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LOCAL DEVELOPMENT PREFERENCES AND SOCIOECONOMIC STRUCTURE IN THE RESOURCE CONSERVATION AND DEVELOPMENT PROGRAM

by
David Carvey

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Local Development Preferences and Socioeconomic Structure in the Resource Conservation and Development Program. By David Carvey, Natural Resource Economics Division, Economic Research Service, U.S. Department of Agriculture.

ABSTRACT

A system for classifying Resource Conservation and Development (RC&D) activities was developed. This system provides for the consistent quantification of local resource development preferences as reflected by local development proposals and resultant actions.

Factor and discriminant techniques were used to examine linkages between socioeconomic structure and shifts in resource development activities over time. Regional and project-level socioeconomic predictors of resource development shifts were identified.

Variables found to be primary determinants of shifts in development preferences included financial aspects of public health and education, rural farm population other than white or negro, bank deposits, nonresident workforce, education centers, government debt and revenue, and efficiency in wholesale trade.

The classification system can be used to monitor ongoing RC&D activities, providing insight as to the types of resource development activities occurring and shifts over time. The analytical techniques can be used to predict development tendencies in new or proposed RC&D projects, thus providing guidelines for program management and evaluation.

Socioeconomic structure can help indicate resource development preferences of local citizens and facilitate the identification of potential areas for tradeoffs necessary to plan and implement projects.

Keywords: Natural resources, Human resource, Socioeconomic structure, Rural sociology, Regional development, Sociological methodology, Discriminant analysis, Factor analysis.

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SUMMARY

This report examines some socioeconomic influences on local resource development decisions in the RC&D program. An effort was made to improve the data describing RC&D program response to local development preferences, and explore the linkages between shifts in program response and the socioeconomic structure of rural areas. Research objectives were:

1. Development of a system for consistently classifying local resource development activities.

2. Determination of resource development trends and analysis of program response to development preferences.

3. Development of an analytical approach for examining socioeconomic structure and relating structure to shifts in development preferences.

4. Examination of research implications for program planning and evaluation and for project level participation.

In-depth study of the 48 RC&D project plans (outlining desired development proposals) led to the formulation of a system for classifying resource development activities occurring in the RC&D program. These activities are divided into two broad groups focusing on either human or natural resource development directions. Each broad group is subdivided into seven categories with a total of 61 development objectives available for classifying any given development proposal. Development actions, recorded in progress reports for each project, are classified by the same process.

This system was used to classify over 8,300 proposals and over 6,500 actions in 48 projects. Two-thirds of proposals and actions stressed concerns for natural resource development. Activities related to Water, Recreation, and Community Facilities and Services, in this order, were found to be the most popular activities, accounting for nearly two-thirds of proposals and actions.

Four regions increased their share of human resource-related activities in converting proposals into actions, while three regions increased their shares of natural resource-related activities. Every region experienced decreased shares of Employment activities and increased shares of Land activities. Of the 48 RC&D projects, 56 percent had shifts toward increased human resource development activities as proposals were translated into actions.

In a regional analysis, local development preferences were examined in relation to socioeconomic structure. Proportional changes in such preferences were explained in terms of variation in socioeconomic structure. Factor analysis was used to reduce the measurements of socioeconomic structure for 297 counties to six dimensions (factors). Of the six factors, those most important in discriminant equations classifying regions are identified as determinants of general development directions

and specific emphases. These determinants include variables describing population level, socioeconomic status (income, taxation, etc.) population change, government financing and expenditures, labor force, manufacturing, and educational centers.

Relationships between local development preferences and socioeconomic structure were also analyzed at the RC&D project level. Again, shifts in development directions and emphases were explained in terms of variation in socioeconomic structure. Factor analysis was used to reduce the same 76 measurements of socioeconomic structure for 297 counties to 20 factors. Using these 20 factors in discriminant analyses produced equations which attained an overall accuracy of 89 percent in reproducing known groupings of projects based on changes in development activities. Only 7 of the 20 factors were found to be primary determinants of shifts in development preferences. These included variables describing financial aspects of public health and education, rural farm population other than white or negro, bank deposits, nonresident workforce, education centers, government debt and revenue, and efficiency in wholesale trade.

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INTRODUCTION

Local involvement is important in USDA's Resource Conservation and Development (RC&D) Program. Both the authorization and definition of RC&D projects acknowledge strong concerns for both natural and human resource development. According to Secretary's Memorandum 1665, RC&D projects

> ... are initiated and carried out by local people with the assistance of agencies of the States and agencies of the [USDA] ... in areas where there is need to accelerate the conservation, development, and utilization of natural resources; improvement of the general level of economic activity; and enhancement of environment and standard of living.[1/]

Further, the USDA in its RC&D Handbook has defined an RC&D project as a

> locally initiated, sponsored, and directed project designed to carry out a program of land conservation, land utilization, accelerated economic development, and reduction of chronic unemployment or underemployment in an area where these activities are needed to foster a local economy.[2/]

In searching out means to improve use of land resources and alleviate economic and environmental problems, local leadership is responsible for identifying local problems, specifying solutions by proposing project measures, setting local priorities for action, and initiating actions. Community representatives must: specify planning objectives; obtain resource inventories; interpret, evaluate, and analyze available data; identify feasible alternatives for action; reach a consensus concerning

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[1/] USDA, Soil Conservation Service. Resource Conservation and Development Projects: RC&D Handbook, Washington, D.C., 1972, Sec. 100.2.

[2/] Ibid. See 100.2b.

project policies and directions; and evaluate and update objectives, policies, and courses of action over time.3/

What are some of the decisions these community representatives have made? What influences help determine the outcomes of these many decisions? Can such influences be identified in the socioeconomic structure of RC&D projects? These questions depict the essence of this study.

In-depth analysis of the many decisions involved in formulating RC&D proposals and initiating actions is beyond the scope of this research. However, in answer to the first question posed above, analysis of the results of RC&D decisionmaking is possible at two crucial stages. The first concerns the number and type of actions initiated as a consequence of considering alternative proposals. Each RC&D area must complete a project plan summarizing identified problems and measures proposed to alleviate these problems. A project plan establishes a first set of goals for an RC&D project. Revealed preferences for goal attainment can be identified as actions initiated within RC&D projects which are summarized in the progress reports for each project. In this study, two general development directions, human vs. natural resource development, and 14 specific development emphases are examined by observing proportional shifts in types of actions initiated compared to types of proposals made. (See Appendix A for examples of proposals and actions.)

The question of which influences affect local development preferences is more difficult to answer. The approach chosen for this study is to correlate the socioeconomic structure of RC&D projects with the changes in general development directions taken and in specific development activities emphasized by local RC&D leaders. This effort entails a program-wide study of 48 RC&D projects across the Nation, all of which were operational prior to 1970 (see table 1).

A second approach is to take an in-depth look at local views of problems and priorities in a selected, operational RC&D area. This has

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3/ Op Cit. RC&D Handbook. Sec. 101.6.

Table 1--Selected RC&D projects

Number	Region & RC&D area	State	Counties included
			Number
I.	NORTHEAST		
1.	East Connecticut	Connecticut	3
2.	St. John-Aroostook	Maine	2
3.	North Country	New Hampshire	3
4.	East Central Vermont	Vermont	4
5.	South Central New York	New York	7
6.	Seneca Trail	New York	3
7.	Penn Soil	Pennsylvania	4
8.	Endless Mountains	Pennsylvania	5
			31
II.	EAST NORTH CENTRAL		
9.	Shawnee	Illinois	14
10.	Lincoln Hills	Indiana	4
11.	Northwest Michigan	Michigan	13
12.	Buckeye Hills	Ohio	5
13.	Pri Ru Ta	Wisconsin	10
14.	Lumberjack	Wisconsin	9
			55
III.	WEST NORTH CENTRAL		
15.	Sunflower	Kansas	7
16.	Top of The Ozarks	Missouri	5
17.	South West Missouri	Missouri	10
18.	West Central Minnesota	Minnesota	5
19.	Onanegozie	Minnesota	4
20.	Randall	South Dakota	3
21.	Black Hills	South Dakota-Wyoming	9
			43
IV.	SOUTH ATLANTIC		
22.	North Central Piedmont	North Carolina	6
23.	Low Country	South Carolina	6
24.	Crossroads	South Carolina	6
25.	Little Kanawha	West Virginia	5
26.	Mountain Dominion	West Virginia-Virginia	5
			28
V.	EAST SOUTH CENTRAL		
27.	Coosa Valley	Alabama	7
28.	Wiregrass	Alabama	9
29.	Tradewater River	Kentucky	6
30.	Southeast Delta	Mississippi	7
31.	Northeast Mississippi	Mississippi	20
32.	Hull-York Lakeland	Tennessee	11
			60

Continued

Table 1--Selected RC&D projects--Continued

Number	Region & RC&D area	State	Counties included
			Number
VI.	WEST SOUTH CENTRAL		
33.	Arkansas River Valley	Arkansas	10
34.	Ozark Foothills	Arkansas	5
35.	Trail Blazer	Louisiana	4
36.	Cherokee Hills	Oklahoma	3
37.	Southeast Texas	Texas	11
38.	Eastern Hill Country	Texas	3
			36
VII.	WEST		
39.	Western Wyoming	Wyoming-Idaho	4
40.	Box Elder	Utah-Idaho	3
41.	North Idaho	Idaho-Washington	5
42.	Upper Willamette	Oregon	4
43.	Northern Rio-Grande	New Mexico	8
44.	South West New Mexico	New Mexico	3
45.	Central Nevada	Nevada	5
46.	North California	Nevada-California	5
47.	Sangre De Cristo	Colorado	5
48.	Bitter Root	Montana	2
			44
		Total	297

been done and is discussed in other reports.[4/] Other possible approaches are beyond the planned scope of this research.

Objectives

The following objectives were formulated to strengthen the data base describing the RC&D program and its activities, and to enhance understanding of the program in relation to the socioeconomic structure of rural areas so as to facilitate and improve overall program administration, coordination, and participation:

1. Development of a system for consistently classifying local resource development activities.

2. Determination of resource development trends and analysis of program response to development preferences.

3. Development of an analytical approach for examining socioeconomic structure and relating structure to shifts in development preferences.

4. Examination of research implications for program planning and evaluation and for project level participation.

Data Requirements

Meeting the objectives of this research requires two basic types of data. First, data describing local resource development preferences for selected RC&D projects are necessary. Second, data describing the structure or socioeconomic makeup of these geographical areas must be examined.

[4/] David Carvey and James McDivitt. The Northwest Michigan Resource Conservation and Development Project County Resident Survey: A Summary Report. U.S. Dept. Agr., Econ. Res. Serv., 1973.

_____ and _____. The Northwest Michigan Resource Conservation and Development Project County Resident Survey: A Technical Report. U.S. Dept. Agr., Econ. Res. Serv., 1973.

_____ , _____ and Timothy Kubiak. The Northwest Michigan Resource Conservation and Development Project Leadership Survey: A Summary Report. U.S. Dept. Agr., Econ. Res. Serv., 1973.

Timothy Kubiak and David Carvey. Citizen Participation: Local Leadership Attitudes Toward Development Program Effectiveness. Paper presented at the 57th Annual Conference, American Institute of Planners, San Antonio, Texas, 1975.

Classification of Development Proposals

Development preferences determined in a context of local decision-making have been found to embrace a wide range of activities including such things as further detailed studies of various proposals, requests for assistance from various agencies, planning and technical assistance, and cost sharing. Quantification of these requires a classification system for consistently categorizing proposals and actions. Review of the system used by the Soil Conservation Service (SCS) revealed several major weaknesses which hindered attempts to adequately analyze RC&D accomplishments in view of the implied comprehensive rural development mission of the program. The system used by SCS for classifying RC&D activities in 1970 is shown below:

Accelerated Resource Developments
Agricultural Water Management Developments
Recreation Developments
Wildlife Developments
Watershed Projects (under Public Law 566)
Water Developments Other Than P.L. 566
Land and Critical Area Stabilization
Special Resource Studies and Inventories
Highways, Scenic Highways, Trails, and Roads
Range Improvement Groups and Associations
Agricultural and Wood Using Processing and Marketing Industries
Other Industries
Public Service Facilities (hospitals, schools, sewage systems, etc.)
Industrial Parks
Rural Water Lines
Rural Sewer Systems
Beautification
Education Measures
Other Measures Not Classified
Accelerated Soil Surveys
Accelerated Conservation Planning
Accelerated Land Treatment
Accelerated Land Conversion: Cropland to Grass and Woodland

One major problem with this framework is that some categories overlap, for example Accelerated Land Treatment and Land and Critical Area Stabilization. Both deal with land and its treatment. Secondly, some categories are too general, as exemplified by Accelerated Resource Developments and Special Resource Studies and Inventories. Measures grouped by these categories would have no unity of intent. A third problem is that some categories are too specific, for example Rural Water Lines and Rural Sewer Systems. These types of problems present serious dilemmas for certain aspects of program analysis.

An in-depth study of RC&D project plans was undertaken in recognition of the weaknesses the SCS classification system contained relative to the proposed research. An effort was made to build a framework that would serve as a reliable classification instrument for any type of development proposal. To solve the problem of ensuring mutually exclusive categories, the basic intent or concern of each proposal was used as the primary criterion for classification.

Study of the project plans revealed two major areas of concern. Proposals directed toward improvement of the human conditions were grouped together as human resource measures. Proposals primarily directed toward improvement in physical conditions were classified as natural resource measures. These two major groups were defined to represent general resource development directions. Subcategories were developed within the human and natural resource groupings using mutual exclusiveness and basic intent as the decision rule. The end result was seven categories in each of the two major groupings. Together these 14 categories provide the basis for analyzing local preferences reflected by program proposals and resultant actions and for examining the relationships between socioeconomic structure and shifts in development preferences. The entire classification system is presented in table 2. A checklist of items which served as criteria for classifying proposals and actions is provided for each of the 14 categories.

In summary, the 14-category classification system is designed for use in quantifying local development preferences as indicated by basic intent of proposals and as reflected by actions occurring within the RC&D context. In classifying a proposal or action, two questions were asked. Is this an attempt to improve a human or natural condition? Assuming a satisfactory decision on this, what is the basic intent of the proposal? This final decision serves to properly classify the proposal or action.

Socioeconomic Structure

Review of literature pertaining to voter preferences, community and regional socioeconomic structure, and decisionmaking suggested a wide range of variables that could be valuable in examining the association between socioeconomic structure and shifts in local development

Table 2--A classification system for resource development activities in RC&D projects

Human Resource	Natural Resource
Education	Environment
- elementary and secondary	- air pollution
- college	- loss of natural beauty
- adult	- changing land use
- vocational	
	Land
Health and Medical Services	- erosion
- medical personnel	- lack of soils data
- medical facilities	- land development
- medical programs	
	Water
Industry	- pollution
- producer's income	- flooding
- labor supply and cost	- drainage
- lack of management personnel	
- lack of development	Agriculture
	- producer's income
Employment	- labor supply and cost
- low wages	- management
- lack of job training	- farm size and ownership
- seasonal work	- land use and treatment
- lack of industry and business	- marketing
Transportation	Forestry
- highways and roads	- producer's income
- harbors and channels	- labor supply and cost
- rail facilities	- management
- air facilities	- timber quality and species
	- marketing
Housing	- forest land ownership
- shortage	
- dilapidation	Recreation
- presence of vacation housing	- owner's income
- housing development controls	- labor supply and cost
	- management
Community Facilities and Services	- land and water use conflicts
- water supply and distribution systems	- public access
	- underdevelopment
- sewage treatment and disposal systems	- overdevelopment
	- financing for businesses
- police and fire service	
- urban improvements	Planning and Development
- business services	- comprehensive planning
- historical and cultural improvements	- land use planning
	- development controls or guidelines

preferences.[5/] In all, 76 socioeconomic variables were chosen for study. All are displayed in table 3. These county-level census measurements were collected for all 297 counties included in the RC&D projects. They depict major aspects of population, residence, ethnicity, age, income, education, labor force, government revenue and expenditures, employee productivity, housing, agriculture, and banking.

All variables were transformed to represent multicounty attributes in accordance with seven major regions and then 48 RC&D area boundaries. Percentages, rates, and averages were used whenever possible to reduce the influence of size of raw data figures.

5/ Rossi, Peter H.
"Community Decision Making," Administrative Science Quarterly, I, No. 4, (March 1957), p. 415.

Hagood, Margaret J., Nadia Danilevsky, and Merlin O. Beum
"An Examination of the Use of Factor Analysis in the Problem of Subregional Delineation," Rural Sociology, 6 (September 1941), pp. 216-233.

Munson, Byron E.
"Structural Analysis of the Community," Rural Sociology, XXXIII, No. 4, (December 1968), pp. 450-459.

Cox, Kevin R.
"Suburbia and Voting Behavior in the London Metropolitan Area," Annals, Association of American Geographers, LXIII, (March 1968), pp. 111-127.

Sharkansky, Ira and Richard I. Hofferbert.
"Dimensions of State Politics, Economics, and Public Policy," American Political Science Review, LXIII, No. 3, (September 1969), p. 867.

Table 3--Selected socioeconomic variables

Number	Variable	Data type
1.	Total population in 1960	Population
2.	% population change 1950 to 1960	"
3.	% population change due to migration, 1950 to 1960	"
4.	% population change due to natural increase 1950 to 1960	"
5.	Population density, 1964	"
6.	% change in number of families, 1950 to 1960	"
7.	% population voted in 1960	"
8.	% urban population, 1960	Resident type
9.	% population rural-farm, 1960	"
10.	% population rural-farm white, 1960	"
11.	% population rural-farm negro, 1960	"
12.	% population rural-farm other, 1960	"
13.	% population in group quarters, 1959	"
14.	% population minority, 1960	Ethnicity
15.	% population foreign born, 1960	"
16.	% population foreign stock, 1960	"
17.	% population under 5 years, 1960	Age
18.	% population over 65 years, 1960	"
19.	% population 21-65 years, 1960	"
20.	Median age of population, 1960	"
21.	Change in median age, 1950 to 1960	"
22.	% population of voting age, 1960	"
23.	Per capita income, 1959	Income
24.	Median family income, 1959	"
25.	% change in family income, 1949 to 1959	"
26.	% family incomes of $3,000 or less, 1959	"
27.	% family incomes of $10,000 or more, 1959	"
28.	Number of cars per capita, 1960	"
29.	% population 5-34 years old in elementary school, 1960	Education
30.	% population 5-34 years old in high school, 1960	"
31.	% population 5-34 years old in college, 1960	"
32.	% population completed 5 grades or less, 1960	"
33.	% population 25 years old or more completed high school, 1960	"
34.	Median years of education, 1960	"

Continued

Table 3--Selected socioeconomic variables--Continued

Number	Variable	Data type
35.	% population 21-65 years old in labor force, 1960	Labor force
36.	% civilian labor force male, 1960	"
37.	% civilian labor force female, 1960	"
38.	% labor force white collar, 1960	"
39.	% of employed working outside home county, 1960	"
40.	% employed 13 weeks or less, 1959	"
41.	% labor force employed in agriculture, 1960	"
42.	% labor force employed in manufacturing, 1960	"
43.	% labor force employed in construction, 1960	"
44.	% labor force employed in retail and wholesale trade, 1960	"
45.	% labor force employed in finance, insurance, and real estate, 1960	"
46.	% labor force employed in educational services, 1960	"
47.	% labor force employed in public administration, 1960	"
48.	Property tax per capita, 1962	Revenue & Expenditures
50.	% general expenditures for education, 1962	"
51.	% general expenditures for highways, 1962	"
52.	% general expenditures for public health and hospitals, 1962	"
53.	% debt of government revenue, 1962	"
54.	% revenue for education, 1962	"
55.	% revenue for highways, 1962	"
56.	% revenue for public health and hospitals, 1962	"
57.	Manufacturing productivity per employee, 1963	Productivity
58.	Wholesale sales per employee, 1963	"
59.	% capital expenditure of value added in manufacturing, 1963	"
60.	Retail sales per employee, 1963	"
61.	Selected services sales per employee, 1963	"
62.	% occupied houses with washer, 1960	Housing
63.	% occupied houses with freezer, 1960	"
64.	% occupied houses with air conditioning, 1960	"
65.	% occupied houses with television, 1960	"
66.	% occupied houses with telephone, 1960	"
67.	% occupied houses with car, 1960	"

Continued

Table 3--Selected socioeconomic variables--Continued

Number	Variable	Data type
68.	% commercial farms with sales of $10,000 or more, 1964	Agriculture
69.	% part-time farms of commercial farms, 1964	"
70.	% farm tenancy, 1964	"
71.	% change in farm size, 1959-1964	"
72.	% farm operator households with nonfarm income, 1964	"
73.	Farm family living index, 1959	"
74.	% time deposits of total deposits, 1964	Banking
75.	% demand deposits of total deposits, 1964	"
76.	% change in bank deposits, 1960-1964	"

RC&D DIRECTIONS, EMPHASES, AND CONSISTENCY

Resource development directions and emphases are viewed nationally, regionally, and by project areas. The delineations of the regions follow those developed by the U.S. Department of Commerce with minor adjustments (see map).

An Overview of RC&D Activities

Between 1963 and 1970, there were 8,341 proposals included in project plans of the 48 RC&D projects chosen for study. A total of 6,590 action measures were reported as of 1970 (see tables 4 and 5). Examination of project plans and progress reports showed that two-thirds of proposals and actions were oriented toward natural resource development.

Water and Recreation activities, both of which are natural resource oriented, were the first and second leading categories in total numbers of proposals. Community Facilities and Services, representing human resource concerns, was third. Nearly two-thirds of all proposals and actions were classified in these three categories.

When proposals were compared to actions, those categories experiencing the greatest proportional increases were Land, Recreation, and Industry, in that order. The greatest declines in emphasis were found in Water, Community Facilities and Services, and Transportation, also in order.

Regional Directions and Emphases

While all seven regions had more natural resource oriented proposals and actions, four regions were found to have increased their shares of human resource development activities as proposals were acted upon: Northeast (I), East South Central (V), West South Central (VI), and West (VII) (tables 6 and 7).

RC&D Regional Delineations

(Based on Census Regions and Geographic Divisions of the United States with slight adjustments for three Wyoming counties)

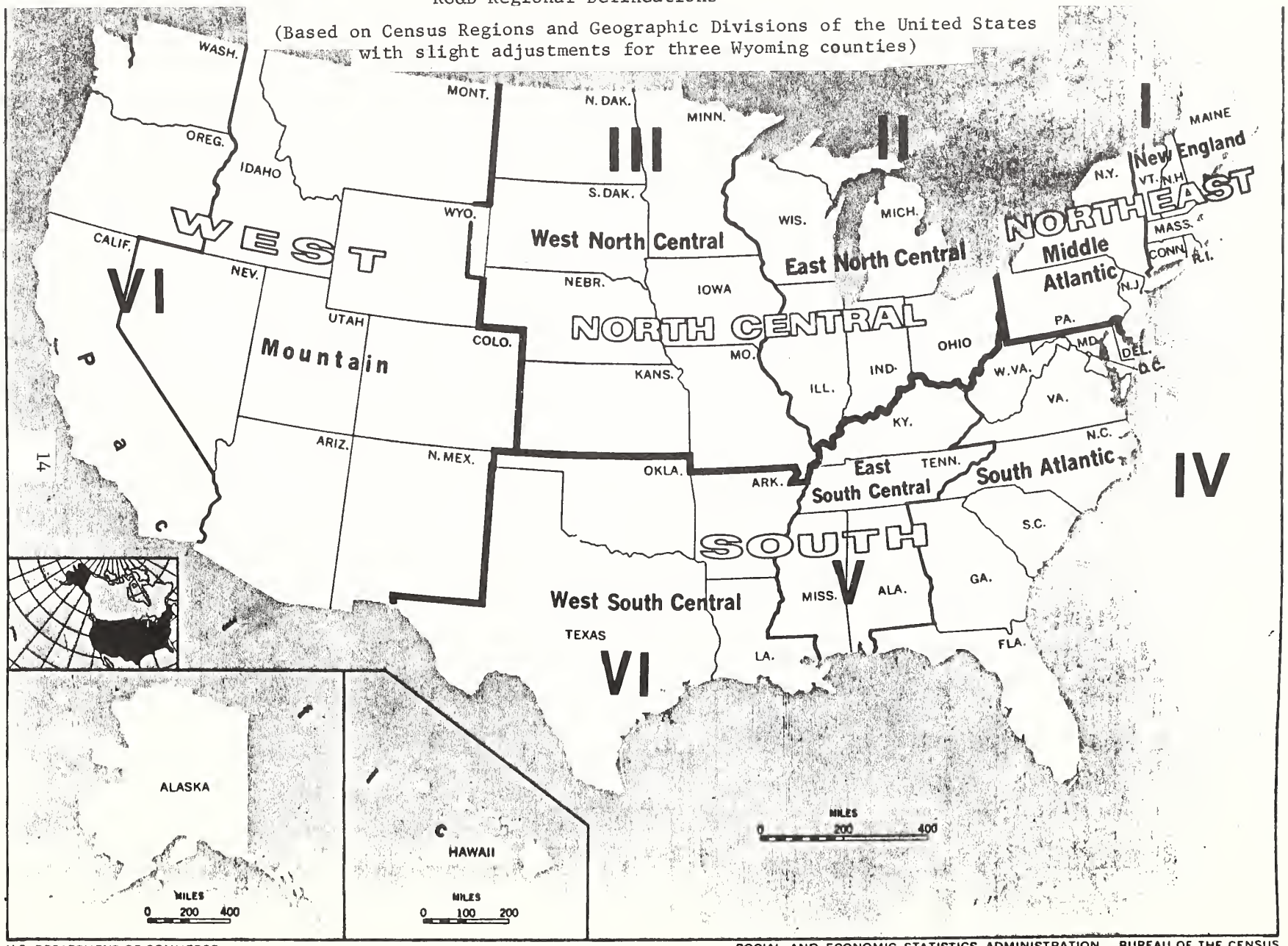

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Table 4--RC&D measures proposed by region

Category	Region							Total	Percent of grand total
	I	II	III	IV	V	VI	VII		
	Number								Percent
Human resources:									
Education	32	28	59	32	29	17	5	202	2.42
Health & Medical Services	3	24	29	29	26	12	3	126	1.51
Industry	30	32	149	21	54	31	65	382	4.59
Employment	10	4	13	6	4	4	2	43	0.52
Transportation	17	144	130	28	69	87	40	515	6.18
Housing	5	14	30	14	17	10	7	97	1.16
Community Facilities & Services	176	170	415	268	257	209	98	1,593	19.04
Total	273	416	825	398	456	370	220	2,958	35.43
Natural resources:									
Environment	27	33	58	45	22	13	6	204	2.45
Land	81	176	102	21	71	46	40	537	6.45
Water	302	268	348	154	289	242	285	1,888	22.62
Agriculture	33	44	88	23	33	46	38	305	3.66
Forestry	61	121	53	41	32	24	24	356	4.27
Recreation	266	482	396	160	172	225	176	1,877	22.53
Planning & Development	93	28	30	13	12	11	29	216	2.59
Total	863	1,152	1,075	457	631	607	598	5,383	64.57

Table 5--RC&D actions reported by region

Category	Region							Total	Percent of grand total
	I	II	III	IV	V	VI	VII		
	Number								Percent
Human resources:									
Education	38	25	33	17	20	22	25	180	2.73
Health & Medical Services	8	12	14	5	27	7	10	83	1.26
Industry	22	28	58	28	57	36	126	355	5.39
Employment	3	3	2	0	1	2	0	11	0.17
Transportation	24	83	48	15	35	88	45	338	5.13
Housing	8	9	26	9	29	32	12	125	1.90
Community Facilities & Services	148	123	180	113	207	174	207	1,152	17.48
Total	251	283	361	187	376	361	425	2,244	34.05
Natural resources:									
Environment	21	19	27	34	18	8	14	141	2.14
Land	126	184	116	34	63	58	84	665	10.09
Water	189	191	190	81	120	116	331	1,218	18.48
Agriculture	15	59	53	7	5	36	104	279	4.23
Forestry	30	94	29	12	7	17	81	270	4.10
Recreation	319	351	289	83	157	143	261	1,603	24.32
Planning & Development	34	42	15	3	14	18	44	170	2.58
Total	734	940	719	254	384	396	919	4,346	65.95

Table 6--Regional shares of proposed RC&D measures

Category	Region						
	I	II	III	IV	V	VI	VII
	Percent						
Human resources:							
Education	2.8	1.8	3.1	3.7	2.7	1.7	.6
Health & Medical Services	.3	1.5	1.5	3.4	2.4	1.2	.4
Industry	2.6	2.0	7.8	2.5	5.0	3.2	8.0
Employment	.9	.3	.7	.7	.4	.4	.2
Transportation	1.5	9.2	6.8	3.3	6.3	8.9	4.9
Housing	.4	.9	1.6	1.6	1.6	1.0	.9
Community Facilities & Services	15.5	10.8	21.9	31.3	23.6	21.4	12.0
Total	24.0	26.5	43.4	46.5	42.1	37.8	26.9
Natural resources:							
Environment	2.4	2.1	3.1	5.3	2.0	1.3	.7
Land	7.1	11.2	5.4	2.5	6.4	4.7	4.9
Water	26.6	17.1	18.3	18.0	26.7	24.9	34.8
Agriculture	2.9	2.8	4.6	2.7	3.0	4.7	4.6
Forestry	5.4	7.7	2.8	4.8	2.9	2.5	2.9
Recreation	23.6	30.8	20.8	18.7	15.8	23.0	21.5
Planning & Development	8.2	1.8	1.6	1.5	1.2	1.1	3.5
Total	76.0	73.5	56.6	53.5	57.9	62.2	73.1

Table 7--Regional shares of reported RC&D measures

Category	Region						
	I	II	III	IV	V	VI	VII
	Percent						
Human resources:							
Education	3.9	2.0	3.1	3.9	2.6	2.9	1.9
Health & Medical Services	.8	1.0	1.3	1.1	3.6	.9	.7
Industry	2.2	2.3	5.4	6.3	7.5	4.8	9.4
Employment	.3	.2	.2	-	.1	.3	-
Transportation	2.4	6.8	4.4	3.4	4.6	11.6	3.3
Housing	.8	.7	2.4	2.0	3.8	4.2	.9
Community Facilities & Services	15.0	10.1	16.7	25.7	27.2	23.0	15.4
Total	25.5	23.2	33.5	42.3	49.4	47.6	31.6
Natural resources:							
Environment	2.1	1.6	2.5	7.7	2.4	1.1	1.0
Land	12.8	15.0	10.7	7.7	8.3	7.7	6.2
Water	19.2	15.6	17.6	18.4	15.8	15.3	24.7
Agriculture	1.5	4.8	4.9	1.6	.7	4.8	7.8
Forestry	3.0	7.7	2.7	2.7	.9	2.2	6.0
Recreation	32.5	28.8	26.7	18.8	20.7	18.8	19.4
Planning & Development	3.5	3.4	1.4	.7	1.8	2.4	3.3
Total	74.5	76.8	66.5	57.7	50.6	52.4	68.4

The remaining three regions moved in the direction of increased natural resource development. Regional changes in development emphases are summarized and shown below by + and - signs.

Category	Region I	II	III	IV	V	VI	VII
Human resources:							
Education	+	+	s*	+	-	+	+
Health & Medical Services	+	-	-	-	+	-	+
Industry	-	+	-	+	+	+	+
Employment	-	-	-	-	-	-	-
Transportation	+	-	-	+	-	+	-
Housing	+	-	+	+	+	+	s
Community Facilities & Services	-	-	-	-	+	+	+
Human resource change	+	-	-	-	+	+	+
Natural resources:							
Environment	-	-	-	+	+	-	+
Land	+	+	+	+	+	+	+
Water	-	-	-	+	-	-	-
Agriculture	-	+	+	-	-	+	+
Forestry	-	s	-	-	-	-	+
Recreation	+	-	+	+	+	-	-
Planning & Development	-	+	-	-	+	+	-
Natural resource change	-	+	+	+	-	-	-

*No change

Increased emphasis in Education and Housing was found in five of seven regions. Employment measures fared poorly with every region, experiencing a decrease in emphasis when actions were compared with proposals. This decrease is understandable in that there is considerable difficulty in affecting employment. In Water and Forestry categories, the emphasis decreased except for one region in each category. All seven regions placed higher emphasis on Land related action measures as compared to proposals.

To test the program consistency within regions, rankings of proposals and action measures were determined for each region. Spearman rank correlation analysis was used to test the strength of agreement between these rankings. For every region, the correlation of proposals and actions exceeded .76 indicating high levels of consistency (see table 8).

Table 8--Rank correlations of proposals and actions by region

	Region	Rank correlation[1/]
I.	Northeast	.89
II.	East North Central	.97
III.	West North Central	.94
IV.	South Atlantic	.76
V.	East South Central	.79
VI.	West South Central	.87
VII.	West	.94

1/ Significant at alpha = .05

Project Directions and Emphases

Although the 2:1 proportion of natural to human resource measures remained constant for proposals and actions overall, many RC&D projects experienced directional shifts in development priorities. Twenty-seven, or 56 percent of the 48 studied projects, had shifts toward more human resource development. Half or more of the RC&D areas increased their emphasis in six categories: Education, Housing, Community Facilities and Services, Land, Water, and Recreation. Half or more of the projects decreased their emphasis in 10 categories: Health and Medical Services, Industry, Employment, Transportation, Housing, Environment, Water, Agriculture, Forestry, and Planning and Development.

Correlation analysis of proposals and actions was performed for each of the 48 selected projects (table 9). As before, the correlation coefficients measure the strength of agreement between rankings of proposals and actions allowing comparisons between projects. Only three coefficients were found to be insignificant at the 95 percent level of confidence. This analysis supports the expectation of a high degree of consistency between the proposal and action phases of the RC&D program.

Table 9--Rank correlations of proposals and actions by RC&D project

Region & area		Correlation coefficient
I.	Northeast	
	1.	.71
	2.	.84
	3.	.84
	4.	.67
	5.	.85
	6.	.79
	7.	.78
	8.	.87
II.	East North Central	
	9.	.76
	10.	.90
	11.	.70
	12.	.86
	13.	.94
	14.	.69
III.	West North Central	
	15.	.84
	16.	.88
	17.	.94
	18.	.90
	19.	.62
	20.	.79
	21.	.86
IV.	South Atlantic	
	22.	.80
	23.	.76
	24.	.77
	25.	.53 1/
	26.	.47 1/
V.	East South Central	
	27.	.52 1/
	28.	.55
	29.	.80
	30.	.74
	31.	.89
	32.	.77

See footnote at end of table Continued

Table 9--Rank correlations of proposals and actions by RC&D project--Continued

Region & area		Correlation coefficient
VI.	West South Central	
	33.	.78
	34.	.54
	35.	.89
	36.	.90
	37.	.85
	38.	.71
VII.	West	
	39.	.75
	40.	.89
	41.	.79
	42.	.63
	43.	.75
	44.	.70
	45.	.82
	46.	.73
	47.	.88
	48.	.69

1/ Insignificant at alpha = .05

REGIONAL ANALYSIS

Regional Socioeconomic Structure

Seventy-six measurements describing various aspects of socioeconomic structure in 297 RC&D counties of 48 RC&D projects were aggregated for 7 regions. Factor analysis of cross sectional data was employed to identify major socioeconomic aspects (factors) and their relationship to each region.[6/] Each factor contains a group of variables which are maximally correlated with the factor. Each variable contained in a factor is a component of that factor. Each component has a factor loading which describes its relationship to a factor with signs (+,-) indicating direct or inverse relationships between components and factors. Loading size determines the level of importance of each component. For a given region a high, positive loading would indicate a high measurement level for a given component while a high, negative loading indicates a low measurement level.[7/]

A region's score on a factor indicates how well the factor and its components represent regional conditions. Factor score magnitude describes the degree to which the factor depicts regional conditions. Factor score signs (+,-) indicate that the factor conditions represented by its components are directly or inversely related to conditions in the region. For example, a high, positive factor score suggests that the factor with its components is very representative of regional conditions.

In this analysis, six major factors were discovered: Socioeconomic Status, Population Change and Government Revenue and Expenditures, Manufacturing Advantage, Rural Labor Force, Education Specialty, and Population Level. Scores on each of these factors were computed for each region and are listed in Appendix table 1. The six factors and their major components are shown in table 10. Factor names were suggested by the researcher. Following discussions concern factor interpretation and a practical test of their value for discriminating regional differences in shifts in resource development preferences. Note that no time series data are analyzed.

Socioeconomic Status

This factor represents a moderately high level of socioeconomic status. Taxation is high as are level-of-living and income measurements. The older segment of population is represented. Definite foreign but nonminority origins are evident. The factor represents political activity and economic productivity. Farm tenancy is low while commercial farming is viable. A predominantly male labor force is concentrated in

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6/ See Appendix C for a discussion of factor analysis.

7/ For example, a factor loading of -.70 for a birthrate component represents a low birthrate, while .85 for an income component indicates a high income level in the factor.

Table 10--Regional socioeconomic factors, major components, and factor loadings

Variable identification number	Factor and components	Loading
	1. Socioeconomic Status	
48.	Property tax per capita, 1962	.9650
67.	% occupied houses with car, 1960	.9604
32.	% population completed 5 grades or less, 1960	-.9600
14.	% population minority, 1960	-.9536
10.	% population rural-farm white, 1960	.9501
70.	% farm tenancy, 1964	-.9486
11.	% population rural-farm negro, 1960	-.9462
66.	% occupied houses with telephone, 1960	.9340
49.	General expenditure per capita excluding capital outlay, 1962	.9319
16.	% population foreign born, 1960	.9297
7.	% population voted in 1960	.9256
73.	Farm family living index, 1959	.9187
62.	% occupied houses with washer, 1960	.8961
71.	% change in farm size, 1959-1964	-.8779
15.	% population foreign stock, 1960	.8551
28.	Number of cars per capita, 1960	.8501
22.	% population of voting age, 1960	.8328
61.	Selected services sales per employee, 1963	.8257
65.	% occupied houses with television, 1960	.7930
23.	Per capita income, 1959	.7663
68.	% commercial farms with sales of $10,000 or more, 1964	.7659
25.	% change in family income, 1949 to 1959	-.7601
26.	% family incomes of $3,000 or less, 1959	-.7574
20.	Median age of population, 1960	.7442
33.	% population 25 years or more completed high school, 1960	.7284
34.	Median years of education, 1960	.7280
24.	Median family income, 1959	.7083
75.	% demand deposits of total deposits, 1964	-.6566
38.	% labor force white collar, 1960	.6509
36.	% civilian labor force male, 1960	.6325
37.	% civilian labor force female, 1960	-.6325
30.	% population 5-34 years old in high school, 1960	.6190
74.	% time deposits of total deposits, 1964	.5990
44.	% labor force employed in retail and wholesale trade, 1960	.5157

Continued

Table 10--Regional socioeconomic factors, major components, and factor loadings--Continued

Variable identification number	Factor and components	Loading
	2. Population Change and Government Revenue and Expenditures	
6.	% change in number of families, 1950 to 1960	.9662
51.	% general expenditures for highways, 1962	-.9566
55.	% general revenue for highways, 1962	-.9537
29.	% population 5-34 years old in elementary school, 1960	.9373
2.	% population change, 1950 to 1960	.9252
54.	% revenue for education	.9031
21.	Change in median age, 1950 to 1960	.8559
50.	% general expenditures for education, 1962	.8545
45.	% labor force employed in finance, insurance, and real estate, 1960	.8108
3.	% population change due to migration, 1950 to 1960	.7897
60.	Retail sales per employee, 1963	-.7720
17.	% population under 5 years, 1960	.7709
4.	% population change due to natural increase, 1950 to 1960	.7476
18.	% population over 65 years, 1960	-.7231
8.	% urban population, 1960	.6924
9.	% population rural-farm, 1960	-.6777
27.	% family incomes of $10,000 or more, 1959	.6602
41.	% labor force employed in agriculture, 1960	-.6499
13.	% population in group quarters, 1959	.6189
19.	% population 21-65 years, 1960	.5958
	3. Manufacturing Advantage	
57.	Manufacturing productivity per employee, 1963	.9336
59.	% capital expenditure of value added in manufacturing, 1963	.8670
56.	% revenue for public health and hospitals, 1962	-.8424
53.	% debt of government revenue, 1962	.8130
52.	% general expenditures for public health and hospitals, 1962	-.8087
35.	% population 21-65 years old in labor force, 1960	-.8060
64.	% occupied houses with air conditioning, 1960	.8045
43.	% labor force employed in construction, 1960	.7445
69.	% part-time farms of commercial farms, 1964	.6890
76.	% change in bank deposits, 1960-1964	.6106

Continued

Table 10--Regional socioeconomic factors, major components, and factor loadings--Continued

Variable identification number	Factor and components	Loading
	4. Rural Labor Force	
63.	% occupied houses with freezer, 1960	.8553
42.	% labor force employed in manufacturing, 1960	-.8335
47.	% labor force employed in public administration, 1960	.8329
39.	% of employed working outside home county, 1960	-.8271
5.	Population density, 1964	-.7723
12.	% population rural-farm other, 1960	.6406
58.	Wholesale sales per employee, 1963	.5872
	5. Education Specialty	
40.	% employed 13 weeks or less, 1959	.8714
46.	% labor force employed in educational services, 1960	.7856
31.	% population 5-34 years old in college, 1960	.7290
72.	% farm operator households with non-farm income, 1964	.7266
	6. Population Level	
1.	Total population	.7700

white collar, retail, and wholesale jobs. This factor measures relatively little change in family incomes in the decade of the 1950's.

Population Change and Government Revenue and Expenditures

Large declines in population are suggested by this factor. This is supported by large changes in family numbers and high levels of outmigration. As population declines, the level of urban population increases relative to farm population and the agricultural labor force. Low levels of revenue and expenditures for highways are associated with this factor. Conversely, the factor describes high levels of education revenue and expenditures.

Manufacturing Advantage

This factor represents high levels of manufacturing productivity along with relatively high levels of capital expenditures compared to value added. This, along with a negative loading on the productive labor force (21 to 65 years old), suggests that manufacturing advantage is inversely related to labor investment and that manufacturing is capital intensive rather than labor intensive. A region correctly described by this factor would also have a low proportion of part-time to commercial farms and low levels of revenue and expenditures for public health and hospitals.

Rural Labor Force

High levels of public administration employment, low levels of manufacturing employment, a resident workforce, and relatively low population density are suggested by this factor. These measurements are often characteristic of rural areas. It has been found that as rurality increases, population density decreases and public administration employment looms larger in proportion. Also with increased rurality, conditions of living convenience change enough allowing home freezers to increase in importance.

Education Specialty

This factor depicts the location of centers of higher education. Loadings show high levels of labor force are employed in educational services, high proportions of college populations are present, and a high proportion of the labor force which is not employed on a full-time basis is also measured. The factor also suggests that farm households having income sources outside agriculture are conducive to the location of educational centers.

Population Level

Total population is the only major component in this factor. Its loading suggests that moderately high levels of population can be a meaningful measure of regional socioeconomic structure.

Regional Development Determinants

The practical test of the value of socioeconomic factors in identifying shifts in regional development preferences is accomplished by means of discriminant analysis. This technique tests for significant differences among two or more groups known to differ in composition. Regional factor scores measuring the degree to which factors represent socioeconomic conditions in the regions serve as basic input data. The analysis produces linear equations identifying those factors which are useful in differentiating between groups of regions with shifting preferences. The probabilities of each region belonging to each group are also computed.

Under constraints of the discrimination procedure, each term in a discriminant equation adds more information for separating those projects which emphasized a development activity from those which did not. The discriminant process identified complex, linear relationships between shifts in resource development activities and socioeconomic structure of projects depicted by their factor scores.[8/]

Development Directions

The discriminant analysis process used regional factor scores to classify regions into two groups determined by regional shifts toward human or natural resource activities. The actual groupings were known beforehand. The value in obtaining new groupings of regions based on the discriminant process lies in the identification of those factors which aid most in accurately reproducing the known groupings. This provides insight as to the socioeconomic influences on shifting development preferences. The groupings as obtained by the discriminant

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8/ Discriminant function values were not produced as program output and are thus not reported. Group classifications and posterior probabilities were used to check on classification accuracy. The statistical significance or F-level for including a variable (factor) in a discriminant equation was .01. The F-level for deletion was .005 and tolerance was set at .0001.

process are shown below. The discriminant process correctly classified each of the seven regions (table 11).

Table 11--Regional classifications and probabilities

Development directions			
Human resource		Natural resource	
Region	Probability	Region	Probability
I. Northeast	.939	II. East North Central	.999
V. East South Central	.999	III. West North Central	.760
VI. West South Central	.959	IV. South Atlantic	.906
VII. West	.816		

Only two of the six regional factors, Population Level and Rural Labor Force, were needed to properly classify all seven regions as shown by the classification coefficients in table 12. The role of factor scores in the classification process is illustrated below and will not be fully discussed for more complex analyses involving several factors in a classification equation. Factor scores are displayed in Appendix table 1.

Table 12--Regional discriminant function coefficients from analysis of shifts in general resource development directions

Factor	Coefficient	
	Human resource	Natural resource
1. Socioeconomic Status	--	--
2. Government Revenue and Expenditures	--	--
3. Manufacturing Advantage	--	--
4. Rural Labor Force	.71	-.95
5. Education Specialty	--	--
6. Population Level	1.32	-1.77
Constant	-.64	-1.14

Discriminant analysis using regional factor scores on the six factors properly classified each region into the group to which it was known to belong as determined by shifts toward human or natural resource development activites. One factor, Population Level, properly classified all but Region VII. Regions II, III, and IV have negative (weak) scores on this factor and were properly placed in the group accenting natural

resource development. Regions I, V, and VI have positive (strong) scores on Population Level and are accurately placed in the group accenting human resource development. Region VII has a weak score on Population Level which suggests a natural resource accent; however, a strong score on Rural Labor Force offsets Population Level as a determinant of group membership and helps to properly place region VII with those accenting human resource activities. This analysis suggests that the higher the total population of a region the greater is its tendency to shift toward human resource-related activites.

Development Emphases

The previous section concerned determinants of regional shifts in general resource development directions. This section identifies those factors which act as determinants of regional shifts in specific resource development emphases, i.e., shifts in 14 specific types of development activities.

Each of the regions was properly classified by scores on the six factors except those which emphasized Employment and Land activities. It was known that no regions emphasized Employment measures while all regions emphasized Land measures; thus there were no group differences to be tested in either category. The discriminant function coefficients in tables 13 and 14 identify those factors important in achieving correct classification of all regions into the No or Yes emphasis grouping for each category, except for Employment and Land. The number of factors required to properly classify regions in 14 categories varies by category. However, in each category the first factor to enter the equation properly classified over 70 percent of the regions. The addition of a second factor to each set of equations raised the classification accuracy to 85 percent, except for Planning and Development. In 7 of 12 categories, classification accuracy was 100 percent using only two factors. See table 15.

Summary

Discriminant analysis identified some important linkages between socioeconomic variables and shifting development preferences. Factors describing Population Level and Rural Labor Force correctly classified all seven regions with regard to general development directions. In the classification equations concerning development emphases, the leading factors are Manufacturing Advantage and Rural Labor Force. These factors have reverse roles in differentiating between regions emphasizing human and natural resource development. Regional factor scores on Manufacturing Advantage are most influential in classifying regions with natural resource emphases but are least important for the human resource activities. The opposite is true for scores on the Rural Labor Force factor.

More in-depth information concerning the value of various factors for determining regional differences in development preferences is presented in table 15. This shows the factors acting as primary determinants

Table 13--Regional discriminant function coefficients from analysis of shifts in human resource development emphases

Category (measure type)		Factor						Constant
		Socioeconomic Status	Population Change & Government Revenue & Expenditures	Manufacturing Advantage	Rural Labor Force	Educational Specialty	Population Level	
Human resources:								
Education	No[1/]	-.89			-.59			-.26
	Yes	2.24			1.49			-1.65
Health, Medical	No		-2.26		-1.96	-1.49	-2.98	-2.01
	Yes		3.01		2.62	1.99	3.98	-3.58
Industry	No		1.35			-1.30		-1.63
	Yes		-.54			.52		-.26
Employment[2/]	No							
	Yes							
Transportation	No	.85			.50			-.30
	Yes	-1.13			-.67			-.54
Housing	No				-2.71		-2.11	-4.40
	Yes				.45		.35	-0.12
Community Facilities	No			-1.04	-1.42	-.63		-.97
	Yes			1.38	1.89	.84		-1.72

1/ No, yes indicates whether or not a given measure type received increased attention when proposals were converted into actions. Each pair of no, yes rows represents results of separate discriminant runs and forms the basis for a predictive model for each measure type.

2/ All regions formed a single group in the Employment category and could not be analyzed.

Table 14--Regional discriminant function coefficients from analysis of shifts in natural resource development emphases

Category (measure type)		Factor						Constant
		Socioeconomic Status	Population Change & Government Revenue & Expenditures	Manufacturing Advantage	Rural Labor Force	Educational Specialty	Population Level	
Natural resources:								
Environment	No[1/]				-.81	-1.15		-.76
	Yes				1.08	1.53		-1.36
Land[2/]	No							
	Yes							
Water	No	.12	.55	.78				-.10
	Yes	-.76	-3.31	-4.71				-3.75
Agriculture	No			-1.02			.93	.51
	Yes			1.36			-1.24	-.90
Forestry	No	-1.41		-1.03		-1.66	1.36	-.56
	Yes	3.54		2.59		4.17	-3.41	-3.53
Recreation	No			1.36			-1.24	-.90
	Yes			-1.02			.93	-.51
Planning & Development	No	-1.45		-1.75		-1.14		-0.58
	Yes	1.94		2.33		1.52		-1.04

1/ No, yes indicates whether or not a given measure type received increased attention when proposals were converted into actions. Each pair of no, yes rows represents results of separate discriminant runs and forms the basis for a predictive model for each measure type.

2/ All regions formed a single group in the Land category and could not be analyzed.

Table 15--Regional primary development determinants and classification accuracy

Category	Primary development determinant	Factor score	Primary classification accuracy	Total factors in final equation	Final classification accuracy
			Percent	Number	Percent
Human resource	Population Level	strong	86	2	100
Natural resource	Population Level	weak	86	2	100
Human resources:					
Education	Socioeconomic Status	strong	86	2	100
Health & Medical Services	Population Level	strong	71	4	100
Industry	Population Change & Govt. Rev. & Exp.	weak	71	2	100
Employment					
Transportation	Socioeconomic Status	weak	71	2	100
Housing	Rural Labor Force	weak	86	2	100
Community Facilities & Services	Rural Labor Force	strong	86	3	100
Natural resources:					
Environment	Education Specialty	strong	71	2	100
Land					
Water	Manufacturing Advantage	weak	71	3	100
Agriculture	Manufacturing Advantage	strong	71	2	100
Forestry	Education Specialty	strong	71	4	100
Recreation	Manufacturing Advantage	weak	71	2	100
Planning & Development	Manufacturing Advantage	strong	71	3	100

of regional development tendencies regarding general development directions and specific development emphases in 14 activities, the relationship of factor scores to classification, primary classification accuracy with the primary factor, the total number of factors in the final equations, and the final classification accuracy. Some implications of these factors as primary determinants of development tendencies are discussed below.

Manufacturing Advantage

This was the leading factor in identifying regional tendencies concerning shifting development emphases. It acted as a primary determinant of classification for Water, Agriculture, Recreation, and Planning and Development. Strong factor scores imply that regions with relatively high levels of manufacturing employment productivity, capital intensive manufacturing, and a commercial dominance in agriculture tend toward Planning and Development and Agriculture development activities. Regions with weak scores on this factor have tendencies toward Water and Recreation activities.

Rural Labor Force

This factor is of primary importance concerning human resource emphases. Strong scores indicate that regions characterized by high levels of public administration employment and low levels of population density and manufacturing employment will emphasize Community Facilities and Services activities. Regions with weak scores on this factor tended to emphasize Housing activities.

Education Specialty

This factor depicts a strong regional concern for higher education, with high levels of employment in educational services, relatively large college populations, and off-farm income sources. Regions with strong scores on this factor tended to emphasize natural resource-related Environment and Forestry activities.

Socioeconomic Status

Socioeconomic Status acts as a primary determinant of development emphasis for two types of human resource-related activities. Strong scores imply that a relatively high level of living as measured by taxation, income, and nonminority components is conducive to an emphasis on Education-related activities and the recognition that perhaps education is an important prerequisite to socioeconomic improvement. Weak scores on this factor suggest that regions with relatively lower levels of living are more concerned with increased development of their productive resources by facilitating access to the resources. Hence, the emphasis on Transportation activities.

Population Change and Government Revenue and Expenditures

This factor acted as a primary determinant of development tendency for only Industry-related activities. Weak scores suggest regions not experiencing large declines in population, having relatively low levels of outmigration, and emphasizing education revenue and expenditures over those for highways will have a tendency to place increased emphasis on Industry-related activities.

Population Level

Strong scores on this factor imply relatively high levels of total population and identify a regional tendency toward Health and Medical Services activities.

PROJECT ANALYSIS

Project Socioeconomic Structure

In this analysis, 76 variables measuring socioeconomic structure in 297 counties were aggregated to 48 RC&D projects. Factor analysis was used to examine the socioeconomic makeup of the projects. The analysis identified 20 factors accounting for 94 percent of the total variance in the data set (48 x 76). Factors, major component variables included in each factor, and factor loadings for components are contained in table 16. Following is a general interpretation of each major factor. Again, the magnitude of factor component loadings suggests a high or low correlation of the component with the factor while the sign of the loading specifies the direction of the correlation and high or low levels of the variable. High positive (strong) scores on a factor imply a close representation of the conditions described in the factor. High negative (weak) scores suggest the inverse. As in the regional anaylsis, the relationships identified in the factors indicate major areas of differences in the socioeconomic makeup of RC&D projects.

Socioeconomic Status

This factor is composed of 26 major components. It identifies a relatively high level of socioeconomic status evidenced by high positive loadings on income, education, living conveniences, and employment components.

Minority Population

This factor is the second largest found, with 10 major components. It measures high levels of influence of minority population with contrasting low levels of "rural-farm-white" population and of indicators of living convenience and political activity.

Health and Education Finances

This factor measures the influence of levels of revenue and expenditures which are very low for public health and hospitals and moderately high on education components. This suggests that the relationship between the two types of components is inverse.

Other Rural-Farm Population

Another minority aspect of socioeconomic structure in RC&D projects is identified by this factor. It is based on a component variable describing rural farm population other than white or negro. The factor describes high levels of rural farm minority population other than negro and low levels of rural farm white population. This factor is directly related to labor force components for construction and public administration.

Table 16--Project-level socioeconomic factors, major components, and factor loadings

Factor	Component	Loading
1. Socioeconomic Status	Per capita income, 1959	.9464
	Family income $10,000 or more, 1959	.9406
	Median family income, 1959	.9302
	% family incomes $3,000 or less, 1959	-.8932
	% population change due to migration, 1950-1960	.8867
	Median school years, 1960	.8677
	% population 25 years old completed high school, 1960	.8666
	% population change, 1950-1960	.8663
	Change in median age, 1950-1960	.8358
	% change in number of families, 1950-1960	.8340
	% labor force employed in insurance, finance, and real estate, 1960	.7462
	% occupied houses with telephone, 1960	.7355
	% labor force white collar, 1960	.6879
	Number of cars per capita, 1960	.6723
	% population completed 5 grades or less, 1960	-.6554
	% commercial farms with sales of $10,000 or more, 1964	.6520
	% urban population, 1960	.6434
	% occupied houses with car, 1960	.6395
	Property tax per capita, 1962	.6134
	% occupied houses with television, 1960	.6028
	General expenditure per capita excluding capital outlay, 1962	.5898
	% population rural-farm, 1960	-.5851
	% population 21-65 years old in labor force, 1960	.5719
	% population 21-65 years old, 1960	.5590
	Manufacturing productivity per employee, 1963	.5400
	% labor force employed in agriculture, 1960	.5117
2. Minority Population	% rural population rural-farm white, 1960	-.8897
	% rural population rural-farm negro, 1960	.8835
	% population minority, 1960	.8618
	% occupied houses with washer, 1960	-.7954

Continued

Table 16--Project-level socioeconomic factors, major components, and factor loadings--Continued

Factor	Component	Loading
2. Minority Population (cont.)	% population voted in 1960	-.7350
	% males in civilian labor force, 1960	-.6552
	% females in civilian labor force, 1960	.6552
	% occupied houses with air conditioning, 1960	.6341
	Selected services sales per employee, 1963	.5712
	% change in farm size, 1959-1964	.4965
3. Health and Education Finances	% revenue for public health and hospitals, 1962	-.9626
	% general expenditures for public health and hospitals, 1962	-.9615
	% general expenditures for education, 1962	.6700
	% revenue for education, 1962	.6555
4. Other Rural-Farm Population	% population rural-farm other, 1960	.8327
	% labor force employed in construction, 1960	.7533
	% labor force employed in public administration, 1960	.6003
5. Age	% population of voting age, 1960	-.9284
	Median age of population, 1960	.9106
	% population under 5 years old, 1960	.9058
	% population change due to natural increase, 1950-1960	.8864
	% population over 65 years old, 1960	-.7928
6. Highway Finances	% revenue for highways, 1962	.9242
	% general expenditures for highways, 1962	.9116
	% occupied houses with freezer, 1960	.4768
7. Banking and Foreign Heritage	% demand deposits of total deposits, 1964	.8199
	% time deposits of total deposits, 1964	-.8194
	% population foreign born, 1960	-.5913
	% population in group quarters, 1960	-.5388
	% population foreign stock, 1960	-.5313

Continued

Table 16--Project-level socioeconomic factors, major components, and factor loadings--Continued

Factor	Component	Loading
Nonresident Workforce	% of employed working outside home county, 1960	.8763
Education Specialty	% population 5-34 years old in college, 1960	-.9087
	% labor force employed in educational services, 1960	-.8843
	% employed 13 weeks or less, 1959	-.5172
Manufacturing Investment Efficiency	% capital expenditure of value added in manufacturing, 1963	-.7985
	% part-time farms of commercial farms, 1964	-.5129
Retail-Wholesale Trade	% labor force employed in retail and wholesale trade, 1960	.8310
	Retail sales per employee, 1963	-.5198
Government Debt/Revenue	% debt of government revenue, 1962	-.8622
Farm Family Living Index	Farm family living index, 1959	-.6949
Nonfarm Income	% farm operator households with nonfarm income, 1964	.9042
	% farm tenancy, 1964	-.5722
Commercial Agriculture	% commercial farms with sales of $10,000 or more, 1964	.4414
Education Structure	% population 5-34 years old in elementary school, 1960	-.7106
	% population 5-34 years old in high school, 1960	-.4110
Family Income Change	% change in family income, 1949-1959	-.6947
Banking Deposits Change	% change in bank deposits, 1960-1964	.4363
Wholesale Efficiency	Wholesale sales per employee, 1963	-.7685
Population Level and Density	Total population, 1960	.7984
	Population density, 1960	.7441
	% labor force employed in manufacturing, 1960	.5227

Age

This factor depicts the element of age in socioeconomic structure. Components representing high levels of younger populations and low levels of older population are described.

Highway Finances

This factor suggests the importance of transportation considerations as an important element of rural structure. The major components depict high levels of highway revenue and expenditures suggesting that the factor represents high levels of highway investment.

Banking and Foreign Heritage

The contrasting relationship between high levels of demand deposits and low levels of time deposits is identified in this factor. Low levels of population with foreign heritage are also measured.

Nonresident Workforce

This factor represents a condition of high levels of nonresidency in the workforce, the single major component.

Education Specialty

Low levels of college population and employment in educational services components indicates that this factor represents an absence of centers of higher education.

Manufacturing Investment Efficiency

This is another negative factor. A low proportion of capital expenditure compared to value added in manufacturing is suggested. The factor is negatively associated with part-time farms as a percent of commercial farms, suggesting that where manufacturing exists at high levels, part-time farming may exist only at low levels.

Retail-Wholesale Trade

The major component of this factor represents high levels of the labor force employed in retail and wholesale businesses. In contrast, another component representing retail efficiency or productivity in sales per employee indicates that low retail productivity may be an important characteristic of retail employment in primarily rural areas.

Government Debt/Revenue Index

This is a strongly negative factor defined by a single major component of the same name. The factor suggests low levels of debt compared

to revenue. Note, however, that it is only one measure of the financial condition of rural governments.

Farm Family Living Index

A single major component identifies this factor. The fairly high negative loading suggests a relatively low level of living for farm families.

Nonfarm Income

This factor contains two major components of opposite signs. High levels of nonfarm income combined with low levels of farm tenancy suggest that where nonfarm incomes are important, generally farm tenancy will not be a dominant characteristic of socioeconomic structure.

Commercial Agriculture

Percent of commercial farms with sales of $10,000 or more is the single major component in this factor. The factor loading depicts moderately high levels of commercial agriculture.

Education Structure

This is a negative factor descriptive of low levels of elementary school population and somewhat lower levels of high school population. The factor generally suggests low levels of school age population.

Family Income Change

This is another negative factor. It is composed of a single major component describing a situation of fairly low levels of family income change.

Banking Deposits Change

This is the weakest factor found. It consists of a single major component measuring moderate change in total bank deposits.

Wholesale Efficiency

This factor consists of a single strongly negative component describing a situation of low wholesale sales productivity.

Population Level and Density

This is the last factor found. Major components describe moderate levels of total population and density. A third component suggests moderate levels of manufacturing employment.

Project Development Determinants

As in the analysis of seven regions, the project area analysis examines linkages between socioeconomic structure and shifting development preferences. The analytical technique is discriminant analysis, which tests for significant differences among two or more groups of RC&D projects known to differ in composition. The analysis produces equations showing which elements of socioeconomic structure are most influential in identifying shifting development preferences at the project level. Scores for all 48 RC&D projects on all 20 factors serve as the basic inputs along with sets of projects grouped according to their known shifts in development preferences. For interpretive purposes, if a project has a high positive (strong) score on a factor, the socioeconomic conditions portrayed by the factor are characteristic of conditions in the project. High negative (weak) scores suggest that project conditions are opposite to those portrayed by the components in the factor. Raw factor scores are provided in Appendix table 2.

Fifteen discriminant problems were analyzed, 1 for general development directions and 14 for specific development emphases. These resulted in the derivation of an equation for each separate group of projects, describing a discriminant value (dependent variable), a constant, and coefficients for all independent variables (factors) which were instrumental in reproducing those groupings of projects closest to the actual groupings.

General Development Directions

RC&D projects were first grouped according to shifts in their overall emphasis on human or natural resource development as proposals were converted into actions. Discriminant analysis using factor scores as input data correctly grouped 22 of 27 projects known to have emphasized human resource development and 19 of 21 projects which had emphasized natural resource development. The discriminant equations were 85 percent accurate in reproducing the two known groupings of projects. Factors entering the discriminant equations are shown in table 17. In all, 10 factors were used in this problem. Health and Education Revenue and Expenditure alone correctly classified 60 percent of the projects, and the addition of the Nonresident Work-force factor raised the accuracy to 73 percent. The eight remaining factors added only 12 percent to total classification accuracy.

Specific Development Emphases

In this analysis, the purpose is to identify those factors instrumental in the most accurate reproduction of the known groupings involving the 14 specific types of development. Those factors acting as determinants of shifting development emphasis and their coefficients are identified in tables 18 and 19. The number of factors entering the classification equations for the 14 development categories varies from six for Recreation to 19 for Transportation, Environment, and Agriculture. However, each of the 20 factors acted as one of the top five leading determinants for one or

Table 17--Project-level discriminant function coefficients from analysis of shifts in general resource development directions

Factor	Function coefficient	
	Human resource	Natural resource
1. Socioeconomic Status	--	--
2. Minority Population	-.21	.27
3. Health & Education Revenue & Expenditure	.52	-.67
4. Other Rural Farm Population	--	--
5. Age	--	--
6. Highways Revenue & Expenditure	-.34	.44
7. Banking	--	--
8. Nonresident Work Force	-.45	.59
9. Education Specialty	-.15	.20
10. Manufacturing Investment Efficiency	--	--
11. Retail-Wholesale Trade Specialty	.17	-.22
12. Governmental Debt/Revenue Index	--	--
13. Farm Family Living Index	--	--
14. Non-Farm Incomes	-.14	.18
15. Commercial Agriculture	--	--
16. Education Structure	--	--
17. Family Income Change	-.20	.26
18. Banking Deposits Change	--	--
19. Wholesale Efficiency	.27	-.35
20. Population Level & Density	-.08	.11
Constant	-.25	-.42

Table 18--Project-level discriminant function coefficients from analysis of shifts in human resource development emphases

Factor	Human resource orientation							
	Education[1/]		Health, medical		Industry		Employment	
	Yes	No	Yes	No	Yes	No	Yes	No
1. Socioeconomic Status	.11	-.19	--	--	-.08	.05	--	--
2. Minority Population	.17	-.29	.38	.27	-.60	.39	-.99	.11
3. Health & Education Revenue & Expenditure	--	--	-.90	.64	--	--	1.56	-.18
4. Other Rural Farm Population	-.52	.88	-.22	.15	-1.03	.68	-1.65	.19
5. Age	--	--	-.17	.12	-1.02	.67	-.73	.08
6. Highways Revenue & Expenditure	--	--	-.13	.09	-.58	.38	.45	-.05
7. Banking	--	--	--	--	--	--	-1.94	.22
8. Nonresident Work Force	.34	-.58	1.08	-.77	1.33	-.87	--	--
9. Education Specialty	--	--	.25	-.18	--	--	--	--
10. Manufacturing Investment Efficiency	--	--	--	--	--	--	1.36	-.16
11. Retail-Wholesale Trade Specialty	-.48	.80	--	--	-.69	.45	--	--
12. Governmental Debt/Revenue Index	.78	-1.30	.46	-.33	.55	-.36	--	--
13. Farm Family Living Index	--	--	.50	-.36	--	--	--	--
14. Nonfarm Incomes	.27	-.45	-.54	.39	-.51	.33	--	--
15. Commercial Agriculture	.26	-.44	--	--	--	--	1.29	-.15
16. Education Structure	--	--	--	--	-.40	.26	--	--
17. Family Income Change	--	--	--	--	-.35	.25	-.23	.02
18. Banking Deposits Change	-.29	.48	-.25	.18	-.61	.40	--	--
19. Wholesale Efficiency	-.30	.51	--	--	--	--	--	--
20. Population Level & Density	.22	-.37	.44	-.32	.53	-.34	1.73	-.20
Constant	-.39	-1.09	-.76	-.38	-1.46	-.63	-4.15	-.05

See footnote at end of table

Continued

Table 18--Project-level discriminant function coefficients from analysis of shifts in human resource development emphases--Continued

Factor	Human resource orientation					
	Transportation		Housing		Community facilities	
	Yes	No	Yes	No	Yes	No
1. Socioeconomic Status	-.54	.50	.24	-.26	-.15	.12
2. Minority Population	.51	-.47	--	--	.32	-.27
3. Health & Education Revenue & Expenditure	.68	-.62	-.31	.33	-.30	.26
4. Other Rural Farm Population	--	--	-.60	.66	--	--
5. Age	-.35	.32	.15	-.16	-.54	.46
6. Highways Revenue & Expenditures	.49	-.45	.59	-.64	--	--
7. Banking	.30	-.28	-.21	.23	.34	-.28
8. Nonresident Work Force	.21	-.20	--	--	.81	-.69
9. Education Specialty	.82	-.75	--	--	.38	-.32
10. Manufacturing Investment Efficiency	.10	-.09	-.68	.74	.27	-.22
11. Retail-Wholesale Trade Specialty	.12	-.11	.07	.07	-.26	.22
12. Governmental Debt/Revenue Index	.23	-.21	-.16	.17	.42	-.35
13. Farm Family Living Index	.35	-.32	.30	-.33	--	--
14. Nonfarm Incomes	.17	-.16	--	--	-.20	.17
15. Commercial Agriculture	.38	-.35	.17	-.18	--	--
16. Education Structure	.38	-.35	--	--	--	--
17. Family Income Change	-.41	.38	--	--	--	--
18. Banking Deposits Change	-.28	.26	.16	-.17	--	--
19. Wholesale Efficiency	-.18	.16	-.75	.81	--	--
20. Population Level & Density	-.29	.26	.19	-.20	.10	-.08
Constant	-.76	-.64	-.54	-.64	-.42	-.30

[1]No, yes indicates whether or not a given measure type received increased attention when proposals were converted into actions. Each pair of columns represents results of separate discriminant runs and forms the basis for a predictive model for each measure type.

Table 19--Project-level discriminant function coefficients from analysis of shifts in natural resource development emphases

Factor	Natural resource orientation							
	Environment[1/]		Land		Water		Agriculture	
	Yes	No	Yes	No	Yes	No	Yes	No
1. Socioeconomic Status	.20	-.24	--	--	--	--	-.26	.15
2. Minority Population	-.17	.20	--	--	--	--	-.32	.19
3. Health & Education Revenue & Expenditure	-.51	.60	--	--	.59	-.42	1.12	-.67
4. Other Rural Farm Population	-.50	.59	-.81	3.10	--	--	-.75	.45
5. Age	-.41	.48	--	--	--	--	-.59	.35
6. Highways Revenue & Expenditure	.10	-.12	-.39	1.51	-.29	.21	-.39	.23
7. Banking	.13	-.16	-.22	.84	--	--	-.65	.39
8. Nonresident Work Force	.42	-.50	--	--	--	--	.60	-.36
9. Education Specialty	-.40	.47	--	--	-.10	.07	.41	-.25
10. Manufacturing Investment Efficiency	.22	-.26	--	--	--	--	.44	-.26
11. Retail-Wholesale Trade Specialty	-.18	.21	--	--	--	--	-.26	.15
12. Governmental Debt/Revenue Index	-.27	.32	.49	-1.87	.20	-.14	.10	-.06
13. Farm Family Living Index	-.18	.22	--	--	.27	-.19	-.17	.10
14. Nonfarm Incomes	-.08	.10	--	--	-.19	.14	--	--
15. Commercial Agriculture	.26	-.31	--	--	-.48	.34	-.31	.18
16. Education Structure	-.41	.49	.36	-1.37	.43	-.30	.04	.02
17. Family Income Change	--	--	-.37	1.42	--	--	.38	-.23
18. Banking Deposits Change	-.09	.10	-.34	1.29	-.23	.16	-.34	.20
19. Wholesale Efficiency	.30	-.36	.33	-1.26	.42	-.30	.48	-.29
20. Population Level & Density	.30	-.36	.50	-1.91	.44	-.31	.36	-.21
Constant	-.34	-.48	-.37	-5.37	-.38	-.19	-.63	-.23

See footnote at end of table

Continued

Table 19--Project-level discriminant function coefficients from analysis of shifts in natural resource development emphases--Continued

Factor	Natural resource orientation					
	Forestry		Recreation		Planning, development	
	Yes	No	Yes	No	Yes	No
1. Socioeconomic Status	-.31	.17	--	--	.26	-.17
2. Minority Population	--	--	--	--	-.25	.16
3. Health & Education Revenue & Expenditure	.31	-.17	-.71	1.08	--	--
4. Other Rural Farm Population	-.27	.14	-.25	.38	-.85	.55
5. Age	-.60	.33	--	--	--	--
6. Highways Revenue & Expenditure	--	--	--	--	-.37	.24
7. Banking	-.37	.20	--	--	-.22	.14
8. Nonresident Work Force	.89	-.48	.51	-.78	.71	-.46
9. Education Specialty	.55	-.30	--	--	-.21	.14
10. Manufacturing Investment Efficiency	.24	-.13	.35	-.54	--	--
11. Retail-Wholesale Trade Specialty	.19	-.10	--	--	-.31	.20
12. Governmental Debt/Revenue Index	.29	-.16	--	--	.65	-.43
13. Farm Family Living Index	.23	-.13	--	--	.26	-.17
14. Nonfarm Incomes	--	--	--	--	-.34	.22
15. Commercial Agriculture	--	--	--	--	-.36	.23
16. Education Structure	.30	-.16	-.35	.53	.16	-.10
17. Family Income Change	-.07	.04	--	--	.20	-.13
18. Banking Deposits Change	-.26	.14	--	--	-.27	.17
19. Wholesale Efficiency	.33	-.18	-.45	.69	.26	-.17
20. Population Level & Density	.21	-.11	--	--	.79	-.52
Constant	-.65	-.19	-.29	-.68	-.69	-.29

[1]No, yes indicates whether or not a given measure type received increased attention when proposals were converted into actions. Each pair of columns represents results of separate discriminant runs and forms the basis for a predictive model for each measure type.

more development categories. The level of final classification accuracy ranges from 79 percent for Water to 100 percent for Land. Overall accuracy was 89 percent. The use of the classification coefficients in tables 18 and 19 is explained in Appendix C.

Summary

Seven factors were identified as primary determinants of group membership based on their contribution to group classification accuracy. These factors, the primary relationship between factor scores and group classification, primary accuracy of classification with a given factor, the number of factors included in final discriminant equations, and final classification accuracy are shown in table 20.

Interpreting some implications of these primary factors in relation to resource development emphases requires knowledge of factor scores for the primary factors and the makeup of the factors suggested by factor loadings on major component variables. The stronger or more positive a factor score is, the more the factor describes conditions in a project. Conversely, the weaker the score, the less the factor describes project conditions. Also recall that positive and negative factor loadings can be interpreted as indicating higher and lower variable measurements, respectively. Factor loadings are displayed in table 16.

Health and Education Finances

This factor identifies an inverse financial relationship between public health and education sectors. Low levels of revenue and expenditures for public health are associated with moderately high levels for education.

Strong scores on this factor indicated shifts in development preferences toward the general area of Human Resources, and the more specific areas of Environment and Recreation. This indicates that RC&D decisionmakers in projects characterized by the relationships in this factor seem to harbor strong interests in improvements impacting rather directly on human conditions. These decisionmakers also seem inclined toward natural resource improvements concerned with recreation and environmental activities which also have important impacts on human well-being.

In projects with weak scores on this factor, decisionmakers tended to emphasize Agriculture and Water activities. Both activities concern primarily the use of natural resources with strong linkages between agricultural production and water.

Other Rural-farm Population

An association between rural-farm population other than white and negro and labor force in construction and public administration is described in this factor. There is a direct relationship between the rural-farm population and labor force variables, in that each has positive factor loadings depicting high to moderately high levels. The factor might

Table 20--Project-level primary development determinants and classification accuracy

Development category	Factor	Factor score	Primary classification accuracy	Total factors in final equation	Final classification accuracy
			Percent	Number	Percent
Human vs. natural resource	Health and Education Finances	strong (+)	60	10	85
Human resources:					
Education	Government Debt/Revenue Index	weak (-)	73	11	85
Health & Medical Services	Nonresident Work Force	weak (-)	67	12	85
Industry	Nonresident Work Force	strong (+)	63	13	96
Employment	Banking and Foreign Heritage	weak (-)	63	10	98
Transportation	Education Specialty	strong (+)	68	19	90
Housing	Wholesale Efficiency	strong (+)	63	14	90
Community Facilities & Services	Nonresident Work Force	weak (-)	58	12	81
Natural resources:					
Environment	Health and Education Finances	strong (+)	63	19	81
Land	Other Rural-Farm Population	weak (-)	79	9	100
Water	Health and Education Finances	weak (-)	64	10	79
Agriculture	Health and Education Finances	weak (-)	60	19	89
Forestry	Nonresident Work Force	strong (+)	63	16	87
Recreation	Health and Education Finances	strong (+)	71	6	85
Planning & Development	Other Rural-Farm Population	weak (-)	64	17	87

suggest an economy providing minority opportunities in agriculture as well as strength in construction and public sectors.

In projects with weak scores on this factor, decisionmakers were inclined to emphasize Land as well as Planning and Development activities. This seems to suggest that in projects lacking strength in the construction and public sectors and in aspects of the agricultural sector, RC&D decisionmakers were attempting to make corresponding improvements.

Banking and Foreign Heritage

This factor identifies an inverse relationship between demand and time deposits as a percentage of total bank deposits, i.e., high levels of demand deposits and low levels of time deposits. The factor also represents low proportions of project populations of foreign stock or foreign birth and a low level of population residing in group quarters.

Projects with weak scores on this factor would typically have low demand deposits relative to time deposits and would have important population elements with strong foreign heritage. Analysis suggests that in such projects decisionmakers partially acted out their changing preferences by emphasizing employment-related activities. This seems logical as demand deposits play an important role in local economic transactions and low levels of such deposits could serve as an indicator of economic slowdown, which is closely related to employment. Further, higher levels of population with strong foreign heritage could indicate problems of unemployment caused by labor force migration, a problem which local decisionmakers would like to resolve.

Nonresident Workforce

This element of socioeconomic structure, characterizing high levels of nonresident employment, was particularly relevant for discriminating differences in projects in regard to four separate activities. Weak scores were crucial in identifying projects with increased emphasis in Health and Medical Services and Community Facilities and Services activities. The implication is that the lack (weak scores) of commuting out of county by the labor force of a project area is directly associated with a concern for local health systems and local community services as opposed to area-wide ones.[9/]

Strong scores on this factor were important in correctly classifying projects in relation to increased emphasis by decisionmakers on Industry and Forestry activities. The fact that the labor force of an area is characterized by a willingness to commute out of county may suggest that a project's population places higher values on the implications of

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[9/] Although RC&D projects are usually formed on a multicounty, i.e., area-wide, basis, most RC&D proposals and actions focus on a much smaller area such as a single county or smaller area.

Industry-related development activities and the attendant employment potentials for their project. A mobile workforce also seems related to a concern for the more extensive, area-wide type of resource development activities that Forestry entails. Perhaps this reflects a general lack of employment alternatives along with an appreciation of forests as a potentially productive natural resource.

Education Specialty

This factor describes low levels of population in college and educational services employment, thus indicating a lack of a center for advanced education. Strong scores on this factor suggest that decisionmakers in projects not characterized by an advanced education center were inclined to be concerned with Transportation-related development activities.

Government Debt/Revenue Index

Low levels of government debt compared to revenue are represented in this factor. Projects with weak scores on this factor are not characterized by low debt levels compared to revenue. Decisionmakers in projects with weak scores seem inclined to emphasize Education activities. The higher levels of indebtedness in such projects may suggest either a greater willingness to pay for public services through borrowing or a lack of tax base from which to raise needed revenue. Either case would keep revenue levels down compared to indebtedness.

Wholesale Efficiency

This factor primarily represents low levels of wholesale sales per employee. Scores on this factor were crucial in discriminating differences in emphasis of Housing activities. In projects with strong scores, decisionmakers tended to increase their emphasis of Housing-related activities. Perhaps in projects characterized by low wholesale efficiency, a strong concern for welfare is manifested in local concern for housing improvements and related Housing activities.

CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

Conclusions

The following study conclusions are presented in accordance with study objectives defined earlier.

1. A system, consisting of 2 broad categories and 14 subcategories, developed for the classification of RC&D proposals and actions, stands up well under two tests. The high degree of consistency found between proposals and actions throughout the program attests to the reasonableness of classifying proposals according to basic intent. Secondly, the high degree of accuracy attained in reproducing groups of known composition strictly on the basis of regional and project socioeconomic structure supports the contention that the groups were quite accurately formed in the first place, i.e., prior to discriminant analysis. However, the fact that as many as 19 factors are necessary to achieve a highest classification accuracy for a few types of development activities may suggest that further definitional improvements could be made in the interpretation of basic development intent and in identifying relevant variables.

2. The identification and examination of general development directions and specific emphases has been successfully accomplished by means of the resource development classification system. Resulting data provide a more definitive view of what occurred in the RC&D program up to 1970. Although the data are relatively old, the importance of being able to view RC&D activities over time from the vantage point of several well defined development categories should not be discounted. Development tendencies and shifts can be observed at the program, regional, and project levels.

3. The analytical approach using factor analysis to explore and identify many dimensions of socioeconomic structure and discriminant analysis to identify determinants of changes in development directions and emphases is valuable and useful at both regional and project levels. It pinpoints variation in socioeconomic structure and, in conjunction with the classification system, it relates this variation to shifts in directions and emphases. It specifies classification equations showing the mix of socioeconomic factors needed to predict changes in development preferences and can indicate the relative importance of each factor.

Implications

The implications of study findings focus on their usefulness and value in three major aspects of the RC&D program: administration, coordination, and local participation. For purposes of this discussion, administration includes program management, evaluation, policy making, program planning, and generally everything above the individual RC&D project-level

effort. Coordination refers only to efforts to achieve actions in individual RC&D projects in accordance with proposals and priorities of local decisionmakers. Participation includes the volunteer involvement of local citizens in decisionmaking, in accordance with their views on resource development problems and needs in their communities.

RC&D Classification System

The classification system formulated in this study embraces a wide range of development aspects. It allows the categorization of RC&D proposals and resultant actions and could also serve to classify locally identified problems and priorities for action within the RC&D program. Mutually exclusive categories provide a firm basis for quantification of RC&D related input of local citizen participants responsible for planning and determining priorities for action. Additionally, the quantification of RC&D related actions provides a measure of program response in achieving progress in designated priority areas of local concern.

An accounting of proposals and actions allows the analysis of major resource development directions and specific development emphases. It can be used to identify trends in planning and action and to check consistency of planning and action at program, regional, and project levels. Profiles for projects, regions, or the Nation can easily be constructed by displaying percentage distributions of plans and actions in simple bar chart form (see fig. 1). Finally, it might also be used as an aid to problem identification in old, new, or proposed RC&D projects, and as a guide to evaluate applications for accordance with the total development concept of the RC&D program.

Regional and Project Analysis

The analysis of regional and project socioeconomic structure is accomplished by factor analysis of secondary data. This method yields socioeconomic factors that can provide substantial clues to the nature of any given region or project as well as pinpoint differences between regions or projects. Profiles can be built by showing deviations of factor scores from a zero line (fig. 2). This type of analysis reveals many aspects of socioeconomic structure which vary with one another, either directly or inversely, and perhaps just as importantly identifies those aspects which do not vary together.

The value of this exercise lies primarily at the administrative level defined to include management and evaluation responsibilities. As concerns about success of projects arise over time, factor profiles for less successful projects or regions could be compared with those of more successful ones. Local citizens could also use factor profiles to further understand their communities. Such glimpses into community or regional systems, perhaps on a regular basis, could do much to educate and inform involved citizens and professionals as to the complexity of community structure. Over time a series of project profiles could show changes in

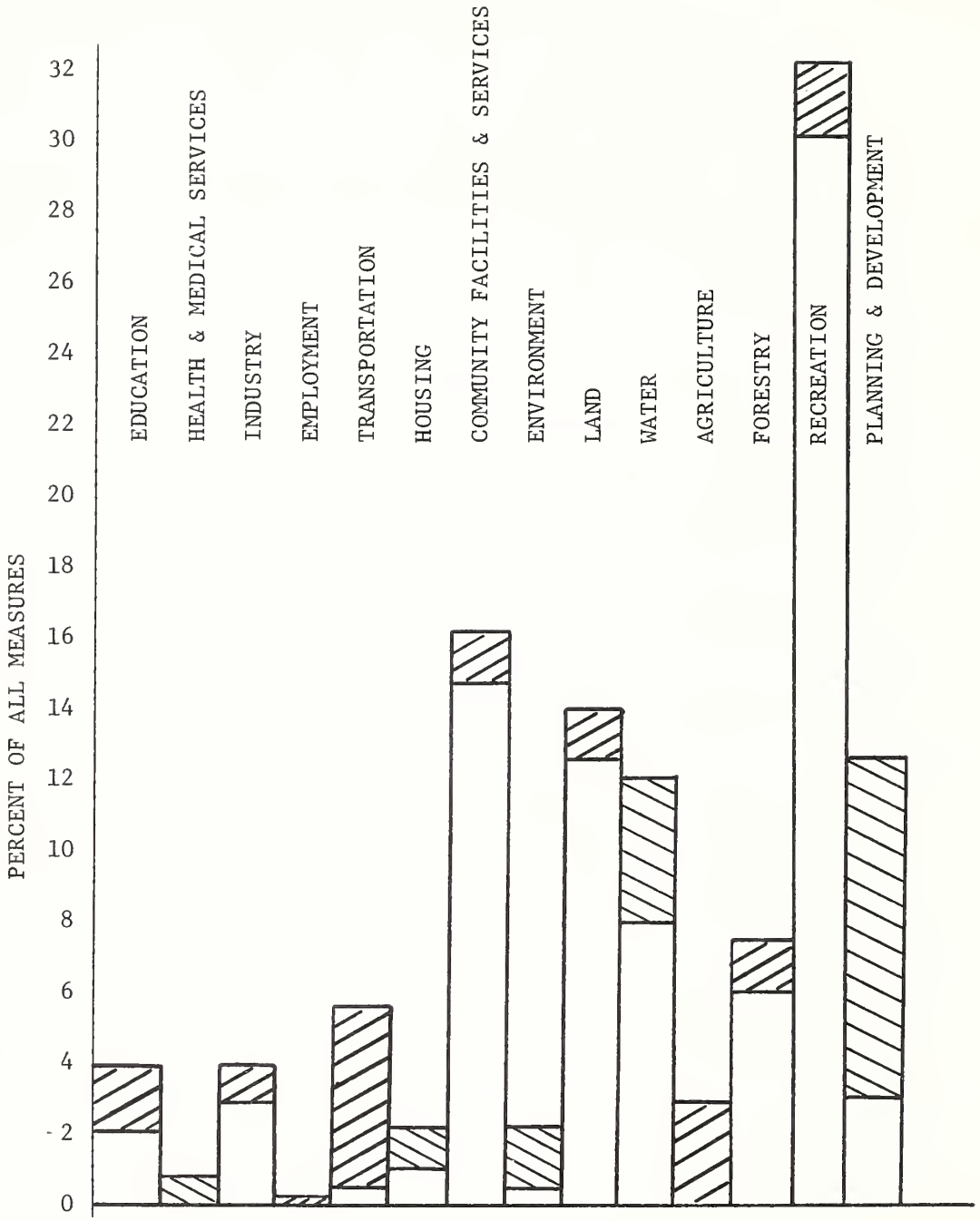
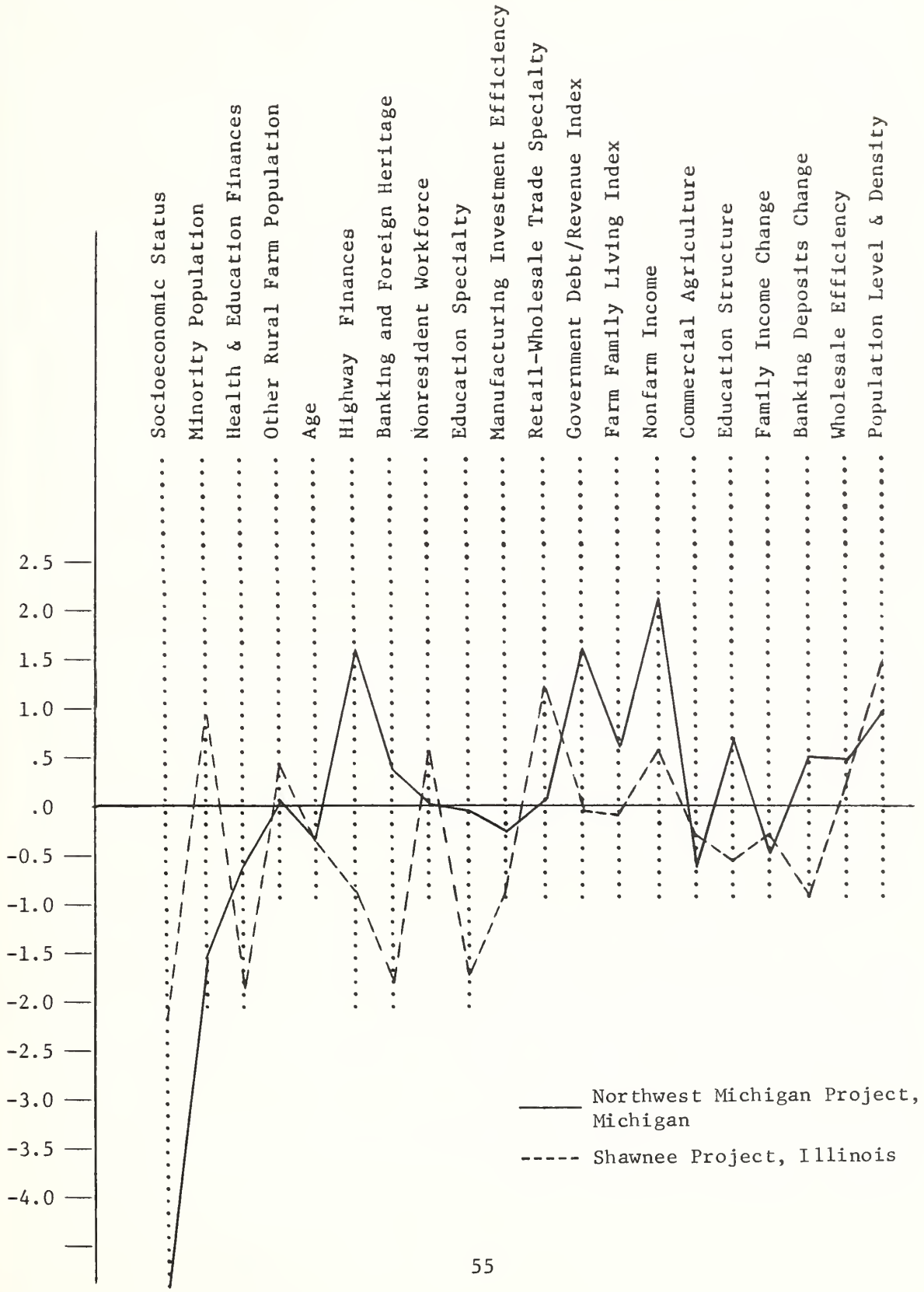


Figure 1. A profile of RC&D measure plans and actions for the Northwest Michigan RC&D Project.

--- Proposals exceed actions

--- Actions exceed proposals

Figure 2. Factor score profiles for selected RC&D projects



the structure of factors and in the relative importance of given variables in these factors.

Determinants of Development Directions and Emphases

Discriminant analysis identified linkages between socioeconomic structure and shifting development preferences. This approach to understanding some influences on local decisionmaking can be extended to predict likely development directions and emphases for any proposed RC&D project for which appropriate secondary data have been collected.

Another interesting extension of this approach is to derive empirical models based on the classification of existing RC&D projects in accordance with their ranking of proposals and actions. Such rankings could be determined by the proportions of proposals and action measures in each development category or by survey methods. New classification equations, again based on scores on socioeconomic factors, could then classify projects according to priorities in planning or action. This sort of analysis could also be used for predicting development preferences for potential RC&D projects, given the appropriate secondary data. Additionally, this method would define relative relationships between different types of development, whereas the models derived in this research define only the direction of changing preferences within a given category of development. The use of both methods would present more detailed inputs for the evaluation of program planning and response. Such inputs could serve as additional criteria for RC&D project selection and could be important at the RC&D administrative level.

Improvement in policy formulation, program planning, management, and evaluation require a continual quest for improvement of indicators of program success or progress. Increased intelligence concerning socioeconomic influences and their relationship to various aspects of the RC&D effort might increase the possibility of discovering other perhaps more meaningful empirical models which could serve well in various aspects of program administration.

Recommendations

RC&D Classification System

The classification system developed and used in this study embraces a wide range of development activities and intentions. It provides an additional data base for quantifying RC&D planning and progress. Consideration should be given to the use of this system to monitor local resource development preferences indicated by project proposals and resultant actions. This would facilitate analysis of planning and action trends on project, regional, and national levels. It should also be considered for use as a guide to problem identification and formulation of planning proposals in existing and potential RC&D areas as well as for evaluation of applications with respect to the total development concept of the RC&D program.

Analysis of Socioeconomic Structure

The exploration of socioeconomic structure of regions and projects is useful for defining elements of considerable variation in their makeup. Profiles can be built which pinpoint socioeconomic differences and similarities in regions and in projects. Besides providing insight into the makeup of RC&D regions and projects, the analyses provide the data input (factor scores) necessary for relating socioeconomic variation to development preferences.

Determinants of Changes in Development Preferences

Improvement in policy formulation, program planning, management, and evaluation require improvement in indicators of program activities and response. The success of the discriminant equations in classifying regions and projects according to shifts in resource development directions and emphases points out the relevance of analyzing socioeconomic data as a means of gaining insight into what factors influence decisionmaking in resource development programs. Consideration should be given to extending the modeling approach to include the prediction of likely development tendencies for proposed RC&D projects for which appropriate data can be collected. This approach could also be extended to the prediction of priorities in planning and action given some additional data concerning local rankings of priorities. Such analyses could help in establishing firm guidelines for planning and action in proposed projects.

Further Research

Additional research is needed to ensure that resource development programs deal effectively with problems of people while assuring socially acceptable impacts on the resources involved. As the RC&D program grows and as other programs related to resource development grow, care must be taken in developing improved approaches to effective resource development. Careful identification and consideration of development preferences in conjunction with scientific analysis and evaluation of results of development activities can help achieve this objective. To this end, consideration should be given to encouraging the type of comparative analysis suggested by this study.

Summary of Recommendations

1. The development classification system, consisting of 14 specific development categories including 61 development purposes, should be considered as a basis for monitoring, analyzing, and evaluating the broad range of development possible within the concept of the RC&D program.

2. Consideration should be given to the search for relevant socioeconomic dimensions or factors characterizing regional and project similarities and differences (including those RC&D projects in the application stage).

3. To facilitate planning and evaluation further effort should be directed toward developing and using empirical models that specify functional relationships between socioeconomic influences and development directions, emphases, and priorities for all RC&D projects (including those in the application stage).

4. Consideration should be given to the concepts and techniques employed in this research project in terms of their potential value and usefulness in other development programs where additional knowledge of geopolitical areas and development preferences is important, especially where local citizen decisionmaking is required to ensure socially acceptable objectives through appropriate resource development and use.

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APPENDIX A

EXAMPLES OF
PROPOSED MEASURES
AND
ACTION MEASURES

Examples of Proposed Measures

Source: Crossroads RC&D Project, Plan of Action, Canfield, Ohio, 1973.

Agriculture

Measure No. 1: Grassland Renovation.
Location: Project-wide.
Purpose: Encourage and implement the renovation of grazing land.
Benefits: Reseed pastures, prevent overgrazing; employment for custom operator of seeding equipment.
Assistance Needed: Technical and source of loan for equipment.
Estimated Cost: $20,000 (equipment).
Sponsors: Rural Development Committees,
Soil and Water Conservation Districts (SWCDs).

Measure No. 2: All Season Pasture.
Location: Columbiana County.
Purpose: Improvement of pasture management.
Benefits: Economical grazing program and reduced soil erosion.
Assistance Needed: Technical and cost sharing or loans.
Estimated Cost: $10,000/yr.
Sponsors: Columbiana County Rural Development Committee,
Columbiana Soil and Water Conservation District.

Measure No. 3: Expansion of Specialized Crop Research.
Location: Mahoning County Branch, Ohio Agricultural Research and Development Center (OARDC), Canfield.
Purpose: Develop new cropping patterns to meet farmers' economic needs.
Benefits: Economic growth for agriculture.
Assistance Needed: Coordination of efforts to start program.
Estimated Cost: $20,000.
Sponsor: SWCDs.

Measure No. 4: Agriculture Pollution Research.
Location: Mahoning County Branch, Ohio Agricultural Research and Development Center, Canfield.
Purpose: Control pollution by agricultural wastes and pesticides on

specific soil types.
Benefits: Economical control and disposal.
Assistance Needed: Organize local efforts; Agricultural Research Service Grant; OARDC leadership.
Estimated Cost: $20,000.
Sponsors: SWCD, County Commissioners.

Forestry

Measure No. 8: Shade Tree Evaluation.
Location: Canfield.
Purpose: Evaluate tree plantings for urban uses.
Benefits: A model shade tree plan for adoption throughout new developments.
Assistance Needed: Technical; cooperation of municipalities.
Estimated Cost: $3,000.
Sponsor: City of Canfield.

Land Use

Measure No. 10: Solid Waste Disposal.
Location: Project-wide.
Purpose: Develop adequate solid waste disposal sites; eliminate pollution and unsightliness from litter.
Benefits: A planned, enforceable program for a sanitary and attractive countryside.
Assistance Needed: Technical--site evaluation and conservation planning assistance in coordination with Mahoning Valley Health Planning Association.
Estimated Cost: $10,000.
Sponsors: County Commissioners, Mahoning Valley Health Planning Association.

Measure No. 11: Coordination of Industrial Development.
Location: Columbiana County.
Purpose: Develop county-wide coordination of industrial opportunities.
Benefits: Orderly industrial development.
Assistance Needed: Organizational assistance, local business fund.
Estimated Cost: $2,000/yr.
Sponsor: Columbiana County Regional Planning Commission.

Measure No. 14: Flood Plain Study.
Location: Project-wide.
Purpose: Identify flood plains and evaluate alternative uses.
Benefit: Sound data for flood plain protection plan.
Assistance Needed: Technical; Lake Erie and Ohio River Basin; River Basin Study data.
Estimated Cost: $50,000.
Sponsors: Lake to River Planning District, SWCDs.

Measure No. 15: Park District Plan Implementation.
Location: Mahoning County.
Purpose: Allocate adequate funds to purchase, develop, and operate park system.
Benefits: Recreation areas throughout county.
Assistance Needed: Organizational and financial assistance.
Estimated Cost: To be determined after further investigation.
Sponsor: Mahoning County Commissioners.

Outdoor Recreation and Tourism

Measure No. 19: Wildlife Food Plots.
Location: Mahoning County Branch, Ohio Agricultural Research and Development Center, Canfield.
Purpose: Establishment of adequate food and cover for wildlife close to people.
Benefits: Knowledge and understanding of plants beneficial to wildlife; establishment of plantings on game farms, club grounds, and leased lands.
Assistance Needed: Arrange for demonstration areas--field trial plants (Soil and Water Conservation Districts); planting stock (Ohio Department of Natural Resources); game clubs provide stock, Mahoning Branch OARDC, provide facilities.
Estimate Cost: $2,000.
Sponsors: Federation of Sportsmen's Clubs, SWCDs.

Example
of
Action Measures

Source: Cherokee Hills RC&D Project, Progress and Status Report, Oklahoma, January, 1967.

CHEROKEE HILLS RESOURCE CONSERVATION & DEVELOPMENT PROJECT - OKLAHOMA Date: January 3, 1967

Progress and Status of Activities

I. Accelerated Services

A. Accelerated Services

1. Soil Conservation Service -- 1 Project Coordinator, 1 Project Office Clerk-Typist, 3 Soil Conservationists, 1 Soil Scientist (part time) (30% more time to the project area), 1 Agronomist (part time) (10% more time to the project area), 1 Range Conservationist (part time) (20% more time to the project area), 1 Woodland Conservationist (part time) (20% more time to the project area), 1 Biologist (part time) (10% more time to the project area), 1 Economist (part time).

2. Forestry Division -- Forester (part time) (RC&D funds).

3. Extension Service -- 1 Resource Development Specialist (part time).

B. Accelerated Conservation Planning and Application

171 landowners and operators assisted --
- 268 Services provided on conservation planning and application.
- 59 Additional plans developed or revised plus other conservation assistance.

2 forestry contacts ----------
- 2 Services provided on conservation planning and application.
- 0 Forest management plans completed plus other forestry measures. (Forester has worked primarily on fire damages report).

C. Agricultural Conservation Program

County Committee Chairmen have announced approval of $40,000 additional funds for each county for calendar year 1967 to carry out special conservation practices.

D. Technical Assistance and Research on Tick Control

A grant of $81,886 annually for a 5-year period has been approved from the Economic Development Administration to be used by Oklahoma State University to study tick control methods.

E. Comprehensive Water and Sewage Study

The Board of County Commissioners has appointed planning commissions in Adair and Cherokee Counties and grants totaling approximately $12,000 have been approved from the Farmers Home Administration to finance the study.

II.

Name of Project Measure	Compl. & in oper. (Check)	In process of planning (Check)	Install. underway (Check)	Sched. for install. (F.Y.)	Source(s) of funds	Estimated Economic Benefits (After installation) Av. annual man years employment	Increase in av. dollar income	Remarks
Accelerated Planning & Application			x	Continuous	RC&D	1,000	$2,900,000	With RC&D funds. New cooperators 13. Plans prepared 35. Plans revised 24.
Accelerated Agricultural Conservation Program Funds			x	Continuous	ACP	–	–	Increase in employment & income included in "A" above.
Accelerated Forest & Woodland Treatment			x	Continuous	RC&D	–	–	" " " " " "
Technical Assistance & Research on Tick Control			x	Continuous	EDA	500	$2,000,000	Grant obtained. OSU conducting research.
Comprehensive Water & Sewage Study			x	1968	FHA	–	–	Study underway in Adair and Cherokee Counties.
III. STRUCTURAL MEASURES								
Watersheds (P.L. #566) Sallisaw Creek			x	1967,68,69	P.L. #566, FHA,APW Local	310	$1,363,143	Construction has already allowed expansion of Stilwell Canning Co. (Provides 200 more jobs).

Name of Project Measure	Compl. & in oper. (Check)	In process of planning (Check)	Install. underway (Check)	Sched. for install. (F. Y.)	Source(s) of funds	Estimated Economic Benefits (After installation) Av. annual man years employment	Increase in av. dollar income	Remarks
IV. Other Structural Measures & Water Developments:								
Whitewater Creek		x		1968	RC&D and Local	10	$ 45,000	Planning has begun.
Scraper Hollow		x		1967	RC&D & Local	5	24,881	Sponsors securing easements.
England Hollow		x		1967	" "	10	44,292	" " "
14-Mile Creek		x		1967	" "	10	44,497	" " "
V. ASSOCIATED MEASURES: Water Level Control on Lake Tenkiller		x		1968	Corp of Eng.	50	500,000	Study scheduled for FY 1967.
Fite Rec. Development		x		1967	State Wildlife & local	2	15,000	
Cherokee Cultural Center			x	1967,68	Fed.,State,Local, Cherokee Historic Society	300	1,350,000	Construction has several different phases.
Stilwell Rodeo Arena	x				Local	5	25,000	
Livestock Pest Control		x		1967,68	EDA,State,Local	10	150,000	Studies are underway.
Limestone Quarry Dev.		x		1968	State & Local	150	1,000,000	No date set for installation. Studies being made now.
SW City Poultry Plant		x		1967	FHA,State,Local	100	1,000,000	
Proposed Park and Recreation Development	x					5	25,000	
Kaufman Park			x	1968	OEO,State,Local	2	15,000	
Illinois River Park			x	1968	" " "	2	15,000	
Develop Adequate Water for Kentucky School	x				Help Save the Children Foundation & Local	4	20,000	
Rural & Municipal Water Development	x	x	x	1967,68	FHA & Local	160	1,000,000	Includes 16 Districts in various stages of development.
Adequate Water & Sewage for Jay		x		1967,68	EDA & Local	50	500,000	2 phases (one sewage and one water development).
Stilwell Sewage Project		x		1967	Fed. and Local	100	750,000	No date set for installation.

Name of Project Measure	Compl. & in oper. (Check)	In process of planning (Check)	Install. underway (Check)	Sched. for install. (F.Y.)	Source(s) of funds	Estimated Economic Benefits (After installation) Av. annual man years employment	Increase in av. dollar income	Remarks
SUPPORTING MEASURES:								
Moodys Community Road Const.		x		1969	Bureau of Public Roads, State,Local	50	750,000	No date set for installation.
Hard Surface - 10 to Kenwood	x				" " "	20	100,000	
" Zena to 10	x				" " "	10	50,000	
" 10 to Tiff City	x				" " "	20	100,000	
" 125 to Bernice			x	1967	" " "	20	100,000	
Tenkiller Road Construction			x	1967	BIA,State,Local	50	1,000,000	
Low Water Crossings	x	x	x	1967,68	OEO,State,Local	20	100,000	4 completed; others planned.
Scheduled Hwy. Construction	x				BPR,State,Local	40	600,000	
Library Facilities		x		1967,68	State,Local	10	50,000	Plans being made for 2-yr. program
Industrial Park Development			x	1967	BIA,State,Local	100	1,000,000	
Senior Citizen Housing		x		1967	FHA,Local	40	750,000	
Indian Arts & Crafts Train-in and Marketing		x		1968	BIA andLabor,M.T.A. State, Local	20	150,000	Cons't started on multi-phase program.
Training and Retraining			x	1967	Dept. Labor,M.T.A. State and Local	35	300,000	Training for heavy equipment operators underway at Kenwood.
Comprehensive Navigation Plan			x	1970	Corps of Eng.			Not considered as project induced although it is in the plan.

APPENDIX B

TABLES

Appendix table 1--Regional factor score matrix

Region	Socio-economic status (1)	Population change & gov't revenue & expenditure (2)	Manufacturing advantage (3)	Rural labor force (4)	Educational specialty (5)	Population level (6)
			Score			
I. Northeast	-0.011	1.122	-0.032	-1.318	0.198	1.429
II. East North Central	1.465	0.904	-0.017	-2.288	0.215	-1.234
III. West North Central	2.107	1.042	-0.749	0.287	-2.975	-0.687
IV. South Atlantic	-1.505	-0.298	-1.140	-0.225	1.436	-0.772
V. East South Central	0.383	0.170	-0.470	0.407	0.703	1.777
VI. West South Central	-1.128	-2.913	2.762	1.123	-1.212	0.251
VII. West	-1.311	-0.027	-0.352	2.013	1.633	-0.763

Appendix table 2--Project-level factor score matrix

Factor	RC&D area identification number[1]										
	1	2	3	4	5	6	7	8	9	10	11
1. Socioeconomic Status	7.21	0.12	-1.55	-0.81	4.91	-0.65	2.16	5.54	-2.15	-0.12	-4.84
2. Minority Population	-3.05	-2.93	-2.33	-0.90	-2.27	-1.97	-0.71	-0.22	0.90	-1.42	-1.58
3. Health & Education Finances	-0.12	-0.00	-1.89	-0.16	-0.27	-1.51	0.32	1.11	-1.58	-0.00	-0.66
4. Other Rural Farm Population	1.01	-1.24	-0.51	-0.21	0.93	0.03	-0.07	-0.14	0.46	0.41	0.03
5. Age	-4.15	-0.45	-3.04	-1.40	-1.44	-1.22	-0.71	-1.05	-0.44	0.69	-0.45
6. Highways Finances	-1.84	-0.06	-0.03	0.49	-0.42	-0.03	-1.42	-0.46	-0.84	1.18	1.52
7. Banking	-0.19	-0.31	-1.69	-0.79	-0.89	-1.01	1.98	-0.04	-1.89	-0.78	0.45
8. Nonresident Workforce	0.41	-1.52	-0.45	-0.40	-0.17	-0.42	-0.91	0.62	0.60	1.92	-0.00
9. Education Specialty	0.41	1.02	-2.18	-0.60	2.02	1.01	1.70	0.80	-1.86	0.26	-0.02
10. Manufacturing Investment Efficiency	2.82	0.69	-1.16	0.05	1.50	0.40	0.93	1.57	-0.92	-0.40	-0.33
11. Retail-Wholesale Trade Specialty	0.03	1.62	0.53	-0.18	-0.45	-0.13	0.02	-2.38	1.33	-1.76	0.10
12. Government Debt/Revenue Index	-0.11	0.77	2.19	1.31	-0.05	0.58	-0.04	-0.07	-0.02	0.72	1.65
13. Farm Family Living Index	0.98	-0.03	2.87	1.13	0.55	0.09	-0.82	-0.82	-0.11	0.08	0.67
14. Nonfarm Income	0.17	0.17	1.20	0.90	1.19	1.56	2.80	1.02	0.77	0.29	2.19
15. Commercial Agriculture	1.00	2.73	0.73	0.45	-0.06	-0.63	-0.81	0.66	-0.29	-0.87	-0.72
16. Education Structure	0.92	2.16	-0.33	-0.53	-1.06	-0.55	-0.46	-1.32	-0.66	0.32	0.78
17. Family Income Change	0.53	-0.51	-0.28	-0.74	-0.52	-0.02	-0.10	-1.12	-0.28	-1.12	-0.33
18. Banking Deposits Change	1.39	-0.90	0.05	-0.84	-0.42	-0.27	-0.32	-0.59	-0.80	1.28	0.53
19. Wholesale Efficiency	-2.86	-0.81	-0.48	0.02	-0.06	0.18	-1.12	0.03	0.28	0.60	0.52
20. Population Level & Density	1.02	0.39	0.74	0.64	1.98	1.92	2.67	-2.11	1.51	-0.69	1.22

Continued

Appendix table 2--Project-level factor score matrix--Continued

Factor	RC&D area identification number[1]									
	12	13	14	15	16	17	18	19	20	21
1. Socioeconomic Status	-0.85	-12.49	-9.84	2.48	-2.93	-0.36	-8.55	-8.51	-13.43	10.97
2. Minority Population	-0.96	-2.45	-2.19	0.84	1.52	1.80	-1.95	-3.08	-0.34	-2.12
3. Health & Education Finances	-1.01	-2.53	-1.01	-0.62	1.38	0.23	-1.47	-2.19	-0.13	1.53
4. Other Rural Farm Population	0.09	-0.30	-0.12	-0.66	-0.16	-0.14	-1.11	-0.46	-1.93	-0.01
5. Age	-0.00	-0.21	0.79	-0.76	-0.33	-1.40	-0.50	-0.73	0.84	-1.58
6. Highway Finances	-0.13	0.76	0.95	0.40	-0.25	-0.39	0.10	-0.56	2.78	0.45
7. Banking	-0.40	0.66	0.84	0.34	1.53	1.73	-0.04	0.27	1.68	-0.40
8. Nonresident Workforce	2.09	-0.52	0.07	1.21	-0.88	0.03	-1.74	-1.47	-1.12	-0.61
9. Education Specialty	0.42	-0.85	0.43	0.87	-2.16	-0.57	0.17	-0.07	-2.78	3.64
10. Manufacturing Investment Efficiency	-1.32	-1.48	-0.52	-0.08	-0.52	0.32	-1.07	-1.00	-3.61	0.84
11. Retail-Wholesale Trade Specialty	0.83	-0.19	-1.02	0.91	-1.06	0.79	-1.54	-3.22	-4.10	1.27
12. Government Debt/Revenue Index	0.22	1.53	1.45	0.36	1.37	1.37	0.01	0.30	2.14	0.45
13. Farm Family Living Index	-0.15	-0.13	-0.16	-0.55	0.20	-0.53	-1.01	-0.79	0.30	1.54
14. Nonfarm Income	1.75	0.84	1.39	-0.99	-0.05	1.15	-2.93	-0.04	-6.41	-3.04
15. Commercial Agriculture	-1.17	-2.40	-1.19	0.62	-0.35	-0.78	-1.43	-0.61	0.17	0.21
16. Education Structure	0.54	-0.15	0.11	-1.11	-1.02	-0.82	-0.27	-0.21	-0.17	0.14
17. Family Income Change	0.55	1.29	1.06	-0.40	-1.77	-0.90	1.07	0.56	2.36	-0.73
18. Banking Deposits Change	-1.35	-1.15	-0.42	-2.46	0.14	-0.77	0.86	1.41	0.36	0.06
19. Wholesale Efficiency	-0.26	-3.00	-0.97	0.44	-0.09	-0.16	-0.07	-0.19	-0.63	0.40
20. Population Level & Density	1.40	3.78	2.88	-0.99	-1.38	0.48	0.29	0.23	0.98	-2.70

Continued

Appendix table 2--Project-level factor score matrix--Continued

Factor	RC&D area identification number[1]									
	22	23	24	25	26	27	28	29	30	31
1. Socioeconomic Status	6.18	2.98	-0.81	4.45	-2.82	2.86	-5.06	3.08	-12.72	-7.83
2. Minority Population	2.43	4.21	4.15	0.01	1.91	1.34	3.55	2.28	5.67	5.07
3. Health & Education Finances	0.33	0.88	0.15	-0.49	0.74	0.26	0.80	1.12	0.13	0.22
4. Other Rural Farm Population	0.03	0.10	-1.20	0.27	-1.12	0.40	-0.34	0.12	-1.47	-0.17
5. Age	0.09	0.62	3.31	0.82	3.33	2.50	2.40	-0.48	4.14	2.54
6. Highway Finances	-0.22	-1.34	-1.11	-1.96	-1.05	-0.33	1.31	-1.51	0.52	1.73
7. Banking	0.13	-0.36	0.51	-1.07	-0.09	-1.24	-0.16	-0.99	-1.14	-0.12
8. Nonresident Workforce	0.64	0.32	1.14	1.14	2.47	1.04	0.25	-0.02	0.46	-0.13
9. Education Specialty	1.46	0.48	-0.29	2.56	0.13	1.26	-3.21	-0.79	-5.66	-4.44
10. Manufacturing Investment Efficiency	2.13	0.85	0.73	-1.64	-0.45	0.07	0.66	1.44	-0.95	-0.14
11. Retail-Wholesale Trade Specialty	0.40	1.42	-1.54	0.15	2.11	0.18	0.02	1.91	-0.82	-0.55
12. Government Debt/Revenue Index	-1.04	1.03	1.01	-1.43	0.02	-2.40	-1.40	-1.18	-0.73	-1.70
13. Farm Family Living Index	-0.34	-1.66	-1.33	1.78	0.24	-0.76	-0.81	-1.51	-1.48	-1.39
14. Nonfarm Income	-0.14	-0.86	0.87	1.61	0.53	0.62	-1.62	-1.04	-4.30	-2.67
15. Commercial Agriculture	-1.55	0.88	0.54	-1.07	0.11	-0.52	0.12	0.60	2.78	0.27
16. Education Structure	2.24	1.40	1.69	-0.16	0.69	1.02	0.68	1.96	0.19	-0.16
17. Family Income Change	0.26	-0.46	1.46	-0.74	1.92	0.14	-0.15	-0.56	-0.73	-0.44
18. Banking Deposits Change	-0.01	1.45	-0.24	0.93	-0.43	-2.29	-1.44	0.06	0.84	-0.53
19. Wholesale Efficiency	0.42	1.33	2.69	2.06	-0.41	1.79	1.74	-0.35	-1.68	1.69
20. Population Level & Density	1.36	-1.22	0.11	-1.17	0.15	0.38	-0.52	-1.45	1.92	1.64

Continued

Appendix table 2--Project level factor score matrix--Continued

Factor	RC&D area identification number[1]									
	32	33	34	35	36	37	38	39	40	41
1. Socioeconomic Status	-7.17	-2.80	-8.37	2.06	-5.14	6.59	1.14	8.52	4.19	4.66
2. Minority Population	2.12	2.59	1.66	4.23	0.14	0.76	0.38	-3.01	-1.58	-1.59
3. Health & Education Finances	0.82	0.82	-0.15	0.57	-0.04	0.78	1.15	1.37	-0.28	0.62
4. Other Rural Farm Population	-0.23	-0.18	-0.83	-0.15	3.22	0.94	-0.34	-0.89	0.23	-0.26
5. Age	2.40	0.60	2.58	1.18	-1.03	0.30	-2.09	0.73	-0.48	-1.75
6. Highways Finances	1.76	0.32	-1.55	0.63	2.71	-1.24	2.58	0.88	1.85	-0.09
7. Banking	-0.26	1.69	0.46	-0.46	-1.42	0.83	1.69	1.67	-1.56	1.06
8. Nonresident Workforce	0.48	0.36	-0.70	1.72	1.80	0.27	-1.81	0.46	0.72	-1.49
9. Education Specialty	-5.02	-2.28	-3.34	-1.27	-6.27	3.05	-1.64	5.87	-0.09	2.73
10. Manufacturing Investment Efficiency	-0.81	-0.06	-0.84	0.77	-0.27	-1.59	-0.24	1.80	0.33	0.06
11. Retail-Wholesale Trade Specialty	-1.55	1.40	-1.22	0.70	1.04	0.14	0.85	0.15	-0.33	2.15
12. Government Debt/Revenue Index	-1.70	0.09	-0.65	-2.06	1.86	-3.54	0.30	0.23	-1.45	0.50
13. Farm Family Living Index	0.86	0.33	-0.57	-1.97	-0.36	0.69	0.35	0.86	-1.14	1.14
14. Nonfarm Income	-2.31	0.43	-1.39	-0.61	-0.73	1.01	-0.99	0.02	-1.45	1.36
15. Commercial Agriculture	0.19	0.71	2.52	0.62	1.12	1.75	-1.27	0.32	-2.24	-1.35
16. Education Structure	1.91	-1.14	0.15	-0.95	-0.51	-1.29	-1.28	0.35	-0.84	-0.07
17. Family Income Change	0.80	-0.25	-0.29	1.86	0.66	0.09	0.52	-0.97	-2.08	-0.85
18. Banking Deposits Change	-0.14	-0.61	-0.39	0.68	2.76	1.42	1.44	1.15	-0.42	-0.32
19. Wholesale Efficiency	0.77	1.88	0.95	0.03	0.33	0.56	1.37	-0.97	0.52	-2.21
20. Population Level & Density	0.50	0.09	-0.16	-2.08	-0.46	2.02	-2.24	-2.58	-4.50	1.56

Continued

Appendix table 2--Project-level factor score matrix--Continued

Factor	RC&D area identification number[1]						
	42	43	44	45	46	47	48
1. Socioeconomic Status	2.10	7.29	-1.54	12.88	14.76	2.92	-0.15
2. Minority Population	-1.26	-0.99	-0.66	-1.61	-2.58	-2.26	-1.53
3. Health & Education Finances	0.76	2.24	-0.42	0.68	0.20	-1.95	-0.78
4. Other Rural Farm Population	-0.36	2.71	-0.99	3.83	1.34	0.27	-0.81
5. Age	-0.43	2.23	3.07	-4.24	-3.07	0.04	-1.68
6. Highways Finances	1.29	-0.95	-1.19	-1.04	-0.98	-2.95	1.04
7. Banking	0.97	0.02	2.19	-1.63	-0.42	-1.57	0.23
8. Nonresident Workforce	-0.44	0.47	-1.27	-1.48	-0.92	-0.75	-1.48
9. Education Specialty	1.73	0.42	0.90	3.14	5.12	3.76	-0.02
10. Manufacturing Investment Efficiency	-1.19	0.30	0.85	-0.71	3.65	1.50	-2.95
11. Retail-Wholesale Trade Specialty	-0.24	0.71	-0.55	-1.01	0.87	1.78	0.46
12. Government Debt/Revenue Index	-0.49	0.53	0.20	0.29	-2.52	-0.27	0.32
13. Farm Family Living Index	0.49	1.69	-0.52	-0.18	4.65	-0.55	0.32
14. Nonfarm Income	2.09	-1.54	1.54	1.64	1.64	1.45	0.83
15. Commercial Agriculture	-0.42	-0.34	1.66	1.02	-0.39	0.66	-2.00
16. Education Structure	0.11	-3.60	-0.22	1.04	0.15	0.41	0.96
17. Family Income Change	-0.00	-0.84	2.71	0.05	0.73	0.15	-1.44
18. Banking Deposits Change	1.95	-0.43	-1.73	-1.92	0.60	1.05	0.78
19. Wholesale Efficiency	-1.48	0.44	-0.41	-1.61	-1.96	1.58	-0.88
20. Population Level & Density	-1.03	-1.97	-0.60	-1.34	3.09	-0.23	-0.45

[1]See RC&D project identification in table 3.

APPENDIX C

METHODS

Factor Analysis

Factor analysis is the generic term for a variety of procedures developed for analysis of intercorrelations within a set of variables. Such techniques facilitate the discovery of regularity, order, and patterns within sets of observations on many variables. Principal component analysis (component factor analysis) is a useful factor technique for determining the minimum number of independent dimensions needed to account for most of the variance in the original set of variables. It not only reveals how several measures of a given domain can be combined to produce maximum discrimination among cases along a single dimension, but also often reveals that several independent dimensions are required to define adequately the domain under investigation. This technique is described below.

The generalized linear factor model is:[1]

$$z_{ji} = a_{j1}F_{1i} + a_{j2}F_{2i} + \ldots + a_{jp}F_{pi} + a_{ju}U_{ju}$$

where z_{ji} = a standard score on test j for individual i,

$j = 1, 2, \ldots m$ measurements,

$i = 1, 2, \ldots n$ cases,

$p = 1, 2, \ldots p$ common factors

a_{jp} = factor loading for the p^{th} factor on the j^{th} variable,

F_{pi} = the factor score for area i on the p^{th} factor and

$a_{ju}U_{ju}$ = a unique term (including the coefficient a_{ju} and the factor score U_{ju}) describing the specific and random error variance in i measurements on the j^{th} variable.

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[1] R. J. Rummel. Applied Factor Analysis. Evanston, Northwestern Univ. Press, 1970, pp. 107-108. Also see pp. 101-155.

The following model displays the factor model for the elements of vector z_j for n cases:

$$z_{1j} = a_{j1}f_{11} + a_{j2}f_{12} + \ldots + a_{jp}f_{1p} + a_{ju}f_{1u}$$
$$z_{2j} = a_{j1}f_{21} + a_{j2}f_{22} + \ldots + a_{jp}f_{2p} + a_{ju}f_{2u}$$
$$\vdots \qquad \vdots \qquad \vdots \qquad \vdots \qquad \vdots$$
$$z_{nj} = a_{j1}f_{n1} + a_{j2}f_{n2} + \ldots + a_{jp}f_{np} + a_{ju}f_{nu}$$

where f_{1p} = p^{th} factor score for the first case on the j^{th} variable and

a_{jp} = p^{th} factor loading for the first case on the j^{th} variable.

When all factors (common and unique) are considered the sum of the squared factor loadings for a given row is equal to one:

$$\sum_{k=1}^{u} a_{ju}^2 = 1.00$$

where k = any factor. In the case of principal component analysis, no differentiation is made for unique variance representing both specific and random error variance in measurements on variables. The unique terms are not included in the generalized linear factor model or in the z_j vector model presented above. The correlation matrix would be factored with unities in the diagonal yielding p common factors explaining most of the variance in the data. Thus in principal component analysis, the sum of the squared factor loadings for a given row (variable) is equal to:

$$h_j^2 = 1.00 - (\text{specific} + \text{error variance})$$

or,
$$h_j^2 = a_{j1}^2 + a_{j2}^2 + \ldots + a_{jp}^2$$

where h_j^2 = the observed communality of variable j when p factors are used,

a_{jp}^2 = the proportion of a variable's total variance accounted for by factor p.

The communality h_j^2 represents the proportion of a variable's total variance accounted for by all p factors. The proportion of total variance in all variables explained by factor p is:

$$vp = \sum_{j=1}^{m} a_{jp}^2 \quad : \text{(trace of correlation matrix)}$$

where the trace = sum of diagonal elements or m.

The following definitions are offered for purposes of review and clarification. A factor loading is a weight for each factor dimension measuring the variance contribution the factor makes to the data vector. Each variable has a loading on every factor. Loadings can be interpreted generally like correlation coefficients, that is, their values vary from -1.00 to +1.00 with the signs indicating that the variable varies inversely or directly with the factor. Loadings are crucial as they form the basis for factor interpretation.

For a given variable, the sum of the squared loadings on each factor equals its communality, or the proportion of a variable's total variation that is included in the factors.

Use of the closed factor model, factoring with unities in the diagonal of the correlation matrix, allows computation of factor scores according to:

$$F_{1i} = a_{11}z_{1i} + a_{21}z_{2i} + \ldots + a_{p1}z_{pi}$$

where F_{1i} = score on factor 1 for case i,

a_{11} = loading on factor 1 for case 1,

z_{1i} = standard data score on test 1 for case i.

Each variable is weighted proportionally to its involvement in a pattern or factor; the more involved, the higher the weight. To determine a factor score, F_1, for a case on a pattern, the case's data, z_{ji}, on each variable is multiplied by the pattern weight, a_{jj}, for that variable. The sum of the weight-times-data products for all variables for a given case equals the factor score for that case on that factor.

Multiple factor analysis involves two basic steps. First a technique, principal components analysis for example, is used to derive an initial set of reference dimensions. Then a rotational technique is used to convert the reference or principal factor pattern to a pattern of simple structure. Rotation causes a shift from factors maximizing total variance to factors delineating separate groups of highly intercorrelated variables.

The basic requirements that simple structure should satisfy are:[2/]

1. Each variable should have at least one zero loading in the factor matrix.

2. For a factor matrix of p factors, each column of factor loadings should have at least p variables with zero loadings.

3. For each pair of columns of loadings (factors), several variables should have zero loadings in one column but not in the other.

4. For each pair of columns of loadings (factors), a large proportion of the variables should have zero loadings in both columns.

5. For each pair of columns of loadings (factors), only a small proportion of variables should have non-zero loadings in both columns.

In this study, rotation was restricted to orthogonality, meaning that the resulting factors are mutually orthogonal. Orthogonality ensures that factors will delineate statistically independent variation and are amenable to subsequent mathematical manipulation and analysis. One primary characteristic of interest is that factor scores obtained from orthogonal factors are linearly independent and uncorrelated. Such factor scores were derived and used in a discriminant analysis technique.

The Varimax criterion was used to obtain an orthogonal rotation. This procedure maximizes the sum of the variances of squared factor loadings in the columns of the factor loading matrix. The Varimax criterion is defined as:

$$V = m \sum_{i=1}^{n} \sum_{j=1}^{m} \left[\frac{a_{ji}}{h_j}\right]^4 - \sum_{i=1}^{n} \left[\sum_{j=1}^{m} \frac{a_{ji}}{h_j^2}\right]^2 = \max$$

where V = variance of normalized factors,

a_{ji} = factor loading of variable x_j on factor F_p,

h_j^2 = communality of variable x_j and

j = 1, 2, . . . m variables

i = 1, 2, . . . n cases

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[2]Ibid., p. 380.

Discriminant Analysis

Discriminant analysis is a technique used to find linear combinations of variables that maximize the ratio of among-groups to within-group variability. The optimum discriminant function for the two-group situation is that function yielding a linear combination of variables which would discriminate between two groups better than any other linear combination.[3/] This optimum function, Fisher's, is described by the following matrix equation:

$$Wv = dk$$

where W = square matrix whose elements are the sums-of-squares and the sums-of-cross products within the two groups, of the p original variables;

d = column vector of the differences between the group-means on the p variables;

k = arbitrary constant; and

v = column vector of weights which satisfy the equation and yield an optimum linear combination.

The two-group discriminant criterion can be defined as:[4/]

$$\frac{SS_b\ (Y)}{SS_w\ (Y)} = \frac{v'Bv}{v'Wv}$$

where SS_b (Y) = between groups sums-of-squares of Y;

SS_w (Y) = within groups sums-of-squares of Y; and

B = between groups SSCP matrix, and

W = within groups SSCP matrix.

Mahalanobis' D^2 statistic is used to measure the "distance" between two groups assuming the populations are multivariate normal with equal

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[3/] Maurice M. Tatsuoka and David V. Tiedeman. "Discriminant Analysis," Review of Education Research, XXIV, No. 5, (December, 1954), p. 402.

[4/] Maurice M. Tatsuoka. Multivariate Analysis: Techniques for Educational and Psychological Research. New York, Wiley, 1971, p. 159.

dispersions (variances and covariances). Upon failure to reject the hypothesis of no difference between groups, the discriminating functions are calculated according to:[5/]

$$F_{LMK} = \Sigma\, c_{mj}\, z_{mkj} + c_{mo}$$

where F_{LMK} = m^{th} discriminant value for case K in group L;

z_{mkj} = observation (factor score) for each variable (factor);

c_{mj} = m^{th} classification function coefficient for variable j;

c_{mo} = m^{th} constant;

L, M = two groups

k = 1, 2, . . . t for each L; and

j = 1, 2, . . . p factors (variables).

Next, the posterior probability of case k in group L having come from group m is computed according to:[6/]

$$P_{LMK} = \text{Exp} \frac{(F_{LMK})}{\sum_{i=1}^{g} \text{Exp}(F_{Li})}$$

where i = 1, 2, . . . g functions.

Basically, group differences are determined by means of the Mahalanobis D^2 statistic and discriminant function values and posterior probabilities are computed and used to classify cases into groups.

Analytical Objectives

The main advantage of factor and discriminant analyses is the capability of assessing and predicting a qualitative dependent variate from a set of quantitative independent variates.

[5/] W. J. Dixon, Ed. Biomedical Computer Programs. Berkeley, Univ. of California Press, 1970, p. 214k.

[6/] Ibid.

Factor analysis techniques may be used to (1) untangle linear relationships into separate patterns with each pattern appearing as a factor delineating a distinct cluster of interrelated data, (2) reduce a mass of information to its essential meaning, (3) discover the basic structure of a given domain, (4) develop an empirical typology for classification or description, (5) transform data to meet the assumptions of other analytical techniques and (6) explore.[7/] At various stages of this research, most of these capabilities were used advantageously.

Discriminant analysis has the capability to (1) test for significant differences among average score profiles of two or more a priori defined groups, assuming multinormal distributions and equal dispersions, (2) determine which variables account most for such intergroup differences in average profiles, (3) find linear combinations of variables which allow the representation of groups by maximizing among-group relative to within-group separation, and (4) establish models for assigning new individuals whose profiles, but not group identity, are assumed to be from one of the a priori defined groups.[8/]

7/ R. J. Rummel. "Understanding Factor Analysis," Journal of Conflict Resolution, XI, No. 4, (December, 1967). Pp. 449-451.

8/ Paul Green and Donald Tull. Research for Marketing Decisions, 2nd ed. Englewood Cliffs, N.J., Prentice-Hall, Inc., 1970, p. 368.

* U.S. GOVERNMENT PRINTING OFFICE : 1977 0-241-445/ERS-56