARCH NEEDS IN RURAL DEVELOPMENT

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Discussion of economic research problems and long-run research needs in rural development is really nothing new in the land-grant universities and the U.S. Department of Agriculture. We've talked about these concerns in one form or another in numerous meetings in the past 20 years, but, perhaps, without much perceptible impact upon either the problem or the research community. Establishment of the North Central Regional Center for Rural Development at Ames is one encouraging event in an otherwise bleak outlook in agricultural economics research on the problems of rural areas.

While the premises of the pessimistic outlook in rural development research can be challenged, we probably have a basis for agreement on a research focus upon the felt needs of rural people and their institutions. In this particular discussion, the felt needs are confined largely to those which can be tackled by research teams of economists and physical scientists.

Problem Focus

Research emphasis on the felt needs of rural people and their institutions can be achieved in several ways for our particular purposes. First, issue areas can be identified in terms of significant external effects of given power cluster activities in rural areas, such as industrial development or energy production. Second, policy areas can be delineated in terms of broad program areas, such as community development, for achieving given national goals. Finally, research program areas can be related to both issue areas and policy areas.

Issue areas

Issue areas are identified in terms of the institutions and individuals that form an interacting group concerned about the control and operation of a particular program or process. For example, in the reports of Regional Development Commissions a more-or-less common set of issue areas is cited which includes (1) agricultural and industrial development, (2) transportation, (3) manpower development and training, (4) education, (5) housing, (6) health care, (7) environmental management, including residuals recycling, (8) recreation, (9) energy resources, and (10) governmental services (32).[1/] Power clusters form around these issue areas and attempt to deal with the felt needs of the interested and interacting parties by achieving a certain degree of closure of conflicting interests (which may be organized vertically with effective communication all the way from a local municipality, for example, to federal agency).

When the felt problems in the specific issue areas are resolved in ways that no longer make possible the internalization of the decision outcomes, inter-area conflicts emerge that may require extensive public intervention in their resolution (33). For example, two issue areas which experience inter-area conflicts are industrial development and environmental management issue areas. Similarly, points of conflict occur between the recreation and energy resources areas, and between transportation and housing. Decision outcomes in these issue areas are no longer internalized. Certain adverse side effects occur which penalize individuals and organizations outside the given power structure.

1/ Literature cited is listed numerically at end of chapter.

Each of the issue areas cited earlier relate to rural development. From a physical science viewpoint, however, several issue areas are less readily researched than other issue areas. Those areas relating to natural resources development, for example, are researched more by the research team of economists and physical scientists than the issue areas relating to human resource development. But even in the latter case, the question of facility location recurs as an important one requiring certain physical science inputs.

Policy areas

Policy areas are viewed as groupings of issue areas in which the side effects of inter-area conflicts are internalized. The key words are "coordination" and "cooperation". Efforts to restructure federal agencies into four major policy areas -- community development, human resources, economic development and natural resources -- are rationalized by stated desires to reduce duplication and improve effectiveness. Administratively, however, inter-area conflicts are internalized within a potential new grouping of power clusters, which may be an entirely new mix of participants or a re-arrangement of roles of existing participants.

Again, the policy areas cited have varying degrees of importance to (1) rural development and (2) physical/economic research. Because of the territorial basis of governmental organization, perhaps, a majority of policy areas are placed-oriented rather than people-oriented. Rural

development, also, is primarily place-oriented. Although the emphasis is upon the problems of rural people and institutions, most rural development efforts are confined to a particular territory and to the determinants of place-prosperity rather than people-prosperity (21).

Research teams of applied physical scientists and economists also may have an affinity for research emphasizing place rather than people. Even in the case of rural development research, more effort is directed towards the resource and economic base of rural areas than its people and their ability to live successfully in a metropolitan society.

Research areas

Research areas represent groupings of information-producing activities for facilitating decision making and problem solving in rural development. Presently, however, research areas in rural development are identified by a variety of headings which have a lot in common with the history of agricultural research.

In an early effort to identify research areas in rural development, selected Research Problem Areas (RPA's) cited in the Cooperative State Research Service (CSRS) guidelines were placed in two groups (48). In Group I, in which the principal focus of the research is rural community and human resource development, the selected RPA's are as follows:

801 Housing for Rural Families
802 Individual and Family Decision Making and Financial Management
803 Causes of Poverty Among Rural People
804 Improvement of Economic Potential Among Rural People

805 Communication and Education Processes
806 Individual and Family Adjustment to Change
807 Improved Income Opportunities in Rural Communities
808 Improvement of Rural Community Institutions and Services

In Group I the selected RPA's are in whole or part are under the Rural Development rubric when it can be demonstrated that the research will be done as a specific input to a rural development program. Specific parts of each RPA that qualify under the Rural Development definition are noted in parentheses as follows:

101 Appraisal of Soil Resources (b, c)
104 Alternative Uses of Land (a, b, c, e)
105 Conservation and Efficient Use of Water (f)
107 Erosion Control and Watershed Management (c, e, g)
108 Economic and Legal Problems in Management of Water and Watersheds (a, b, c, d, e, f, g, h)
110 Appraisal of Forest and Range Resources (d)
113 Remote Sensing (d)
114 Research Management (g)
203 Prevention and Control of Forest and Range Fires (d, e, h, i)
302 New and Improved Forest Engineering Systems (c)
316 Farm Business Management (a, b, c, d, e, f)
510 Farmer Cooperatives and Bargaining Power (c, d)
608 Government Programs to Balance Farm Output and Market Demand (a, b, c, d)
902 Outdoor Recreation (a, b, c, d, e, f, g)
905 Trees to Enhance Rural and Urban Environment (a, b, c, d, e, f)
906 Culture and Protection of Ornamentals Turf (a, b, c, d, e, f)

In an effort to relate the issue areas and policy areas cited earlier to the listing of RPA's, a two-way table was prepared with the eight Group I RPA's and the 16 Group II RPA's were listed according to issue area and policy area. In the classification, one or more RPA's fall under each of the 10 issue areas, expect the energy resources area, and to each of the four policy areas.

When the listing of RPA's was applied to the classification of 101 rural development research projects in the North Central Region, which were reported by the CSRS, approximately one-half of the projects fell into one issue area and one policy area. In five issue areas not more than two projects were identified and, indeed, in two areas no research projects were listed. Thus, rural development research in the North Central States, at least according to this one effort in project classification, is as much concerned with the economic development of the agricultural and industrial sectors as with all other facets of rural development.

A definition of rural development is implicit in the preceding discussion which relates to (1) the export-producing, (2) the residentiary and service, and (3) the social priority-setting activities of rural communities. Rather than provide another definition of rural development, however, the purpose in this presentation is to identify and assess the economic activities of rural areas that are the focus of alternative economic development strategies.

Economic Development Strategies

Discussion of economic development strategies is concerned with the formulation and implementation of a "long-run approach to the positive development of rural areas in the United States." Long-run development approaches are identified for achieving (1) balanced national growth in

export-producing activities, (2) optimal management scale of service delivery, and (3) widespread citizen participation in social priority setting. Each of the development approaches has certain information requirements and knowledge needs which are the special concerns of this discussion.

Export-base expansion

Concern about lagging regions and rural-urban disparities is translated into a domestic development strategies for enhancing the viability of an area's economic base. Early efforts in "rural industrialization" were motivated by the idea of creating new jobs where jobs were needed by inducing expanding or relocating industries to move into rural areas. Emphasis was on jobs and income as the primary and, indeed, only means of improving rural well being (7).

By emphasizing the job creating potentials of new industries, certain kinds of development approaches are favored, such as agricultural and industrial development, energy use and production, and public enterprise development, which are market-oriented approaches to the expansion of the export-producing activities. However, public enterprise development deals with the relaxation of supply constraints, too. In addition, land control, while primarily a state-level responsibility, may involve both local and federal agencies in the development of state-wide land control measures for the purpose of promoting rural-urban balance. Hence, public enterprise development and land control represent additional strategies for affecting the supply of resources in programs of balanced national development. But the common element in each of the three sorts of strategies is the spatial-economic scale of

strategy design and implementation -- not multi-county but multi-area i.e., regional.

The Upper Midwest is used as a prototype development region to illustrate the results of disparities in the range of choice for business and households (fig.1). Contrasting population trends occur for the core area, which is the seven-county Twin City metropolitan area, and the outlying areas (table 1). The core area is the first to be examined because it offers insight into the processes of regional change.

In 1950, the Minneapolis-St. Paul core area accounted for 22 percent of the total regional population; by 1970, the percentage had increased to 32. The core area growth of 55 percent for the 1950-70 period compares with the total growth of 3 percent for the rest of the region (table 2). The differential growth is associated with high levels of private investment in job-creating industrial and commercial activities in the core area.

An approximately 100-mile influence zone around the Minneapolis-St. Paul core area includes the core area satellite cities, which are identified in fig. 1., namely, St. Cloud, Willmar, Mankato, Rochester, and Eau Claire. The third ring of satellite cities are the subregional growth poles of approximately 100,000 people, namely, Fargo-Moorhead, Sioux Falls and Duluth-Superior. In addition Wausau, Wisconsin, which is within the second ring of satellite cities, is included. However, Wausau is dependent upon Green Bay as well as Minneapolis-St. Paul, and Green Bay is part of the Chicago-Milwaukee regional system. Each of the second ring of satellite cities within a

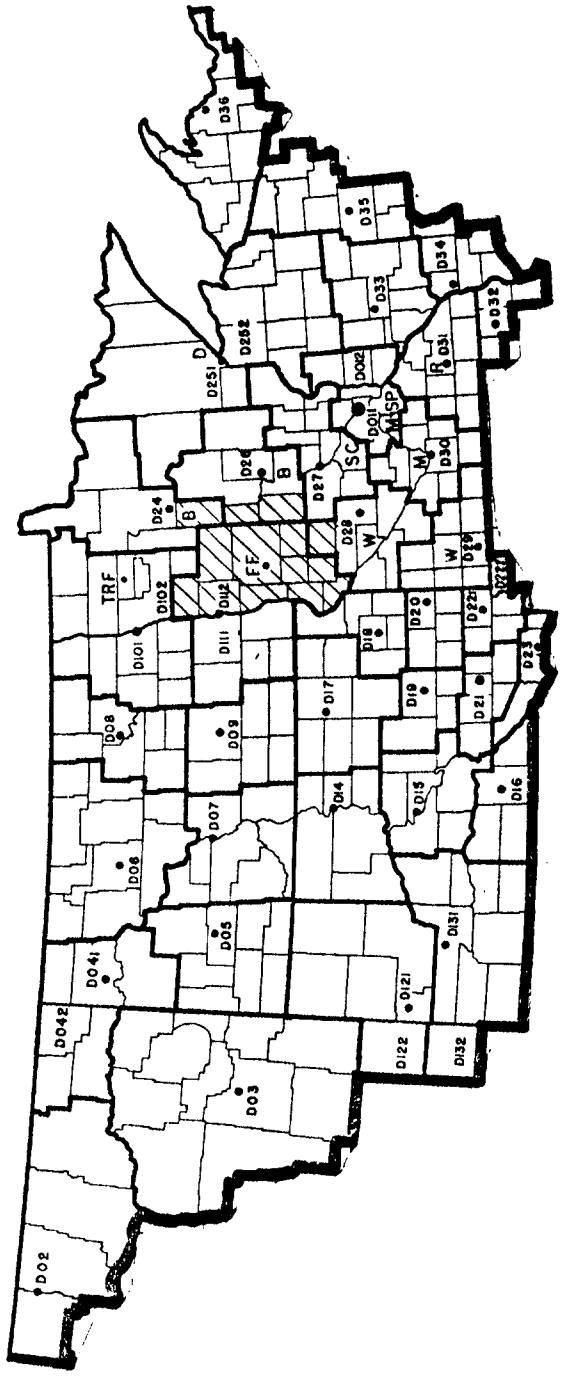


Fig. 1. Multi-county Commuting Areas in Upper Midwest Region

Table 1. Components of population change in specified areas of Upper Midwest, 1960-1970.[1/]

Area	1960	Change 1960-1970 Natural Increase Births	Natural Increase Deaths	Net migration	Total Change	1970
Twin Cities Metropolitan Area:						
Central Cities	796,283	164,914	91,390	-125,427	- 51,903	744,380
Outside Central Cities[2/]	729,014	212,780	45,855	234,061	400,986	1,130,000
Total	1,525,297	377,694	137,245	108,634	349,083	1,874,380
Fargo-Moorehead SMSA:						
Central Cities	69,596	15,893	5,330	2,893	13,456	83,052
Outside Central Cities	36,431	7,049	2,999	-3,295	755	37,186
Total	106,027	22,942	8,329	- 402	14,211	120,238
Sioux Falls SMSA:						
Central City	65,466	17,069	5,853	-4,194	7,022	72,488
Outside Central Cities	21,109	3,510	1,640	- 258	1,612	22,721
Total	86,575	20,579	7,493	-4,452	8,634	95,209
Duluth-Superior SMSA:						
Central Cities	140,447	26,975	17,108	-17,499	-7,632	132,815
Outside Central Cities	136,149	22,453	13,390	-12,677	-3,614	132,535
Total	276,596	49,428	30,498	-30,176	-11,246	265,350
Rochester SMSA:						
Central City	40,663	11,393	3,651	5,352	13,094	53,757
Outside Central City	24,869	6,815	1,375	31	5,471	30,340
Total	65,532	18,208	5,026	5,383	18,565	84,097
Other metropolitan related counties:						
Blue Earth (Mankato)	44,385	9,369	4,286	2,854	7,937	52,322
Stearns (St. Cloud)	80,345	20,584	6,497	968	15,055	95,400
Kandiyohi (Willmar)	29,987	5,365	2,851	-1,953	561	30,548
Extended suburban (6 counties)	111,433	24,894	12,093	15,598	28,399	139,832
Total	266,150	60,212	25,727	17,467	51,952	318,102
West Minnesota Study Area	248,998	45,500	25,602	-20,462	-564	248,434
Remainder of State[3/]	1,037,219	191,415	105,432	-110,508	-24,525	1,012,694
All Areas (Minnesota)	3,413,864	743,549	326,947	-25,485	391,117	3,804,981

1/ U.S. Bureau of Census, 1970 Census of Population and Housing, Minnesota, South Dakota series PHC(2)-25, "General Demographic Trends for Metropolitan Areas 1960 to 1970". U.S. Government Printing Office, Washington, D. C., July 1971.

2/ Includes Carver and Scott counties and the five counties in the Minneapolis-St. Paul SMSA.

3/ All areas except Minneapolis and other Metro areas, Rochester, West Minnesota and Minnesota side of Duluth-Superior and Fargo-Moorehead SMSA.

Table 2. Ranking of environmental areas by percentage change in population, and related statistics, Upper Midwest Region, 1950-1970

Area center	Area code	Population 1950	Population 1970	Change, 1950-70: Core county	Change, 1950-70: Other counties	Change, 1950-70: Total area
		(1,000)	(1,000)	(pct)	(pct)	(pct)
Minneapolis-St. Paul	1	1,258.0	1,946.5	39	128	55
Rapid City	13	72.3	93.9	73	-8	30
St. Cloud	27	211.3	264.2	33	21	25
Marshfield	35	249.3	290.3	18	16	16
Rochester	31	286.5	331.3	69	5	16
Sioux Falls	22	119.3	136.6	34	-15	15
Mankato	30	231.2	261.3	37	8	13
Bismark	7	77.3	83.7	54	-14	8
Pierre	15	24.2	26.0	43	-11	7
Eau Claire	33	237.3	248.5	19	-1	5
Deadwood	12	58.9	61.2	2	5	4
Decorah	32	65.5	68.1	60	-10	4
Fargo-Moorhead	11	301.7	308.1	33	-11	2
LaCrosse	34	182.7	186.5	18	-8	2
Duluth-Superior	25	463.4	465.2	6	-4	0
Minot	6	124.4	125.2	68	-25	-1
Havre	2	40.5	39.8	18	-13	-2
Yankton	23	52.7	51.9	13	-8	-2
Brookings	20	55.2	54.0	20	-13	-2
Marquette	36	188.3	183.6	34	-15	-3
Williston	4	49.4	48.1	17	-12	-3
Grand Forks	10	205.3	199.4	54	-16	-3
Bemidji	24	68.1	64.7	-7	-5	-5
Worthington	29	152.6	144.6	3	-7	-5
Brainerd	26	128.7	121.1	-5	-5	-5
Miles City	3	59.0	55.8	-6	-5	-5
Mitchell	21	49.6	45.8	4	-14	-8
Winner	16	25.5	23.4	-12	-6	-8
Dickinson	5	46.9	42.5	22	-26	-9
Aberdeen	17	84.0	75.6	12	-24	-10
Mobridge	14	30.1	27.0	0	-14	-10
Willmar	28	150.9	134.3	5	-15	-11
Huron	19	37.9	33.2	-2	-26	-12
Watertown	18	67.2	55.3	-1	-24	-18
Jamestown	9	62.9	51.2	-4	-28	-19
Devils Lake	8	64.3	50.1	-11	-25	-22
All areas	--	5,582.4	6,399.0	31	4	15

100-mile influence zone has its own ring of satellite cities; these are the area service centers outside the regional core area zones of influence.

The regional center, the regional subcenters, and the dependent area centers form potential subregional development districts in the Upper Midwest. Where the big metropolitan regions have a common boundary, subregional development districts are likely to depend partly upon the two regional centers for certain high order services, e.g., Wausau-Green Bay subregional development district. Still other subregional development districts may be delineated in the big region focusing upon Minneapolis-St. Paul core area, but the identification of the core area of these districts is difficult because of their large geographic size and the lack of dependent satellite cities that might serve as subregional centers (9a,23,31,35).

One subregional center, namely Fargo-Moorhead, has been identified as a potential focal area for rural development programs in the Upper Midwest (fig. 2).Altogether, seven environmental planning areas in western Minnesota and eastern North Dakota make up the multi-area district. In addition, the Red River Basin segment of the Souris-Red-Rainey River Basins planning region is included within the district boundaries (2, 14).

Within the development district, a 14-county environmental planning area has been selected, as delineated in fig.1., for intensive study of the present and potential role of local government in subregional development.

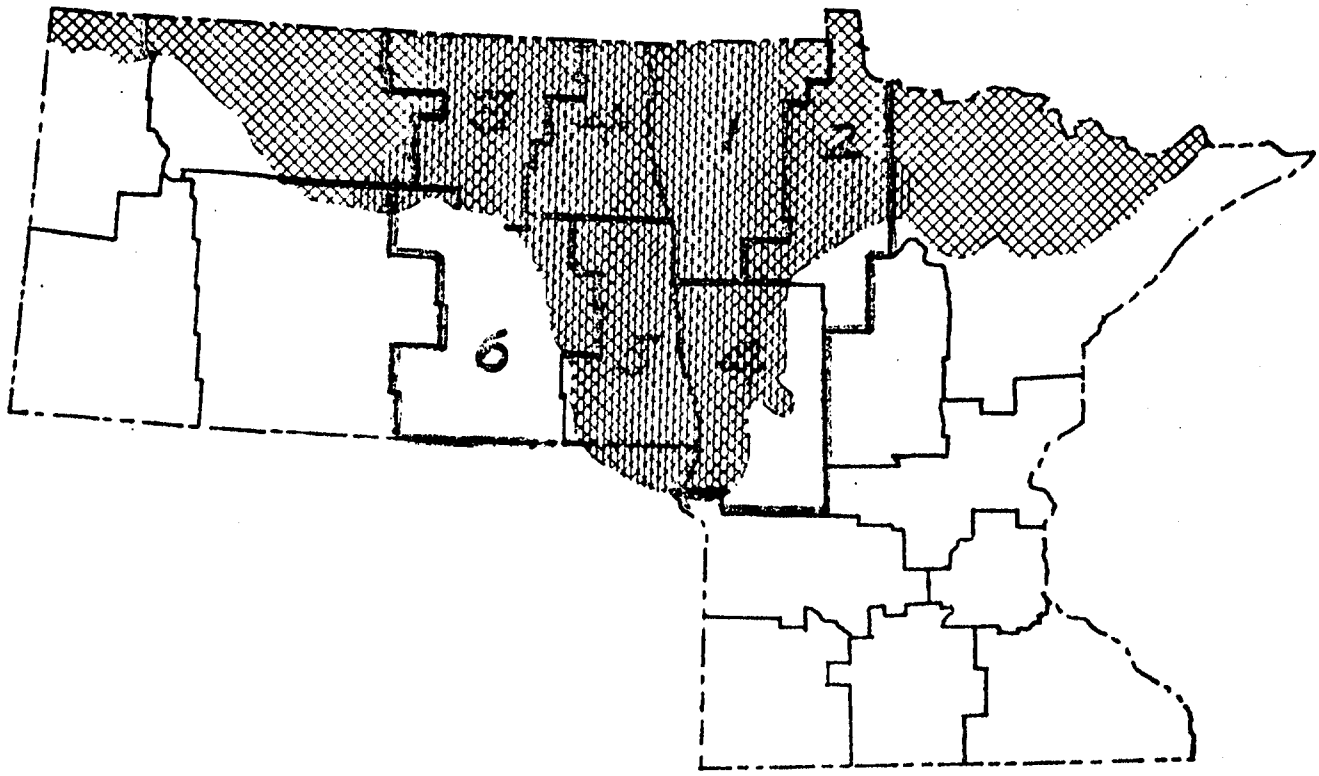


Fig. 2. Fargo-Moorhead development subregion, Souris-Red-Rainey River Basins and state planning areas in Minnesota and North Dakota portion of regional system.

Seven so-called functional communities, (i.e., local service areas) are delineated within the 14-county study area. Each of the functional communities is identified by a primary and a secondary area service center (fig. 3).

Area service centers have emerged in West Minnesota and elsewhere simply because of their dominant position in providing high order services to smaller local centers and to the local open-country population. Together with the small local service centers, which oftentimes are county seat towns, the area centers have become the key links in an emerging decentralized system of state and federal services. But to facilitate the trend towards economic decentralization, the regional development system must be established as a viable entity for achieving certain regional development objectives which are likely to be part of national efforts in achieving balanced national growth (40a,42a,26,49,52,54)

Energy use and production is involved, also, in achieving balanced national growth. Regional energy requirements, of course, relate to national growth requirements. Projected energy requirements also are associated with given sets of assumptions about national environmental standards and use of pollution-reducing technologies and consumption-reducing pricing practices (20).

Subregional energy production depends only partly upon subregional energy requirements. Because of new energy transfer systems, the location of energy production is a variable subject to environmental management constraints asserted at a subregional and area level of

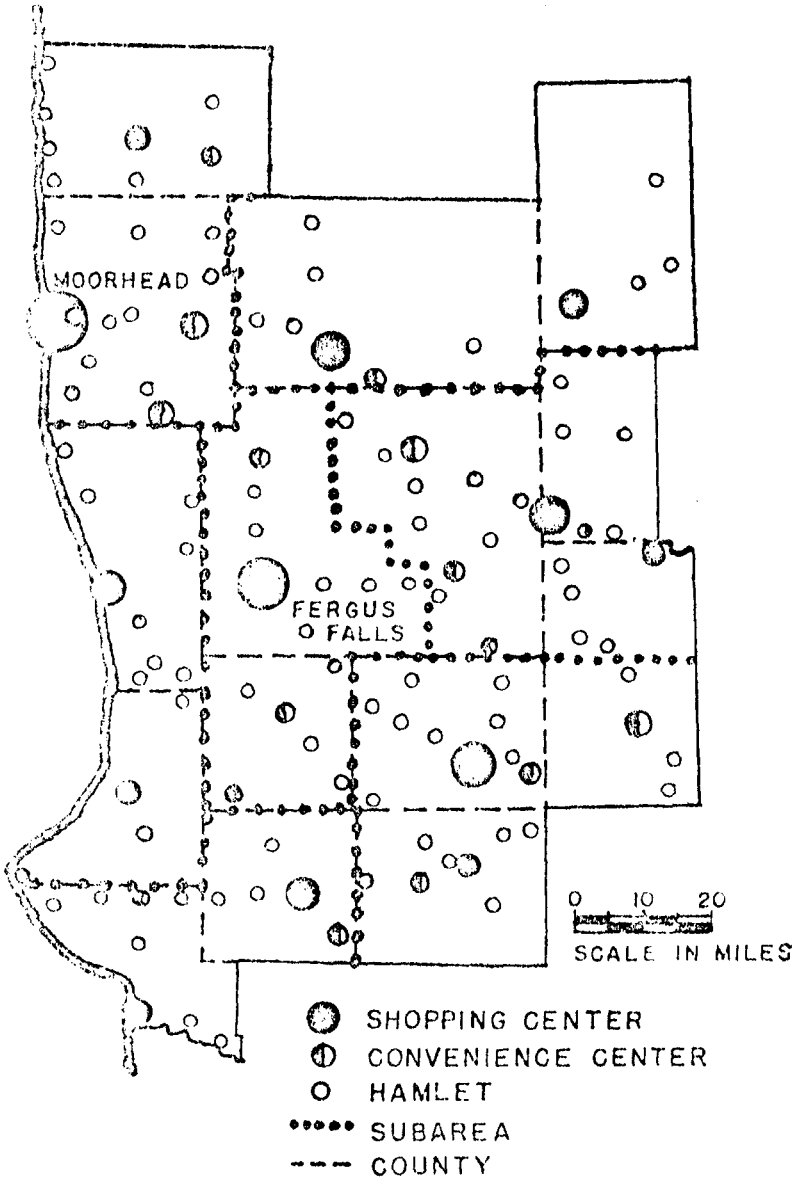


Fig. 3. Functional communities in West Minnesota study area, 1967.

development planning. Hence, the energy use and production subsystem in regional development will interact with environmental management considerations in regional conflict resolution, with the environmental impacts of energy production being specified for an entire planning area as well as particular points within the area.

As suggested earlier, private entrepreneurship, including the provision of technical skills and financial support, becomes a critical development input for export-producing industries in the private sector (6,45). Private capital formation in the subregional producer/provider system, especially among small businesses, depends upon the relaxation of supply constraints on output expansion. Hence, public enterpirse inputs, which would be represented by an appropriate mix of technical know-how, capital improvements and manpower skills, is introduced as a means of achieving certain levels of regional development and growth because of the expansion of small businesses enterprise.

Public enterprise development is achieved through federal-state cooperation of the sort emerging under the Appalachian Regional Development Administration program (30). Federal financing is coupled with state participation in the organization of local service delivery systems, as well as in the planning and construction of economic and social infrastructure. The critical missing ingredient, however, has been flexibility in financing procedures, coupled with organizational and staffing limitations for assisting small businesses in expanding

their marketing outlets and improving the efficiency of their plant operations.

Needed in the public entrepreneurship role is knowledge and information for projecting alternative regional futures based upon alternative programs and projects for obtaining regional development goals. Also needed is an evaluative capability for assessing the probable impacts of the alternative programs and projects upon specific segments of the area economy and population. In other words, what's being sought is a measure of the incidence of the benefits and costs of the proposed private investment and related public financing(15,16).

Finally, land control is emerging as a central concern of the commissions and task forces recently established to study alternative population and growth policies for the United States (4a). Among state governments, concern over lake shore land use, over-rapid expansion of metropolitan peripheries, and the possibilit es of establishing new towns and self-sustaining metroplitan centers is bringing up the issue of public control of land use and land values. Comprehensive state land-use planning that would involve the full range of instruments of land control from outright purchase and ownership to alternative forms of leading, retention of easements rights, taxation of capital gains, zoning and subdivision control (16a).

Currently, the U.S. Congress is engaged in hearings on individual and corporate ownership of land in rural areas. Who owns rural America? In the metropolitan

areas we are asking who owns the downtown, the diversified service centers in the outlying suburbs, and the open space now being held for purposes of speculative gains. Enveloped in the issue of ownership is the more decisive issue of control. Public control, however, can be asserted under private ownership.

Public control of land use and land value is exercised, potentially, on a state-wide and region-wide level. Such control can be implemented at the multi-county level, but even at the multi-county level divergence of values among local interests in a region will divert land into uses that inevitably are conflicting and adverse to broad regional interests. Eventually, the police powers heretofore confined almost totally to the municipal and county levels of government in zoning and subdivision controls may be pooled on a multi-county basis within an environmental planning area to sustain certain broad regional values in land use.

Optimal management scale of service delivery

Unlike export-base expansion, public service delivery is primarily an area management function of regional development. For purposes of this discussion, the area management function is confined to residuals recycling and disposal, public facility location, and capital budgeting. In addition, land control consideration are involved in area management of public services as well as in programs for achieving balanced national growth (11,34,46,52).

Each of the management concerns relates to the decentralization of state government activities and the improvement of consumer/user

access to essential public services. Effective resolution of these management concerns is likely to require the existence of some form of multi-county councils of government for coordinating the public management activities on an areawide basis (13a).

In residuals management, the recycling and/or disposal of solid, liquid, gaseous, and thermal waste are commonly included, along with abatement of noise and visual pollution. In many rural areas, of course, sewage disposal is a high-priority current local issue; in other areas, conformance with new air quality standards or thermal pollution standards, may be of primary concern. Altogether, control of the major forms of pollution -- water, solid waste and air -- is estimated to cost $13.5 billion annually, of which the much smaller portion presumably will be incurred in rural areas (6a).

Areawide control of sewage disposal has become a primary instrument of control of urban expansion into the countryside. Even roads and streets are less important than sewage hook-up in controlling the conversion of agricultural areas into residential commercial and industrial land uses (10a).

While sewer systems are being managed on an area wide scale in the multi-county Twin Cities metropolitan area, the appropriate systems management scale for sewage recycling and disposal in outstate Minnesota is much less extensive, covering only a few municipalities and townships. The small watershed probably is the appropriate management unit for rural and small town sewage systems the the less densely populated areas. Nontheless, several small

watersheds must cooperate on a multi-county scale to effectively control the pollution of a system of lakes for which the environmental planning function is undertaken on an areawide scale.

Public facility location, which includes the location of residuals management facilities as well as streets, roads and highways, lacks the grass-roots participation that occurs in the residuals management issue area. Nontheless, public facility location has its own participant cluster from higher education, public schools, libraries, hospitals and health care facilities, parks and recreation areas, airports, streets, roads, highways, fire stations and police stations. Within the general public, clientele groups emerge in potential area service centers that may be vieing with one another to become a dominant center in a particular multi-county commuter shed. Policy on public facility locations at the state level thus becomes a policy for regionalization of key governmental services, such as health care and education (45a).

A facility package model has been proposed which combines the original public, i.e., "noxious," facility to be located with a least-cost of other facilities and activities selected to minimize public cost at given risk levels (29c).In the short run, such a model is viewed as a political placation model, while in the long run it becomes a welfare distribution model in whichlong run benefits and costs and their incidence among different groups in the impact area must be ascertained. Only the long-run approach, which takes into account

specific gainers and losers in the facility location process and outcome, makes sense in terms of development strategy.

In rural areas, the sharing of public facilities is widely accepted. A recent Minnesota poll shows 70 percent of all adults supporting the idea that small towns joined together in regional groups sharing schools, hospitals and other facilities (29a). Those who favor regional sharing say that pooling resources provide better and more facilities at less cost. Those who think rural facility sharing is a poor idea say towns are too far apart and require too much travel. Obviously, a variety of reasons -- pro and con, are advanced on the issue of rural facility sharing, but the findings remain strongly supportive of the idea of merging a wide range of public facilities into one large service area and an area service center.

Capital budgeting, when undertaken on an area-wide scale, must be accomplished concurrently with the public facility location. However, area-wide capital budgeting is a process, if instituted, that would work its way from the bottom up -- from the many municipalities and townships in a multi-county area to the multi-county council of government, or its counterpart. Public facility location, on the other hand, works from the top down as a primary instrument of state and/or federal regionalization policy. We expect much greater difficulties, therefore, in the implementation of area wide capital budgeting as compared with a state-wide policy of public facility location(9,12).

Presently, the multi-county councils of government in the United States are primarily clearing houses rather than area-wide coordinating agencies for capital improvement programs (29b). The legal and legislative bases exist in several states, however, for area wide coordination of capital improvements to be effective, provided that the area-wide body is willing to require review of special-purpose district and municipal programs and budgets at one time so that budgeting priorities can be established, not within a single special-purpose function, but between functions.

An optimal management scale for service delivery, involves some considering again, of land control. Land control is a municipal,township or county govern function when exercised in the form of zoning or subdivision control. Differential taxation of agricultural lands, or taxation of development gains, is typically a state government function. Outright fee simple purchase of private lands by any governmental or quasi-governmental agency may or may not require prior exercise of the right of eminent domain. Or alternatively, a limited property right, through an easement purchase or a leaseback arrangement, may be acquared by a local or state government agency. Thus, a wide array of policy instruments for limited land control are available, but not necessarily for an areawide resource management agency (5,10a,34).

Citizen participation in social priority setting

Of the three "cutting edges" of regional rural-urban development, social priority setting may be the sharpest, but it presents a deeply

troublesome dilemma. To what extent and for whom is the loss in local autonomy, if any, compensated by the gains in economy and access as a result of larger management systems for producing and providing essential social services?

The technical modeling capabilities outlined later provide only partial answers to the fundamental dilemma. We are trying to establish the data base and the criteria for determining the economies of scale in service delivery. But we lack the non-economic criteria for determining the non-economic or non-monetized costs of larger service delivery systems (36,40,53).

Even more serious is our inability to establish priorities between program areas, e.g., roads vs. schools. Disagreement over goals and values, however, becomes confused with data problems and communication difficulties. Not only more information but better communication is sought. More sophisticated information and communication systems are being developed, while we continue to disagree even more strongly than before because of fundamental conflicts, implicitly if not explicitly, in goals and values. In this paper, therefore, social priority setting is viewed as a three-fold task: First, identifying and delineating broad goal areas sought by citizens of a region; second, relating the goal areas to program areas which are ranked in terms of their perceived or expected contribution to their respective goal areas and, thus, to the quality of life in the region; and, third, seeking program area agreement on specific projects that best meet given program area objectives.

Long-Run Research Needs

The preceding discussion has focused on a series of issue and strategies relating to rural development.

What long-run research needs emerge from the discussion depends on the sorts of difficulties anticipated in reconciling conflicts and establishing working arrangements for dealing with each of the issue areas of importance in rural development.

Underlying the preceding discussion is a need, also, for effective multi-disciplinary collaboration in the implementation of a regional programming model for (1) generating future development alternatives and (2) assessing their implications for present-day decision making and planning. Implied is a capability for simulating alternative regional futures for both development planning and environmental management.

To invent and evaluate future alternatives, certain multi-disciplinary capabilities have been tapped in the construction of the regional programming model (table 3). In this model, population change is viewed as the intervening (i.e., between decision input and decision output) variable that triggers a series of subsequent changes in demand, output and employment, and other regional activity components. Research efforts are being organized to implement with each of the activity components (which are found in the pilot-study subregion cited earlier).

Of particular concern in the research design are the internal linkages of three broad service systems -- the producer/provider system, the consumer/user system, and the distribution system. These three

able 3. Submodels in an overall regional system model for development planning and environmental management.

ubmodel escription	Popula-tion 1	Demand 2	Output and em-ployment 3	Earnings and income 4	Capital improve-ments and financing 5	Facility location 6	Land use 7	Environ-mental manage-ment 8	Public financing 9
.. Population	1.1								
2. Demand	2.1	2.2							
3. Output and employment	3.1	3.2	3.3						
4. Earnings and income	4.1	4.2	4.3	4.4					
5. Capital improvements and financing		5.2		5.4	5.5				
6. Facility location	6.1				6.5	6.6			
7. Land use	7.1		7.3	7.4	7.5	7.6	7.7		
8. Environmental management	8.1		8.3			8.6	8.7	8.8	
9. Public financing	9.1	9.2		9.4		9.6	9.7	9.8	9.9
0. Public policy	10.1	10.2	10.3	10.4	10.5	10.6	10.7	10.8	10.9

systems can be, and are being, stimulated by public intervention. They are strongly dependent, however, upon the export-producing activities in the region. Both the spatially-dispersed activities, such as agriculture, and concentrated manufacturing activities are identified in considerable spatial and sectoral detail in the regional submodels.

Input-output submodel

The producer/provider system, in total, includes the export-producing activities and all residentiary activities dependent upon the export-producing activities. Estimation of the individual elements in the producer/provider model of the development subregion is implemented in two stages. In the first stage, a conventional input-output submodel provides a framework for estimation of all relationships within the producer/provider model. A two-region input-output model, which is built promarily from secondary data, is used to generate an initial set of inter-industry and inter-regional linkage coefficients (25).2/

2/ The two-region input-output model is based, in part, on U.S. data for 1963 and 1980 and a computer program for making gross output allocations to the two regions. For Region a, the allocation is given by the form,

$$\begin{bmatrix} X^{aa} \\ X^{bb} \end{bmatrix} = \left[\begin{pmatrix} I & 0 \\ 0 & I \end{pmatrix} - \begin{pmatrix} A^{aa} & 0 \\ 0 & A^{ba} \end{pmatrix} \right] \cdot \begin{bmatrix} Y^{aa} \\ Y^{ba} \end{bmatrix},$$

and for Region b by,

$$\begin{bmatrix} X^{ab} \\ X^{bb} \end{bmatrix} = \left[\begin{pmatrix} I & 0 \\ 0 & I \end{pmatrix} - \begin{pmatrix} A^{ab} & 0 \\ 0 & A^{bb} \end{pmatrix} \right] \cdot \begin{bmatrix} Y^{ab} \\ Y^{bb} \end{bmatrix}$$

The second-stage estimation procedures are approached, initially in the context of an expanded input-output framework (fig. 4). Research areas are identified which represent logical extensions of a primarily resource-oriented approach to regional development planning. However, because of the conceptual and operational limitations of the input-output framework, the series of submodels unnecessarily fragments the concept of total research effort. Research areas and activity components are described, therefore, in terms of three broad groups of producer/provider submodels, the first of which is the input-output (group 3 in table 3) submodel(19,27,47,50).

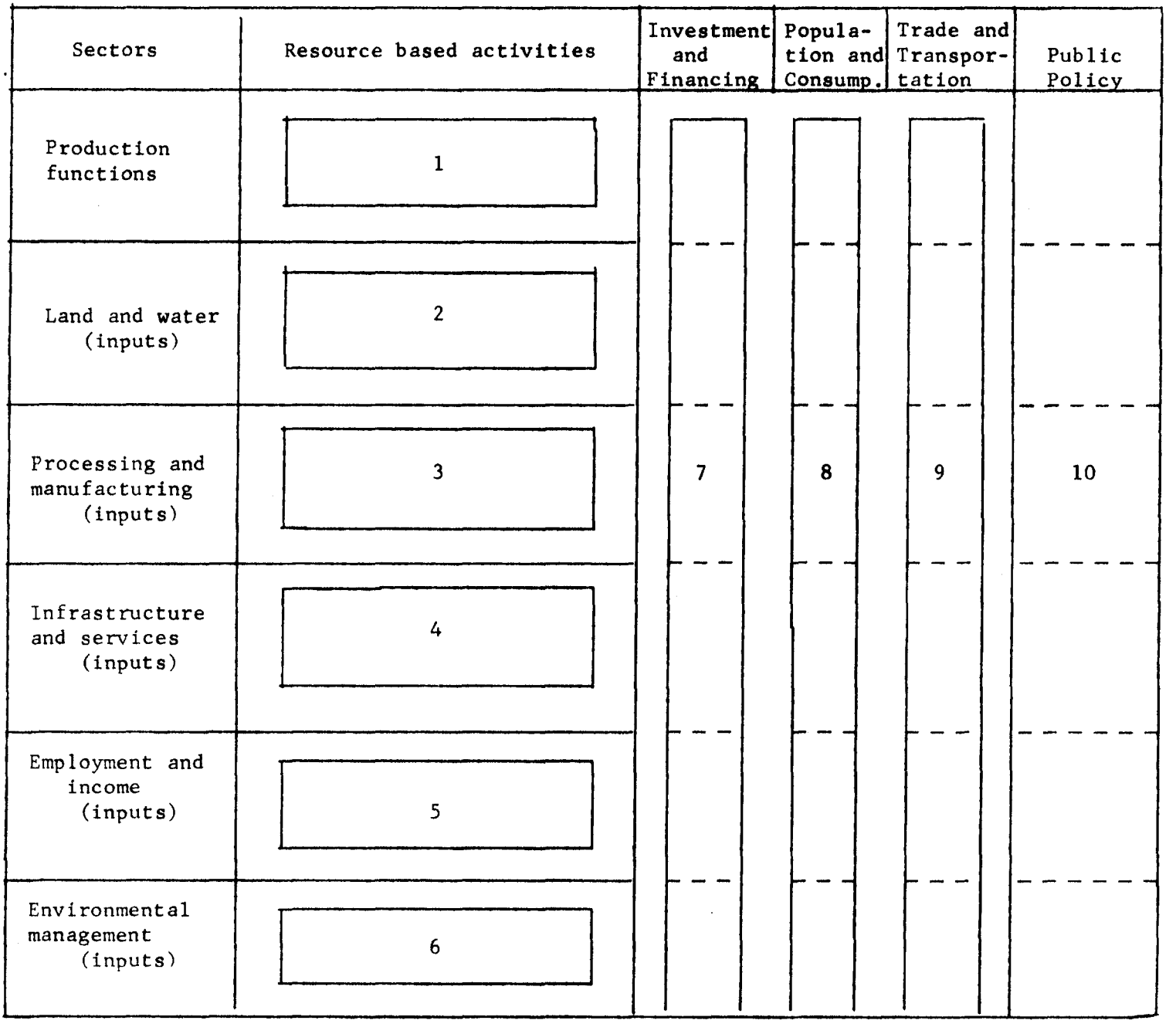
Inputs and outputs in the submodel are linked to income, employment and population estimates generated by other submodels (3,4,8,43,22,42). per worker estimates in the base year are extended to an intermediate year and, finally, to a projected target year, which is the year of the first projection series derived with the subregional models(51).

Resource access submodels

The next five submodels are grouped together because of their close association with the input side of the input-output submodel. Each of the five submodels focuses upon the flow of production inputs from resource owners to the producer/provider system and the flow of income payments from the producer-provider system to resource owners.

The land allocation (group 7) submodel provides for two patterns of land allocation -- a rural and an urban. Important data sources for the land allocation submodel are (1) a recently completed state

Figure 4. Research areas in first-stage research design for Fargo-Moorhead development subregion pilot-study.



land use inventory, which shows current land use, by 40-acre unit, and (2) an area land type survey, which delineates key surficial and subsoil characteristics of land for urban and rural development(29). Thus, the submodel provides a framework for relating existing land-use inventories to projected future land-use patterns associated with projected future product-output levels for the sub-regions.

In the private investment and financing (group 5) submodel, individual establishments are geocoded and grouped into four-digit industry classifications for analytical purposes. Of primary importance in the private investment and financing submodel is the specification and estimation of capital, labor and entrepreneurial inputs into primarily export-producing activities. This submodel, therefore, is closely linked to other resource access submodels and to the facility location and public financing submodels.

The facilities location (group 6) submodel relates primarily to the location of public facilities in the subregion. Hence, linkages between the transportation-communication networks and the size and spacing of area facilities are important considerations in accounting for emerging patterns of rural land use and its conversion into urban-industrial uses in the periphery of urban centers.

In addition, public facility location influences the spatial distribution of private sector services, particularly medical and other professional services. Thus, the level and range of service inputs flowing into the input-output submodel will depend upon the data and procedures of the infrastructure and services submodel.

The earnings and income (group 4) submodel translates

output levels into corresponding levels of labor earnings and other income payments (1). This submodel, in the economist's view, is demand, rather than supply, oriented. Employment depends upon output and, indeed, it is derived from output by using output-employment relationships. And, the level of total income payments depends upon the level of employment in each sector. Thus, market-based input-output projections of future output levels determine the corresponding future levels of earnings and income.

A population (equation group 1) submodel for generating area population distributions, by age and sex, is used in projecting future employment levels that are influenced also by population supply (as well as labor demand) considerations (24,28). Inter-area migration within the region is influenced by relative employment, income and consumption prospects. Hence, demand-based output projections are constrained by consumer considerations outside the conceptual and factual domain of the subregional input-output submodel.

The environmental management (group 8) submodel deals largely with environmental services inputs for other resource access submodels. Data on residuals recycling and disposal are processed by this submodel, which, also, will include geocoded public facility input-output coefficients and constraints (20,39).

Service delivery submodels

The remaining submodels listed earlier are primarily demand-oriented. They are concerned with service delivery linkages within

the producer-provider system.

In contrast with the resource access submodels, the service delivery submodels are influenced by national as well as local considerations. Hence, many of the explanatory variables accounting for subregional shifts in levels of investment, population, trade and public policy are dominantly exogeneous to the pilot-study subregion.

The private investment and financing submodel cited earlier includes the capital and institutional accounts of the subregional economy. Flow of funds data provide an indication of the net savings position of the subregion. Private capital formation is the demand-oriented component of the submodel. In addition, public financing group 9) institutions establish constraints on the supply side of service delivery (10,37,40b,41). In subsequent years, the current year's public infrastructure outlays will induce private capital formation in the agricultural, processing, manufacturing and other private sectors of the subregional economy.

Other demand-oriented components of the producer-provider system are represented by the demand (group 2) submodel. Projected subregional household consumption depends upon projected population, earnings per worker, and persons supported per worker. Hence, the population-consumption submodel is linked to the employment-income submodel through earnings and labor force participation ratios.

A subregional household expenditure function is derived as a means of allocating a portion of total subregional income to given

producing sectors in the form of household expenditures for a specified mix of consumer goods and services. Thus, an additional series of consumption accounts are introduced into the producer/provider model through the population-income submodel.

In addition, trade and transportation activities link the input-output submodel to export markets. Transportation services are provided to move subregional products to demand centers outside the subregion. Thus, the demand-oriented trade-transportation activities are linked directly to the supply-oriented public facility location submodel.

Finally, a public program (group 10) submodel introduces current and projected public policy considerations into the overall producer/provider model. Public program impacts may originate largely from outside the region; they, too, relate to demand-oriented dimensions of the subregional model.

Each of the 10 submodels is a building block in the construction of the subregional producer-provider model. Feedback from one stage to the preceeding stage is obtained by use of iterative procedures that correspond to management and policy guides for directing the producer/provider system toward predetermined goals and targets.

Consumer/user system submodels are used, also, to represent the total regional system. These submodels involve the use of behavorial relations for predicting changing consumer and user responses to the outputs of the producer/provider system. Involved in the transformation of producer

outputs for consumer use is the end-in-view of the consumption process -- measurable outcomes that add up to improvements in the quality of life attainable by all residents in the pilot-study development subregion. Hence, a third-stage consumer "input-output" submodel is envisioned in the research design that relates a "service access" submodel to an "outcome delivery" submodel.

A final major component of subregional impact analysis model is the distribution system, which determines the incidence of benefits and costs of subregional growth and development. Presently, subregional institutions, primarily local governments, are engaged in limited income re-distribution. Only to the extent that public and quasi-public institutions localized in the metropolitan core area of the development subregion share in the distributive functions performed by local and national governments, and engage in concerted efforts to channel public capital outlays to the core area, or, alternatively, to local service centers within the development subregion, can we identify a truly subregional distribution system.

Regional Systems Design

The broad set of constraints imposed upon the regional systems modeling implies a territorial organization for functional regionalism. The "region" will vary in size depending upon the particular function. For example, export-base expansion is viewed as being handled optimally by a multi-state, metropolitan-focused development region (table 4). The environmental services delivery

Table 4. Relation of social/environmental systems submodels and regional development planning to regional systems design.[1/]

Social/environmental systems submodels	Regional Development Planning							
	Export Base Expansion			Social/environmental Services Delivery				
	Agricultural and industrial production	Energy production	Public entrepreneurship	Residuals recycling and disposal	Public facility location	Capital budgeting	Land control	Social priority setting
A. Producer/provider system								
1. Input-output submodel	DR	DR	DR					
2. Resource access submodels	DR	DR	DR					
3. Service delivery submodels	DR	DR	DR					
4. Linkage and feedback	DR	DR	DR	EA	EA	EA	EA	FC
B. Consumer/user system								
1. Input-output submodel				EA	EA	EA	EA	
2. Service access submodels				EA	EA	EA	EA	
3. Outcome delivery submodel				EA	EA	EA	EA	
4. Linkage and feedback	DR	DR	DR	EA	EA	EA	EA	FC
C. Distribution system								
1. Economic control	DR	DR	DR					F/S/L
2. Political control				EA	EA	EA	EA	F/S/L

1/ Individual cell entries refer to: Development region, DR; environmental area, EA; functional community, FC; federal, state and/or local, F/S/L.

function is handled optimally in a sub-state, multi-county environmental planning area. The priority-setting function is handled optimally by the extended metropolitan neighborhood or the multi-nucleated rural functional community. The interaction of economic and political functionalism results in a particular regional systems structure that is hierarchical in its economic linkages but with a broad political base in the functional community.

Multi-state development region

Export-base expansion is optimally a function of the multi-state development region. The end-in-view is enhancement of the productivity of human effort by reducing waste and improving the comparative advantage of the region's basic industry on a regional scale of public intervention.

Intermediate-size metropolitan centers are the subregional growth poles for strategies of focused decentralization of industry and population in the development region (13,44)Potential growth in the regional core area, i.e., the seven-county Twin Cities Metropolitan area, could be diverted to the smaller metropolitan centers, namely, Fargo-Moorhead, Duluth-Superior, Sioux Falls and Green Bay by deliberate decentralization of population and industry. These centers are approaching a minimum viable size for self-sustaining urban-industrial growth.

In addition, an intermediate zone of urban-industrial expansion is represented by the first ring of free-standing satellite cities located within a 100-mile zone from the regional center. Each satellite city serves as a service center for a commuting area of roughly 50 miles

radius. Thus, an extended regional core area, which includes the first ring of satellite cities, makes up the Minneapolis-St. Paul development subregion.

Producer-provider systems are being delineated and projected for the region and for each of the five metropolitan-centered subregions and the outlying territory outside the subregions. Environmental issues pertaining to the achievement of balanced national growth are the problem focus of the regional and subregional models and analysis.

Multi-county environment planning area

Each development subregion includes several environmental planning areas. The planning areas are commuter "sheds" for the urban activities work force (18). Administratively, each area looks to its state government for some resources, e.g., police and taxing powers, and to the federal government for other resources, e.g., development grants. Each planning area is linked, also, to the development subregion and, thus, to the export-base functions of the development region. Improving access to opportunity in reducing distance (physical, social and economic) is a major rationale for the planning area activities.

For many public services, the environmental planning area is of optimal size for economy and diversity of choice while at the same time it remains accessible to a substantial majority of area residents. Because of the emphasis upon service delivery, however, the consumer/user orientation becomes dominant in the provision of services, provided that appropriate arrangements have been made for broad citizen

participation and involvement in the system management.

Optimizing management scale of service delivery systems is dominantly an environmental planning area concern, but it relates, also, to area potentials for export-base expansion. Under an alternative regional future of focused decentralization (as compared with metropolitan concentration) of population and industry, economic expansion potentials in the subregional growth nodes would be strengthened as a result of improved service delivery, especially social services like housing, health and education. Each area service center thus would perform a critical role in the regional development system because of the diversity of services and ease of access to these services.

Multi-nucleated functional community

The multi-nucleated functional community has been identified as a subarea component of an environmental area services delivery system. Because the functional community is synonymous with a consumer-user advocate role in regional development planning, its organization and function is represented by the linkage and feedback elements in the producer/provider and consumer/user submodels. It is a primary unit in the model regional system for reducing inequities of regional development and area planning through active and extensive participation of local residents in the planning activities (4).

In the early stages of optimizing management scale of service delivery, the functional community representation may favor small-scale to large-scale systems. In later stages, where effective citizen

input and local control of service mix and costs is achieved, the functional community representation may opt for large-scale delivery systems. In either case, a research need is asserted for distribution system submodels that can be used to work out the incidence of costs and benefits, and of economic and political control, for alternative sizes of area service delivery systems(17).

The concept of the functional community is introduced as an organizational bridge between the individual citizen and the public official and/or professional worker. It relates to one void in social priority setting, namely, the neighborhood or community level of citizen input. It relates, also, to the shift towards functional regionalism, particularly in the decentralization of state-level functions to subregional and area centers.

By starting with the present status of rural development research and ending with an outline of some elements in regional systems design, the role of applied economic and engineering research in spatial planning and environmental management is emphasized. Spatial planning relates to the multi-scale regional scale of export-base expansion. Environmental management relates to the multi-county area scale of service delivery. Thus, a two-pronged research and development approach is emphasized which evolves from the idea that each function has its appropriate level in the overall regional structure and organization. Underlying such an approach to the positive development of the rural areas of the United States is the conviction that rural and urban America are inexorably inter-related, but they differ in many ways, especially in their spatial and environmental characteristics.

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