SOCIO-ECONOMIC CHARACTERISTICS AND ATTITUDES TOWARD SELECTED LAND USE CONTROL MEASURES IN THE THUMB AREA OF MICHIGAN

By

Gordon L. Szlachetka

A DISSERTATION

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

Department of Resource Development

1976

ABSTRACT

SOCIO-ECONOMIC CHARACTERISTICS AND ATTITUDES TOWARD SELECTED LAND USE CONTROL MEASURES IN THE THUMB AREA OF MICHIGAN

By

Gordon L. Szlachetka

This study sought to investigate the relationship of specific socio-economic characteristics and attitudes toward selected land use control measures. It attempted to establish whether individual attitudes toward land use control measures were reflective of traditional socio-economic indicators such as age, educational attainment, income, etc., or whether such attitudes were conditioned by other factors which were more difficult to recognize and measure such as upbringing and cultural heritage.

Data for the study were collected through the use of a questionnaire mailed to a randomly selected sample of the population in three counties in Michigan. The questionnaire contained questions which provided information about an individual's socio-economic characteristics and his opinion on three aspects of land use control: land use planning, ordinances to enforce land use planning, and zoning. The three counties, Huron, Sanilac, and

Tuscola, were selected because at the time of the study they were primarily rural counties which were undergoing varying degrees of developmental pressure. It was thought that such an environment would be an appropriate context within which to conduct the study, because it seemed that these impending land use changes had created an atmosphere of interest in land use control measures.

The collected data were subjected to weighted regression analysis. The three questions relating to aspects of land use control being the dependent variables and the socio-economic information being utilized as the independent variables. Weighted regression analysis was utilized because the dependent variables were dichotomous and the majority of the independent variables were not continuous in form. The problem of non-continuous independent variables was partially overcome through the use of complex dummy variable systems based on inter-comparison matrices.

The results of the analysis of the data were three equations which indicated the conditional probability of an individual favoring each of the three specific land use control measures. The independent variables in the individual equations were the socio-economic characteristics which were shown to be statistically significant in the context of the respective questions relating to land use.

Thirteen basic hypotheses were tested during the conduct of the study. These were all related to individual socio-economic characteristics and were directional in that they anticipated the effect a characteristic would have on an individual approving or rejecting an issue related to land use control measures.

The study showed that an individual's age, whether or not he owned a home, or if he perceived land use conflicts, had no bearing on attitudes toward land use control measures. On the other hand, an individual's perception of how well his local government was serving his needs was indicated as being the single most important aspect in predicting an individual's response to land use control measures. This variable was found to be the most significant variable in all three equations.

There were other variables that also appeared to be significant across the three equations. It was found that the probability of an individual favoring land use control measures was increased if he lived in a high population density area, voted regularly, had high income, and controlled either large or small amounts of property.

Significant relationships between variables associated with other hypotheses and approval of land use control measures were more difficult to interpret. Some dimension of the occupation variable and the group participation variable appeared as being significant in each of the three predictive equations. The primary occupation variable appeared as significant in only the zoning equation. The action of this variable failed to support the contention that "white collar" occupations would increase the probability of favoring land use control measures. In contrast to this, second occupation appeared as being a significant variable in all three equations and generally supported the hypothesis of "white collar" occupations increasing the probability of favoring land use control measures. The variable related to father's occupation also appeared as being significant in all three equations.

Variables related to education and political party identification appeared as being significant in both the ordinance and zoning equations. The action of the education variable generally supported the basic hypothesis that increased education would increase the probability of favoring land use control measures.

In terms of political party identification, it was hypothesized that individuals who considered themselves as being Democrats would be more likely to favor land use control measures than would either Republicans or American Independent Party members. This basic hypothesis was not supported. It was found that Republican party affiliation increased the conditional probability of favoring land use control measures to a greater degree than did Democratic party affiliation.

The variable related to sex appeared as being significant in only the zoning equation. In this context, the basic hypothesis of males being more likely to favor land use control measures than females was supported.

Overall, the research results indicated that the relationships between socio-economic characteristics and attitudes toward land use control measures were extremely complex. This research did not bear out the traditional relationships between socio-economic variables and partisan voting behavior identified in most previous research. It seems that the usual socio-economic variables cannot be used to predict attitudes or voting behavior in such nonpartisan environmental issues as land use planning and control.

ACKNOWLEDGMENTS

Numerous persons, both faculty and fellow students, contributed to the completion of this study. Special thanks are due to several. I wish to thank Dr. Manfred Thullen for his advice and numerous critical readings of the document. Dr. William Kimball also deserves gratitude for both his advice and direction in the development of the study. The statistical techniques utilized were a direct result of the interest and help provided by Dr. Daniel Chappelle. Dr. Stanley Brunn offered a great deal of assistance in respect to the conceptual organization of the study and evaluation of appropriate statistical techniques. Special thanks are also due to Dr. Richard Rodefeld. Dr. Rodefeld not only provided astute insights as to the nature of the study, but also provided encouragement at the times when it was most needed.

Two fellow graduate students also were instrumental in the conduct of the study. Both Alan Kirk and Fritz Saver were of inestimable help in the design and conduct of the survey which was the basis of the study.

Also, special thanks are due to Jo Ann Ohn for patience and the typing of countless pages of draft copy.

TABLE OF CONTENTS

Chapter		Page
	Participation in Various Types of Groups is Significantly Related to Attitudes Toward Land Use Control Measures	180
	Identification With a Specific Political Party is Significantly Related to Attitudes Toward Land Use Control Measures	181
	Participation in Elections is Significantly Related to Attitudes Toward Land Use Control Measures	181
	An Individual's Perception of How Well His Local Government is Serving Him is Significantly Related to Attitudes Toward Land Use Control Measures	182
	The Amount of Property a Person Owns or Controls is Significantly Related to Attitudes Toward Land Use Control Measures	183
	Educational Attainment is Significantly Related to Attitudes Toward Land Use Control Measures .	184
	Income Level is Significantly Related to Attitudes Toward Land Use Control Measures	184
	Population Density is Significantly Related to Attitudes Toward Land Use Control Measures . .	185
	Calculation of the Conditional Probability of Favoring Zoning	186
V.	SUMMARY, CONCLUSIONS, LIMITATIONS, AND RECOMMENDATIONS	190
	Summary	190
	Conclusions	214
	Limitations	218
	Recommendations	224
BIBLIOGRAPHY		232
APPENDIX		237

LIST OF FIGURES

LIST OF TABLES

Table		Page

Table | Page

CHAPTER I

THE PROBLEM

Introduction

Less than a century ago the economy of the United States was primarily agrarian. The majority of the population was comprised of independent farmers with relatively small holdings. During this period of one hundred years ago pressures for the development of rural lands existed, but the forces were concentrated primarily toward a single end; the bringing of more land into agricultural production. While pressures existed with respect to rural land, they were mainly focused toward a single use.

Today, developmental pressures being exerted on rural land no longer focus upon a single use. Rural lands are presently being subject to developmental pressures for a variety of uses. Increasing population has subjected land to numerous pressures for both increasing food production and increasing living space. Technological advances have shifted the economy of this country from an agrarian one to one primarily concerned with manufacturing and service industries. Along with the technological changes there has been a dramatic change in the life style of the American population.

TABLE 1.--Approximate Acreage of Land in Principal Non-Agricultural Uses for Selected Years, 1920-1964.[a]
(Land in Millions of Acres)

Type of Land Use	1920	1930	1945	1950	1959	1964
Urban Areas	10.0	12.0	15.0	18.3	27.2	29.3
Highways and Roads	15.0	19.0	19.1	19.4	20.5	21.2
Railroad Rights-of-Ways	4.0	4.0	3.4	3.4	3.4	3.3
Airports	--[b]	--[b]	1.3	1.3	1.4	1.5
State and National Parks	8.0	12.0	17.9	18.7	29.7	31.9
Wildlife Areas	--[b]	1.0	4.7	8.9	17.2	29.0
National Defense Areas	2.0	2.0	24.8	21.4	24.4	23.6
Total	39.0	39.0	86.2	91.4	123.8	139.8

[a]Raleigh Barlowe, Land Resource Economics (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1958), p. 47.

[b]Not separately reported.

The variety of pressures being exerted on land, outside the agricultural sector, in the United States could be documented through examination of some of the increases in non-agricultural land uses during the past fifty years.

The table illustrates that over 100 million additional acres of land were consumed by non-agricultural uses in the period between 1920 and 1964.

The total population of the United States has increased greatly over the past years. If just the one hundred year time span between 1870 and 1970 is considered, the population of this country has increased from 38,558,371 to 203,211,926.[1] While it is true that the United States must be considered an urbanized country, the rural population has also continued to increase in terms of absolute numbers. Between 1870 and 1970 the rural population increased from 28,656,010 to 53,886,996.[2] The rural population of the 1970's is very different than that of the 1870's.

No longer is the typical rural resident cast in the mold of the Jeffersonian ideal. The independent American farmer with small holdings has largely become a reflection of the past. 1916 marked the farm population highwater mark in the United States. In this year over 32 million of the nation's inhabitants were residents of farms. This number dropped to less than 13 million in the 1960's.[3]

The new rural resident is an amalgamation of both rural and urban characteristics and desires. Suburban or rural living has become the American dream or norm. Technological advances have made the American population increasingly mobile, and workers are no longer forced to live in the immediate proximity of employment. The new rural resident has escaped the pressures of the

---

[1]Michigan State University, Division of Research, Graduate School of Business Administration, Michigan Statistical Abstract, comp. David I. Verway (9th ed.; East Lansing: Michigan State University, 1972), p. 4.

[2]Ibid., p. 4.

[3]Calvin L. Beale, "Rural Depopulation in the United States: Some Demographic Consequences of Agricultural Adjustments," Demography, Vol. 1, No. 1 (1964), 264-72.

urban setting by moving to rural areas. However, he has satisfied his gregarious yearnings by locating in relatively close proximity to other residents. Great quantities of what was once prime rural agricultural land has been covered by land consumptive single family residences.

Improved transportation and other technological advances have made location of industries less restricted. New industrial sites are being increasingly found in what were once considered rural areas. Increased leisure time and affluence has created demands for recreation and second home sites. These factors, and many more, such as land being utilized for highway construction and population support facilities, have been responsible for increasing developmental pressures being exerted upon rural land. With increasing population in rural areas, there have been increasingly diverse pressures placed upon rural land. Developmental pressures are no longer being exerted toward a single end, rather developmental pressures are directed toward a multitude of uses which are often conflicting in nature.

In many cases, development of rural areas has been either ill conceived or unplanned. Haphazard development has often wasted the true potential or rural areas. Conflicting and incompatible land uses were and are often located in close proximity. Farms being surrounded by residential areas, factories within residential zones, and sites of landfills have, and will continue to be points of contention. In many instances, the "growth syndrome" has superceded planned, orderly development. Without some type of control mechanisms there is no reason to think that this will not continue in the future.

Land must be considered a finite resource which should not be wasted or misused. The importance of the land resource was illustrated by the statement "we may actually again be returning to the point where land, as a limited productive resource, will play a strategic role in determining human progress."[1] Intelligent and long range policy decisions dictate that land utilization should be geared toward providing the greatest benefits possible to a population. How the maximization of benefits is to be realized is dependent on the establishment of criteria relating to the conceptualization of benefits.

A problem which arises is one of what constitutes the greatest benefit, in terms of land use and its derived benefits, to the greatest proportion of the population. This stated problem contains many facets and ramifications. The issue of public vs. private land interests must be recognized in such a statement. These two interests are often not compatible in a short run situation. Ideally, the two should be compatible in a long term situation. However, since most people's planning horizons are short term, the issue of public vs. private land use interests are frequently brought into sharp focus. The desire of the

---

[1]Arthur Mauch, "Land Use in a Changing World," <u>Land Use in Michigan</u>, Extension Bulletin 610, Natural Resources Series, Cooperative Extension Service, Michigan State University, 1969, First Revision, pp. 5-6.

individual to obtain short term benefits or profits is often diametrically opposed to long term benefits of the society within which he lives.

The geographic distribution of land use benefits must also be considered. Depending on what geographic area is being considered, the concept of the greatest benefit to the greatest proportion of the population takes on different meanings. In terms of broad interests, such as national defense or energy production, individual private interests are often superceded for the benefit of the majority of the population. This also holds true in the consideration of lesser geographic areas. Individual property interests often must give way to public interest when sites and routes are considered for the location of public utilities, transportation routes, public services, recreation areas and other land consumptive uses which are considered public in nature. However, regardless of what level is being considered, it must be realized that individual property rights and interests are being affected.

Because of the frequent conflicts between public and private land use interests, two primary schools of thought have evolved in regards to land use policy and its resultant controls. One school of thought advocates the employment of systematic controls to direct and limit development. Through this process it is believed that controls can be used to foster orderly development. Public controls can be used to regulate land use in a manner which is perceived to benefit the greatest proportion of the population. The limitation of private interests and options is viewed as a mechanism to insure the collective best use of land resources.

Opposed to this philosophy are those who feel a property owner has the right to do as he wishes with his property and are opposed to any governmental controls with respect to land uses. Private property rights are viewed as being almost sacred and should therefore not be subjected to governmental controls which limit or restrict options or alternatives. This group believes that collective good is created exclusively through individual effort and individual interests. Rather than imposing governmental controls and restrictions to determine land use development and direction, the anti-control faction believes that the market structure will determine the appropriate direction for land use.

Between these two extremes there is a middle ground made up of both philosophies. Private interests are viewed as being extremely important, but there is a realization that collective public rights are also important. It is within this middle ground that the American system of government was designed to function. Individual rights and interests are to be both fostered and protected. At the same time, public rights are also encouraged and protected.

Statement of the Problem

Land use control measures and issues affect both society and the individual. Since society is the collective expression of the individual it is important to understand the individual's attitudes toward land use control measures. Obviously, many factors will condition a person's feelings toward land use control measures, but an important question is whether particular attitudes are reflections of specific socio-economic criteria. Are attitudes toward land use controls reflective of age, educational attainment, income, amount of property owned, and physical location? Or, are such attitudes conditioned by other factors which are more difficult to recognize and measure such as upbringing and cultural heritage? The problem is to isolate and identify specific indicators or variables which are significant in understanding the individual's attitudes toward land use measures.

Significance of the Problem

The power of local governments to regulate land use is delegated by state government. The inherent power of state government to regulate, promote or limit the activities of citizens in their use of land is usually divided into five categories: the police power, the power of eminent domain, the taxing power, the spending power, and the power of public ownership.[1]

The police power, exercised to insure the health, safety, morals, and general welfare of the population is of particular interest. Land use controls, especially zoning, are often fostered by local governments through the exercise of this power.

[1] Ibid., pp. 31-32.

Zoning, a method of dividing land into zones or areas for specific types of development, is a method of attempting to assure ordered and rational development. In Michigan Zoning must be proposed by government, but it may be rejected by the affected populace. Interim zoning may be instituted by fiat during the period of time required for the preparation of a permanent zoning ordinance. Interim zoning remains valid for one year and may be renewed for two more years. Permanent zoning ordinances, once accepted by the legislative body, may be defeated by the citizenry through referendum. Thus, a permanent zoning ordinance is a reflection of the consensus of the populace.

How the residents of a region feel about land use controls is a crucial issue. In a democratic system, government is intended to be responsive to the needs and desires of its constituents. Knowing how residents feel toward specific land uses and controls will enable governmental officials to more effectively serve the resident population and formulate proposals which will better reflect the residents' needs and desires. Knowledge of the residents' desires will reduce the number of ill conceived zoning ordinances which are typically defeated by popular vote. The ability to anticipate residents' feelings about land uses and control measures will foster closer cooperation between area residents and governmental officials. Such cooperation and understanding of local residents' attitudes will give citizens a greater voice in shaping future land uses in their locality.

Previously, attempts to ascertain how residents felt toward land use issues and controls utilized some type of survey. These surveys have been both costly and time consuming. If the various socio-economic characteristics relating to attitudes pertaining to land use control measures could be identified, secondary sources could be used as a basis for the prediction of residents' attitudes. This would greatly reduce the cost of ascertaining a population's attitudes toward land use control measures as compared to traditional techniques such as questionnaires mailed to the resident population. If the factors affecting attitudes toward land use controls could be understood and measured, predictive techniques could be developed which would foretell residents' attitudes toward land use control measures.

Identification of variables which relate to attitudes concerning land use control measures would also add to general knowledge in the realm of understanding individual actions. Addition of such information would enable decision makers to function with more complete data than presently exists.

Objectives of the Study

The objectives of this study were three-fold in nature. First, to try to identify some socio-economic and physical/locational factors which were significantly related to a rural resident's attitudes toward land use control measures. Identification and isolation of these significant variables would greatly strengthen the knowledge and understanding of relationships between population characteristics and attitudes. Illustrations of such relationships would serve as important inputs in both public and private decision making processes. Administrators and policy makers would be able to utilize such relationships to better serve their clientele.

Second, utilizing population characteristics identified as being significant in explaining or understanding attitudes, an attempt was made to develop predictive models which could anticipate attitudes of rural populations toward alternative land use control measures.

Meeting these two objectives would have accomplished a great deal with respect to identifying whether relationships and linkages between specific population characteristics and attitudes toward land use control measures existed. Development of models would have provided a mechanism, hopefully based on secondary data sources, by which to anticipate rural residents' attitudes toward land use control measures.

A third objective of this study was to add to the knowledge gained during a preliminary investigation conducted in Ionia County in 1972. In the conduct of this study initial observations were made pertaining to identification of specific variables related to attitudes concerning land use control measures. Also, preliminary efforts were initiated in regard to developing predictive models which would anticipate individuals reactions to land use control measures. This study was purposefully designed to elaborate upon and attempt to perfect research techniques developed in the initial exploratory study.

CHAPTER II

EFFECTS OF SOCIO-ECONOMIC CHARACTERISTICS ON VOTING BEHAVIOR

Literature Review

In many cases the decision of whether or not to adopt various land use control measures has been made by citizens through the process of voting. For this reason, the process of voting has been viewed as the ultimate indication of a citizen's attitude toward land use control issues. The literature review indicated that the decision to vote "yes" or "no" in respect to any issue was found to be based upon a multitude of attitudes and perceptions which the individual possessed.

As a general comment, Pattannaik stated that voting is the most common device used for recording people's preferences.[1] Therefore, it was reasonable to assume that attitudes held by the populace would be reflected in their voting behavior.

There are many references pertaining to individual voting behavior and a number of the works have attempted to relate specific socio-economic characteristics to voting behavior. The majority of the literature supported the contention that the socio-economic

---

[1]Prasanta K. Pattannaik, Voting and Collective Choice (Cambridge: Cambridge University Press, 1971), pp. 5-6.

characteristics of an individual greatly influenced his interest in voting and played an important role in determining how he would cast his ballot. However, it was important to realize that socio-economic characteristics alone did not determine an individual's voting behavior. As Burdick found:

> Apparently the voter is caught in an intricate and invisible web of religion, desire for security within status, social aspiration, economic class, and family background. But how these elements work on him, why one argument is persuasive at one time and ineffective at another, the way these attitudes are transmitted is still unknown. Until these elements are isolated and explicated it is impossible to conscientiously draw up a theory of concord based on contemporary empirical data from the voting studies.[1]

Burdick found that voting behavior was determined by a host of conditioning and causal factors. Many of these factors were apparently emotional and hence difficult or impossible to quantify or measure. However, he did admit that certain quantifiable variables such as religion, economic class, and family background existed.

While it was obvious that many factors which help decide how a person will vote were difficult to measure and interpret, there were specific indications which could be useful in predicting a person's voting behavior. Key indicators, in the form of socio-economic characteristics, have been recognized by many researchers as greatly influencing a person's voting behavior. However, specific socio-economic characteristics apparently were not

---

[1]Eugene Burdick, "Political Theory and Voting Studies," American Voting Behavior, ed. by Eugene Burdick and Arthur J. Brodbeck (Glencoe, Illinois: The Free Press, 1959), p. 147.

equally significant in all cases investigated. It was apparent that the degree to which a specific variable related to a person's voting behavior depended on context. Thus, different variables were important in different situations. In a given situation a variable showed a positive correlation with a specific voting response while in other situations the same variable showed a negative correlation or failed to be significant in either a positive or negative manner. This dichotomous situation existed even after compensation was made for chance variations.

Therefore, existing studies were useful in illustrating socio-economic characteristics which were generally considered to be linked to voting behavior. However, linkages between population socio-economic characteristics and issue-specific voting behavior were not clearly defined. It was obvious that linkages between socio-economic characteristics and voting response to land use control measures would have to be validated by empirical research.

The literature suggested a number of socio-economic characteristics which seemed to be more or less universally recognized as influencing voting behavior. The specific characteristics included age, sex, education, income, occupation, property ownership, political attitudes, and group participation. When these individual characteristics were combined they formed a rather nebulous composite known as "socio-economic status" or "class."

"Class" was widely recognized as potentially influencing voting behavior.[1]

"Class" and Voting Behavior

However, even though "class" was recognized by most researchers as being related to voting behavior, the direction in which specific characteristics included in the concept of class were related to voting behavior was not universally agreed upon. Unless a specific context or situation was identified, it was repeatedly indicated that it was virtually impossible to generalize the contribution a characteristic would make in respect to voting behavior.

Key and Munger were well aware of this when they observed:

> Much further refinement of our knowledge of the place of social characteristics in electoral decision, for example,

---

[1]Paul F. Lazarsfeld, Bernard Berelson, and Hazel Gaudet, The People's Choice (New York: Columbia University Press, 1949); and Robert R. Alford, Party and Society (Chicago: Rand McNally and Company, 1963). The following references are contained in American Voting Behavior, ed. by Eugene Burdick and Arthur J. Brodbeck (Glencoe, Illinois: The Free Press, 1959): Eugene Burdick, Chapter 6, "Political Theory and Voting Studies," pp. 136-149; Leslie A. Fiedler, Chapter 9, "Voting and Voting Studies," pp. 184-196; R. S. Milne, Chapter 11, "Second Thoughts on 'Straight Flight,'" pp. 209-216; Kurt and Gladys Engle Lang, Chapter 12, "The Mass Media and Voting," pp. 217-235; Ithiel De Sola Pool, Chapter 13, "TV a New Dimension in Politics," pp. 237-261; R. Duncan Luce, Chapter 18, "Analyzing the Social Process Underlying Group Voting Patterns," pp. 330-52; and Angus Campbell and Donald E. Stokes, Chapter 19, "Partisan Attitudes and the Presidential Vote," pp. 353-71. See also: Seymour Martin Lipset, Political Man (Garden City, New York: Double-Day and Company, 1960); Angus Campbell, Gerald Gurin, and Warren E. Miller, The Voter Decides (Evanston, Illinois: Row, Peterson, and Company, 1954); Harold F. Gosnell, Grass Roots Politics (New York: Russell and Russell, 1942); and Gilles Picard and Albert Juneau, A Sociological Study of Agricultural Change in the Pilot Region (BAEQ), ARDA Condensed Report

> would probably quickly follow once the setting of political alternatives and the matrix of objective conditions within which these determinants operate were brought more specifically into the field of observation. It seems apparent that social characteristics move into and out of the zone of political relevance, that they 'explain' the actions of some people and not those of others, and that insofar as social characteristics determine political preference they encounter considerable preference.
>
> What are the consequences, for example, of the subjection of differing proportions of the vote to determination by specified social characteristics? There can be no doubt that there is at times a high degree of association between readily identifiable social characteristics and political preference. At the extreme position it might be argued that political preference is a hitch hiker on social characteristics. Yet there seems to be always a very considerable part of the electorate for which no readily isolable social characteristic 'explains' political preference. Some of the considerable variance unaccounted for by social determination might be removed by attempts to analyze the nature of the individual's identification with the community and the nation, the character of his identification with political party, his perception of the political world, his general orientation toward the complexes of policy questions, his conceptions of his role as a voter and as a citizen.
>
> There may well be, for a part of the electorate at least, roles, identifications and preferences of a purely political nature with quite as much reality as his 'social characteristics.'[1]

In the conduct of this study, the composite of individual characteristics known as class was found to be difficult to quantify and deal with. Instead the individual key components of class were examined. It was thought that examination of the individual

---

CR-NO. 15 (Ottawa: Canada Department of Forestry and Rural Development, Queen's Printer and Controller of Stationary, 1968).

[1]V. O. Key, Jr. and Frank Munger, "Social Determinism and Electoral Decisions: The Case of Indian," American Voting Behavior, ed. by Eugene Burdick and Arthur J. Brodbeck (Glencoe, Illinois: The Free Press, 1959), pp. 297-99.

characteristics which contributed to the concept of "class" would be manageable and result in the clarification of individual characteristic roles in regard to voting behavior related to land use control measures. The identification of the specific characteristics made it possible to concentrate on linkages between a relatively few socio-economic characteristics and voting behavior. The following represents investigation of the selected characteristics.

Age and Voting Behavior

It has been widely held that age tended to cause a person to be more conservative in both his attitudes and voting behavior. Lipset found that "an older population will probably slow down political change."[1] He further stated that different ages affected left and right political behavior in that younger persons were more liberal than older persons.[2] Campbell discovered that age was a causal factor leading to the perception of parties and stronger party identification.[3] Lazarsfeld stated that "tradition has it that youth shuns the conservative, in politics as well as in clothes, music and manners."[4] He went on to say that "legend

---

[1]Seymour Martin Lipset, Political Man (Garden City, N.Y.: Double-Day and Company, 1960), p. 269.

[2]Ibid., p. 264.

[3]Angus Campbell, Philip E. Converse, and Warren E. Miller, The American Voter (New York: John Wiley and Sons, Inc., 1960), pp. 496-97.

[4]Paul F. Lazarsfeld, The People's Choice (New York: Columbia University Press, 1949), p. 16.

has it that older people are more conservative in most things, including politics . . . younger people are more liberal, more receptive to change."[1]

Thus, the works of several researchers reinforced the commonly held stereotype that older persons are more conservative and less amenable to change. In a voting context this apparently meant that the older an individual was the more likely he was to reject new concepts or issues. This seemed to indicate that older persons would reject land use control issues because they would represent a change in the status quo.

In the opposite vein Brunn, et al., found, in a specific instance, that age did not relate to a voting pattern which could be interpreted as being conservative. In the course of analyzing voting behavior related to a school milage, it was shown that there was a weak positive relationship between age and a positive vote.[2] This appeared to contradict the notion that older persons are more conservative and less amenable to change. An additional study also concluded that "a progressive attitude is not necessarily dependent on age" and "younger people are not necessarily more progressive than their elders, although they are less traditional in their attitudes."[3]

---

[1]Ibid., pp. 23-24.

[2]Stanley D. Brunn, Wayne L. Hoffman, and Gerald H. Romsa, "The Youngstown School Levies: A Geographical Analysis in Voting Behavior," Urban Education, Vol. V, No. 1.

[3]Gilles Picard and Albert Juneau, A Sociological Study of Agricultural Change in the Pilot Region (BAEQ), ARDA Condensed

Thus, one variable, age, which was thought to be linked with voting behavior had been shown to correlate differently depending on the specific situation. It became clear that behavior of this variable was dependent on context or situation. Unless a specific context or situation was identified, it did not seem possible to dogmatically generalize the specific direction in which the variable would influence voting behavior.

The preliminary study which was conducted in Ionia County presented an opportunity to see how the age variable was related to decisions in a specific context. It was shown that older persons were slightly more receptive to land use control measures than were younger persons. The difference was minimal but it did exist. These results, in conjunction with some of the literature, seemed to indicate that increased age would favor the acceptance of land use control measures.

Sex and Voting Behavior

The role that a person's sex played in determining voting behavior did not appear to be clear cut. "The possibility of sex difference in political behavior remains a subject of interest in part because female suffrage is still disputed in some modern western democracies and in part because of our own acceptance of female activity in politics is of rather recent vintage."[1] Campbell

---

Report CR-NO. 15 (Ottawa: Canada Department of Forestry and Rural Development, Queens Printer and Controller of Stationary, 1968), p. 13.

[1] Campbell, et al., The American Voter, p. 483.

went on to say that past clearly defined political sex roles were apparently breaking down. However, the degree to which this was happening was dependent upon both social and geographic context.[1]

One researcher felt that womens' voting patterns were merely reflections of their husbands'.[2] Another felt that sex was relatively important in influencing voting behavior. Lipset indicated that women tended to be more conservative than men.[3] The Langs stated that while women tended to more or less follow their husbands' voting decisions, the "'woman's vote' is less clearly linked to social class than is the male vote."[4]

Once again it was indicated that there was a difference in opinion as to both the importance and the direction of influence a specific socio-economic characteristic would exert on voting behavior. The issue of context appeared to play a major role as to the variable's influence.

In the context of land use control measures, the sex variable was not found to be significant in the Ionia Study. The variable was eliminated and not included in the regression equations. However, other researchers had shown a great deal of interest in this

---

[1]Ibid., pp. 483-89.

[2]Lazarsfeld, The People's Choice, p. 141; H. H. Remmers, "Early Socialization of Attitudes," American Voting Behavior, p. 57.

[3]Seymour Martin Lipset, Political Man (Garden City, N.Y.: Double-Day and Company, 1960), p. 221.

[4]Kurt and Gladys Engle Lang, "The Mass Media and Voting," American Voting Behavior, p. 57.

variable in respect to voting behavior. This previous interest dictated that the sex variable be included in this study. Based partly on the literature and partly on intuition, it was suspected that women would be less amenable to land use control measures than men would.

Education and Voting Behavior

The influence of formal education upon voting behavior has been widely recognized. "Formal education, nevertheless, has many striking consequences for political behavior that are independent of status implications and that undoubtedly remain constant in strength even in times when class differences lose most of their partisan importance."[1] It was further indicated that the better educated person's view of political objects and events would be more specific and more highly differentiated.[2]

Alford contended that better educated persons were more likely to vote in a manner which would protect their business interests and vested interests. At the same time these better educated persons were less likely to favor general welfare proposals.[3]

In contrast to Alford's position, Adrain stated that the better educated person could see the "larger picture" and understand

---

[1]Campbell, et al., The American Voter, p. 475.

[2]Ibid., p. 476.

[3]Robert R. Alford, "Class Voting in the Anglo-American Political Systems," Party Systems and Voter Alignment, ed. by Seymor M. Lipset and Stein Rokkan (New York: The Free Press, 1967), p. 6.

that the productive unit in which they had a stake was not limited or bounded by their vested interest. The better educated segment of society tended to favor measures which would benefit all levels of society.[1]

Once again, an apparent dichotomy existed. The Ionia Study did not contain data which indicated educational attainment so no comment on the action of this variable in the issue specific context was possible. It was decided to take an optimistic position and accept Adrian's contention. If land use control measures could be viewed as a benefit to society, then the better educated segments of the population would support them and vote for them.

Income and Voting Behavior

Income, like the previously mentioned characteristics, had been recognized by many researchers as influencing voting behavior.

Gosnell indicated that income was an important indicator in respect to national elections.[2] Campbell also indicated that people of similar economic status tended to unite and form similar perceptions in regard to political issues.[3] This same view was reflected by Lazarsfeld when he stated that persons of the same economic level "have about the same political attitudes."[4] Alford

---

[1]Charles R. Adrian, "A Typology for Nonpartisan Elections," Western Political Quarterly, Vol. 12 (1959), p. 203.

[2]Harold F. Gosnell, Grass Roots Politics (New York: Russell and Russell, 1942), p. 2.

[3]Campbell, et al., The American Voter, p. 385.

[4]Lazarsfeld, The People's Choice, p. 20.

also supported the contention of similar economic groups holding similar political views especially in the case of the higher income segment of the population.[1]

There seemed to be a widely held consensus that income was one of the key indicators of voting behavior. Income was also linked to the development of attitudes which were considered the precursors of voting behavior. In respect to attitude formation in the adoption of new agricultural practices, Picard and Juneau made the statement that "income, of course, is also related to progress, although those living on small incomes do not necessarily have unprogressive attitudes. We find, too, that those with small incomes are generally, but not always, the most individualistic."[2]

If lower income persons were indeed the most individualistic, it seemed reasonable to assume that they would most likely oppose land use control measures and vote against them. Individualism would dictate that lower income persons oppose any aspect of collectivization.

Occupation and Voting Behavior

Campbell indicated that occupation was possibly the single most important indicator of political behavior. "Occupation tends to predict political attitudes and voting most efficiently."[3] He

---

[1]Alford, "Class Voting in the Anglo-American Political Systems," Party Systems and Voter Alignment, ed. Lipset and Rokkan, p. 68.

[2]Picard and Juneau, A Sociological Study of Agricultural Change in the Pilot Region, p. 14.

[3]Campbell, et al., The American Voter, p. 344.

supported this contention by stating that an occupation defined the group of people with whom the individual worked and thereby delimits spheres of primary group influence. Occupations lead to the development of perspectives and some occupations created unusually direct relationships with government and this will influence political response.

Alford also found that "for a comparative study of voting behavior, occupation is probably the best single indicator."[1]

However, Lazarsfeld felt that once a person's general socio-economic status was determined further classification by occupation did not refine the groups very greatly. "In other words, people of the same general socio-economic status have about the same political attitudes regardless of their occupation."[2] The apparent intent of this statement is to indicate that a person's "class," the composite of many socio-economic characteristics, influences his vote more than his actual occupation.

However, it seemed reasonable to assume that there were positive correlations between occupation and education and income. Generally better educated persons have more prestigious occupations and usually higher incomes. Since it was suspected that the better educated and higher income segments of the population would support and vote for land use control measures, it

---

[1] Robert R. Alford, Party and Society (Chicago: Rand McNally and Company, 1963), p. 74.

[2] Lazarsfeld, The People's Choice, p. 20.

was assumed that persons in more prestegious "white collar" occupations would also.

Property Ownership and Voting Behavior

Alford found that a landed interest is placed into a different social class than unlanded persons, actuated by different sentiments and views.[1] Vested interests and future opportunity costs would surely enter into the formation and the determination of voting behavior.

However, simply the amount of property a person possessed was not thought to be the sole factor conditioning the individual response to land use control measures. If an individual held a great deal of land for purely speculative purposes, and was hoping to reap benefits which would accrue from a change in use, he would oppose any restrictions on his use of the property. Conversely, an individual possessing a great deal of property who wished to continue utilizing it in the same manner would support any mechanism which would assure continuation of the existing usage without penalization.

The reaction of persons possessing small amounts of property towards land use control measures was also a matter of pure speculation. Since windfalls are less likely to occur to small property owners in rural areas, it was speculated that they would most likely support restrictions which would perpetuate the status quo. Because

---

[1]Robert R. Alford, "Class Voting in the Anglo-American Political Systems," Party Systems and Voter Alignment, ed. by Lipset and Rokkan, p. 69.

of this, any change in the status quo would likely be to the disadvantage of the small property owner because of the resulting change in life style. The small property owner was thought likely to support land use control measures which would guarantee continuous utilization of his property.

In the context of the Thumb Area, with the great deal of agricultural activity, it was suspected that the majority of large property owners would be agriculturalists. Therefore, it seemed logical to assume they would prefer that their property be protected from developmental pressures.

The influence of home ownership on attitudes and voting decisions had been recognized by several researchers. Gosnell recognized home ownership as being significant in determining voting behavior.[1] Lee also recognized the importance of this aspect when he stated: "The major differentiating factor reported in local politics was the occasionally contrasting interests and views of the homeowner versus the occupant of rental property."[2]

The homeowner has typically been considered one of the traditional pillars of society. Home ownership reflected a degree of stability and permanence not thought of as being associated with non-homeowners. Admittedly, in the face of a decreasing percentage of homeowners, this widely held contention may be undergoing modification. However, it was thought that there would still

---

[1]Harold F. Gosnell, Machine Politics Chicago Model, 2nd ed. (Chicago: University of Chicago Press, 1968), p. 111.

[2]Eugene C. Lee, The Politics of Nonpartisanship (Berkeley: University of California Press, 1960), p. 144.

be a difference between homeowners and renters in respect to land use control measures. The homeowner has a large capital investment in his home. Anything which would adversely affect his property values or his amenity level would be opposed by the homeowner. Conflicting or non-compatible land uses adjacent to residential areas would have a greater effect on the homeowner than they would on the renter. The renter would have greater freedom to move to a new location than would the homeowner with his invested capital.

Therefore it was suspected that homeowners would more strongly favor land use control measures to protect their vested interests than would non-homeowners.

Population Density and Voting Behavior

It seemed reasonable to expect that differing population densities, and the pressures exerted, would condition individuals to view land use controls differently. It was expected that persons being subjected to higher densities would view land use controls differently than persons living in lower density areas. The differing population densities would not only create conditions in themselves which influenced people but, differing densities would allow for differing group interactions and socialization processes.

The impact of growth and increasing population densities were recognized by Lee. "Growth brings with it the problems and pressures with which local politics are concerned--the conflict of personalities, the creation of new interest groups, and the change in the character of new interest groups, and the change in the character of existing ones."[1]

Alford also pointed out a suspected relationship between population density and the level of urbanization and voting behavior. He noted that in the more densely populated areas that the correlations between income, education, and occupation and voting behavior tended to break down.[2]

Based on the concept of the breakdown of some of the primary correlates; income, education, and occupation, and voting behavior it was suspected that differing population densities would assume a significant role. It was thought that increased crowding would call for an attempt to achieve increased structure and order.

With this as a conceptual base it was expected that increasing population densities would result in greater approval of land use control measures which would represent an abstraction of structure and order.

Perceived Conflicts and Voting Behavior

Perceived conflicts in respect to land use was an issue specific situation which was not readily found in the literature reviewed. Intuitively it was felt that whether or not a person perceived conflicts between various types of land uses was sure

---

[1]Ibid., p. 150.

[2]Robert R. Alford, "Class Voting in the Anglo-American Political Systems," Party Systems and Voter Alignment, ed. by Lipset and Rokkan, p. 24.

to create attitudes relating to various land use controls. If conflicts were perceived, the affected person was likely to develop opinions regarding land use control measures. It was thought that the perception of conflict would draw persons together, forming groups or collections of persons with common interests. The desire to eliminate perceived conflicts was sure to affect the voting on specific land use control issues. Individuals who perceived conflicts in terms of land use and were concerned about them were likely to favor land use controls more than persons who did not perceive conflicts.

Perception of Local Government Service and Voting Behavior

Several researchers indicated that a sense of alienation between the voter and the governmental powers represented in the election would have significant impact. If the voter felt alienated from the government, no matter what the cause, his vote would take the form of a protest, an expression of political discontent. This protest vote was often "independent of economic self-interest and related variables."[1] The degree and amount of alienation was suspected to follow "class" lines when specific issues were being considered.[2]

---

[1] John E. Horton and Wayne E. Thompson, "Powerlessness and Political Negativism: A Study of Defeated Local Referendums," The American Journal of Sociology, Vol. 67 (1968), p. 485.

[2] Gerald Pomper, "Ethnic and Group Voting in Non-Partisan Municipal Elections," The Public Opinion Quarterly, Vol. 30 (1966), p. 260.

It was also indicated that a person's perception of his ability to influence governmental action or response would also contribute to his propensity to participate in elections. If a citizen felt that a governing body or mechanism was capable of being influenced in the decision making process he had a sense of electoral potency which would stimulate more active participation in the election process.[1]

The literature review made it obvious that an individual's perception of his local government would greatly affect his voting actions in respect to land use control measures. If he distrusted or disliked the governing body he would not be likely to approve land use control measures. The disenchanted citizen would view governmental proposals with misgivings and distrust. On the other hand if the individual felt his interests were being well served by the governing body he would be more likely to support the measures put forth by the governmental structure. The greater faith an individual had in the governmental system and its component parts the more likely he would be to approve land use control measures.

Political Party Identification and Voting Behavior

Identification with a specific political party was obviously caused by many of the variables which were mentioned in the previous

---

[1]Robert E. Agger, Daniel Goldrich, and Bert E. Swanson, "Classifying Power Structures and Political Regimes," The Search for Community Power, ed. by William D. Hawley and Frederick M. Wirt (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1968), p. 322-42.

portion of the literature review. So, it may have been a case of "double counting" to suggest that identification with a certain political party would influence voting behavior.

However, both Lazarsfeld and Adrain recognized the relationship between political party association and voting behavior. Lazarsfeld indicates that in the case of presidential elections the notion of Republicans being more "conservative" and Democrats being more "liberal" holds true in respect to voting behavior.[1] Adrain stated that, in the case of nonpartisan elections, party affiliation influenced voting patterns in much the same way.[2]

In respect to land use control measures it was suspected that more "conservative" people would be less likely to favor additional restrictions. Therefore, utilizing commonly held stereotypes of Democrats being more liberal than either Republicans or members of the American Independent Party, it was thought that individuals who considered themselves as being Democrats would be the most likely to favor land use control measures.

Group Participation and Voting Behavior

Many references existed relating group participation to voting behavior. Perhaps the most concise explanation of the influence of group participation on voting behavior was presented by Riecken. Riecken pressed the case that group or organization membership would influence voting behavior. He found that "people

[1]Lazarsfeld, The People's Choice, p. 24.

[2]Adrain, "A Typology for Nonpartisan Elections," Western Political Quarterly, p. 203.

who are closely associated tend to vote alike" and members of groups "will endeavor to bring their opinions into line with the norms of each group."[1]

Thus, by ascertaining a person's group affiliations, it would be possible to determine whether or not associations with specific groups would influence voting behavior and opinion formation.

The manner in which specific groups would influence voting behavior was mostly conjecture. However, it was felt that membership in some specific groups would reflect similarity of various socio-economic characteristics or "classes." The groups would therefore possibly act as surrogates for specific socio-economic characteristics. For example, farmer organizations would consist primarily of farmers and reflect their views. The same could be said for various professional organizations. Membership in these groups would reflect a person's "class" or status and should contribute to voting behavior in a similar manner as would the individual characteristics. As a generalization, the more conservative the group, the less likely the member would be to favor land use control measures.

The Ionia Project

Additional supportive information for this study was obtained from a survey which was conducted in Ionia County during

---

[1]Henry W. Riecken, "Primary Groups and Political Party Choice," American Voting Behavior, p. 163.

1972. Preliminary research was carried out in respect to citizens' attitudes concerning various developmental questions and land use control measures in Ionia County. A total of more than 5,000 questionnaires were mailed to the County's rural box holders. 1,336 of the County's rural residents took the time to complete and return the questionnaire. The results of this questionnaire were used to add to the information obtained from the literature review and to support some intuitive feelings about voting behavior and land use control measures.

The collection of data related to certain socio-economic characteristics was hampered by restraints imposed by the County Board of Commissioners. The Commissioners specified that questions pertaining to economic or educational characteristics could not be asked. This lack of variables left a void in what must be considered as being germane to this type of research. However, using the available data from the questionnaires, three predictive models were constructed. A major portion of the thinking related to the design of these models was directed at identifying the socio-economic characteristics which influence attitudes concerning land use control measures. Through identification of such indicators it was possible to construct predictive models which provided indications as to citizens' potential votes relating to land use control issues.

The only socio-economic characteristics which proved to be significant were age, township population density, and township population density change. The same variables did not prove to be significant in every model. With the limited number of social characteristics which were included in the models, it is not surprising that the variables retained were so few in number.

Even though the results of the Ionia Project were somewhat disappointing, a great deal was gained in the course of the research. Such aspects as questionnaire refinement, model building, and goal specification were clarified and developed. The knowledge gained from the Ionia Project proved invaluable in the conduct of this study.[1]

Hypotheses

The literature review and the results of the Ionia project created a basis for the generation of the hypotheses which were formulated for this study. The following hypotheses were generated in an attempt to relate population characteristics to an issue specific vote--land use control measures. The hypotheses were created to serve as a conceptual framework for the analysis phase of the study.

The basic assumption for this study was that rural residents' attitudes toward land use control measures were a result of their perception of their position and role in both society and their immediate environment. Land use controls would have different meanings and impacts on an individual, conditioned by both real and imagined pressures and roles. An individual's

---

[1]Results of the Ionia Project will be contained in a forthcoming Agricultural Experiment Station Bulletin.

attitudes toward land use control measures would be conditioned by the classic socio-economic indicators as well as his perception of land use conflicts and the service he was being provided by government.

Thirteen specific hypotheses were developed and tested. These hypotheses were:

1. Increased age will increase the probability of favoring land use control measures.

2. Males will be more likely to favor land use control measures than will females.

3. Increased educational attainment will increase an individual's probability of favoring land use control measures.

4. Increased income level will increase an individual's probability of favoring land use control measures.

5. Individuals with more prestigious "white collar" occupations will be more likely to favor land use control measures than will individuals with less prestigious "blue collar" occupations.

6. Possession of either small or very large amounts of property will increase the probability of an individual favoring land use control measures.

7. Being a homeowner will increase the probability of an individual favoring land use control measures.

8. Individuals residing in higher population density areas will be more likely to favor land use control measures than will individuals residing in lower population density areas.

9. Individuals perceiving conflicts in land usage will be more likely to favor land use control measures than will individuals who perceived no such conflicts.

10. Individuals who feel their interests are being well served by their local government will be more likely to favor land use control measures than will individuals who feel local government is not serving their interests.

11. Individuals who consider themselves Democrats will be more likely to favor land use control measures than will individuals who consider themselves Republicans or American Independents.

12. Individuals belonging to groups which are considered "conservative" will be less likely to favor land use control measures than will individuals belonging to "liberal" groups.

13. Individuals with high voting participation rates in local elections will be more likely to favor land use control measures than will individuals with low voting participation rates.

The preceeding hypotheses were generated as a result of the literature review, the Ionia Project, and through personal judgment and speculation. These hypotheses were aimed at identifying variables which might illustrate relationships between various physical and socio-economic characteristics and attitudes pertaining to land use control measures. The validity of these hypotheses were tested in the analysis phase of the study.

CHAPTER III

RESEARCH PROCEDURES

The Study Area

Reasons for Selecting the Study Area

In order to conduct the research required for this study, it was desirable to find an area where land use changes were just beginning to occur. The ideal type of area would be one still predominately rural but beginning to experience effects of urban pressures. Within such an area the resident population would be just beginning to experience land use pressures and should be formulating attitudes toward land use control measures. Such an area provides an ideal sampling frame within which to gather data pertaining to residents' attitudes toward land use control measures. The Ionia Study had shown that residents of areas undergoing shifts in land usage had well defined attitudes concerning land use control measures.

It was decided that the sampling units for the study would consist of individual counties. The question of how people felt about land use issues could best be dealt with in a limited geographic region. If too large a geographic area were encompassed, responses to questions would most likely have been couched in general terms. However, if land use control questions were made community specific, the responses would most likely reflect the respondents' views of issues which have local and personal importance. The county as a geographic entity is a familiar concept to most people. The county offers an easily recognizable region upon which to base questions dealing with land use control measures and issues. A county is geographically small enough to enable people to realize that land use decisions which they favor or reject will have a personal impact on them. The county is also a recognized and functioning administrative unit which provides a sense of realism for respondents discussing land use issues. Additionally, the county provides a mechanism through which land use policies could be formulated and implemented. There has been increased interest expressed by the federal government in returning certain decision-making and policy implementation functions to the local level. Specific examples of this include water quality planning and development and urban systems transportation fund monies. This increased interest in local level administrative decisions makes a county a political unit with an increasing potential for administrative power. Also, the county is a geographic unit which is recognized by the United States census in a definitional sense. Data are gathered and displayed at this level of aggregation. The county is further divided geographically into townships and minor civil divisions. Some data are also available at this lesser geographic level, which could provide a greater degree of local specification.

During the time that the investigation was underway to select a research area for this study, a separate study was being initiated by the Department of Resource Development at Michigan State University. This latter study was being conducted in conjunction with the Office of Economic Opportunity and was also to be concerned with citizen's attitudes related to land use change. The area selected for the MSU-OEO study was a three county region in the Michigan Thumb Area. Investigation showed that the three county region would also be applicable for the purposes of this study. The area was predominately rural and experiencing land use changes due to increasing pressures from both population increase and urbanizing forces being exerted from surrounding areas. Also, data for the study were being collected on a county basis.

Since the area was appropriate for the purposes of the study and data to be collected were to be gathered on a county basis, the possibility of a joint questionnaire was presented. After it had been determined that a joint questionnaire was realistic, it was decided to utilize the three county area in the Michigan Thumb as the site of this study.

Description of the Study Area

The study area was comprised of a three county region in the Michigan Thumb Area (refer to Figure 1). The thumb area counties of Huron, Sanilac, and Tuscola, provided an appropriate region to ascertain local residents' feeling and opinions toward land use control measures and issues.

Figure 1.--Location of the Study Area.

All three counties had a portion of their boundaries made up of coast line, either Lake Huron or Saginaw Bay. They were comparable in terms of climatic conditions because of their similar latitudinal and longitudinal location.

In terms of land use characteristics, Huron and Sanilac Counties were more comparable to each other than they were to Tuscola County. Data presented in Table 2 illustrates that Tuscola County contained larger amounts of forested and recreational lands and significantly less agricultural land than did Huron or Sanilac Counties. The importance of agriculture to the three counties should not be minimized. Each of the individual counties had between approximately 70 to 80 percent of their land area devoted to agriculture. All three of the counties had roughly comparable amounts of land devoted to transportation and urbanization.

In light of the importance placed upon agricultural production in recent years, an examination of agricultural trends within the counties was thought to be desirable. All three counties were considered to contain some of the best and most productive agricultural lands in the state. The market value of farm products sold totaled $94,022,700 for the three counties in 1969.[1] Increasing population and developmental pressures being exerted on the land resource will ultimately result in conflicts between agricultural and non-agricultural land uses.

---

[1] County and Regional Facts, State Planning and Development Region 7, William J. Kimball Coordinator, Michigan State University Cooperative Extension Service, 1974, Section IV, Table 24, Market Value of Farm Products sold Selected Characteristics, pp. 77-78.

TABLE 2.--Land Use Characteristics of Huron, Sanilac and Tuscola Counties 1970.[a]

Type of Land Use	Huron County		Sanilac County		Tuscola County	
	Acres	Percentage	Acres	Percentage	Acres	Percentage
Inland Water	3,328	0.6	0	0.0	3,264	0.6
Land Surface	524,032	99.4	615,040	100.0	521,536	99.4
Forested	61,600	11.8	70,200	11.4	105,500	20.2
Agricultural	426,244	81.3	461,108	75.0	359,139	68.9
Transportation	17.030	3.2	19,529	3.2	19,027	3.6
Recreation	3,543	0.7	8,535	1.4	27,462	5.3
Urbanization	3,104	0.6	2,570	0.4	3,944	0.7
Other[b]	12,511	2.4	53,098	8.6	6,464	1.2
Total	527,360	100.0	615,040	100.0	524,800	100.0

[a]County and Regional Facts, State Planning and Development Region 7, William J. Kimball, Coordinator, Michigan State University Cooperative Extension Service, 1974, pp. 82-85.

[b]Other land includes all lands not previously categorized. Private recreational land and unproductive forest land, such as conifer swamps and bogs, is included in this definition.

Some shifts were evident in respect to agricultural land uses in the past few years. Table 3 illustrates that between 1964 and 1969 agricultural acreage decreased by five percent in Huron County. During the same period, agricultural acreage increased by approximately eleven and eight percent respectively in Sanilac and Tuscola Counties. Also, during this time period, all three counties evidenced a decrease in the absolute number of farms.

TABLE 3.--Agricultural Characteristics within Huron, Sanilac and Tuscola Counties 1969.[a]

Agricultural Characteristics	County		
	Huron	Sanilac	Tuscola
Total Agricultural Acreage	426,244	461.108	359,139
Change in Total Acreage 1964-1969 (%)	-5.0	11.1	8.1
Acres per Farm - All Farms	170.0	165.4	162.6
Acres per Farm - Commercial[b]	205.4	206.4	206.8
Number of Farms 1964	2,656	3,321	2,664
Number of Farms 1969	2,507	2,787	2,208
Change in number of Farms 1964-1969 (%)	-5.6	-16.1	-17.1
Value of Land and Buildings per Farm 1969	$52,633	$44,031	$68,271
Total Market Value of Farm Products Sold 1969	$34,845,900	$32,910,300	$26,266,500

[a] County and Regional Facts, State Planning and Development Region 7, William J. Kimball Coordinator, Michigan State University Cooperative Extension Service, 1974, pp. 71-74, 77-78.

[b] Farms with sales of $2,500 or more.

Each of the counties had a much higher percentage of total earnings from the agricultural sector than did the state. Table 4 illustrates that as a state average, agricultural earnings represented only approximately one percent of total earnings. Agricultural earnings accounted for approximately 20 percent of both Huron and Sanilac Counties' total earnings and 11 percent of Tuscola County's total earnings. While agricultural earnings were more important in the economies of both Huron and Sanilac Counties than they were in Tuscola County, all three counties' agricultural earnings greatly exceeded the state average.

Differences in major sources of earnings were also evident in respect to other sectors of the economy. Manufacturing was more important in Sanilac County than in either Huron or Tuscola Counties. Manufacturing accounted for nearly 40 percent of total earnings in Sanilac County while it accounted for only approximately 25 percent in both Huron and Tuscola Counties. Also, the governmental sector of the economy was more important in Tuscola County than in either of the other two counties. Nearly 25 percent of Tuscola County's total earnings were from the governmental sector while both Huron and Sanilac Counties derived approximately 15 percent of their total earnings from this sector.

While differences existed, the three counties did exhibit a degree of similarity. They were primarily rural with very important agricultural sectors of their economies. Shifts were evident in respect to agricultural land uses in that both Sanilac and Tuscola counties evidenced absolute increases in agricultural acreage while Huron County exhibited reduced agricultural acreage.

TABLE 4.--Total Earnings by Major Source Within Huron, Sanilac and Tuscola Counties 1969.[a]

Distribution of Earnings	Region: Michigan Percentage	Huron County Percentage	Sanilac County Percentage	Tuscola County Percentage
Farm	1.1	21.1	20.3	11.2
Government	12.0	16.9	12.5	24.7
Manufacturing	45.4	23.1	39.1	26.2
Mining	0.1	--	--	--
Contract Construction	5.7	3.8	3.2	3.8
Transportation, Communications and Public Utilities	4.9	6.6	1.2	4.5
Wholesale and Retail Trade	13.9	15.9	12.4	18.4
Finance, Insurance and Real Estate	3.2	--	1.4	--
Services	12.2	9.0	8.8	8.8
Other	0.2	0.9	1.1	0.7
Total Earnings	$29,607,631	$71,165	$75,585	$80,998

[a]County and Regional Facts, State Planning and Development Region 7, William J. Kimball Coordinator, Michigan State University Cooperative Extension Service, 1974, pp. 48-51.

Evidence indicated that the Thumb Area Counties may be on the verge of experiencing major shifts in land uses due to developmental pressures. While the population of these counties has been relatively stable in the past, events have been taking place which will likely alter both population and the direction and magnitude of developmental pressures.

Table 5 illustrates that the resident population of the area has exhibited a general moderate increase since 1940. During the decade of 1940-1950, all three counties were relatively static with growth rates of less than ten percent. However, after 1950 a differential in population growth became evident. The population of Huron County exhibited the slowest rate of the increase, less than three percent, while Tuscola county's population exhibited the greatest rate of increase, over 13 percent. During the decade of 1960-1970 the population of both Sanilac and Tuscola Counties were growing at a significant rate of approximately nine and twelve percent respectively, while the population of Huron County was relatively static. The greater growth rates in both Sanilac and Tuscola counties indicated that land use changes and adjustments due to population pressures were occurring at a different rate than in Huron County. If a classification scheme for ranking the counties in terms of absolute population increase were developed, Tuscola County would have ranked first, followed by Sanilac and then Huron.

Table 6 illustrates that there was also a significant difference between the counties in terms of the percentage of

TABLE 5.--Population Growth Within Huron, Sanilac and Tuscola Counties 1940-1970.[a]

	Population						
County	1940	1950	% Change 1940-1950	1960	% Change 1950-1960	1970	$ Change 1960-1970
Huron	32,584	33,149	1.7	34,006	2.6	34,083	0.2
Sanilac	30,114	30,837	2.4	32,314	4.8	35,181	8.9
Tuscola	35,694	38,258	7.2	43,305	13.2	48,603	12.2
Total	98,392	102,244	3.9	109,625	7.2	117,867	7.5

[a]Michigan Statistical Abstract, Compiled under the Direction of David I. Verway, Division of Research, Graduate School of Business Administration, Michigan State University, Ninth Edition, 1972, pp. 34-36.

TABLE 6.--Urban and Rural Population Distribution Within Huron, Sanilac and Tuscola Counties 1970.[a]

Population Distribution	County					
	Huron		Sanilac		Tuscola	
	Number	Percentage	Number	Percentage	Number	Percentage
Urban[b]	2,999	8.8	0	0.0	6.503	13.4
Rural	31,084	91.2	35,181	100.0	42,100	86.6
Total	34,083	100.0	35,181	100.0	48,605	100.0

[a]Michigan Statistical Abstract, Compiled under the Direction of David I. Verway, Division of Research, Graduate School of Business Administration, Michigan State University, Ninth Edition, 1972, pp. 38-41.

[b]Urban being defined as places 2,500 or larger.

population which was classified as being either urban or rural. Sanilac County had no population which was classified as being urban, while Tuscola County had the greatest percentage of urban population, approximately 13 percent. Huron County's urban population accounted for approximately nine percent of the total population.

As well as there being population growth within the study area, there has been extensive population growth in surrounding areas. The study area is peripheral to densely populated Southeastern Michigan and the populated regions containing Bay City, Flint, and Saginaw. Table 7 documents the population growth in the standard metropolitan areas which are peripheral to the study area. During the decade of 1960-1970 the individual S.M.S.A.s of Bay City, Detroit, Flint, and Saginaw have increased in population somewhere between ten and twenty percent. The combined population increase in these four S.M.S.A.s totaled nearly 600,000 persons.

The increasing population in the areas surrounding the study area added an additional dimension to the developmental pressures being exerted. The location of the study area counties has historically made them vacation, recreation and retirement areas. Increasing pressure upon the land use in these counties has resulted because of both the acquisition of vacation and retirement home sites and the influx of vacationers. The majority of land consumption for second home sites has occurred along the shore line allowing the interior of the counties to escape this pressure. However, as the

TABLE 7.--Population Growth in the Standard Metropolitan Statistical Areas Peripheral to the Study Area 1960-1970.

Standard Metropolitan Statistical Area	Population		
	1960[a]	1970[b]	% Population Change 1960-1970
Bay City	107,042	117,339	+ 9.6
Detroit	3,762,360	4,199,931	+11.6
Flint	374,313	486,658	+19.3
Saginaw	190,752	219,743	+15.2
Total	4,434,467	5,033,671	+13.5

[a]Michigan State University, Division of Research, Graduate School of Business Administration, Michigan Statistical Abstract, Comp. David I. Verway (9th Ed.); East Lansing: Michigan State University, 1972, pp. 33-36.

[b]U.S. Department of Commerce, Bureau of the Census, 1970 Census of Population, General Population Characteristics Michigan, PC(1)-B24 Mich., pp. 24-59.

availability of shore property decreases, increasing pressure will be brought to bear on interior lands.

Vacation visits are no longer seasonal in the Thumb, but are year round primarily because of heavy snowmobile usage. The influx of non-residents for both vacations and retirement has added yet another dimension to the land use control issue. Acquisition of vacation and retirement property has put additional strains on land uses. Table 8 shows that a sizeable number of housing units within the three county area were seasonal in nature. Over 12 percent of the three county total housing units were seasonal.

TABLE 8.--Total and Seasonal Housing Units within the Study Area 1970.[a]

County	Housing Units: Total	Seasonal and Migrational	% of Housing Units which were Seasonal and Migrational
Huron	14.647	2,736	18.7
Sanilac	14,841	2,425	16.3
Tuscola	15,523	326	2.1
Total	45,011	5,487	12.2

[a]County and Regional Facts, State Planning and Development Region 7, William J. Kimball Coordinator, Michigan State University Cooperative Extension Service, 1974, pp. 23-28.

Huron and Sanilac Counties both contained over 15 percent seasonal housing units, while, Tuscola County had the fewest seasonal housing units, approximately two percent of the total. The growth of these surrounding regions has, and will continue to, exert both influence and pressure on land uses in the Thumb Area counties.

Characteristics of the three county populations were also examined in respect to age, education, occupation and income.

In terms of age composition, Huron and Sanilac counties were very similar while Tuscola County differed slightly from either of the two. Table 9 illustrates that differences between Tuscola County and the other two counties were evident in both the 20-44 years of age group and the 65+ years age group. Tuscola County had more residents in the younger group, nearly 30 percent as compared to approximately 25 percent, and fewer in the older, nine percent as compared to approximately twelve percent.

TABLE 9.--Population Age Composition Within Huron, Sanilac and Tuscola Counties 1970.[a]

Age Cohort	Percent of Population Within Cohort		
	Huron County	Sanilac County	Tuscola County
	Percentage	Percentage	Percentage
Under 5 years	8.8	9.0	9.5
5 to 19 years	10.2	10.8	11.6
10 to 19 years	21.4	21.3	21.4
20 to 44 years	25.2	26.3	29.7
45 to 64 years	21.6	20.7	18.8
65 years and Older	12.8	11.9	9.0
Total	100.0	100.0	100.0

[a]County and Regional Facts, State Planning and Development Region 7, William J. Kimball Coordinator, Michigan State University Cooperative Extension Service, 1974, p. 14.

Table 10 shows that in respect to educational attainment there were very slight differences between the counties. Huron County exhibited a slightly lower percentage of persons with high school education, but in the main, differences at all levels were minimal. The median years of school completed for persons 25 years and over was similar in all three counties, approximately 11 years.

A much greater difference in population characteristics between the counties became evident when the occupations of employed persons were examined.

TABLE 10.--Years of School Completed by Persons 25 Years Old and Older in Huron, Sanilac and Tuscola Counties 1970.[a]

	Percent of Population 25 Years Old and Older		
	Huron County	Sanilac County	Tuscola County
Years of School Completed	Percentage	Percentage	Percentage
None	0.9	1.1	1.0
Elementary School			
1-7 years	14.2	11.1	10.4
8 years (completed elementary school)	27.3	22.2	21.0
High School			
1-3 years	15.7	19.0	20.6
4 years (completed high school)	30.4	35.5	34.5
College			
1-3 years	6.7	7.0	7.5
4 years or more (completed college)	4.8	4.1	5.0
Median Years of School Completed	10.5	11.4	11.6

[a]County and Regional Facts, State Planning and Development Region 7, William J. Kimball Coordinator, Michigan State University Cooperative Extension Service, 1974, pp. 21-22.

Table 11 illustrates that, once again, characteristics of Huron and Sanilac counties were similar while those of Tuscola County differed. The major differences occurred in respect to the operative/laborer and farmer categories.

Tuscola County had a higher percentage of operatives/ laborers, approximately 34 percent, than did either Huron or Sanilac Counties, 26 and 29 percent respectively. Conversely, Tuscola County possessed a much lower percentage of farmers, approximately five percent, when compared to either Huron or Sanilac Counties where farmers comprised approximately 15 percent of the total labor force.

Family income was also utilized as a comparison between the three counties. Table 12 illustrates that Tuscola County had a greater proportion of its families in income classes above $6,000 than did either Huron or Tuscola Counties. Nearly 80 percent of the families in Tuscola County had income levels above $6,000. Huron County had slightly more than 60 percent of its families above the $6,000 per year level while approximately 70 percent of Sanilac County families were at this income level. Huron County had a greater proportion of its families in the lower income groups than did either of the other counties. Nearly 37 percent of Huron County families were below the $6,000 per year level while the percentages were approximately 30 percent and 20 percent respectively for Sanilac and Tuscola Counties. The differences between family income levels in the three counties were not great, but they showed that Tuscola County families had slightly higher income levels

TABLE 11.--Occupations of Employed Persons Within Huron, Sanilac and Tuscola Counties 1970.[a]

Occupation	Huron Number	Huron Percentage	Sanilac Number	Sanilac Percentage	Tuscola Number	Tuscola Percentage
Professional, Technical and Kindred Workers	1,010	9.3	856	7.3	1,590	10.0
Managers, Administrators, Self-employed and Salaried	854	7.9	659	5.6	769	4.9
Sales and Clerical Workers	1,546	14.3	1,781	15.2	2,410	15.2
Craftsmen and Foremen	1,623	15.0	1,940	16.6	2,760	17.4
Operatives and Laborers	2,807	25.9	3,419	29.3	5,333	33.6
Farmers and Farm Workers	1,652	15.3	1,839	15.7	765	4.8
Service Workers	1,329	12.3	1,205	10.3	2,228	14.1
Total Employed Persons 16 Years Old and Over	10,821	100.0	11,699	100.0	15,855	100.0

[a]U.S. Department of Commerce, Bureau of the Census, *United States Census of Population: 1970, General Social and Economic Characteristics Michigan*, PC(1)-C24, pp. 24-560 and 24-564.

TABLE 12.--Family Income Levels Within Huron, Sanilac and Tuscola Counties 1970.[a]

	Percentage of Families by Income Level		
	Huron County	Sanilac County	Tuscola County
Income Group	Percentage	Percentage	Percentage
Less than $3,000	16.6	12.8	9.2
$3,000 - $5,999	20.3	17.8	12.3
$6,000 - $8,999	22.2	22.9	23.7
$9,000 - $11,999	17.7	21.6	22.5
$12,000 - $14,999	11.3	12.4	15.0
$15,000 - $24,999	9.8	10.8	14.4
$25,000 - $50,000	2.0	1.7	2.7
Above $50,000	0.2	0.3	0.3
Total	100.0	100.0	100.0

[a]County and Regional Facts, State Planning and Development Region 7, William J. Kimball Coordinator, Michigan State University Cooperative Extension Service, 1974, pp. 41-43.

than did the families of either Huron or Sanilac Counties (refer to Table 12).

In summary, there were differences between the three counties in the selected study area. Tuscola County exhibited differences in demographic characteristics when compared with the other two counties. All indications seemed to point to the conclusion that Tuscola County was more urban in nature than were Huron or Sanilac Counties. Tuscola County had a greater absolute population as well as a greater population growth rate than either of the other counties. A greater proportion of Tuscola County's population was considered urban. The population of Tuscola County was also slightly younger than that of the other two counties. There were fewer farmers in Tuscola County and a greater number of persons employed in the occupations which were considered urban. Finally, the family income levels were higher in Tuscola County than they were in either Huron or Sanilac Counties.

When these features were considered in total, Tuscola County emerged as the most urbanized of the three counties. For the purposes of this study, this degree of urbanization was considered as a surrogate for the degree of developmental pressures which were being exerted on the counties. From an examination of the utilized characteristics, Tuscola County was considered the area subjected to the most developmental pressures followed by Sanilac County and then Huron County. However, examination of data also showed that the counties exhibited great similarities in respect to population characteristics. The demographic and land use data showed that all three counties were experiencing developmental pressures to some degree.

All these aspects combined to produce a region which was about to undergo shifts in respect to land use. The pressures which were being exerted on the land resource in the three county study area would necessitate reevaluation of both the goals and objectives of land use policy. The study area was considered similar to many portions of the United States which were undergoing comparable changes in respect to developmental pressures. An area such as the one in which the study was conducted provided an excellent opportunity to determine how local residents felt about land use issues and controls in the face of impending change.

Models

There were three major objectives to this study: (1) Identify variables related to land use control measures, (2) Develop predictive models, and (3) Elaborate preliminary findings gained from the Ionia Project.

The accomplishments of these stated objectives depended heavily upon formulation and utilization of models. Because of this, it was important to select the appropriate type of model for the study.

Choice of the Appropriate Model for the Study

Because reality was being represented symbolically, the appropriate model to select was the symbolic model. Because symbols were used to represent quantities, the type of model selected was actually a mathematical model. The mathematical model was selected because it permitted manipulation and precision to a greater degree than do models expressed in other forms. Mathematical models are required if the tools of modern technology, particularly the electronic computer, are to be fully utilized in the conduct of the research.

The form of the model which was utilized in this research was a statistical model: It was a symbolic model in equation form utilizing multiple regression.

Since a model could be viewed as a set of hypotheses, it was possible to integrate the hypotheses under investigation into an equation form. Measurements of the variables relating to the hypotheses could be assigned quantitative values and would lend themselves to being inputs into the statistical model.

For example, the literature review indicated that many variables conditioned or influenced voting behavior. If voting behavior, the decision to vote in a specific manner, were considered the dependent variable, then certain socio-economic characteristics could be considered dependent variables. The socio-economic characteristics would have a bearing on an individual's voting behavior. Individual characteristics, expressed as independent variables such as age, sex, educational attainment, income, etc., would influence a specific vote.

Based on this premise, a simplistic description of the research efforts could be illustrated by the following equation in implicit form:

<u>Dependent Variable Y</u>		<u>Independent Variables X</u>
Individual Attitudes Pertaining to Land Use Control Measures (Surrogate for voting behavior)	=	f[(age), (sex), (educational attainment), (income level), (occupation), (land controlled), (home ownership), (population density), (perceived land use conflicts), (perception of governmental service), (political party identification), (group participation), (participation in elections)]

This, in a very general and basic form, was the model which was conceptualized for the conduct of the research.

Regression Analysis

Simple and Multiple Regressions

A basic objective of the study was to be able to predict an individual's response to various questions about land use control measures if certain characteristics pertaining to the individual were known.

Simple regression offers a method of examining the relationship between two variables, one which may be called x (the independent variable) and another y (the dependent variable). However, if x and y are statistically independent it is impossible to predict y from x. In the case of statistical independence, knowledge of x will not improve the prediction of y.[1]

When the two variables being considered are not statistically independent, knowledge of x assists in the prediction of y. The stronger the dependence between x and y the more accurate the predictions will be.[2]

Simple regression examines the relationship between the two variables x and y. For each change in x the resultant change in y is measured. The strength of the relationship between x and y is indicated by the correlation coefficient. If there is perfect

---

[1]Hubert M. Blalock, Jr., Social Statistics (New York: McGraw-Hill Book Company, 1960), p. 363.

[2]Ibid., p. 363.

correlation between x and y exact prediction is possible, for each change in x would result in a consistent change in y. A correlation between the two which is less than perfect (1.0) will result in predictions of y which are not exact.

Basic regression therefore measures the degree of relationship between two variables and enables a prediction of y (the dependent variable) based on knowledge of its relationship to x (the independent variable).

Multiple regression is similar to simple regression except that the relationship between a number of independent variables and the dependent variable is investigated. An attempt is made to predict a single dependent variable from a number of independent variables.[1] Predictions of y are no longer based on the relationship between the dependent variable and a single independent variable. As in the case of simple regression, correlation coefficients indicate the degree of relationship between each independent variable and the dependent variable. Additionally, multiple regression offers the advantage of providing partial correlation coefficients. Partial correlation coefficients may be utilized to summarize the degree of relationship between two variables, controlling for all other variables.

Reasons for Using Multiple Regression

As mentioned previously, a basic objective of the study was to be able to predict an individual's response to various land use

---

[1]Ibid., p. 429.

control questions if knowledge pertaining to his characteristics were known. Multiple regression provided an ideal mechanism by which to generate predictions using answers to specific land use control measure questions as the dependent variable and measures of individual characteristics as independent variables.

Another objective of the study was to identify specifically which socio-economic characteristics could be used to predict an individual's attitudes and opinions regarding land use control measures.

In addition to providing estimates of population parameters (i.e., regression coefficients), multiple regression offers a method of identifying which independent variables are related to the dependent variable. By setting a significance level, it is possible to have independent variables included or deleted in the regression equation based on their significance in predicting the values of the dependent variable. Since the variables specified for the final equation were based on hypotheses, inclusion or deletion of a variable amounts to a test of the hypothesis. Deletion of an independent variable at a given significance level constitutes rejection of a given hypothesis at that particular significance level.[1] Inclusion of an independent variable indicates that the particular independent variable is related to the dependent variable. A given hypothesis is validated to the extent that the associated independent variable is shown to be statistically related to the dependent variable.

---

[1]Ronald J. Wonnacott and Thomas H. Wonnacot, Econometrics (New York: John Wiley and Sons, Inc., 1970), pp. 64-67 and 256-257.

Multiple regression was ideally suited to the major objectives of this study since it offered a method for prediction while concurrently providing a mechanism of testing hypotheses.

Design of the Method of Analysis

The method of analysis employed in this study was a variation of multiple linear regression. This technique allowed for the identification of those individual characteristics (independent variables) which exerted a significant influence upon individual responses to questions pertaining to land use control measures (dependent variables) and an estimation of the extent of the influence.

For use in regression equations, dependent variables were coded in a dichotomous, binary form. This meant that the dependent variable in the regression equation only had two possible values rather than an infinite number of values that the dependent variable is normally assumed to take. That is, values which the dependent variable "y" could assume are the following:

$$y = \begin{cases} 1 & \text{If the respondent approved of the land use control measure.} \\ 0 & \text{If the respondent did not approve of the land use control measure.} \end{cases}$$

The use of dichotomous, "dummy," dependent variables presented problems in respect to variances in multiple regression. Use of a dichotomous "y" violated the assumption of homogeneous variance which is considered critical in respect to the general linear model in statistical theory.

Weighted Regression

To correct for the problems created through the use of a dummy dependent variable, it was possible to utilize weighted regression. Weighted regression differs from general linear regression in the respect that it compensates for the error term ε, as discussed below:

The form of a general linear regression model is:

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 \ . \ . \ . \ \beta_i x_i + \varepsilon$$

where y represents the dependent variable

$x_1, x_2 \ . \ . \ . \ x_i$ are the specified independent variables

$\beta_0, \beta_1, \beta_2 \ . \ . \ . \ \beta_i$ represents unknown population parameters that measure the effect of the independent variables in the prediction of the random response y

ε is an error term which explains the random fluctuation in y for fixed settings of $x_1, x_2, \ . \ . \ . \ x_i$.

The random component ε creates problems when the dependent variable (y) is of a dichotomous form. When the dependent variable is not dichotomous it is assumed that ε "is a normally distributed random variable, with mean zero and variance σ^2."[1] Further, repeated values of ε are "not only uncorrelated but necessarily independent."[2]

---

[1]N. R. Draper and H. Smith, Applied Regression Analysis (New York: John Wiley and Sons, Inc., 1966), p. 17.

[2]Ibid., p. 17.

Goldberger has shown that when y is dichotomous the assumption of homogenous variance is untenable. With a dichotomous dependent variable it has been found that ε values are heteroscedastic: that they vary systematically with estimated values of y and hence, with particular values of the independent variables.[1]

Goldberger suggests a process to compensate for the problems created by a dichotomous dependent variable. To obtain the best linear unbiased estimates with a dichotomous dependent variable, a two stage least squares procedure is recommended. First, the calculated values of $\hat{y}$ are obtained for each observation from an ordinary least squares solution. The $\hat{y}$ values are then used to calculate the term $\hat{y}(1-\hat{y})$ which is an approximation of the variance of ε for that particular observation. Then, values of the dependent and independent variables for each observation are transformed by dividing them by the corresponding $\hat{y}(1-\hat{y})$ term. Finally, analysis of the transformed values by ordinary least squares is conducted to derive parameter estimates. Through this procedure, better unbiased estimators are obtained, and validity of the significance determination is increased.[2] Also, because of the dichotomous nature of the dependent variable:

> . . . the calculated value of y for any given x is interpreted as an estimate of the conditional probability of y, given x. That is, if x changes by one unit then the probability of y

---

[1]Arthur S. Goldberger, Econometric Theory (New York: John Wiley and Sons, Inc., 1964), p. 249.

[2]Ibid., pp. 250-255.

correspondingly changes by the estimated parameter value associated with that x.[1]

The Ionia Study in Which the Weighted Regression Procedure was Utilized

Ionia Model

Mention has been made of the Ionia Project which was previously conducted. The concepts of weighted regression and conditional probability are best illustrated by an example from the Ionia Project.

A model which was created in the course of the Ionia Project dealt with the issue of where additional housing should be located within the county. A question in the mailed questionnaire asked "If more single family, non-farm residences are added, where would you prefer they be located?"[2] The response options provided were:

No restrictions on location (anywhere)
Large rural lots
Rural subdivisions
Subdivisions adjacent or within villages and cities
Don't know

Variables

The response to the locational question was used as the dependent variable in a regression equation. The dependent variable was coded in a dichotomous, binary form. The no restriction response was coded as, a 1.

---

[1]Douglas Melvin Crapo, "Recreational Activity Choice and Weather: The Significance of various weather preceptions in influencing preference for selected recreational activities in Michigan State Parks" (unpublished Ph.D. dissertation, Michigan State University, 1970), p. 53.

[2]A copy of the Ionia Questionnaire is found on pages 238-241 of the Appendix.

Responses indicating a desire for control over location (large rural lots, rural subdivisions, and subdivisions adjacent or within villages and cities) were coded as a 0. "Don't knows" and unusable responses were deleted. This process yielded a dependent variable which was dichotomous in nature, indicating a desire for, or a rejection of, controls over location of additional housing. The dependent variable was designated x_4.

Because of the dichotomous nature of the dependent variable, the regression equation was in the form of a conditional probability equation. The general form of a conditional probability linear regression equation is $P(y|x) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 \ldots + \beta_i x_i + \varepsilon$.

Ten independent variables, thought to be useful in predicting response to the location of additional housing were selected for inclusion in the equation. The ten independent variables were:

Occupation (X_2)

The occupation classifications were:

1 = unemployed or handicapped and students
2 = retirees
3 = housewife
4 = semi or unskilled blue collar (factory)--skilled
5 = clerical and sales workers
6 = farmers
7 = proprietors or self-employed
8 = officials = government, business and industrial supervisors
9 = teaching or white collar

There was an interest in the relationship between farmers and locational issues. For this reason, the occupation variable was coded in a dichotomous form. Farmers were coded as 1 while all other occupations were coded as 0. This was done specifically to indicate the relationship between farmers and the location of additional housing.

Age (X_3)

actual ages were recorded and coded.

Mobile Home Location (X_5)

The question relating to the location of mobile homes was, "If more mobile homes are added, which location would you prefer?" The response options were:

No restrictions on location (anywhere)
Rural mobile home parks
Mobile home parks adjacent to or within villages and cities
Don't know

This variable was also coded in a binary, dichotomous form. "No restrictions" was coded as a 1 while restrictions on location (rural mobile home parks and mobile home parks adjacent to or within villages and cities) were coded as a 0. The "Don't know" responses were deleted.

Shopping Location (X_6)

The specific question was "If more shopping and service facilities were added, where would you prefer they be located?" The response options were:

No restrictions on location (anywhere)
Downtown areas
Shopping centers
Don't know

This variable was also coded in a 0-1 format. "No restrictions" was coded as 1 and responses indicating restrictions were desired (downtown areas and shopping centers) were coded as 0. The "Don't know" responses were deleted.

Industry Location (X_7)

The question asked was, "If more industry were added, where would you prefer it be located?" The possible responses were:

No restrictions on location (anywhere)
Within incorporated cities and villages
Only in controlled, specified, industrial parks
Don't know

Once again a 0-1 coding format was used. "No restrictions" was coded as 1 and responses desiring restrictions (within incorporated cities and villages and only in controlled, specified, industrial parks) were coded as 0. The "Don't know" responses were deleted.

Zoning (X_8)

A question designed to ascertain respondents' attitudes toward zoning was also contained in the questionnaire. The question asked, "What are your feelings as to the timing for use of each of the land control measures?" One of the control measures specifically cited was land use zoning. The responses provided were:

Now
Later
Never
Don't know

"Now" and "later" were thought to indicate a desire for zoning at some time. They were combined and coded as a 1. The "never" responses were coded as a 0. The responses were thus divided into those favoring zoning and those opposed to it. Again, the "Don't know" responses were deleted.

1970 Township Density (X_9)

Individual responses were identified as to township of residence. Thus, it was possible to calculate population density associated with each respondent. The 1970 population density per square mile of the respondent's township was calculated and coded to the nearest thousandth.

1960-1970 Township Density Change (X_{10})

The 1960-1970 township density change was calculated for each township. These values, rounded to the nearest thousandth, were coded and assigned to the individual data sets.

Zoning-Age Interaction (X_{11})

It was hypothesized that an interaction between a respondent's age (X_3) and his opinion on zoning (X_8) might be of significance in predicting the probability of a given response to location of additional housing units. Therefore, an interaction variable, (X_3 X_8), was created and designated X_{11}.

Occupation--Age Interaction (X_{12})

It was also hypothesized that an interaction between occupation (X_2) and age (X_3) might be significant in prediction responses. The interaction variable X_{12} was created (X_2 X_3) to explore this possible relationship.

The above were the 10 independent variables which were hypothesized to be of value in predicting the probability of a response indicating a desire for either "no restrictions" or "restriction" on location of additional homes in Ionia County.

In respect to each variable, all responses which did not indicate explicit preference by a single answer were not included. In order to be included in the final data set, all questions had to be answered. The final resulting data set, because of the above restrictions, consisted of 734 individual observations from the total of 1336 completed questionnaires which were returned.

With the responses coded in the form of a dependent and ten independent variables, the data set was subjected to analysis through a stepwise least squares (LSSTEP) regression routine.

Stepwise Least Squares Regression Routine (LSSTEP)

The LSSTEP routine was used to estimate the "best" relationship, based on the "goodness of fit" criterion, between a dependent variable and a set of independent variables.[1] The LSSTEP routine included in the final equation only those variables which were most significant. The LSSTEP routine calculated the significance probability of the F statistic for the partial regression coefficient associated with an independent variable. Through this calculation it was possible to determine whether or not the variable should be deleted from, or left in, the equation. Deletion is accomplished by a user specified "sigout" value. In the Ionia regression model a significance level of .10, commonly used in sociological research, was specified. This resulted in

---

[1] Preliminary documentation, MSU STAT System (6500) May 17, 1972, part 12, LSSTEP Program.

variables which had a significance greater than .10 being retained for the final regression equation.

In the Ionia Study, five variables were retained in the final regression equation:

TABLE 13.--Ionia Model Original Regression Coefficients.

Variable		Regression Coefficient
(X_3)	Age	-.002
(X_5)	Mobile Home location	+.40
(X_6)	Additional Shopping location	+.18
(X_7)	Additional Industry location	+.26
(X_8)	Zoning	-.09

Initial Regression Model

The retention of these variables indicated that they were significant (at the .10 level) in explaining variation around the mean of the dependent variable, restrictions on the location of additional housing within the county (X_4).

Signs associated with the regression coefficients were of interest. Variables X_5, X_6, X_7 had positive regression coefficients. This indicated that persons opposed to restrictions on the location of additional mobile homes (X_5), additional shopping (X_6), and additional industry (X_7), would also be inclined to oppose restrictions on the location of additional housing. The positive values of the regression coefficients meant that the probability of saying no to restrictions on location of additional housing would be enhanced if a respondent was opposed to restrictions on the location of additional mobile homes, shopping, and industry.

Regression coefficients for the zoning variable (X_8) and the age variable (X_3) were both negative. In the case of the zoning variable (X_8), this was to be expected. In the coding format, a value of 1 indicated the respondent favored zoning. Therefore, it was logical to expect that if a person favored zoning he would also favor restrictions on the location of additional housing. The sign of the regression coefficient substantiated this relationship.

The regression coefficient for the age variable (X_3) also had a negative sign. This indicated that as a person's age increased, he was less likely to favor "no restrictions on the location of additional housing." The older a person was, the more likely he was to favor restrictions. This seemed to refute the generally held notion that older people are less amenable to change. Increasing age decreased the conditional probability of a person favoring no restrictions.

Associated statistics were a multiple correlation coefficient (R) of .6186 and a multiple coefficient of determination (R^2) of .3827. An R^2 of .3827 meant that approximately 38% of the variation around the mean of the dependent variable, probability of saying no restrictions to the location of additional housing, was explained by the five significant independent variables (X_3, X_5, X_6, X_7 and X_8).

The standard error of estimate (S_{xy}) was .30028. This represented a measurement of the variation among the errors of estimate. Residuals ($y-\hat{y}$) greater than $\pm$ 1 S_{xy} would lie outside the regression plane defined by the best fit criteria. Residuals of this magnitude represented a failure in estimating which was not explained by the regression equation at the .10 significance level.

An R^2 of .38 was not particularly high, so an investigation of the residuals (actual y - estimated y) was undertaken. Distribution of residuals suggested that no non-linear functions were present, but rather, the problem seemed to be one of hetroscedasticity (unequal variance). Because of hetroscedasticity there was a great dispersion of observed values in respect to the regression line (line of best fit).

With a condition of hetroscedasticity, the regression line will not "fit" the distribution of values as precisely as it would if a condition of homoscedasticity (equal variance) existed. There will be major differences and systematic differences between the actual dependent variable value (y) and the predicted dependent variable value ($\hat{y}$). These differences will give rise to large residuals ($y-\hat{y}$). The residuals should be thought of as errors in respect to predicting the dependent variable value through use of the regression equation.

A method of correcting for, or modifying the effects of, hetroscedasticity, is weighted regression. The weighted regression model, if the correct weights are used, specifically corrects for hetroscedasticity and eliminates some scaling problems.[1]

Data were prepared for weighted regression through a series of intermediate steps.

"RESID" Routine.--The first step was to calculate the residuals $(y-\hat{y})$ for each observation. This was done through use of an especially designed program entitled "RESID." Regression coefficients from the LSSTEP routine were used to calculate estimated values of the dependent variable $(\hat{y})$ and the residuals $(y-\hat{y})$.

Output of the "RESID" routine consisted of a new data deck. Individual cards in the new deck contained the observation case number, actual value of the dependent variable (y), and estimated value of the dependent variable $(\hat{y})$, and the residual $(y-\hat{y})$.

"CONVERT" Routine.--A second program was designed to create weights necessary for the final regression analysis. The weights, required to obtain consistent estimates of the variances, were created through use of the following formula:[2]

$$\text{weight} = \frac{1}{\hat{y}_i(1-\hat{y}_i)}$$

---

[1] Wonnacott & Wonnacott, Econometrics, pp. 133-134.

[2] Jan Kmenta, Elements of Econometrics (New York: The MacMillan Company, 1971), p. 427.

Output of the "Convert" Routine was another new data deck. This deck contained the individual observations case number and calculated weight in single precision format. An additional routine was necessary to combine original data and the new weights on a single card for each observation.

"SWITCH" Routine.--A third program, "SWITCH," was developed to accomplish merging of original data for each observation and weights on to a single data card.

The data deck resulting from the "SWITCH" routine was input to the weighted multiple regression computer program.

Weighted Regression.--The weighted regression routine weighted the variables, which were shown to be significant through use of the LSSTEP routine, by the calculated weights and recalculated the regression coefficients. These transformations, as mentioned above, corrected for hetroscedasticity and scaling programs. In the weighted regression negative weights were deleted. This was not a significant problem because only 11 observations were deleted for this reason. Retained observations used in the weighted regression totaled 723.

The weighting process changed the outcome of the regression equation. The regression coefficients, while retaining the same signs (+,-), changed in magnitude. The regression coefficients generated by the weighted regression as compared to the original regression coefficients were:

TABLE 14.--Ionia Model Weighted Regression Coefficients.

Variable		Weighted Regression Coefficients	Original Regression Coefficients
(X_3)	Age	-.0007	-.002
(X_5)	Additional Mobile Home Location	+.39	+.40
(X_6)	Additional Shopping Location	+.17	+.18
(X_7)	Additional Industry Location	+.26	+.26
(X_8)	Zoning	-.09	-.09

The final equation, derived by inserting the weighted regression coefficients was:

$$P(y|x) = .17 - .0007X_3 + .39X_5 + .17X_6 + .26X_7 - .09X_8$$

The weighted regression equation yielded a multiple correlation coefficient (R) of .6049 and a multiple coefficient of determination (R^2) of .3659. The multiple coefficient of determination indicated that slightly more than 36% of the variation in the dependent variable, location of additional housing, was associated with the influence exerted by the five significant independent variables.

Both the R and R^2 of the weighted regression were lower than those of the original regression equation which were .6186 and .3827 respectively. However, this was relatively unimportant in respect to weighted regression. The R and R^2 in weighted regression are not particularly reliable. The important aspect is the prediction of conditional probabilities.

The standard error of estimate (S_{xy}) was .2369. This value was a reduction compared to the S_{xy} from the unweighted regression which was .30028. This indicated the predicted values of the dependent variable lying outside the plane defined by the multiple regression equation. Residuals greater than +1 or -1 S_{xy} represented over-predictions or under-predictions which were not explained at the .10 significance level by the regression equation.

Signs of the regression coefficients were identical to those produced by the first equation. Mobile home location (X_5), shopping location (X_6), and industry location (X_7) were positive. Once again, this indicated that respondents opposed to restrictions on those types of activities were also opposed to restrictions on location of additional housing. Regression coefficients for age (X_3) and zoning (X_8) were negative as before. This showed that the probability of a respondent's favoring unrestricted location, in respect to additional housing, decreased with a person's age and his desire to have zoning controls.

<u>Examples of the Weighted Regression Output</u>.--The dependent variable was in a dichotomous, "dummy," (0-1) format. As indicated previously, this resulted in the generation of probability statements concerning a respondent's attitude toward restrictions or no restrictions on the location of additional housing. The actual output of the weighted regression allowed for the generation of

conditional probability statements concerning the dependent variable. Conditional simply means that the probability statement is conditioned or dependent upon the value of the significant independent variable.

It is possible to illustrate the meaning of the conditional probability statement with two examples.

The dependent variable (X_4) was a quantification of the issue of "restrictions" or "no restrictions" on the location of additional housing within the county. The model was geared to provide the conditional probability of a respondent saying "no restrictions" in respect to this issue. The weighted regression formula, as described before, had the following form and values:

$$P(y|x) = .17 - .0007X_3 \text{ (age)} + .39X_5 \text{ (mobile home location)} + .17X_6 \text{ (shopping location)} + .26X_7 \text{ (industry location)} - .09X_8 \text{ (zoning)}$$

The first example was a situation where a respondent gave the following answers to the questions relating to the independent variables (see Table 15). These values were entered into the weighted multiple regression equation.

$$P(y|x) = .17 - .0007(10) + .39(1) + .17(1) + .26(1) - .09(0)$$
$$P(y|x) = .99$$

The conditional probability of saying "no restrictions" on the location of additional housing within the county was .99. This meant that at the .10 significance level, the probability of saying

TABLE 15.--Theoretical Responses and Resulting Variable Values used in the Ionia Weighted Regression Model to Generate the Greatest Conditional Probability of Saying "No Restrictions" on the Location of Additional Housing.

Independent Variable Number	Variable	Response	Input Value for Regression Equation
X_3	Age	10 years	10
X_5	Mobile Home Location	No Restrictions	1
X_6	Shopping Location	No Restrictions	1
X_7	Industry Location	No Restrictions	1
X_8	Zoning	Never	0

"no restrictions" was approximately 99%, given the above answers that the respondent gave to questions associated with the independent variables.

A second example was represented by the responses in Table 16.

The utilization of the .10 significance level meant that such predictions, based on the relationship of the five significant independent variables and the dependent variable, should be in error no more than 10% of the time. The assignment of the .10 significance level meant that a risk of being wrong in approximately one out of ten cases was accepted.

Given the preceding responses, probability of a respondent desiring "no restrictions" on the location of additional housing within the county was .027 or slightly more than 2%.

TABLE 16.--Theoretical Responses and Resulting Variable Values used in the Ionia Weighted Regression Model to Generate the Smallest Conditional Probability of Saying "No Restrictions" on the Location of Additional Housing.

Independent Variable Number	Variable	Response	Input Value for Regression Equation
X_3	Age	80 years	80
X_5	Mobile Home Location	Restrictions	0
X_6	Shopping Location	Restrictions	0
X_7	Industry Location	Restrictions	0
X_8	Zoning	Now	1

The two preceding examples represented the extremes of the predictive equation output. All other probability statements had values which fell between these two extreme values (Refer to Table 17).

The predictive equation made it possible to estimate probability of a person desiring "no restrictions" on location of additional housing within the county if data on the other five significant variables were available. The .10 significance level meant that such outcomes should be due to chance in approximately only 10% of the cases. In approximately 90% of the cases, the predicted probabilities should be due to the relationship between the five significant independent variables and the dependent variable. The predicted probabilities should be in error no more than 10% of the

TABLE 17.--P(y|x) The Conditional Probability of Saying "No Restrictions" on the Location of Additional Housing in Ionia County (Variable #4).

Variable	Variable Values							
#5[a]	1	1	1	1	0	0	0	0
#6[b]	1	1	1	0	0	0	1	0
#7[c]	1	1	0	0	0	0	1	1
#8[d]	1	0	0	0	0	1	1	1
Age								
10	.901	.987	.722	.553	.159	.074(1)	.507	.339
20	.894	.980(5)	.715	.547(5)	.153(12)	.067(95)	.500(1)	.332(5)
30	.888	.973(2)	.708(2)	.540(7)	.146(14)	.060(116)	.494	.325(3)
40	.881(1)	.967(6)	.702	.533(2)	.139(14)	.054(102)	.487(4)	.318(5)
50	.874	.960(4)	.695(1)	.527(5)	.132(13)	.047(91)	.480(1)	.312(7)
60	.868(3)	.953(2)	.688	.520	.126(9)	.040(69)	.474(1)	.305(2)
70	.861	.946(1)	.682	.513(2)	.119(2)	.034(20)	.467	.298
80	.854(1)	.940	.675	.506	.112(1)	.027(4)	.460	.292(1)

TABLE 17.--Continued.

Variable	Variable Values							
#5[a]	1	1	1	1	0	0	0	0
#6[b]	0	1	0	0	1	0	1	1
#7[c]	1	0	0	1	0	1	1	0
#8[d]	1	1	1	0	1	0	0	0
Age								
10	.733(1)	.636	.468(1)	.818	.242	.424	.593	.328
20	.726(4)	.630(1)	.461(16)	.811(1)	.236(4)	.417	.586	.321
30	.719	.623(3)	.454(9)	.805(3)	.229(4)	.411(2)	.579	.314
40	.713(1)	.616	.448(9)	.798(4)	.222(2)	.404(3)	.572(1)	.308
50	.706(1)	.610	.441(5)	.791(1)	.215	.397	.566	.301
60	.699	.603(1)	.434(4)	.785(1)	.209	.391(2)	.559	.294(1)
70	.692	.596(1)	.428	.778(1)	.202(3)	.384(1)	.552(1)	.288
80	.686	.589	.421(1)	.771	.195	.377	.546	.281

[a]Variable #5: Location of Mobile Homes 1 = No Restrictions, 0 = Restrictions on Location

[b]Variable #6: Location of Shopping 1 = No Restrictions, 0 = Restrictions on Location

[c]Variable #7: Location of Industry 1 = No Restrictions, 0 = Restrictions on Location

[d]Variable #8: Response to Zoning 1 = Now or Later, 0 = Never

NOTE: Ionia County Final Model Number I - Weighted Regression $P(y|x) = .16593795 - .00067014$ (Age) $= .39407781$ (Mobile Homes) $+ .16853950$ (Shopping) $+ .2648373$ (Industry) $- .08547651$ (Zoning). Numbers in Parenthesis represent the number of responses for the age grouping.

time. A risk of being in error in approximately one case out of ten was accepted.

It should be realized, however, that not all the cells in the predictive table contained observations (refer to Table 17). The values, probability statements, for the cells which did not contain observations were extrapolated through use of the regression equation.

The Dummy Variable Technique

The primary prerequisite for using a dummy variable is a set of observations which can be logically divided into a set of mutually exclusive classes.[1] "To each class is assigned a dummy variable, D_j, with a value of one (1) if an observation falls within the class and a value of zero (0) if the observation does not fall within the class ($D_{ij} = 1$ if observation i falls in class j and $D_{ij} = 0$ if observation i does not fall in class j)."[2] This results in the following equation for the case of a dependent variable y, regressed on one independent variable X:

$$y = a + bx + u \qquad (1)$$

Where: a is the intercept term
b is the slope coefficient
u is the error term
x is the dummy variable (D_{ij}) with a value of 0 or 1.

---

[1] F. Larry Leistritz, The Use of Dummy Variables in Regression Analysis, Ag. Econ. Misc. Report No. 13 (Technical) Department of Agricultural Economics, Agricultural Experiment Station, North Dakota State University, Fargo, North Dakota, August 1973, p. 1.

[2] Ibid., p. 2.

With two classes of observations, in which the observations of the two classes are pooled, dummy variables may be used in the equation to provide estimates of class effects in the following manner:

$$y = a_o + a_1 D_1 + a_2 D_2 + bx + u \qquad (2)$$

Where: D_1 = 1 if observation falls in class 1; 0 if in class 2
D_2 = 1 if observation falls in class 2; 0 if in class 1

This equation cannot be estimated because of singularity in the moments matrix. Constraints must be imposed before determinate estimates of the parameters can be obtained.

> The use of dummy variables requires the imposition of additional constraints on the parameters of regression equations if determinate estimates are to be obtained. Among the possible constraints the most useful are (a) to set the constant term of the equation to zero, or (b) to omit one of the dummy variables from the equation. In working with a single system of classes either constraint can be used, and results from the application of one are readily derived from those obtained from the other. If several systems of classes are involved the best procedure is to delete one dummy variable from each system.[1]

By setting one of the $a_j = 0$, it is just necessary to arbitrarily drop one of the dummy variables and the equation becomes:

$$y = a_o + a_2 D_2 + bx + u \qquad (3)$$

if a_1 is set to equal 0.

---

[1]Robert E. Sweeney and Edwin F. Ulveling, "A Transformation for Simplifying the Interpretation of Coefficients of Binary Variables in Regression Analysis," <u>The American Statistician</u>, Vol. 26, No. 5 (December 1972), p. 30.

Now the equation can be estimated with either moments about the means (corrected sums of squares) or moments about zero (raw sums of squares). In the equation a_0 is the intercept term for observations of class 1 and $(a_0 + a_2)$ is the intercept term for observations of class 2.

This concept is best illustrated by the illustration in Figure 2.

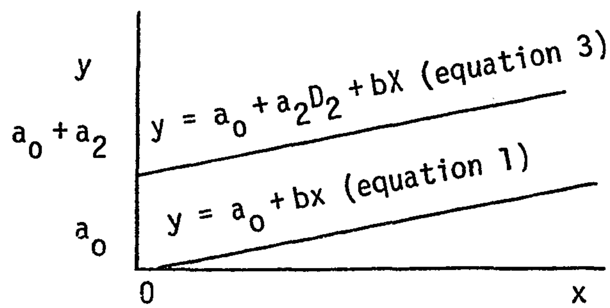

Figure 2.--Regression Slopes Illustrating the Effect of the Deletion of a Single Class in a Dichotomous Dummy Variable System.

This results in the coefficients estimated for each class measuring the net effect of membership in the deleted class. The slope is implicitly assumed to be the same for all classes. The difference between the intercepts measures the effect of membership in the deleted class.

As an example, it was possible to conceive of a regression equation utilizing two systems of dichotomous dummy variables and a single continuous variable. The equation would be as follows:

$$y = a_0 + a_1S_1 + a_2R_1 + bX + u \tag{4}$$

Where: S = sex: 1 if male (class one), 0 if female (class two)
R = race: 1 if white (class one), 0 if non-white (class two)
X = age in years: continuous variable

If a_1 was set to 0 then the resulting equation becomes:

$$y = a_o + a_2R_1 + bX + u \qquad (5)$$

The equation may be solved, resulting in the following values which may be graphed.

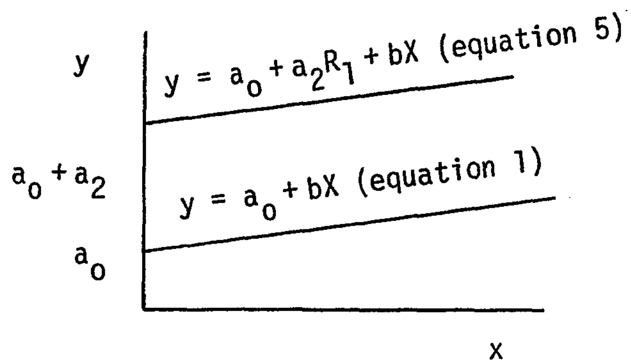

Figure 3.--Regression Slopes Illustrating the Effect of the Deletion of a Single Class of a Dichotomous Dummy Variable System when used in Conjunction with a Continuous Variable.

The difference between the intercepts $[(a_o + a_2) = a_o]$ gives a value for a_1 (sex) which was set at 0. Coefficients estimated for each class measure net effect of membership in each class. This method is applicable to any number of dichotomous dummy variables. However, "if the model contains several systems of dummy variables, each with a single deleted class, the interpretation of the numerous coefficients is likely to be confusing."[1]

[1] Ibid., p. 30.

Major problems arise when dummy variables are utilized in some thing other than dichotomous form. As an example it is possible to consider a regression equation utilizing three systems of dummy variables with two, three, and four classes respectively and a single continuous variable.

Where: S_1 = Male
S_2 = Female
L_1 = Location (town)
L_2 = Location (farm)
L_3 = Location (suburban)
I_1 = Income (class I)
I_2 = Income (class II)
I_3 = Income (class III)
I_4 = Income (class IV)
X = Age (continuous variable)

Deleting one class from each dummy variable system yields the following equation:

$$y = a_o + a_1S_2 + a_2L_2 + a_3L_3 + a_4I_2 + a_5I_3 + a_6I_4 + bX + u \qquad (6)$$

The solution to this equation could then be plotted on a graph. The intercept value would indicate the combined effect of the variables contained in the first class of each dummy variable system.

If it were determined that $S_2 = L_2 = I_2 = 0$, another equation $y = a_o + a_3L_3 + a_5I_3 + a_6I_4 + bX + u$ (equation 7) could be solved and plotted. This intercept value would illustrate the combined effect of the variables contained in the second class of each dummy variable system. The difference in the intercepts of the two

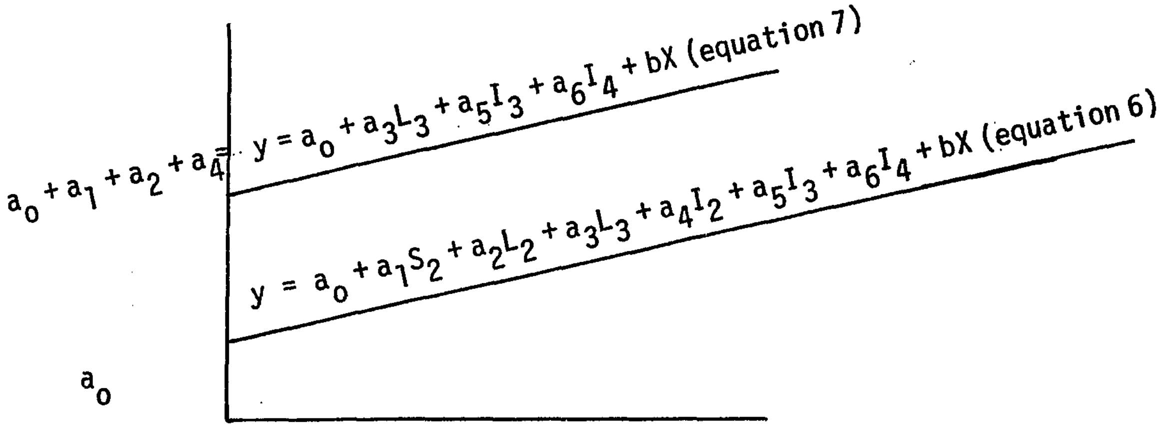

Figure 4.--Regression Slopes Illustrating the Effect of the Deletion of a Single Class of Dummy Variable from a Multi-Classed Dummy Variable System.

equations would measure the net effect of all the class one variables in each dummy system. Individual equations could be solved which would generate intercepts for the equation with successive classes of variables removed for each dummy variable system.

A major problem is that effects of a single variable cannot be measured. Differences between intercept values is the combined effect of a number of variables. Thus, one term is actually a composite of the effects of several variables.

Sweeney and Ulveling recommended a method to overcome problems related to measuring effects of deleted classes of dummy variables if more than one system was used in an equation.[1] The method involved transformation of binary variable coefficients to

[1]Ibid., p. 31.

simplify their interpretation in problems involving several dummy variables. However, when equations included both dummy variables and conventionally scaled independent variables, an additional adjustment was required to insure that the intercept parameter would equal the sample mean of the dependent variable. The process was rather complicated and involved, so an alternative method to cope with the problems created by multiple systems of dummy variables was sought.

A technique for utilizing dummy variables which were in a non-dichotomous form had been developed by Chappelle.[1] The technique was relatively simple and eliminated the problem of combined net effects of variables.

The basis of the method was the generation of matrices for dummy variables which allowed inter-dependent comparisons within dummy variable systems. Since inter-dependent comparisons were possible, the influence of individual dummy variables could be measured in all cases. This eliminated the problem of combined variable effects.

It was possible to demonstrate the technique by an example which was actually used in the study. Marital status was one of the socio-economic characteristics which was under consideration and utilized as a dummy variable. There were three classes within the single dummy variable system; single, married and divorced. The matrix which was generated was as seen in Figure 5.

---

[1]Daniel E. Chappelle, Financial Maturity of Eastern White Pine in New York State, Syracuse University, 1966, p. 35.

	X_1	X_2
Single	+1	+1
Married	-1	+1
Divorced	0	-2

Figure 5.--Example of a Multi-Classed Dummy Variable System Matrix.

The numbering system within the individual matrices was arbitrary. The only restriction was that the columns sum to zero and the row totals sum to zero.

The matrix formation process created two variables for a dummy variable with three classes.

A regression equation which utilized the numbers created by the matrix was:

$$y = a + b_1X_1 + b_2X_2 + b_3X_3$$

Where: X_1 = [1(single) - 1(married)]
X_2 = [1(single) + 1(married) - 2(divorced)]
X_3 = continuous variable (to set slope of regression line)

The equation then became:

$$y = a + b_1(\text{single-married}) + b_2(\text{single + married} - 2\text{ divorced}) + b_3X_3$$

Individual equations were then derived which indicated intercept of the regression line with the y axis for single, married and divorced individuals. These equations utilized the regression coefficients which were generated from the original equation. They were:

$$\text{(single)} \quad y = (a + b_1 + b_2) + b_3X_3$$
$$\text{(married)} \quad y = (a - b_1 + b_2) + b_3X_3$$
$$\text{(divorced)} \quad y = (a - 2b_2) + b_3X_3$$

When these regression lines were graphed, the difference in the intercept values was the measure of the influence exerted by the variable under investigation.

The entire technique was best illustrated by assuming hypothetical regression coefficient values and inserting them in the appropriate equation. For the sake of illustration it was assumed that:

$$a = 5$$
$$b_1 = 2$$
$$b_2 = 3$$

These values, inserted into the appropriate equations yielded the following intercept values.

$$\text{(single)} \quad y = a + b_1 + b_2 + b_3X_3 \qquad (1)$$
$$y = 5 + 2 + 3 + b_3X_3$$
$$y = 10 + b_3X_3$$
$$\text{(married)} \quad y = a - b_1 + b_2 + b_3X_3 \qquad (2)$$
$$y = 5 - 2 + 3 + b_3X_3$$
$$y = 6 + b_3X_3$$

$$(\text{divorced})\ y = a - 2b_2 + b_3X_3 \qquad (3)$$

$$y = 5 - 6 + b_3X_3$$

$$y = -1 + b_3X_3$$

When the values were plotted the difference in the intercepts of the regression lines could be noted (see Figure 6).

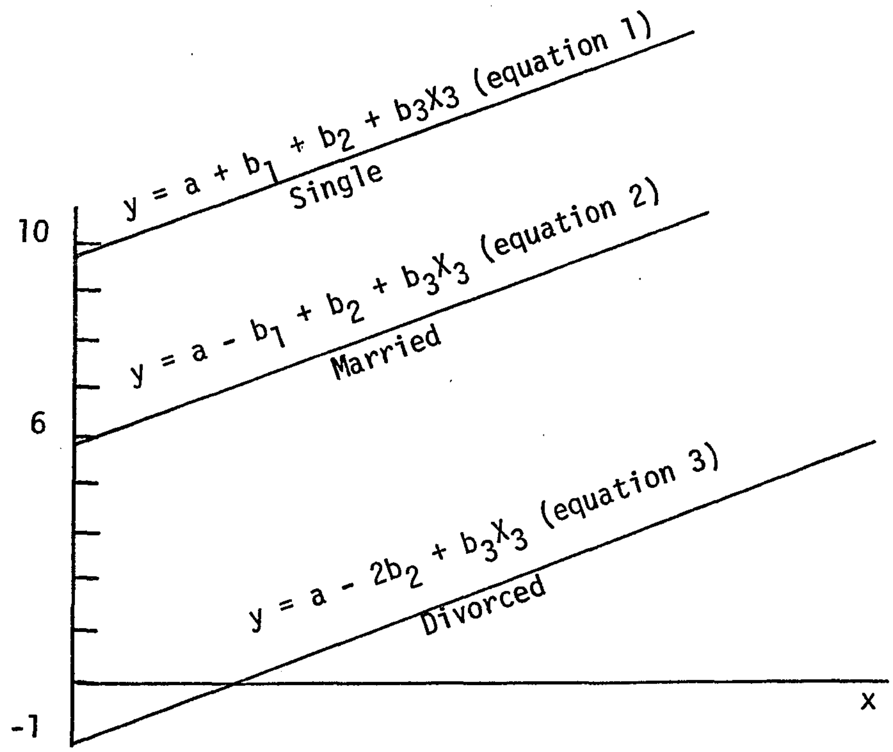

Figure 6.--Regression Slopes Resulting from Utilization of Multi-Classed Dummy Variable System Matrices.

The differences in intercepts indicated the influence exerted by each class of the dummy variable. All three classes were illustrated and the results were easy to analyze. This technique was applicable to regression equations with multiple systems of dummy variables. Combined effects of variables were accounted for by this procedure. Through this technique, the effects of individual variables could be recognized and the regression equations solved by utilizing the values generated by the matrices.

The utilization of the dummy variable technique resulted in modification of intercepts of regression lines. The differences in intercepts provided an indication of the influence exerted by the classes of the dummy variables. It should be noted that interactions between b_3, the coefficient of the continuous variable used to set the slope of the regressed line, and the dummy variable coefficients are also possible. The use of interactions would further increase the explanatory power of the regression equation.

The use of the dummy variable technique is not mandatory. If sufficient data existed, individual equations could be created for the various classes represented by the dummy variables. However, the dummy variable technique greatly reduces the number of equations which would have to be created and run to achieve the same end result. In this respect the dummy variable technique represents a significant savings in both time and funds. The development of the dummy variable technique enabled the analysis phase of the study to be conducted in a more concise manner.

Thumb Area Data Collection

Instrument Design

A questionnaire was designed during the conduct of the previously mentioned Ionia Study. This questionnaire proved to be inadequate for collecting socio-economic data that would permit quantification of relationships between individual characteristics and opinions pertaining to land use control measures and issues. The major problems encountered did not lie in the basic questionnaire design, rather they resulted because of the previously mentioned information gathering restrictions imposed by the Ionia County Board of Commissioners. However, many portions of the Ionia Questionnaire proved to be both useful and relevant. Because of this, the Ionia Questionnaire was used as a basis or starting point for the design of the Thumb Area Questionnaire.[1]

The new questionnaire incorporated the best aspects of the Ionia Project Questionnaire and provided for the gathering of additional pertinent socio-economic data.[2] The additional socio-economic data which was gathered related directly to the hypotheses which were enumerated in the preceding chapter. Additional questions were included which related to the respondent's income, education, group participation, satisfaction with governmental response to issues, and political party affiliation. The specific questions were designed to support the contentions which were primarily suggested during the process of literature review.

There were many questions included in the questionnaire which were not relevant to this study. This was because the

[1]A copy of the Ionia Project Questionnaire is found on pages 238-241 of the Appendix.

[2]A copy of the Thumb Area Questionnaire is found on pages 242-247 of the Appendix.

total questionnaire reflected a joint effort: this study and an Office of Economic Opportunity study, which were being conducted in the Thumb Area concurrently. However, all questions which were considered pertinent to the conduct of this study were contained in the questionnaire.

The questionnaire was subjected to several revisions before the final form evolved. It was reviewed by several faculty members in the Departments of Resource Development, Agricultural Economics, and Sociology. It was hoped that the joint approach to questionnaire design, incorporating differing perspectives, avoided inclusion of serious technical and conceptual errors.

The questionnaire was divided into eight major sections. The first section posed questions regarding future county and local population growth and population control policies. The second section consisted of questions pertaining to land use planning and control measures, related governmental policies, and specific references to major physical characteristics of the study area (lakeshore lands and farmlands). The third and fourth sections contained questions regarding the development and control of local and county industrial and commercial enterprises. The fifth section dealt with questions relating to local and county residential development and control. The sixth section was on recreational needs and tourism. The seventh section of the questionnaire consisted of a number of questions which would provide information on the respondents' individual socio-economic characteristics. This final section of the questionnaire posed two open-ended questions regarding opinions on past and future change in the study area. Most data used in this study were generated from: section two, questions relating to land use planning and control measures; and section seven, individual respondents' socio-economic characteristics.

Questionnaire Pretest

The adequacy of the questionnaire to provide the required information was best tested in a real world situation. Therefore, the questionnaire was pre-tested under actual mailing conditions. Fortunately, a situation arose through which the questionnaire could be tested under realistic conditions.

A land use research effort was being conducted in Bunker Hill Township, Ingham County, Michigan, which required substantially the same information as was being sought for the Thumb Area Study. Therefore, it was possible, with slight modifications, to utilize and test the Thumb Area questionnaire in Bunker Hill Township.[1] The test location provided a context somewhat similar to the Thumb Area, a rural area being subjected to the emerging pressures of a metropolitan area. Bunker Hill Township was in relatively close proximity to the Lansing urbanized area, and subjected to the increasing pressures of urbanization.

The purpose of the pre-test was twofold: (1) To test various aspects of the questionnaire design; and (2) to test three different mailing techniques.

---

[1]A copy of the Bunker Hill Questionnaire is found on pages 248-255 of the Appendix.

Testing of questionnaire design was limited to observing if there were specific problems in the wording of individual questions and if the questionnaire was too lengthy. Judgments on these aspects were made based on observations of return rates, and levels of non-response and "Don't Know" responses to individual questions.

The three different mailing techniques which were tested were: (1) A post card sent to potential respondents asking them if they would be willing to participate in the survey, (2) A mailed notification that the individual had been selected to participate in the survey, and (3) A mailing of the questionnaire with no prior notification. From the response rates of the three mailing techniques it was possible to judge which was the most appropriate technique for the Thumb Area survey.

A random sample of 300 Bunker Hill Township residents was selected to receive the questionnaire. The sample was drawn from the township's tax rolls. While this method of enumerating the sampling universe differed from the technique used in the Thumb Area, in the respect that only property owners were sampled, it still provided a population by which to test the logic and mechanics of the questionnaire.

Mr. James E. Mulvany, Ingham County Extension Director, agreed to lend his support in the pre-test situation in Bunker Hill Township. Not only did he review the questionnaire, but he was very helpful in offering suggestions for the questionnaire's improvement, and wrote several cover letters to add additional credence to the survey.[1]

On November 9, 1973, a letter and return post card were mailed to 150 property owners which were selected in the sampling process. The letter indicated that the recipient had been selected to participate in the survey. The post card was to be returned indicating whether or not the person chose to participate in the survey.[2] This procedure of forewarning a potential respondent that he was about to receive a questionnaire, and asking if he was willing to participate in the survey, was intended to test the first of the three mailing procedures which were previously outlined.

On November 27, 1973, a letter was sent informing another 75 persons that they had been selected to receive the questionnaire.[3] This procedure was intended to evaluate the potential success of the second mailing technique, forewarning but no chance for the recipient to indicate his willingness to participate. The remaining 75 persons, of the sample of 300, were to be mailed questionnaires with no prior notification.

Thus, of the total sample of 300 persons who were selected to receive the questionnaire, 225 were forewarned that they would

---

[1] Copies of Mr. Mulvany's cover letters are found on pages 256-257 of the Appendix.

[2] Copies of the letter and post card are found on page 258 of the Appendix.

[3] A copy of the letter is found on page 260 of the Appendix.

be receiving the questionnaire. The return rates from the three different mailing techniques were compared to see if the forewarning process influenced return rates. Before the mailing of the questionnaire occurred, post card returns from the group which was given the option of participating in the survey revealed that only 35 of the original 150 chose to participate.

The actual mailing of the Bunker Hill Township questionnaires occurred during the last week of November, 1973. The return rates associated with the three different mailing techniques were as indicated in Table 18.

The total response rate was 62 questionnaires returned of the 185 which were originally sent. This was a response rate slightly in excess of 33%. The highest response rate was associated with the pre-committed group, approximately 66%. However, this was only in respect to the persons who indicated they would be willing to participate in the survey. When the original sample size of this group was considered, 150 persons, the 23 returns only represented 15.3% of the original sample.

The forewarned group returned 20 (26.7%) of the 75 questionnaires which were mailed. This percent was greater than the percentage of persons who expressed a willingness to participate when given the option.

Of the persons who were not forewarned and simply received a questionnaire, 15 (20.0%) of the 75 questionnaires were returned.

Based on the return rates and mailing expenses, a decision was made regarding the mailing technique to be utilized in the

TABLE 18.--Return Rates Associated with the Bunker Hill Pretest.

	Number Sent	Number Returned	% Returned
Questionnaires returned by persons who made a precommitment by returning post cards (35 out of 150)	35	23	65.7
Questionnaires returned by people who were forewarned before receiving a questionnaire	75	20	26.7
Questionnaires returned by people who were not forewarned or who did not make a precommitment	75	15	20.0
Questionnaires which could not be categorized because of the absence of code number	--	2	--
Total	185	62	33.5

Thumb Area Study. The method of providing a person selected during the sampling process to decide whether or not he chose to participate was ruled out for the following reasons:

1. The method involved four mailings; (1) the letter discussing the project and participation choice, (2) the return of the post card expressing the willingness or lack of interest in participation, (3) the mailing of the questionnaire, and (4) the return of the questionnaire.

2. The method required that records be kept regarding who chose to participate and who did not. This added an additional element to complexity and potential confusion.

3. The time required between the original and subsequent mailings. Questionnaire mailings could only occur after the participation post cards were returned.

4. The size of the group of persons who indicated they chose to participate (23.3%) was quite small when compared to the original sampling frame.

The return rate involving the employment of the other two methods, forewarning and not forewarning, were not substantially different from each other. The forewarned group returned 26.7% of the questionnaires while the group which was simply mailed the questionnaire had a return rate of 20.0%. It was thought that additional mailing expenses which would be incurred by utilizing the forewarning process would not be justified by the slightly increased return rate. Therefore, the decision was made to simply mail the questionnaire to the Thumb Area sample population without any forewarning.

In respect to actual instrument design, there did not seem to be any major problems. Length of the questionnaire seemed acceptable and questions appeared to be unambigious. Since no significant non-response patterns were evident it was assumed that no major questionnaire modification was necessary. However, to substantiate this contention, a limited follow-up survey of non-respondents was conducted.

Because of limitations on both time and funds, only 15 non-respondents were randomly selected. An abbreviated survey form was used for the personal interviews. The non-respondent interview substantiated the fact that there were no major problems with either the logic or design of the questionnaire.

The Bunker Hill pre-test had allowed for an actual check on the questionnaire construction and had generated results which made the selection of an appropriate mailing technique possible. This pre-testing process set the stage for the actual conduct of the Thumb Area survey.

Sampling Procedures

The sampling frame for the study was a telephone list of the region obtained from telephone directories. This data source was chosen for several reasons. The various telephone companies serving the study area indicated that between 90-95% of the area's households had telephone service. While this did not represent a total census of households, it was a more complete listing of households than either property tax rolls or voter registration lists would have been. Telephone listings were more complete in that they included both owners and non-owners of property, and voters and non-voters.

Since residential telephones were an indication of households, the individual sampling unit in the study area was the household. While it is true that some households have more than one telephone and some do not have telephones, it was felt that telephone listings provided a relatively error free enumeration of households in the study area.

Questionnaires were mailed to the person listed in the telephone directory. It was assumed that the person listed in the directory was the head of the household. The opinions expressed by the person completing the questionnaire were viewed as being more or less representative of the entire family. Past research revealed that wives and children within a household vote in a manner very similar to the husband or head of the household.[1]

The actual sample of Thumb Area residents was drawn from the telephone directories which covered the three county study area. A systematic random sample of names was drawn for each county. The sample size for each county was determined by using a formula for calculating the confidence interval of a dichotomous variable and solving for n, the sample size.[2] This approach was justified in that the majority of the questions in the questionnaire presented dichotomous (yes-no) choices.

Through the use of the formula, the calculated sample sizes necessary for a confidence level of 90% and a significance level of 10% (± 5%) were as shown in Table 19.

TABLE 19.--Mailed Questionnaire Survey Sample Size for Huron, Sanilac, and Tuscola Counties.

Huron County	=	265 Households
Sanilac County	=	265 Households
Tuscola County	=	267 Households
Total		797 Households

[1]H. H. Remmers, "Early Socialization of Attitudes," Chapter 2 in American Voting Behavior, ed. by Eugene Burdick and Arthur J. Brodbeck (Glencoe, Illinois: The Free Press, 1959), p. 57; Kurt Lang and Gladys Engel Lang, "The Mass Media and Voting," Chapter 12 in American Voting Behavior, ed. by Eugene Burdick and Arthur J. Brodbeck (Glencoe, Illinois: The Free Press, 1959), p. 228.

[2]The calculation of the samples sizes are found on pages 262-264 of the Appendix.

The total sample response required was 797 returns. Based on the results of the Ionia Project and the pre-test, it was estimated that the survey response rate would be approximately 25%. Therefore, calculated sample size for each county was multiplied by four to determine the number of questionnaires to be mailed. This meant that a total of 3,188 questionnaires were needed if a response rate of 25% was assumed.

During the summer of 1973 the random sampling process of selecting names from the telephone directories was completed. Approximately every tenth name was selected in the random sampling process. Telephone listings which were obviously not private households were eliminated from the sampling frame.

A sample of 3,258 households was created. In addition, a sample of 318 elected and appointed officials and opinion leaders was also created. These officials and leaders were included because such data were pertinent to the O.E.O. study which was being conducted simultaneously. The data was to be used to evaluate if there was a difference between elected and appointed officials and opinion leaders and citizens at large in respect to various developmental issues. These officials and opinion leaders were included in this study because they were also members of the voting public and therefore valid subjects for this study.

The sample of elected and appointed officials and opinion leaders was created from a list of these individuals obtained from the East Central Michigan Planning and Development Office. The listing provided contained 249 of the approximately 593 county and local office holders. The listing represented a census of county commissioners and clerks, township supervisors and clerks, and city mayors and village presidents and clerks. Minor officials, such as school board members, were not contained in the listing. The sample of elected and appointed officials consisted of the following:[1]

TABLE 20.--Sample Size of Elected and Appointed Officials and Opinion Leaders for Huron, Sanilac and Tuscola Counties.

All county commissioners and clerks	25
All township supervisors and clerks	154
All city mayors and village presidents and clerks	70
Total sample	249

The sample of 249 represented 42% of the total number of elected and appointed officials in the study area.

Also, a number of those persons classified as opinion leaders was also contained in the listing which was provided. Members of this group included planning commission members, Co-operative Extension Service Directors, newspaper editors and radio station news directors. The total number of persons classified as opinion leaders in the study area was not known. The total listing of 69 identified opinion leaders was used as a sample which was hoped to be representative.

[1]The listings of these officials were obtained from the East Central Michigan Planning and Development Office.

Thus, a total sample of 3,576 persons was created, subdivided in the following manner:

TABLE 21.--Total Sample Utilized in the Thumb Area Study Mailed Survey.

Private Citizens	3,258	
Elected and Appointed Officials	249	
Opinion Leaders	69	
Total Sample	3,576	Individuals

Questionnaire Mailing

On April 15, 1974 questionnaires were mailed to all persons selected for the sample. Identical questionnaires were mailed to both the citizen sample and the elected official/opinion leader sample. In total, as noted above, 3,576 questionnaires were sent during the initial mailing. Enclosed with each questionnaire was a cover letter, a request form for a summary of the findings, and a postpaid return envelope.[1]

To stimulate returns, a post card reminder was mailed on April 30, 1974 to every one sent a questionnaire.[2] This occurred approximately one week after the initial mailing. It was intended that the post card would arrive about 3 to 4 days after the

[1]Copies of the cover letter and summary request form are found on pages 265-266 of the Appendix.

[2]A copy of the post card reminder is found on page 266 of the Appendix.

questionnaire. Hopefully, the post card would prompt those who had not completed and returned the questionnaire to do so.

Since the questionnaires were numbered and keyed to individuals sampled, it was possible to identify non-respondents. A second copy of the questionnaire and cover letter with an additional note were mailed to non-respondents on May 13, 1974, approximately two weeks after the initial questionnaire mailing.[1]

Cut-off date for the acceptance of the returned questionnaires was approximately one month after the last mailing, the first week of July, 1974. Past research had shown that minimal return rates are evident approximately three weeks after a mailing.[2]

Response Rates

By the cut-off date, the first week of July, 1974, a total of 1,537 questionnaires had been returned. This represented a return rate of approximately 43% of the sample of 3,576. However, 107 of the returned questionnaires were unusable for a variety of reasons, such as: questionnaires which were totally blank; relatively incomplete; questionnaires with the identification number removed; and questionnaires completed by persons living outside the study area.

---

[1]A copy of the additional note is found on page 267 of the Appendix.

[2]James A. Christenson, "A Procedure for Conducting Mail Surveys with the General Public," Paper presented at the Annual Meeting of the Community Development Society, Wilmington, North Carolina, August 7, 1974.

The returned questionnaires were from the following sources:

TABLE 22.--Returned Thumb Area Questionnaires by Source.

	Number of Returned Questionnaires		
County	Citizen	Leader	County Total
Huron	421	69	490
Sanilac	396	67	463
Tuscola	417	60	477
Total	1,234	196	1,430

In respect to county totals, the returned questionnaires exceeded in all cases the number which was calculated as being necessary for the given level of statistical significance.

Non-Respondent Check

Following the cut-off date for the acceptance of returned questionnaires, a non-respondent check was conducted to determine how representative mailed returns were of the overall sample, including the non-respondents. If the distribution of responses for the returned questionnaires and the non-respondent check were similar, it could be assumed with relative confidence that both samples came from the same population. However, if the two sets of responses differed, a bias in the mailed questionnaires would be suspected.

During the period of August 20, 1974 to September 3, 1974 a telephone survey was taken of a sample of the non-respondents.

Size of the non-respondent sample was determined by using the same formula as was used to determine the mail survey sample size, with the total number of non-respondents as the population from which to calculate sample size. The required sample size was 114 persons. If 114 individuals could be contacted, a maximum confidence interval of $\pm$ 7.5% could be maintained with α = .10.

Selection of non-respondents was accomplished through a simple random sample of names from the list of individuals who did not return a questionnaire. A table of random numbers was used for the selection of each name.

Selected non-respondents were contacted by phone during the hours of 7:00 PM to 10:00 PM on weekdays excepting Fridays.

Of the first 114 names randomly chosen, efforts made to contact the households yielded the following results:

TABLE 23.--Results of the Initial Thumb Area Study Non-Respondent Telephone Survey.

Interviews completed	75
Interviews refused	8
Wrong number, no new number, or disconnected number	20
No answer on three separate occasions	11
Total	114

In order to obtain at least 114 completed non-respondent interviews, 74 additional names were drawn at random from the list of non-respondents. The efforts to contact these households was as follows:

TABLE 24.--Results of the Second Thumb Area Study Non-Respondent Telephone Survey.

Interviews completed	39
Interviews refused	12
Wrong number, no new number, or disconnected number	8
No answer on three separate occasions	15
Total	74

The two samples of non-respondents consisted of exactly 114 persons.

A set of 12 questions from the survey questionnaires were asked of each non-respondent. These were as follows:

Question A.1.a
What would you like to see happen to the population of your county over the next 5 years?

Question B.3
What do you think of the idea of having a general overall public plan for the future uses of land?

Question B.7
Do you support the general concept of having ordinances to enforce a land use plan?

Question C.1.a
Should more efforts be made to increase industry within this county?

Question E.1.a.
Do you feel that the addition of more housing would be desirable in your county?

Question F.2.a
Do you feel the growth of tourism in your county would be beneficial?

Question G.1
What is your age?

Question G.2
What is your sex?

Question G.4.a
What is your major full-time occupation?

Question G.9
Do you live _____ in the open country side?
_____ in a built-up area?
_____ in an incorporated village or city?

Question G.15
What is the highest number of years you have completed in school?

Question G.16
What is your approximate yearly total family income?

These questions were selected because they highlighted the key issues contained in the survey and provided a socio-economic profile of the individual non-respondent.

Once the non-respondent interviews were completed, it was possible to compare these responses to the citizen responses obtained from the mail survey. Comparison was made between only the citizen mail responses and the non-respondent telephone interviews. The officials and leaders sample was not included in the comparison because it represented a totally different population.

Comparison between the telephone non-respondent sample response and the citizen mail response was completed by examining percentage differences and evaluating differences using the Chi square test.

Chi square analysis indicated that at the $\alpha = .10$ level there was a significant difference between the non-respondent population answers and the mail survey citizen population answers for eight of the twelve questions asked.[1]

The four questions which exhibited similar distributions of answers were related to ordinances to enforce a land use plan, the increasing of industry within the county, the provision of more housing within the county, and the location of the respondents residence. The residence location response was the only socio-economic question which exhibited a similar response pattern in relation to the two groups. The responses to all other socio-economic questions were shown to be significantly different.

Thus, in terms of the socio-economic characteristics of age, sex, occupation, education, and income the non-respondent and mail survey responses were shown to be significantly different. This meant that the two samples were drawn from what could be considered two different populations. This had to be kept in mind when discussing the validity of the research results. It was obvious that the mail survey returns were biased.

A comparison was made, based on simple percentages, between the socio-economic characteristics of the two groups. It revealed that, in terms of age, there were no extreme differences in the two

---

[1]The calculated chi square statistics are found on pages 268-274 of the Appendix.

groups. There were slightly more non-respondents in the extreme age groups (18-29 years and 70+ years) than occurred in the mail survey sample.

A noticeable difference in sex was evident. There was a much larger proportion of females in the non-respondent group than in the mail survey group. This sex bias was also reflected in the comparison of occupations. Many more housewives were indicated in the non-respondent group. There were also fewer non-respondent professionals and managers than occurred in the mail survey group.

In general, the non-respondent group was apparently less educated than the mail survey group. Fewer of the non-respondents had college education or vocational training.

The non-respondents also exhibited a pattern of lower income. A far smaller number of the non-respondents had incomes in the $15,000+ bracket than did the mail survey group.

Data Preparation

After the termination date for the acceptance of returned questionnaires, data were coded and recorded on coding sheets.[1] A total of 1,430 usable returns were coded and key punched. Key punched date cards represented a master deck of all usable information generated through the Thumb Area mail survey.

Not all data contained in the questionnaires were useful to the research being conducted in this study. Because of this,

---

[1] A copy of the coding format is found on pages 275-303 of the Appendix.

data cards were sorted on the basis of questions pertinent to the study. Only data sets which were complete in terms of all items being sorted were retained for inclusion in the study. These criteria for selection were utilized because the method of analysis would have been adversely affected by missing values.

Sorts of the data cards were made on the basis of the questions shown in Table 25.

The selection process of pertinent variables resulted in 35 of the original 104 data items being retained for the study. Elimination of incomplete data sets resulted in 805 of the original 1,430 observations being retained. Therefore, 625 observations were eliminated because of missing data.

Data Transformation

The data, for use in multiple regression, could not be used in its original form. Transformations were necessary to generate dummy variable values used to fit the regression equations. Matrices of comparison variables were created and the transformation process assigned new variable values to them.[1]

Variables and their assigned numbers were as shown in Table 26.

Along with the variables created by the transformations, other variables were generated through the collection of additional data from secondary sources. The additional variables were related

---

[1]A coding format for the transformed variables is found on pages 304-328 of the Appendix.

TABLE 25.--Initial Data Sort of the Thumb Area Study Data.

Question Number	General Question Subject	Original Variable Number
	Questionnaire Identification Number	X_1
B.3.	Lans Use Planning Response	X_9
B.7.	Ordinances to Enforce Land Use Plan Response	X_{13}
B.8.	Zoning Response	X_{14}
G.1.	Age	X_{51}
G.2.	Sex	X_{52}
G.3.	Marital Status	X_{53}
G.4.a.	Occupation	X_{54}
G.4.b.	Second Occupation	X_{55}
G.4.c.	Father's Occupation	X_{56}
G.5.a.	Fraternal Organization Participation	X_{57}
G.5.b.	Service Organization Participation	X_{59}
G.5.c.	Farm Organization Participation	X_{61}
G.5.d.	Formal Social or Recreational Organization Participation	X_{63}
G.5.e.	Union Organization Participation	X_{65}
G.5.f.	Professional Organization Participation	X_{67}
G.5.g.	Political Organization Participation	X_{69}
G.5.h.	Other Group Participation	X_{71}
	Total Organization Membership	X_{73}

TABLE 25.--Continued.

Question Number	General Question Subject	Original Variable Number
G.6.b.	Political Party Identification	X_{75}
G.6.d.	Voting in County Elections	X_{77}
G.6.e.	Voting in Local Elections	X_{78}
G.6.f.	Voting Participation	X_{79}
G.7.a.	Response of County Governmental Officials	X_{80}
G.7.b.	Response of Local Governmental Officials	X_{81}
G.8.a.	County of Residence	X_{82}
G.9.	Residence Location	X_{84}
G.10.a.	Years Lived in Local Community	X_{85}
G.10.a.	Years Lived in the County	X_{86}
	Total Family Size	X_{93}
G.13.	Home Ownership	X_{94}
G.14.	Property Owned or Buying	X_{95}
G.14.	Property Rented or Leased	X_{96}
G.15.	Education	X_{97}
G.16.	Family Income	X_{98}

TABLE 26.--New Variable Numbers Assigned to the Thumb Area Study Data.

New Variable Number	Variable
X_1	Questionnaire Identification Number
X_2	Land Use Planning Response
X_3	Ordinances to Enforce Land Use Plan Response
X_4	Zoning Response
X_5	Age
X_6	Sex
X_7-X_8	Marital Status
X_9-X_{17}	Occupation
X_{18}-X_{27}	Second Occupation
X_{28}-X_{37}	Father's Occupation
X_{38}	Fraternal Organization Participation
X_{39}	Service Organization Participation
X_{40}	Farm Organization Participation
X_{41}	Formal Social or Recreational Organization Participation
X_{42}	Union Organization Participation
X_{43}	Professional Organization Participation
X_{44}	Political Organization Participation
X_{45}	Other Group Participation
X_{46}	Total Organization Membership

TABLE 26.--Continued.

New Variable Number	Variable
X_{47}-X_{50}	Political Party Identification
X_{51}	Voting in County Elections
X_{52}	Voting in Local Elections
X_{53}-X_{55}	General Voting Behavior
X_{56}	Response of County Governmental Officials
X_{57}	Response of Local Governmental Officials
X_{58}-X_{59}	County of Residence
X_{60}-X_{61}	Residence Location
X_{62}	Years Lived in Local Community
X_{63}	Years Lived in County
X_{64}	Total Family Size
X_{65}	Home Ownership
X_{66}-X_{73}	Property Owned or Buying
X_{74}-X_{81}	Property Leased or Rented
X_{82}-X_{89}	Education
X_{90}-X_{96}	Income

to population and geographic characteristics. These new variables were as shown in Table 27.

TABLE 27.--New Variables Added to the Thumb Area Study Data Set.

New Variable Number	Variable
X_{97}	1970 Minor Civil Division Population
X_{98}	1960 Minor Civil Division Population
X_{99}	1970 Minor Civil Division Population Density
X_{100}	1960 Minor Civil Division Population Density
X_{101}	1960-1970 Minor Civil Division Population Density Change
X_{102}	Minor Civil Division Area--Square Miles
X_{103}	1970 County Population
X_{104}	1960 County Population
X_{105}	1970 County Population Density
X_{106}	1960 County Population Density
X_{107}	1960-1970 County Population Density Change
X_{108}	County Area--Square Miles

As a result of the transformation routine and the addition of new variables, 107 variables, X_2 through X_{108}, were created. 107 variables were used in the analysis of the data. X_1 was simply the questionnaire identification number. Variables X_2 (Land Use Planning Response), X_3 (Ordinances to Enforce A Land Use Plan Response), and

X_4 (Zoning Response) were used as individual dependent variables in separate regression equations. Variables X_5 through X_{108} were the independent variables for the regression equations.

CHAPTER IV

ANALYSIS AND RESULTS

The Initial Model--Land Use Planning

The initial model which was constructed utilized the response to the land use planning question (X_2) as the dependent variable. The dependent variable was coded in a dichotomous fashion with 1 indicating approval of land use planning and 0 indicating opposition to land use planning. The independent variables were all the 106 variables which were listed previously.

The Stepwise Least Squares Regression Routine (LSSTEP) was utilized to estimate a "best" relationship between the dependent variable and the set of independent variables. A significance level of .10 was specified which resulted in the variables having a significance of less than .10 being deleted from the final equation.

The LSSTEP routine yielded a multiple regression equation which retained 19 of the original 106 independent variables. The multiple correlation coefficient (R) was .6437 while the multiple coefficient of determination (R^2) was .4144. Examination of the output of the LSSTEP program resulted in a disturbing discovery. When the partial correlation coefficients were examined it was found that the variable X_3 (response to the ordinances question), when correlated with X_2, (response to the planning question), had a partial correlation coefficient of .59402. This indicated a very high correlation between this independent variable and the dependent variable (X_2). Upon reflection it became clear that the two variables, response to planning and response to the ordinances question, were related in a very obvious manner. In effect, they were more or less measuring the same general concept. This resulted in these two variables being highly collinear with one another. It was obvious that future dependent variables were not to be included as independent variables in the various equations.

Additionally, inspection of the simple correlation matrix revealed that many of the independent variables were either very highly correlated or had virtually no correlation with one another. To reduce the problems associated with singularity it was decided to delete one of each pair of variables which, when correlated with one another, exhibited a correlation of .80 or greater. The variable which was deleted was the one which exhibited the lower correlation with the dependent variable.

Also, it was arbitrarily decided to eliminate all variables which exhibited a correlation coefficient of less than .01 with any of the three dependent variables; X_2 (response to the land use planning question), X_3 (response to the ordinance question), and X_4 (response to the zoning question). This eliminated all independent variables which were virtually uncorrelated with the dependent variables.

This deletion process eliminated 31 of the independent variables. Thus, the number of independent variables which would be used in the succeeding equations was 75 instead of the original 107.

The variables which were deleted were as shown in Table 28.

"LSSTEP" Routine

The reduced data set was subjected to the LSSTEP routine using X_2 (response to the land use planning question) as the dependent variable. A significance level of .10 was specified and the following independent variables were retained as shown in Table 29.

The LSSTEP routine identified the variables which were significant at the .10 level and would be included in the final weighted regression equation.

"RESID" Routine

Using the "RESID" Routine, the residuals $(y-\hat{y})$ for each observation was calculated. These data were compiled in a new Data Deck and used to calculate the weights necessary for the weighted regression.

"CONVERT" Routine

Using the residuals, a weight for each observation was calculated, through the use of the formula:

$$\text{weight} = \frac{1}{y_i(1-\hat{y}_i)}$$

TABLE 28.--Variables Deleted from the Land Use Planning Model.

	Variable	Correlation Coefficients of Deleted Variables
X_3	Ordinances to enforce land use plan	Dependent Variable
X_4	Zoning	Dependent Variable
X_9	Occupation	-.86
X_{11}	Occupation	-.93
X_{13}	Occupation	+.86
X_{14}	Occupation	+.00003
X_{16}	Occupation	-.007
X_{24}	Second occupation	+.004
X_{31}	Father's occupation	-.006
X_{32}	Father's occupation	-.005
X_{37}	Father's occupation	-.001
X_{48}	Political party identification	-.001
X_{55}	General voting behavior	-.91
X_{58}	County of residence	-.004
X_{59}	County of residence	-.009
X_{61}	Residence location	-.87
X_{63}	Years lived in local community	+.00008
X_{64}	Total family size	+.009

TABLE 28.--Continued.

Variable		Correlation Coefficients of Deleted Variables
X_{70}	Property owned or buying	-.90
X_{75}	Property leased or rented	-.90
X_{78}	Property leased or rented	-.97
X_{82}	Education	-.003
X_{87}	Education	-.0008
X_{98}	1960 minor civil division population	-.009
X_{101}	1960-1970 minor civil division population density change	-.002
X_{102}	Minor civil division area--square miles	-.84
X_{103}	1970 county population	+.005
X_{104}	1960 county population	-.005
X_{105}	1970 county population density	-.007
X_{106}	1960 county population density	-.81
X_{107}	1960-1970 county population density change	-.005

TABLE 29.--Variables Retained in the Land Use Planning Model.

Variable	
X_{18}	Second occupation
X_{27}	Second occupation
X_{28}	Father's occupation
X_{30}	Father's occupation
X_{34}	Father's occupation
X_{35}	Father's occupation
X_{36}	Father's occupation
X_{40}	Farm organization participation
X_{44}	Political organization participation
X_{53}	General voting behavior
X_{56}	Response of county government officials
X_{66}	Property owned
X_{74}	Property leased
X_{90}	Income
X_{100}	1960 minor civil division population density

A new Data Deck was created containing weights for each observation.

"SWITCH" Routine

The "SWITCH" Routine was used to merge original data for each observation and created weights onto a single data card.

The data deck resulting from the "SWITCH" Routine was the input to the weighted regression analysis.

Weighted Regression

The weighted regression routine weighted the variables, which were shown to be significant through the use of the "LSSTEP" routine, by the calculated weights. These transformations were partially corrected for hetrosedasticity and scaling problems.

Regression coefficients generated by the weighted regression analysis were as shown in Table 30.

The final mathematical equation, derived by utilizing the values of the weighted regression coefficients was:

$$P(Y|X) = .43 + .09\ X_{18} - .05\ X_{27} - 07\ X_{28} + .06\ X_{30} - .04\ X_{34} - .04\ X_{35} + .02\ X_{36} + .08\ X_{40} + .11\ X_{44} - .06\ X_{53} + .097\ X_{56} + .05\ X_{66} - .099\ X_{74} - .07\ X_{90} + .00008\ X_{100}$$

The weighted regression equation yielded a multiple correlation coefficient (R) of .3549 and a multiple coefficient of determination (R^2) of .1259. The value of the multiple coefficient of determination indicated that slightly more than 12% of the

TABLE 30.--Weighted Regression Coefficients for the Land Use Planning Model.

	Variable	Regression Coefficient
X_{18}	Second occupation	+.09
X_{27}	Second occupation	-.05
X_{28}	Father's occupation	-.07
X_{30}	Father's occupation	+.06
X_{34}	Father's occupation	-.04
X_{35}	Father's occupation	-.04
X_{36}	Father's occupation	+.02
X_{40}	Farm organization participation	+.08
X_{44}	Political organization participation	+.11
X_{53}	General voting behavior	-.06
X_{56}	Response to county government officials	+.097
X_{66}	Property owned	+.05
X_{74}	Property leased	-.099
X_{90}	Income	-.07
X_{100}	1960 minor civil division population density	+.00008

variation in the dependent variable, response to the land use planning question, was associated with the influence exerted by the 15 significant independent variables.

The 15 independent variables which were retained fell into eight major groupings. These groupings were as shown in Table 31.

TABLE 31.--Grouped Variables for the Land Use Planning Model.

Group	Variable Number
Second occupation	X_{18}, X_{27}
Father's occupation	X_{28}, X_{30}, X_{34}, X_{35}, X_{36}
Organization participation	X_{40}, X_{44}
Voting behavior	X_{53}
Response to governmental officials	X_{56}
Property controlled	X_{66}, X_{74}
Income	X_{90}
Population density	X_{100}

By utilizing the matrices which were constructed for utilizing the dummy variables it was possible to calculate the influence that variables exerted on the conditional probability of approving land use planning. This was accomplished by multiplying the matrix value of the variable by the regression coefficient for that variable. If two or more variables were contained within the grouping the net effect of the variables were utilized to show the effect on the conditional probability of approving land use planning. As an example the second occupation classification of farmer could be considered. Variables retained from the second occupation matrix were X_{18} and X_{27}. The values from the matrix were -1 and -3 respectively, while the regression coefficients were +.09 and -.05. The net effect of these two variables was:

$$-1\ (.09)\ -3\ (.05) =$$
$$-.09 + .15 =$$
$$+.06$$

Thus, if a respondent's second occupation was farming, the conditional probability of approving land use planning was increased by slightly more than 6%. Utilizing this process it was possible to calculate the effect that various second occupations had upon the conditional probability of approving land use planning.

This basic process was used to calculate the influence that all the general groupings of variables exerted on the conditional probability of approving land use planning. The following table (Table 33) illustrates the values generated by multiplying a significant variable's regression coefficient by its matrix value.

Hypotheses Validation

The inclusion of specific variables in the weighted regression equation served as a method to either support or reject the various hypotheses which were previously presented. A number of the hypotheses which were generated were rejected in that the

TABLE 32.--An Example Illustrating the Calculated Effect of an Individual Variable on the Conditional Probability of Approving Land Use Planning.

Second Occupation	Effect on the Conditional Probability of Approving Land Use Planning
No Response	+.14
Professional, technical, and kindred workers	+.14
Office holder	+.15
Sales and clerical workers	-.005
Craftsmen and foremen	-.005
Operatives and laborers	+.04
Farmers	+.06
Service workers	-.15
Retired	-.15
Unemployed or handicapped	-.19
Housewife	-.04

TABLE 33.--Effect of Individual Variables on the Conditional Probability of Approving Land Use Planning.

Variable	Effect on the Conditional Probability of Approving Land Use Planning
Second Occupation	
No Response	+.14
Professional, Technical and Kindred Workers	+.14
Office Holder	+.15
Sales and Clerical Workers	-.005
Craftsmen and Foremen	-.005
Operatives and Laborers	+.04
Farmers	+.06
Service Workers	-.15
Retired	-.15
Unemployed or Handicapped	-.19
Housewife	-.04
Father's Occupation	
No Response or Deceased	+.096
Professional, Technical and Kindred Workers	+.006
Managers, Administrators, Self-employed or Salaried	-.04
Sales and Clerical Workers	+.10
Craftsmen and Foremen	-.12
Operatives and Laborers	-.14
Farmers	-.04
Service Workers	+.21
Retired	-.17
Unemployed or Handicapped	+.17
Housewife	+.04
Organization Participation	
Farm Organization Participation	+.08
Political Organization Participation	+.11
Voting Behavior	
General voting behavior	
Do not vote in elections (0% of elections)	-.06
Vote in some elections (1% - 50% of elections)	-.06
Vote in most elections (51% - 99% of elections)	+.06
Vote in all elections (100% of elections)	+.06

TABLE 33.--Continued.

Variable	Effect on the Conditional Probability of Approving Land Use Planning
Response to Governmental Officials	
Response of county governmental officials	
County officials responsive	+.097
County officials not responsive	0
Property Ownership	
Property owned	
None	+.05
Less than 1 Acre	+.05
1-10 Acres	+.05
11-40 Acres	0
41-80 Acres	-.05
81-160 Acres	-.05
161-320 Acres	-.05
321-640 Acres	0
More than 640 Acres	0
Property leased	
None	-.099
Less than 1 Acre	-.099
1-10 Acres	-.099
11-40 Acres	0
41-80 Acres	+.099
81-160 Acres	+.099
161-320 Acres	+.099
321-640 Acres	0
More than 640 Acres	0
Income	
Less than $3,000	-.07
$3,001-$6,000	-.07
$6,001-$9,000	-.07
$9,001-$12,000	0
$12,001-$15,000	+.07
$15,001-$25,000	+.07
$25,001-$50,000	+.07
$50,000 +	0
Population Density	
1960 Minor Civil Division Population Density The regression coefficient of +.00008 meant that greater densities would increase the probability of approving land use planning.	

variables associated with them were not included in the final regression equation. The variables of age, sex and education attainment were deleted as were homeownership, perceived conflicts regarding land usage, and political party identification. Variables were retained which were associated with the hypotheses dealing with occupation, group participation, voting behavior, perception of adequacy of governmental service, property ownership, income, and population density. It was possible to assess, through the regression coefficients, if the final regression equation validated the proposed hypotheses.

Occupation is Significantly Related to Attitudes Toward Land Use Control Measures

It was hypothesized that individuals with more prestigious "white collar" occupations would be more likely to favor land use control measures than individuals with less prestigious "blue collar" occupations. The variables retained did not deal with primary occupation. Rather, they were an extension of the concept of occupation. Variables were retained which indicated a respondent's second occupation and father's occupation. The reason for the primary occupation variable being eliminated and these two being retained was unclear. However, when the variable pertaining to second occupation was compared to the hypothesis, the hypothesis was generally supported. The second occupations which would increase the conditional probability of approving land use planning were as shown in Table 34.

TABLE 34.--Second Occupations Which Increased the Conditional Probability of Approving Land Use Planning.

Second Occupation	Effect on the Conditional Probability of Approving Land Use Planning
Professional, technical, and kindred workers	+.14
Office holder	+.15
Operatives and laborers	+.04
Farmers	+.06

The two second occupations which could clearly be defined as "white collar" occupations exerted a strong influence toward increasing the conditional probability of approving land use planning. Although the classes of operatives and laborers and farmers also increased the conditional probability of approving land use planning, their influence was much less significant. It was possible that farmers approved of planning in order to protect vested interests. All other second occupation classifications decreased the conditional probability of approving land use planning. These classifications were generally associated with "blue collar" occupations.

In respect to the father's occupation variable, the results were basically different. The occupation classifications which would increase the conditional probability of approving land use planning were mostly "blue collar" occupations which apparently presented a basis for rejection of the occupation hypothesis. The only occupation which would be defined as "white collar" was professional, technical, and kindred workers. The occupation classifications which increased the conditional probability were as shown in Table 35.

TABLE 35.--Father's Occupations which Increased the Conditional Probability of Approving Land Use Planning.

Father's Occupation	Effect on the Conditional Probability of Approving Land Use Planning
Professional, technical, and kindred workers	+.006
Sales and clerical workers	+.10
Service workers	+.21
Unemployed or handicapped	+.17

The effects of a respondent's second occupation on attitudes pertaining to land use planning was very different than the effects exerted by the respondent's father's occupation.

In terms of second occupation, the "white collar" occupations of professional, technical, and kindred workers and office holder, greatly increased the conditional probability of approving land use planning. This was consistant with the basic hypothesis that persons with more prestigious "white collar" occupations would be more likely to approve land use control measures than would persons with less prestigious "blue collar" occupations. The positive effect of a person's second occupation being farming has previously been rationalized in that farmers may approve of planning to protect vested interest. Why a second occupation classification of operatives and laborers would increase the conditional probability of approving land use planning is relatively unclear. Perhaps, these individuals had a primary occupation such as farming which would condition their attitudes.

The father's occupation variable effect was inconsistent with the basic hypothesis. Only one "white collar" occupation classification appeared as being significant in increasing the conditional probability of approving land use planning. The father's occupation classification of professional, technical and kindred workers increased the conditional probability of approving land use planning by a minor amount (+.006). The other occupation classifications which increased the conditional probability of approval, sales and clerical workers, service workers, and unemployed and handicapped, were definitely not "white collar" occupations. Why these father's occupation classifications increased the conditional probability of a respondent favoring land use planning is not obvious. The research necessary to discover the nature of such relationships is obviously beyond the scope and intent of this study.

Participation in Various Types of Groups is Significantly Related to Attitudes Toward Land Use Control Measures

It was hypothesized that various groups would reflect common interests and membership in specific groups would predicate a person's response to various land use control measures. Membership in farm organizations and political organizations both increased the conditional probability of approving land use planning while participation in other types of groups had a zero effect on the probability of approving land use planning.

TABLE 36.--Group Participation which Increased the Conditional Probability of Approving Land Use Planning.

Group Participation	Effect on the Conditional Probability of Approving Land Use Planning
Farm Organization	+.08
Political organization	+.11

Farm organization participation influence was possibly related to the concept that farmers were concerned with agricultural land preservation and viewed planning as a mechanism to accomplish this end. Any explanation of the influence of political organization participation would be pure conjecture.

Participation in Elections is Significantly Related to Attitudes Toward Land Use Control Measures

It was hypothesized that individuals with high voting participation rates would be more likely to favor land use control measures than individuals with low voting participation rates. The regression coefficients supported this general hypothesis. Individuals with lower voting participations rates, 0% to 50%, were more likely to oppose land use planning than were individuals with higher voting participation rates. Those with the lower rates actually decreased the conditional probability of approving land use planning, while those with the higher rates increased the conditional probability of approval.

TABLE 37.--The Effect of Voting Participation Rates on the Conditional Probability of Approving Land Use Planning.

General Voting Behavior	Effect on the Conditional Probability of Approving Land Use Planning
Do not vote in elections (0% of elections)	-.06
Vote in some elections (1%-50% of elections)	-.06
Vote in most elections (51%-99% of elections)	+.06
Vote in all elections (100% of elections)	+.06

An Individual's Perception of How Well His Local Government is Serving Him is Significantly Related to Attitudes Toward Land Use Control Measures

It was hypothesized that individuals who felt they were being well served by governmental officials would be more likely to favor land use control measures. This hypothesis was supported in that the response of those individuals who felt that county government officials were responsive increased the conditional probability of favoring land use planning (+.097). The responses of those individuals who felt that the county officials were not responsive had a zero effect on the conditional probability.

Since conditional probabilities ideally range between 0 and 1, this meant that individuals who felt they were being well served by governmental officials were approximately 10% more likely to approve land use planning than were individuals who felt they were not being well served by governmental officials. This strongly supported the concept that persons who felt they were being adequately served by governmental officials would support measures which the government proposed.

The Amount of Property a Person Owns or Controls is Significantly Related to Attitudes Toward Land Use Control Measures

It was hypothesized that the possession of either small or large amounts of property would increase the conditional probability of an individual favoring land use control measures. Property owned and property leased were treated as two separate dimensions. Persons owning small amounts of property contributed to the conditional probability of favoring land use planning, while individuals owning large amounts of property detracted from it. If an individual owned no property, or between less than 1 acre to 10 acres, the conditional probability of favoring land use planning was increased by +.05. However, if an individual owned between 41 and 320 acres the conditional probability of favoring land use planning was decreased by -.05.

The situation was completely reversed with respect to the amount of property leased. Individuals leasing no property, or between less than 1 acre to 10 acres, decreased the conditional probability of favoring land use planning by -.099. Individuals leasing between 41 and 320 acres increased the conditional probability by +.099.

It is possible to speculate as to the reason for the reversal of favoring land use planning which occurred between property owned and property leased. Individuals owning between 1 and 10 acres were most likely concerned about the preservation of home sites and would therefore favor land use control measures which would preserve their home sites and their surroundings. Individuals owning larger amounts of land, 41 to 320 acres would possibly oppose planning for two reasons. First, if such land was being held for speculation, land use planning could possibly lead to restriction in use and reduced profit margins. Secondly, if an individual was a farmer, there could have been fears that land use planning could lead to the elimination of agricultural areas.

Also, many farmers, although they are farming full time, are also "speculating." They are hoping to sell their property for a substantial profit when they retire, so as to assure themselves an adequate retirement income. Such individuals could possibly view land use planning as an imposition which would restrict the profit margin they could realize through the sale of their property.

With respect to property leased, speculation as to meaning of the increases and decreases in the conditional probability of favoring land use planning and the amount of property leased, was mere conjecture. The reasons for persons leasing between 1 and 10 acres opposing land use planning were not evident. The only speculation for persons leasing between 41 and 320 acres was one that planning and resultant land use controls would enable them to continue their leasing practices.

In total, the relationships between property controlled and either favoring or opposing land use planning were not clear. Apparently, the proposed hypothesis was far from sufficient. The analysis of the property controlled variables did not really support or disprove the hypothesis.

In retrospect, an attempt to fit a directional hypothesis to relationships which were not initially clear, was a futile exercise. A much more appropriate approach would have been to utilize a non-directional hypothesis which would have simply illustrated relationships rather than trying to justify them.

Income Level is Significantly Related to Attitudes Toward Land Use Control Measures

It was hypothesized that individuals with higher incomes would be more likely to favor land use control measures than lower income individuals. The results of the regression equation supported this hypothesis. Individuals with incomes from less than $3,000 to $9,000 decreased the conditional probability of favoring land use planning by -.07. Individuals with higher incomes, between $12,001 and $50,000 increased the conditional probability of favoring land use planning by +.07.

Population Density is Significantly Related to Attitudes Toward Land Use Control Measures

It was hypothesized that higher population densities would increase the conditional probability of an individual favoring land use control. For the regression equation, population densities were utilized for both 1960 and 1970. The hypothesis was supported in respect to 1960 population densities. Population density, persons per square mile, were multiplied by a factor of +.00008. This meant that higher 1960 population densities would minimally increase the conditional probability of favoring land use planning.

Why 1960 population densities were significant and 1970 densities were not, was not completely clear. However, it should be recognized that the 1960 and 1970 population densities were highly correlated and the weaker one was "washed" out. For prediction purposes, it probably did not matter which of the two variables was retained.

Calculation of the Conditional Probability of Favoring Land Use Planning

Using the variables which were retained in the weighted regression equation and the associated regression coefficients it was possible to calculate the conditional probability of an individual favoring land use planning. For purposes of illustration, the maximum and minimum values were utilized in two separate equations. This provided an indication of the individual characteristics which were associated with the extremes of favoring or opposing land use planning. All other cases fell between these two extremes.

Utilizing the general form of the equation:

$$P(Y|X) = \beta_0 + \beta_1 X_1 \ldots \beta_i X_i$$

It was possible to generate, utilizing the retained variables, the greatest conditional probability of favoring land use planning.

P(Y|X) = + .43 + [Net effect of (second occupation)] + [Net effect of (Father's occupation)] + .08 (Farm organization participation) + .11 (Political organization participation) + .06 (General voting behavior) + .097 (Response of county government officials) + .05 (Property owned) + .099 (Property leased) + .07 (Income) + .00008 (1960 minor civil division population density)

P(Y|X) = + .43	+ .15	+ .21
	(second occupation: office holder)	(Father's occupation: service worker)
	+ .08	+ .11
	(Organization Participation: Farm Organization)	(Organization Participation: Political Organization)
	+ .06	+ .097
	(Voting Behavior: Vote in most elections, Vote in all elections)	(Response to governmental officials: County officials responsive)
	+ .05	+ .099
	(Property owned: None, less than one acre, 1-10 acres)	(Property leased: 41-80 acres 81-160 acres, 161-320 acres)

+ .07 (Income: $12,000-$15,000 $15,001-$25,000 $25,001-$50,000)

+ .17 (1960 minor civil division population density: Caro 2208.75/square mile)

$P(Y|X) = 1.53$

Thus utilizing the greatest values associated with the retained variables, it was shown that the maximum level of the conditional probability of approving land use planning was +1.53. An individual who reflected the characteristics indicated in the preceeding equation would be statistically the most likely to approve land use planning.

The lowest conditional probability of approving land use planning was generated through use of the following equation:

$P(Y|X) = + .43$

- .19 (Second occupation: unemployed or handicapped)

- .17 (Father's occupation: retired)

+ 0 (Organization participation: Do not belong to farm organization)

+ 0 (Organization participation: Do not belong to a political organization)

- .06 (Voting behavior: Do not vote in any elections, vote in some elections)

+ 0 (Response to governmental officials: county officials not responsive)

- .05 (Property owned: 41-80 acres, 81-160 acres, 161-320 acres)

- .099 (Property leased: None, Less than 1 acre 1-10 acres)

- .07	+ .0009
(Income: Less than \$3,000 \$3,001-\$6,000 \$6,001-\$9,000)	(1960 minor civil division population density: Minden Township 12.5/square mile)

$P(Y|X) = - .017$

The smallest conditional probability of approving land use planning was - .017. This resulted from utilization of the variables with the lowest values associated with them. Thus, an individual reflecting the characteristics indicated in the preceeding equation, would be statistically the least likely to approve land use planning.

In theory, values associated with conditional probability are only supposed to range between 0 and +1. In this case, the extreme values generated through the use of predictive equation violated this assumption. The extreme values were purposely generated to dramatize the differences which individual responses played in the calculation of conditional probabilities. The extreme values set bounds between which all other conditional probabilities would fall, determined by individual responses. However, the relative values were of importance in that they gave an indication of both the direction and magnitude of the effect that individual variables exerted upon the conditional probability of approving land use planning.

The Second Model--Ordinances to Enforce A Land Use Plan

The second model was constructed in the same basic manner as was the first model. The variables which were correlated greater than .80 or less than .10 were again deleted. Also, variables which were dependent variables in the other two equations were deleted. The dependent variable in the second model was X_3 (response to the ordinances question). This dependent variable was run against the 74 independent variables in the LSSTEP Routine.

Results of the "LSSTEP" Routine

Using X_3 (response to the ordinances question) as the dependent variable and a specified significance level of .10, the data was subjected to the "LSSTEP" routine. The following independent variables were retained (see Table 38).

The "LSSTEP" routine identified the variables which were significant at the .10 level and would be included in the final weighted regression equation.

The steps which were indicated for the previous regression equation were utilized to prepare the data for the weighted regression. The data was subjected to the "RESID," "CONVERT" AND "SWITCH" routines and used as input into the weighted regression.

Weighted Regression

The regression coefficients generated by the weighted regression were as shown in Table 39.

The final mathematical equation, derived by utilizing the values of the weighted regression coefficients was:

$$P(Y|X) = .48 + .06\ (X_{18}\ \text{second occupation}) - .04\ (X_{27}\ \text{second occupation}) - .06\ (X_{28}\ \text{Father's occupation}) + .02$$

TABLE 38.--Variables Retained in the Land Use Ordinance Model.

Variable	
X_{18}	Second occupation
X_{27}	Second occupation
X_{28}	Father's occupation
X_{36}	Father's occupation
X_{37}	Father's occupation
X_{40}	Farm organization participation
X_{45}	Other group participation
X_{47}	Political party identification
X_{49}	Political party identification
X_{50}	Political party identification
X_{52}	Voting in local elections
X_{56}	Response ot county government officials
X_{61}	Residence location
X_{66}	Property owned
X_{67}	Property owned
X_{76}	Property leased
X_{82}	Education
X_{83}	Education
X_{86}	Education
X_{88}	Education
X_{89}	Education
X_{90}	Income
X_{91}	Income
X_{95}	Income
X_{101}	1960-1970 minor civil division population density change

TABLE 39.--Weighted Regression Coefficients for the Land Use Ordinance Model.

	Variable	Regression Coefficient
X_{18}	Second occupation	+.06
X_{27}	Second occupation	-.04
X_{28}	Father's occupation	-.06
X_{36}	Father's occupation	+.02
X_{37}	Father's occupation	+.02
X_{40}	Farm organization participation	+.09
X_{45}	Other group participation	+.05
X_{47}	Political party identification	+.06
X_{49}	Political party identification	-.04
X_{50}	Political party identification	+.05
X_{52}	Voting in local elections	+.07
X_{56}	Response to county government officials	+.13
X_{61}	Residence location	-.02
X_{66}	Property owned	+.04
X_{67}	Property owned	-.04
X_{76}	Property leased	+.098
X_{82}	Education	-.06
X_{83}	Education	+.05
X_{86}	Education	+.06
X_{88}	Education	-.04
X_{89}	Education	-.05
X_{90}	Income	-.14
X_{91}	Income	+.06
X_{95}	Income	+.05
X_{96}	Income	+.08
X_{101}	1960-1970 minor civil division population density change	+.23

(X_{36} Father's occupation + .02 (X_{37} Father's occupation) + .09 (X_{40} Farm organization participation) + .05 (X_{45} other group participation) + .06 (X_{47} political party identification) - .04 (X_{49} political party identification) + .05 (X_{50} political party identification) + .07 (X_{52} voting in local elections) + .13 (X_{56} response to county government officials) - .02 (X_{61} residence location + .04 (X_{66} property owned) - .04 (X_{67} property owned) + .098 (X_{76} property leased) - .06 (X_{82} education) + .05 (X_{83} education) + .06 (X_{86} education) - .04 (X_{88} education) - .05 (X_{89} education) - .14 (X_{90} income) + .06 (X_{91} income) + .05 (X_{95} income) + .08 (X_{96} income) + .23 (X_{101} 1960-1970 minor civil division population density change.)

The weighted regression equation yielded a multiple correlation coefficient (R) of .3974 and a multiple coefficient of determination (R^2) of .1579. The value of the multiple coefficient of determination indicated that nearly 16% of the variation around the mean of the dependent variable, response to the ordinance question, was associated with the 26 significant independent variables.

The independent variables which were retained fell into eleven major groupings. These groupings were as shown in Table 40.

By utilizing the matrices which were constructed for using the dummy variables, it was possible to calculate the net effect of the variables upon the conditional probability of approving ordinances to enforce a land use plan (See Table 41).

TABLE 40.--Grouped Variables for the Land Use Ordinance Model.

Group	Variable Number
Second Occupation	X_{18}, X_{27}
Father's occupation	X_{28}, X_{36}, X_{37}
Organization participation	X_{40}, X_{45}
Political party identification	X_{47}, X_{49}, X_{50}
Voting behavior	X_{52}
Response to governmental officials	X_{56}
Residence location	X_{61}
Property controlled	X_{66}, X_{67}, X_{76}
Education	X_{82}, X_{83}, X_{88}, X_{89}
Income	X_{90}, X_{91}, X_{95}, X_{96}
Population density	X_{101}

Hypotheses Validation

Once again, the inclusion of specific variables in the weighted regression equation served as a method to either support or reject the various hypotheses.

In terms of grouping of variables, there was a great similarity in the variables retained in both equations. Additional variables were retained in the response to the ordinance question which could be grouped into general headings of political party identification, residence location, and educational attainment (See Table 42).

TABLE 41.--Effect of Individual Variables on the Conditional Probability of Approving Ordinances to Enforce A Land Use Plan.

Variable	Effect on the Conditional Probability of Approving Ordinances to Enforce a Land Use Plan
Second Occupation	
No Response	+.10
Professional, Technical and Kindred Workers	+.10
Office Holder	+.12
Sales and Clerical Workers	-.01
Craftsmen and Foremen	-.14
Operatives and Laborers	+.03
Farmers	+.05
Service Workers	-.10
Retired	-.10
Unemployed or Handicapped	-.14
Housewife	-.03
Father's Occupation	
No Response or Deceased	-.03
Professional, Technical and Kindred Workers	-.03
Managers, Administrators, Self-Employed or Salaried	-.02
Sales and Clerical Workers	-.15
Craftsmen and Foremen	-.07
Operatives and Laborers	-.095
Farmers	-.06
Service Workers	+.13
Retired	+.05
Unemployed or Handicapped	+.15
Housewife	+.002
Organization Participation	
Farm Organization Participation	+.09
Other Group Participation	+.05
Political Party Identification	
Democrat	+.07
Republican	+.11
American Independent	-.09
Other	-.12
None	-.02

TABLE 41.--Continued.

Variable	Effect on the Conditional Probability of Approving Ordinances to Enforce a Land Use Plan
Voting Behavior	
Vote in Local Elections	+.07
Do Not Vote in Local Elections	0
Response to Government Officials	
Response of County Government Officials	
County Officials Responsive	+.13
County Officials Not Responsive	0
Residence Location	
Open Country Side	-.02
Built-up Area	-.02
City or Village	+.05
Property Ownership	
Property Owned	
None	+.004
Less than 1 Acre	+.08
1-10 Acres	+.004
11-40 Acres	+.04
41-80 Acres	-.04
81-160 Acres	-.004
161-320 Acres	-.08
321-640 Acres	+.04
More Than 640 Acres	-.04
Property Leased	
None	-.098
Less Than 1 Acre	0
1-10 Acres	+.098
11-40 Acres	0
41-80 Acres	-.098
81-160 Acres	0
161-320 Acres	+.098
321-640 Acres	+.098
More Than 640 Acres	-.098

TABLE 41.--Continued.

Variable	Effect on the Conditional Probability of Approving Ordinances to Enforce a Land Use Plan
Educational Attainment	
Less Than 6 Years of Elementary School	+.08
Completed Elementary School (6 Years)	-.22
Some Junior High School (Less Than 8th Grade)	+.06
Completed Junior High School (8th Grade)	-.05
Some High School (1-3 Years)	-.08
Completed High School (4 Years)	-.01
Vocational School or other Training	-.09
College (1-3 Years)	+.08
College (4 Years or More)	+.06
Income	
Less Than $3,000	-.15
$3,001-$6,000	-.09
$6,001-$9,000	-.04
$9,001-$12,000	+.008
$12,001-$15,000	+.03
$15,001-$25,000	+.03
$25,001-$50,000	+.04
$50,000 +	+.17
Population Density	
The regression coefficient of +.23 meant that increases in population densities would increase the probability of approving ordinances to enforce a land use plan.	

TABLE 42.--Variable Groupings Appearing in the Land Use Planning and Ordinance Equations.

Land Use Planning Equation Variable Groupings	Ordinance Equation Variable Groupings
Second occupation	Second occupation
Father's occupation	Father's occupation
Organization participation	Organization participation
	Political party identification
Voting behavior	Voting behavior
Response to Governmental Officials	Response to Government Officials
Property controlled	Property controlled
	Education
Income	Income
Population density	Population density
	Residence Location

Occupation is Significantly Related to Attitudes Toward Land Use Control Measures

As with the land use planning equation, primary occupation was not retained as a significant variable. Both second occupation and Father's occupation were once again retained.

In terms of second occupation, the results were identical with those of the land use planning equation. The second occupations which would increase the conditional probability of approving ordinances to enforce a land use plan were identical to those which increases the conditional probability of approving land use planning (See Table 43).

TABLE 43.--Second Occupations which Increased the Conditional Probability of Approving Ordinances to Enforce a Land Use Plan.

Second Occupation	Effect on the Conditional Probability of Approving Ordinances to Enforce a Land Use Plan
Professional, Technical, and Kindred Workers	+.10
Office Holder	+.12
Operatives and Laborers	+.03
Farmers	+.05

Once again, the hypothesis that individuals with more prestigious "white collar" occupations would be more likely to favor land use control measures was, to some degree, supported. The two occupations which are generally recognized as being "white collar" exerted a strong influence towards increasing the conditional probability of approving ordinance to enforce a land use plan.

The variable related to Father's occupation exhibited a very different result when compared to the second occupation variable. The results discredited the hypothesis of more prestigious "white collar" occupations favoring land use control measures. The Father's occupations which increased the conditional probability of approving ordinances to enforce a land use plan were definitely not "white collar." The only legitimate occupation was that of service worker which is generally considered a "blue collar" occupation. The other "occupations" which increased the conditional probability of approval were retired and unemployed or handicapped (See Table 44).

TABLE 44.--Father's Occupations which Increased the Conditional Probability of Approving Ordinances to Enforce a Land Use Plan.

Father's Occupation	Effect on the Conditional Probability of Approving Ordinances to Enforce a Land Use Plan
Service Worker	+.13
Retired	+.05
Unemployed or Handicapped	+.15

Again, the effect of Father's occupation upon a respondent was nearly opposite to the effect exerted by second occupation.

<u>Participation in Various Types of Groups is Significantly Related to Attitudes Toward Land Use Control Measures</u>

Farm organization participation again increased the conditional probability of approving a land use control measure. The only other type of group participation which increased the conditional probability was the catch all category of "other group participation" (See Table 45).

TABLE 45.--Group Participation which Increased the Conditional Probability of Approving Ordinances to Enforce a Land Use Plan.

Group Participation	Effect on the Conditional Probability of Approving Ordinances to Enforce a Land Use Plan
Farm Organization	+.09
Other Group Participation	+.05

Participation in the other types of specified groups had a zero effect on the conditional probability of approving ordinances to enforce a land use plan.

<u>Identification with a Specific Political Party is Significantly Related to Attitudes Towards Land Use Control Measures</u>

Respondents who considered themselves either Republicans or Democrats increased the conditional probability of approving ordinances. Responses of individuals who thought of themselves as being American Independents, "other," or having no political party affiliation decreased the conditional probability of approving ordinances.

It was hypothesized that individuals who considered themselves Democrats would be more likely to favor land use control measures than either Republicans or American Independent Party members. This hypothesis was rejected in that respondents who identified themselves as being Republicans exhibited the strongest influence upon increasing the probability of approving ordinances to enforce a land use plan (See Table 46).

TABLE 46.--Political Party Affiliation which Increased the Conditional Probability of Approving Ordinances to Enforce a Land Use Plan.

Political Party Affiliation	Effect on the Conditional Probability of Approving Ordinances to Enforce a Land Use Plan
Democrat	+.07
Republican	+.11

Participation in Elections is Significantly Related to Attitudes Toward Land Use Control Measures

The hypothesis that individuals with high voting participation rates would be more likely to favor land use control measures was again supported. In this case individuals who voted in local elections increased the conditional probability of approving ordinances when compared to individuals who did not vote in local elections. Individuals who did not vote in local elections had a zero effect on the conditional probability of approving ordinances.

TABLE 47.--Voting Behavior which Increased the Conditional Probability of Approving Ordinances to Enforce a Land Use Plan.

Voting Behavior	Effect on the Conditional Probability of Approving Ordinances to Enforce a Land Use Plan
Vote in Local Elections	+.07

An Individual's Perception of How Well His Local Government is Serving Him is Significantly Related to Attitudes Toward Land Use Control Measures

The hypothesis that individuals who felt they were being well served by governmental officials would be more likely to favor land use control measures was again supported. Individuals who believed that county governmental officials were responsive increased the conditional probability of approving ordinances (+.13). The responses of individuals who felt county governmental officials were not responsive had a zero effect on the conditional probability.

The Amount of Property a Person Owns or Controls is Significantly Related to Attitudes Toward Land Use Control Measures

It was hypothesized that possession of either small or large amounts of property would increase the conditional probability of an individual favoring land use control measures. In terms of approving ordinances, the ownership of relatively small amounts of property increased the probability of favoring ordinances to enforce a land use plan. Individuals owning between 0 and 40 acres increased the conditional probability of favoring ordinances. Also, ownership of between 321 and 640 acres also increased the probability of favoring ordinances. All other size grouping of property owned reduced the conditional probability of approval. These results more or less supported the hypothesis (See Table 48).

In respect to property leased, a pattern emerged which was not as clear. Only individual leasing 1 to 10 acres, 161 to 320

TABLE 48.--Amounts of Property Owned which Increased the Conditional Probability of Approving Ordinances to Enforce a Land Use Plan.

Property Owned	Effect on the Conditional Probability of Approving Ordinances to Enforce a Land Use Plan
None	+.004
Less than 1 acre	+.08
1-10 acres	+.004
11-40 acres	+.04
321-640 acres	+.04

acres, or 321 to 640 acres increased the conditional probability of approving ordinances. All other responses either reduced the probability of approval or had a zero effect. These results did not provide a firm basis upon which to either reject or accept the hypothesis (See Table 49).

TABLE 49.--Amounts of Property Leased which Increased the Conditional Probability of Approving Ordinances to Enforce a Land Use Plan.

Property Leased	Effect on the Conditional Probability of Approving Ordinances to Enforce a Land Use Plan
1-10 acres	+.098
161-320 acres	+.098
321-640 acres	+.098

Educational Attainment is Significantly Related to Attitudes Toward Land Use Control Measures

It was hypothesized that more educated individuals would be more likely to favor land use control measures than individuals with less education. The results failed to either support or discredit the hypothesis. Educational levels which added to the conditional probability of approving ordinances were scattered throughout the range of levels. However, there was a slight tendency for individuals with more education to favor approval than those individuals with less education. Responses of individuals with less than six years of elementary school, some junior high school, vocational or other training, and 1 to 4 or more years of college all increased the conditional probability of approving ordinances. Responses for all other educational attainment levels reduced the conditional probability of approval (see Table 50).

TABLE 50.--Educational Levels which Increased the Conditional Probability of Approving Ordinances to Enforce a Land Use Plan.

Educational Attainment	Effect on the Conditional Probability of Approving Ordinances to Enforce a Land Use Plan
Less than six years of elementary school	+.08
Some junior high school (less than 8th grade)	+.06
Vocational School or other training	+.09
College (1-3 years)	+.08
College (4 years or more)	+.06

Income Level is Significantly Related to Attitudes Toward Land Use Control Measures

The hypothesis that individuals with higher incomes would more likely favor land use control measures was strongly supported. The responses of all individuals within income groupings of $9,000 or more increased the conditional probability of favoring ordinances. There was a general pattern of increasing probability of acceptance with increasing income levels (See Table 51).

TABLE 51.--Income Levels which Increased the Conditional Probability of Approving Ordinances to Enforce a Land Use Plan.

Income	Effect on the Conditional Probability of Approving Ordinances to Enforce a Land Use Plan
$9,001-$12,000	+.008
$12,001-$15,000	+.03
$15,001-$25,000	+.03
$25,001-$50,000	+.04
$50,000 +	+.17

Responses from individuals with incomes less than $9,000 reduced the conditional probability of approving ordinances to enforce a land use plan.

Population Density is Significantly Related to Attitudes Toward Land Use Control Measures

The two variables dealing with population density, which were retained, supported the hypothesis that higher population densities would increase the conditional probability of favoring land use control measures.

The regression coefficient for the 1960-1970 Minor Civil Division population density change was +.23. This meant that the greater the increase in population density during this time period the greater the conditional probability of favoring ordinances.

The second variable retained dealt with population densities in an abstract manner. Residence location gave a rough indication of population density. The three response choices were open country side, built up area (semi-developed rural areas), or within a city or village. This was viewed as a progression from low population densities to higher population densities. Only the response associated with the highest population density, within a city or village, increased the conditional probability of approving ordinances (+.05). The other two responses detracted from the probability of approval.

Calculation of the Conditional Probability of Favoring Ordinances to Enforce a Land Use Plan

Again, by using the variables which were retained in the weighted regression equation and the associated regression coefficients, it was possible to calculate the conditional probability of an individual favoring implementation of ordinances to enforce a land use plan. The minimum and maximum values were utilized in two separate equations to provide an indication of the individual characteristics which were associated with the extremes of favoring or opposing ordinances to enforce a land use plan. All other cases would fall between these two extremes.

The greatest conditional probability of favoring ordinances was as follows:

$P(Y|X)$ = + .48 + [net effect of (second occupation)] + [net effect of (father's occupation)] + .09 (farm organization participation) + .05 (other group participation) + [net effect of (political party identification)] + .07 (voting in local elections) + .13 (response to county governmental officials) - .02 (residence location) + [net effect of (property owned)] + .098 (property leased) + [net effect of (education)] + [net effect of (income)] + .23 (1960-1970 Minor Civil Division population density change)

$P(Y|X)$ = + .48 + .12 (Second occupation: office holder) + .15 (Father's occupation: unemployed or handicapped)

+ .09 (Organization participation: farm organization) + .05 (Organization participation: other groups)

+ .11 (Political party identification: Republican) + .07 (Voting behavior: vote in local elections)

+ .13 (Response to county governmental officials: county officials responsive) + .05 (Residence location: city or village)

+ .08 (Property owned: less than one acre) + .098 (Property leased: 1-10 acres, 161-320 acres, 320-640 acres)

+ .09
(Educational attainment: vocational school or other training)

+ .17
(Income: $50,000 +)

+ .12
(1960-1970 Minor Civil Division population Density change: Caseville Township, Huron County +53%)

$P(Y|X) = + 1.81$

Through utilization of the greatest values associated with the retained variables the maximum value of the conditional probability of approving ordinances to enforce a land use plan was calculated to be + 1.81.

The lowest conditional probability of approving ordinances to enforce a land use plan was calculated through the use of the following equation:

$P(Y|X) = + .48$

- .14
(Second occupation: unemployed or handicapped)

- .095
(Father's occupation: operative or laborer)

+ 0
(Organization participation: did not belong to a farm organization)

+ 0
(Organization participation: did not belong to other groups)

- .12
(Political party identification: other)

+ 0
(Voting behavior: did not vote in local elections)

+ 0
(Response to Governmental officials: county officials not responsive)

- .02
(Residence location: open country side, built-up area)

- .08
(Property owned: 161-320 acres)

- .098
(Property leased: none, 41-80 acres, more than 640 acres)

- .22
(Educational attainment: completed elementary school [6 years])

- .15
(Income: less than $3,000)

- .20
(1960-1970 minor civil division population density change: Point Aux Barques Township, Huron county - 88%)

$P(Y|X) = - .64$

The lowest conditional probability of approving ordinances was calculated to be - .64. This was calculated by utilizing the variables with the lowest associated values.

Again, the calculated values were beyond the range of 0 and +1 which are normally associated with conditional probabilities. However, the relative values provided an indication of both the magnitude and direction of the influence the individual variables had upon the conditional probability of approving ordinances to enforce a land use plan.

The Third Model--Zoning

The third model was constructed in the same basic manner as were the first two models. The variables which were correlated greater than .80 or less than .10 were again deleted. Also, the variables which were dependent variables in the other two equations were deleted. The dependent variable in the third model was X_4 (response to the zoning question--Do you favor land use zoning?). This dependent variable was run against the 74 independent variables in the LSSTEP Routine.

Results of the "LSSTEP" Routine

Using X_4 (response to the zoning question) as the dependent variable and a specified significance level of .10, the data were subjected to the LSSTEP Routine. The following independent variables were retained as shown in Table 52.

The LSSTEP Routine identified the variables which were significant at the .10 level and were to be included in the final weighted regression. The same steps utilized in the preceeding regression equations were used to prepare the data for the weighted regression. Data were subjected to the "Resid," "Convert," and "Switch" Routines and finally used as input into the weighted regression.

Weighted Regression

The regression coefficients generated by the weighted regression were as shown in Table 53.

The final mathematical equation, derived by utilizing the values of the weighted regression coefficients, was:

$$\begin{aligned} P(Y|X) = {} & .40 + .06X_6 - .03X_{14} + .20X_{18} - .11X_{20} - .05X_{23} \\ & - .06X_{25} + .04X_{26} - .09X_{27} + .01X_{36} + .07X_{44} \\ & + .05X_{45} + .06X_{47} - .05X_{49} + .07X_{50} + .07X_{51} \\ & + .14X_{56} - .02X_{61} - .03X_{81} + .03X_{86} - .02X_{88} \\ & + .03X_{91} + .04X_{92} + .04X_{94} + .15X_{101}. \end{aligned}$$

The weighted regression equation yielded a multiple correlation coefficient (R) of .3899 and a multiple coefficient of determination (R^2) of .1520. The value of the multiple coefficient

TABLE 52.--Variables Retained in the Zoning Ordinance Model.

Variable	
X_{6}	Sex
X_{14}	Occupation
X_{18}	Second occupation
X_{19}	Second occupation
X_{20}	Second occupation
X_{23}	Second occupation
X_{25}	Second occupation
X_{26}	Second occupation
X_{27}	Second occupation
X_{36}	Father's occupation
X_{44}	Political organization participation
X_{45}	Other group participation
X_{47}	Political party identification
X_{49}	Political party identification
X_{50}	Political party identification
X_{51}	Voting in county elections
X_{56}	Response to country governmental officials
X_{61}	Residence location
X_{81}	Property leased
X_{86}	Education
X_{88}	Education
X_{91}	Income
X_{92}	Income
X_{94}	Income
X_{101}	1960-1970 Minor civil division population density change

TABLE 53.--Weighted Regression Coefficients for the Zoning Ordinance Model.

	Variable	Regression Coefficient
X_{6}	Sex	+.06
X_{14}	Occupation	-.03
X_{18}	Second occupation	+.20
X_{19}	Second occupation	+.11
X_{20}	Second occupation	-.11
X_{23}	Second occupation	-.05
X_{25}	Second occupation	-.06
X_{26}	Second occupation	+.04
X_{27}	Second occupation	-.09
X_{36}	Father's occupation	+.01
X_{44}	Political organization participation	+.07
X_{45}	Other group participation	+.05
X_{47}	Political party identification	+.06
X_{49}	Political party identification	-.05
X_{50}	Political party identification	+.07
X_{51}	Voting in county elections	+.07
X_{56}	Response to county governmental officials	+.14
X_{61}	Residence location	-.02
X_{81}	Property leases	-.03
X_{86}	Education	+.03
X_{88}	Education	-.02
X_{91}	Income	+.03
X_{92}	Income	+.04
X_{94}	Income	+.04
X_{101}	1960-1970 Minor civil division population density change	+.15

of determination indicated that slightly more than 15% of the variation in the dependent variable, response to the zoning question, was associated with the influence exerted by the 25 significant independent variables.

The 25 independent variables which were retained fell into thirteen major groupings. These groupings were as shown in Table 54.

TABLE 54.--Grouped Variables for the Zoning Ordinance Model.

Group	Variable Number
Sex	X_6
Occupation	X_{14}
Second occupation	X_{18}, X_{19}, X_{20}, X_{23}, X_{25}, X_{26}, X_{27}
Father's occupation	X_{36}
Organization participation	X_{44}, X_{45}
Political party identification	X_{47}, X_{49}, X_{50}
Voting behavior	X_{51}
Response to governmental officials	X_{56}
Residence location	X_{61}
Property controlled	X_{81}
Education	X_{86}, X_{88}
Income	X_{91}, X_{92}, X_{94}
Population density	X_{101}

By utilizing the matrices which were constructed for using the dummy variables, it was possible to calculate the net effect of the variables on the conditional probability of approving zoning (see Table 55).

Hypotheses Validation

As in the previous models, the inclusion of specific variables in the weighted regression equation served as a method to support or reject the various hypotheses.

When the groupings of variables which were retained in the zoning equation were compared to the groupings of variables retained in the two previous equations, it was obvious that great similarities existed. Two additional variables, sex and primary occupation, which were not significant in the previous equations were retained in the zoning equation (See Table 56).

Sex is Significantly Related to Attitudes Toward Land Use Control Measures

It was hypothesized that females would be less likely to favor land use control measures than would males. The effect of the sex variable on the conditional probability of approving zoning supported this hypothesis. Being a male contributed +.06 to the conditional probability of approving zoning. Being female had a zero (0) effect on the probability of approval. In respect to the zoning equation, it was clear that males viewed zoning more favorably than females.

TABLE 55.--Effect of Individual Variables on the Conditional Probability of Approving Zoning Ordinances.

Variable	Effect on the Conditional Probability of Approving Zoning Ordinances
Sex	
Male	+.06
Female	0
Occupation	
Professional, technical and kindred workers	-.03
Managers, Administrators, self-employed, salaried	0
Sales and clerical workers	+.03
Craftsmen and foremen	0
Operatives and laborers	-.03
Farmers	+.03
Service Workers	-.03
Retired	+.03
Unemployed or handicapped	-.03
Housewife	+.03
Second Occupation	
No response	+.13
Professional, technical, and kindred workers	+.11
Office holder	+.09
Sales and clerical workers	-.03
Craftsmen and foremen	+.02
Farmers	+.02
Service workers	+.06
Retired	-.296
Unemployed or handicapped	-.40
Housewife	+.11
Father's Occupation	
No response or deceased	+.03
Professional, technical and kindred workers	+.03
Managers, Administrators, self-employed, salaried	+.03
Sales and clerical workers	0
Craftsmen and foremen	-.03
Operatives and laborers	-.03
Farmers	-.03
Service workers	+.02
Retired	-.02
Unemployed or handicapped	+.02
Housewife	-.02

TABLE 55.--Continued.

Variable	Effect on the Conditional Probability of Approving Zoning Ordinances
Organization Participation	
Political organization participation	+.07
Other group participation	+.05
Political Party Identification	
Democrat	+.08
Republican	+.11
American Independent	-.14
Other	-.13
None	+.08
Voting Behavior	
Vote in county elections	+.07
Do not vote in county elections	0
Response to Governmental Officials	
Response to county governmental officials	
County officials responsive	+.14
County officials not responsive	0
Residence Location	
Open country side	-.02
Built-up area	-.02
City or village	+.05
Property Ownership	
Property leased	
None	-.06
Less then 1 acre	0
1-10 acres	+.06
11-40 acres	+.03
41-80 acres	+.03
81-160 acres	-.03
161-320 acres	-.03
321-640 acres	+.06
More than 640 acres	-.06

TABLE 55.--Continued.

Variable	Effect on the Conditional Probability of Approving Zoning Ordinances
Educational Attainment	
Less than 6 years of elementary school	+.10
Completed elementary school (6 years)	-.06
Some junior high school (less than 8th grade)	-.02
Completed junior high school (8th grade)	-.03
Some high school (1-3 years)	-.10
Completed high school (4 years)	+.01
Vocational school or other training	+.02
College (1-3 years)	+.02
College (4 years or more)	+.06
Income	
Less than $3,000	+.01
$3,001-$6,000	-.11
$6,001-$9,000	-.03
$9,001-$12,000	+.03
$12,001-$15,000	+.08
$15,001-$25,000	+.04
$25,001-$50,000	-.007
$50,000 +	-.01
Population Density	
1960-1970 Minor Civil Division Population Density Change	

The regression coefficient of +.15 meant that increases in population densities would increase the probability of approving zoning.

TABLE 56.--Variable Groupings Appearing in the Land Use Planning, Ordinance and Zoning Equations.

Land Use Planning Equation Variable Grouping	Ordinance Equation Variable Grouping	Zoning Equation Variable Grouping
		Sex
		Primary Occupation
Second Occupation	Second Occupation	Second Occupation
Father's Occupation	Father's Occupation	Father's Occupation
Organization Participation	Organization Participation	Organization Participation
	Political Party Identification	Political Party Identification
Voting Behavior	Voting Behavior	Voting Behavior
Response to Governmental Officials	Response to Governmental Officials	Response to Governmental Officials
Property Controlled	Property Controlled	Property Controlled
	Educational Attainment	Educational Attainment
Income	Income	Income
Population Density	Population Density	Population Density
	Residence Location	Residence Location

Occupation is Significantly Related to Attitudes Toward Land Use Control Measures

Primary occupation appeared as a significant variable for the first time in the zoning equation. This variable had not been significant in the two previous equations. It was hypothesized that individuals with the more prestigious "white collar" occupations would be more likely to favor land use control measures than individuals with less prestigious "blue collar" occupations. This hypothesis was clearly rejected in view of the results. The primary occupations which contributed positively to the approval of zoning could not be classed as "white collar" occupations (See Table 57).

TABLE 57.--Primary Occupations which Increased the Conditional Probability of Approving Zoning.

Primary Occupation	Effect on the Conditional Probability of Approving Zoning
Sales and clerical workers	+.03
Farmers	+.03
Retired	+.03
Housewife	+.03

All other occupations had either a zero (0) or negative effect on the conditional probability of approving zoning.

As with the previous equations, both second occupation and father's occupation were retained as significant variables. In respect to second occupation, the basic hypothesis concerning occupation was neither supported or rejected. There was almost a blanket approval of zoning. Very few second occupations detracted from the conditional probability of approving zoning. These exceptions were as shown in Table 58.

TABLE 58.--Second Occupations which Decreased the Conditional Probability of Approving Zoning.

Second Occupation	Effect on the Conditional Probability of Approving Zoning
Sales and clerical workers	-.03
Retired	-.296
Unemployed or handicapped	-.40

All other second occupations contributed positively to the conditional probability of approving zoning. This was somewhat different than the results of the previous equations. In the other equations, "white collar" second occupations were more or less associated with approving land use control measures. In this equation, there was no such distinction.

Father's occupation somewhat supported the basic hypothesis. The occupations which are usually considered white collar contributed positively to the probability of approving zoning. The influence exerted by these "white collar" occupations was greater than that of the other occupations (See Table 59).

TABLE 59.--Father's Occupations which Increased the Conditional Probability of Approving Zoning.

Father's Occupation	Effect on the Conditional Probability of Approving Zoning
Professional, technical, or kindred workers	+.03
Managers, administrators, self-employed or salaried	+.03
Service workers	+.02
Unemployed or handicapped	+.02

Participation in Various Types of Groups is Significantly Related to Attitudes Toward Land Use Control Measures

Again, membership in a political organization and membership in "other groups" increased the conditional probability of approving zoning. Participation in the other types of groups listed had a zero (0) effect on the conditional probability of approving zoning (See Table 60).

TABLE 60.--Group Participation which Increased the Conditional Probability of Approving Zoning.

Group Participation	Effect on the Conditional Probability of Approving Zoning
Political organization participation	+.07
Other group participation	+.05

Perhaps political organization participation lead to an increase in the level of awareness of issues pertaining to zoning. This could possibly increase the probability of approving zoning. Any speculation as to why participation in "other groups" would increase the probability of approving zoning would be mere conjecture because of the vague nature of the question.

Identification With a Specific Political Party is Significantly Related to Attitudes Toward Land Use Control Measures

It was hypothesized that individuals who considered themselves Democrats would be more likely to favor land use control measures than would either Republican or American Independent party members. This hypothesis was rejected in that respondents who identified themselves as being Republicans exhibited the strongest influence upon increasing the conditional probability of approving zoning. Respondents who considered themselves Democrats or had no political party affiliation also contributed positively to the probability of approving zoning. American Independent Party membership and "other" political party membership both detracted from the probability of approval (See Table 61).

Participation in Elections is Significantly Related to Attitudes Toward Land Use Control Measures

The hypothesis that individuals who participated in elections would be more likely to favor land use control measures than individuals who did not was again supported. Individuals who voted in county elections exhibited a positive effect on the conditional probability of approving zoning. Individuals who did

TABLE 61.--Political Party Affiliation which Increased the Conditional Probability of Approving Zoning.

Political Party Affiliation	Effect on the Conditional Probability of Approving Zoning
Democrat	+.08
Republican	+.11
None	+.08

not participate in county elections had a zero effect on the probability of approval (See Table 62).

TABLE 62.--Voting Behavior which Increased the Conditional Probability of Approving Zoning.

Voting Behavior	Effect on the Conditional Probability of Approving Zoning
Vote in county elections	+.07

An Individual's Perception of How Well His Local Government is Serving Him is Significantly Related to Attitudes Toward Land Use Control Measures

The hypothesis that individuals who felt they were being well served by governmental officials being more likely to favor approval of land use control measures was again supported. Individuals who felt county officials were responsive increased the conditional probability of approving zoning (+.14). The responses of individuals who felt county governmental officials were not responsive had a zero (0) effect on the conditional probability of approval.

The Amount of Property a Person Owns or Controls is Significantly Related to Attitudes Toward Land Use Control Measures

In this equation, property ownership failed to appear as a significant variable. Property leased was retained as a significant variable. The basic hypothesis was that control of either small or large amounts of property would increase the conditional probability of approving land use control measures. The results failed to support the hypothesis. The greatest positive influence upon approval of zoning was concentrated in the responses of persons who leased rather moderate amounts of property, 1 to 80 acres (See Table 63).

TABLE 63.--Amounts of Property Leased which Increased the Conditional Probability of Approving Zoning.

Property Leased	Effect on the Conditional Probability of Approving Zoning
1-10 acres	+.06
11-40 acres	+.03
41-80 acres	+.03
321-640 acres	+.06

The responses from individuals who leased all other indicated amounts of property either detracted from the conditional probability of approval or had a zero (0) effect.

Educational Attainment is Significantly Related to Attitudes Toward Land Use Control Measures

It was hypothesized that more educated individuals would be more likely to favor land use control measures than would individuals with less education. In terms of the zoning equation the hypothesis was strongly supported. As a generality, the more educated individuals were more likely to favor zoning than less educated individuals (See Table 64).

TABLE 64.--Educational Levels which Increased the Conditional Probability of Approving Zoning.

Educational Attainment	Effect on the Conditional Probability of Approving Zoning
Less than 6 years of elementary school	+.10
Completed high school (4 years)	+.01
Vocational school or other training	+.02
College (1-3 years)	+.02
College (4 years or more)	+.06

Responses to all other educational attainment levels reduced the conditional probability of approving zoning.

Income Level is Significantly Related to Attitudes Toward Land Use Control Measures

The basic hypothesis that individuals with higher income levels would be more likely to favor land use control measures than individuals with lower incomes, was not supported by the results.

The responses which increased the conditional probability of approving zoning were generally concentrated in the mid income range, $9,001 to $25,000. Responses from individuals with higher income levels reduced the probability of approval (See Table 65).

TABLE 65.--Income Levels which Increased the Conditional Probability of Approving Zoning.

Income	Effect on the Conditional Probability of Approving Zoning
Less than $3,000	+.01
$9,001-$12,000	+.03
$12,001-$15,000	+.08
$15,001-$25,000	+.04

Population Density is Significantly Related to Attitudes Toward Land Use Control Measures

Two variables, residence location and 1960-1970 minor civil division population density change, dealing with population density were retained. The effect exhibited by both supported the basic hypothesis that greater population densities would increase the conditional probability of approving land use control measures.

In terms of residence location, an abstraction of population density, the response of an individual living in a city or village increase the conditional probability of approving zoning (+.05). Responses of individuals living in the open country side or built-up areas decreased the probability of approval (-.02).

The regression coefficient for the 1960-1970 minor civil division population density change was +.15. This meant that the greater the increase in population density during this time period, the greater the conditional probability of favoring ordinances.

Calculation of the Conditional Probability of Favoring Zoning

Through use of the variables which were retained in the weighted regression equation and the associated regression coefficient, it was again possible to calculate the conditional probability of an individual approving zoning. The minimum and maximum values were utilized in two separate equations to provide an indication of the individual characteristics which were associated with the extremes of favoring or opposing zoning.

The greatest conditional probability of favoring zoning was as follows:

$P(Y|X)$ = + .40 + .06 (sex) - .03 (occupation) + [net effect of (second occupation)] + .01 (father's occupation) + .07 (political organization participation) + .05 (other group participation) + [net effect of (political party identification)] + .07 (voting in county elections) + .14 (response to county governmental officials) - .02 (residence location) - .03 (property leased) + [net effect of (education)] + [net effect of (income)] + .15 (1960-1970 minor civil division population density change).

$P(Y|X) = +.40$ + .06 (sex:male) + .03 (occupation: sales and clerical workers, farmers, retires, housewife)

+ .11 (second occupation: professional, technical and kindred workers)

+ .03 (father's occupation: professional, technical, or kindred worker. managers, administrators, self-employed or salaried)

+ .07 (organization participation: political organization)

+ .05 (organization participation: other groups)

+ .11 (political party identification: republican)

+ .07 (voting behavior: vote in county elections)

+ .14 (response to county governmental officials: county officials responsive)

+ .05 (residence location: city or village)

+ .06 (property leased: 1-10 acres, 321-640 acres)

+ .10 (educational attainment: less than 6 years of elementary school)

+ .08 (income: \$12,001-\$15,000)

+ .08 (1960-1970 minor civil division population density change: Caseville township, Huron county + 53%)

$P(Y|X) = +1.44$

Through utilization of the greatest values associated with the retained variables, the maximum value of the conditional probability of approving zoning was calculated to be +1.44.

The lowest conditional probability of approving zoning was calculated through use of the following equation:

$P(Y|X) = +.40$

+ 0 (sex:female)

- .03 (occupation: professional, technical, and kindred workers, operatives and laborers, service workers, unemployed or handicapped)

- .40 (second occupation: unemployed or handicapped)

- .03 (father's occupation: craftsmen and foremen, operatives and laborers, farmers)

+ 0 (organization participation: do not belong to a political organization)

+ 0 (organization participation: do not belong to other groups)

- .14 (political party identification: American independent party)

+ 0 (voting behavior: do not vote in county elections)

+ 0 (response to county governmental officials: county governmental officials not responsive)

- .02 (residence location: open country side, built-up area)

- .06 (property leased: none, more than 640 acres)

- .10 (educational attainment: some high school [1-3 years])

- .11 (income: $3,001-$6,000)

- .13 (1960-1970 minor civil division population density change: Point Aux Barques township, Huron county -88%)

$P(Y|X) = -.62$

The lowest conditional probability of approving was calculated to be -.62.

The calculated values were once again beyond the range of 0 and +1 which are normally associated with conditional probabilities. However, the relative values were useful in providing an indication of both the magnitude and direction of the influence the individual variables had upon the conditional probability of approving zoning.

CHAPTER V

SUMMARY, CONCLUSIONS, LIMITATIONS, AND RECOMMENDATIONS

Summary

The study had three basic objectives:

1. To attempt to identify some of the socio-economic and physical/locational factors which were significantly related to a rural resident's attitudes toward land use control measures.

2. To attempt to develop predictive models which could be used to anticipate the attitudes of rural population toward alternative land use control measures.

3. To add to the knowledge gained in the preliminary Ionia County Study.

The study basically met the three objectives which were set forth. However the degree of success in meeting the individual objectives varied greatly. A discussion of the results in terms of the individual objectives seems appropriate.

Objective 1. Identification of Individual Characteristics which were Significantly Related to Attitudes Toward Land Use Control Measures

The study was relatively successful in identifying both socio-economic and physical/locational factors which were significant in influencing attitudes toward land use control measures. A total of 13 hypotheses, relating to individual characteristics and attitudes toward land use control measures were initially generated. The following simple matrix summarizes the variables significantly associated with specific hypotheses (see Table 66).

TABLE 66.--Variable Groupings Appearing as Being Significant in the Land Use Planning, Ordinance and Zoning Equations.

	Independent Variables Indicated as Being Significant in the . . .		
Types of Variables	Planning Equation	Ordinance Equation	Zoning Equation
Age			
Sex			X
Education		X	X
Income	X	X	X
Occupation	X	X	X
Property Controlled	X	X	X
Home Ownership			
Population Density	X	X	X
Perceived Land Use Conflicts			
Governmental Service	X	X	X
Political Party Identification		X	X
Group Participants	X	X	X
Voting Behavior	X	X	X

Examination of the matrix revealed that variables associated with three hypotheses, age, home ownership, and perceived land use conflicts, were not significant in any of the equations. Variables associated with all other hypotheses were significant in at least one of the three equations.

Why variables associated with the three hypotheses concerning age, home ownership, and perceived land use conflicts failed to be significant in any of the equations is not clear. Two of these variables, age and home ownership, had been cited by various authors as influencing attitude formation. The third variable, a perception of land use conflicts, seemed intuitively to be a logical factor which would influence attitudes toward land use control measures. Apparently, the influence of these three variables was not of nearly the magnitude which was suspected.

The ten remaining hypotheses, and the effect of the associated variables were best examined on an individual basis.

- <u>Sex would influence attitudes toward land use control measures</u>. Females would be less likely to favor land use control measures.

The sex variable appeared as being significant only in the zoning equation. In this equation, being male increased the conditional probability of favoring zoning by nearly 6%. Being female had a zero (0) effect on the conditional probability.

Since the sex variable appeared as being significant in only one equation, there is no firm basis to either accept or reject the hypothesis. However, the value of this variable in respect to predicting attitudes toward land use control measures is questionable. The fact that the variable was significant in a single equation and supported the hypothesis is a tenuous basis upon which to make decisions.

- Educational Attainment would influence attitudes toward land use control measures. More educated individuals would be more likely to favor land use control measures.

The variables associated with this hypothesis appeared in both the ordinance and zoning equations. In both equations there was a general tendency for the more educated individuals to favor both ordinances and zoning more than the less educated individuals. However, in both equations, responses from the lowest level of educational attainment (less than 6 years of elementary school) contributed positively to the conditional probability of approving land use control measures. Because of the influence of the education variables in both the ordinance and zoning equations, the hypothesis was generally supported (See Table 67).

- Income Level would influence attitudes toward land use control measures. Individuals with higher incomes would be more likely to favor land use control measures.

Variables related to income levels appeared as being significant in all three equations. The hypothesis was generally validated. In both the planning and ordinance equations, increased income levels increased the conditional probability of approving land use control measures. In the same equations, the lower income levels decreased the conditional probability of approval. In the

TABLE 67.--Effect of the Educational Attainment Variable in Respect to the Ordinance and Zoning Equations.

Educational Attainment	Effect of Variable	
	Ordinance Equation	Zoning Equation
Less than 6 years of elementary school	+.08	+.10
Completed elementary school (6 years)	-.22	-.05
Some junior high school (less than 8th grade)	+.06	-.02
Completed junior high school (8th grade)	-.05	-.03
Some high school (1-3 years)	-.08	-.10
Completed high school (4 years)	-.01	+.01
Vocational school or other training	+.09	+.02
College (1-3 years)	+.08	+.02
College (4 years or more)	+.06	+.06

zoning equation the pattern was not clear cut. Responses of individuals in the lowest income level increased the probability of approval while responses of individuals in the two highest categories reduced the probability of approval. The reason for the difference in the effect of the income variable in the zoning equation is not known (See Table 68).

- Occupation would influence attitudes toward land use control measures. Individuals with more prestigious "white collar" occupations would be more likely to favor land use control measures than individuals with less prestigious "blue collar" occupations.

TABLE 68.--Effect of the Income Variable in Respect to the Land Use Planning, Ordinance and Zoning Equations.

Income	Effect of Variable		
	Planning Equation	Ordinance Equation	Zoning Equation
Less than $3,000	-.07	-.15	+.01
$3,001-$6,000	-.07	-.09	-.10
$6,001-$9,000	-.07	-.04	-.03
$9,001-$12,000	0	+.01	+.03
$12,001-$15,000	+.07	+.03	+.08
$15,001-$25,000	+.07	+.03	+.04
$25,001-$50,000	+.07	-.04	-.01
$50,000 +	0	+.17	-.01

The variable relating to primary occupation appeared as being significant only in one equation, the zoning equation. Based on this single equation, it was impossible to clearly accept or reject the basic hypothesis of occupation influencing attitudes toward land use control measures. Again, one example of a variable being significant is a tenuous basis upon which to formulate judgments. The primary occupations which increased the conditional probability were definitely not "white collar" occupations (See Table 69).

In contrast to the appearance of primary occupation in only one equation, second occupation appeared as being significant in all three equations. The hypothesis was validated in that the two

TABLE 69.--Effect of the Primary Occupation Variable in Respect to the Zoning Equation.

Primary Occupation	Effect of Variable: Zoning Equation
Professional, technical, and kindred workers	-.03
Managers, administrators, self-employed, salaried	0
Sales and clerical workers	+.03
Craftsmen and foremen	0
Operatives and laborers	-.03
Farmers	+.03
Service Workers	-.03
Unemployed or handicapped	-.03
Housewife	+.03

second occupations which could clearly be identified as being "white collar," professional, technical, and kindred workers and office holder, both strongly increased the conditional probability of approving land use control measures. However, if a respondent's second occupation was operative or laborer or farmer, the conditional probability of approval was also increased. Generally, second occupations which were recognized as being "blue collar" detracted from the conditional probability of approval. Why second occupations validated the hypothesis and primary occupations failed to do so was not clear (See Table 70).

TABLE 70.--Effect of the Second Occupation Variable in Respect to the Land Use Planning, Ordinance and Zoning Equations.

	Effect of Variable		
Second Occupation	Planning Equation	Ordinance Equation	Zoning Equation
No response	+.14	+.10	+.13
Professional, technical, and kindred workers	+.14	+.10	+.10
Office holder	+.15	+.12	+.09
Sales and clerical workers	-.005	-.01	-.03
Craftsmen and foremen	-.005	-.01	+.11
Operatives and laborers	+.14	+.03	+.02
Farmers	+.05	+.05	+.01
Service workers	-.15	-.10	+.06
Retired	-.15	-.10	-.30
Unemployed or handicapped	-.19	-.14	-.40
Housewife	-.04	-.03	+.11

Also, classed under the general heading of occupation, was the variable related to father's occupation. While this was not occupation per se, there was a suspected relationship between a respondents father's occupation and the respondents attitudes toward land use control measures. It was felt that the environment in which the respondent was raised would be somewhat conditioned by the respondents father's occupation. It was further felt that a father's occupation and the influence it exerted on the respondent would have the same effect as was described in the hypothesis. The variable pertaining to father's occupation appeared as being significant in all three equations.

There were only five father's occupations which exhibited a consistant relationship across all three equations. Three father's occupations, craftsmen and foremen, operatives and laborers, and farmers, detracted from the conditional probability of approving zoning. This was consistent with the hypothesis pertaining to occupation. However, it was of interest to note that the farmer variable had the opposite effect in terms of father's occupation than it did in regard to either primary or second occupation. Only two father's occupations, service workers and unemployed or handicapped, were consistent in increasing the conditional probability of approving land use control measures.

In total, the attempt to relate father's occupation to a respondent's attitudes toward land use control measures was not particularly successful. The basic lack of consistency in the effect of the variable on the three equations, lead to this conclusion (See Table 71).

- The amount of property a person owns or controls would influence attitudes toward land use control measures. Possession of either small or very large amounts of property will increase the probability of favoring land use control measures.

Variables related to this hypothesis appeared as being significant in all three equations.

TABLE 71.--Effect of the Father's Occupation Variable in Respect to the Land Use Planning, Ordinance and Zoning Equations.

Father's Occupation	Effect of Variable		
	Planning Equation	Ordinance Equation	Zoning Equation
No response or decreased	+.10	-.03	+.03
Professional, technical, or kindred worker	+.007	-.03	+.03
Managers, administrators, self-employed or salaried	-.04	-.02	+.03
Sales and clerical workers	+.10	-.02	0
Craftsmen and foreman	-.12	-.07	-.03
Operatives and laborers	-.14	-.10	-.03
Farmers	-.04	-.06	-.03
Service workers	+.21	+.13	+.02
Retired	-.17	+.03	-.02
Unemployed or handicapped	+.17	+.15	+.02
Housewife	+.04	+.002	-.02

The variable related to property owned appeared in two equations, planning and ordinances. The effect of this variable indicated that the hypothesis should be tentatively rejected. The conditional probability of approving land use control measures was mainly increased by responses of persons who owned relatively small amounts of property, less than 40 acres. The responses of persons owning larger amounts of property reduced the conditional probability of approving land use control measures in nearly all cases (See Table 72).

TABLE 72.--Effect of the Property Owned Variable in Respect to the Land Use Planning and Ordinance Equations.

Property Owned	Effect of Variable	
	Planning Equation	Ordinance Equation
None	+.06	+.004
Less than 1 acre	+.06	+.08
1-10 acres	+.06	+.004
11-40 acres	0	+.04
41-80 acres	-.06	-.04
81-160 acres	-.06	-.004
161-320 acres	-.06	-.08
321-640 acres	0	+.04
More than 640 acres	0	-.04

The property leased variable appeared as being significant in all three equations. However, the action of this variable lead to the tentative rejection of the hypothesis. The results did not support the contention that persons leasing small or large amounts of property would increase the conditional probability of approving land use control measures. No real pattern emerged. Rather, the positive influence of the variable seemed to be scattered throughout the various categories (See Table 73).

- Population density would influence attitudes toward land use control measures. Individuals residing in higher population density areas would be more likely to favor land use control measures than individuals residing in lower density areas.

TABLE 73.--Effect of the Property Leased Variable in Respect to the Land Use Planning, Ordinance and Zoning Equations.

	Effect of Variable		
Property Leased	Planning Equation	Ordinance Equation	Zoning Equation
None	-.10	-.10	-.06
Less than 1 acre	-.10	0	0
1-10 acres	-.10	+.10	+.06
11-40 acres	0	0	+.03
41-80 acres	+.10	-.10	+.03
81-160 acres	+.10	0	-.03
161-320 acres	+.10	+.10	-.03
321-640 acres	0	+.10	+.06
More than 640 acres	0	-.10	-.06

Variables indicating some aspect of population density appeared in all three equations. In every instance the effect of the variables supported the hypothesis. A total of three separate variables appeared, all being significant in one or more of the equations. These variables were: 1960 minor civil division population density, 1960-1970 minor civil division population density change, and residence location. The 1960 minor civil division population density variable appeared as being significant in a single equation, the planning equation, while both the 1960-1970 minor civil division population density change variable and the residence location variable appeared in the other two equations, ordinances and zoning.

The reason for the 1960 density variable being significant was totally unknown. Both the 1960-1970 density change variable and the residence location variable acted in a manner which supported the hypothesis. The positive effect of the density change variable occurred as densities increased. The residence location variable exhibited the same effect in both the ordinance and zoning equations. In both cases the replies of respondents living in the open country side or built up areas (semi-developed rural areas) decreased the conditional probability of approving land use control measures. Replies of respondents living in cities or villages increased the probability of approval. The effect of all the population density variables validated the suspected relationship between increasing densities and increasing likelihood of approving land use control measures.

- An individual's perception of how well his local government is serving him would influence attitudes toward land use control measures. Individuals who felt they were being well served by their local government would be more likely to favor land use control measures than individuals who felt local government was not serving their interests.

The variable related to perception of local government appeared in all three equations. In each case, the effect of the variable strongly supported the hypothesis. The responses of respondents who felt county governmental officials were responsive to their needs increased the conditional probability of approving land use control measures. The responses of individuals who felt county governmental officials were not responsive had a zero (0) effect on the conditional probability of approval (See Table 74).

TABLE 74.--Effect of the Perception of Governmental Service Variable in Respect to the Land Use Planning, Ordinance and Zoning Equations.

Response to Governmental Officials	Effect of Variable		
	Planning Equation	Ordinance Equation	Zoning Equation
County officials responsive	+.10	+.13	+.14
County officials not responsive	0	0	0

- An individual's identification with a specific political party would influence attitudes toward land use control measures. Individuals who considered themselves Democrats would be more likely to favor land use control measures than individuals who considered themselves Republicans or American Independents.

The variable related to political party identification appeared as being significant in both the ordinance and zoning equations. The effect of the variable was similar in both equations. The responses of persons who considered themselves as either Democrats or Republicans increased the conditional probability of approving land use control measures. The responses of persons who considered themselves American Independents or "other" political party members decreased the conditional probability. The responses of persons who indicated they had no political party affiliations decreased the probability of approving ordinances but increased the probability of approving zoning. The hypothesis of Democrats being more likely to approve land use control measures was refuted. Instead Republicans were shown to be more receptive (See Table 75).

TABLE 75.--Effect of the Political Party Affiliation Variable in Respect to the Ordinance and Zoning Equations.

Political Party Affiliation	Effect of Variable	
	Ordinance Equation	Zoning Equation
Democrat	+.07	+.08
Republican	+.11	+.11
American Independent	-.09	-.14
Other	-.12	-.13
None	-.02	-.08

A basic relationship was exhibited. Persons considering themselves members of the two larger established political parties were in favor of land use control measures. Members of lesser political parties opposed land use control measures, while people with no political affiliation were inconsistent.

- Participation in various types of groups would influence attitudes toward land use control measures. Individuals belonging to groups which were considered "conservative" would be less likely to favor land use control measures than individuals belonging to "liberal" groups.

These hypothesis was, at best, ill conceived. The attempt to ascribe "liberal" or "conservative" labels to groups was totally without foundation. It would have been sufficient to say that group membership would influence attitudes toward land use control measures and then describe the results.

Some dimension of the organization participation question appeared as being significant in all three equations. However, membership in a single group did not appear as being significant across all three equations. Membership in a farm organization, political organization, and "other groups" all appeared as being significant in two of the three equations (See Table 76).

TABLE 76.--Effect of the Group Participation Variable in Respect to the Land Use Planning, Ordinance and Zoning Equations.

	Effect of Variable		
Group Participation	Planning Equation	Ordinance Equation	Zoning Equation
Farm Organization	+.08	+.09	--
Political Organization	+.11	--	+.07
"Other Group"	--	+.05	+.05

In all cases the effect of the group participation variable was positive and increased the conditional probability of approving land use control measures. Speculation could be made about the reasons for members of farm organizations favoring land use control measures, but speculation as to why members of political and "other" organizations favored land use control measures would be absurd. The only conclusion which could be drawn, was that membership in various groups did have an effect on favoring land use control measures, but there was no basis for speculation as to the effect that membership in the various groups exerted.

- Participation in local elections would influence attitudes toward land use control measures. Individuals with high voting participation rates in local elections would be more likely to favor land use control measures than individuals with low voting participation rates.

Once again, some dimension of this hypothesis appeared in each of the three equations. However, a different variable appeared in each of the three. The results generally supported the hypothesis in that voting participation increased the conditional probability of approving land use control measures (See Table 77).

In summary, the study was successful in identifying a number of socio-economic and physical/locational factors which were significantly related to attitudes toward land use control measures. However, several individual characteristics which have traditionally been thought to be associated with voting behavior, i.e. age and homeownership, failed to be significant. Also, in respect to the variables which were significant, some issues were raised as to their interpretation. Specific variables related to individual characteristics often did not act in a consistent fashion across

TABLE 77.--Effect of the Voting Behavior Variable in Respect to the Land Use Planning, Ordinance and Zoning Equations.

Voting Behavior	Effect of Variable		
	Planning Equation	Ordinance Equation	Zoning Equation
General Voting Behavior			
Did not vote in elections (0% of elections)	-.06	--	--
Vote in some elections (1-50% of elections)	-.06	--	--
Vote in most elections (51-99% of elections)	+.06	--	--
Vote in all elections (100% of elections)	+.06	--	--
Vote in local elections	--	+.07	--
Vote in county elections	--	--	+.07

all three equations. The same class within a variable would have an opposite effect within individual equations. In most cases, the relationship between a specific individual characteristics and the approval of land use control measures was complex rather than simple. Perhaps the single statement which could be made was that the study did identify individual characteristics which were statistically related to attitudes toward land use control measures but the exact nature of the relationship was unclear in many cases.

Objective 2. Development of Predictive Models which could Anticipate the Attitudes of Rural Population Toward Alternative Land Use Control Measures

The study was somewhat successful in respect to developing predictive models which could anticipate the attitudes of rural population toward alternative land use control measures. It was shown that the techniques employed could generate models which would provide the conditional probability of approval of specific land use control measures. However, the degree of predictability provided by the models left a great deal to be desired.

All three models had low coefficients of determination (R^2). The R^2 for the land use planning model was only .1259. This meant that slightly more than 12% of the variation in the dependent variable, approval or disapproval of land use planning, was associated with independent variables. The R^2's for the ordinance and zoning models were also low. The ordinance model's R^2 was .1579 while the zoning model's R^2 was .1520. Thus, in all three models the amount of variation in the dependent variable associated with the independent variables was very low.

The low coefficients of determination generated by the three models indicated that in all cases the degree of successful prediction was low. A degree of predictability in the neighborhood of 15% is a tenuous basis upon which to make assumptions or decisions.

Combined with the low coefficients of determination were relatively large residuals ($y-\hat{y}$). This meant that the equations were not generating accurate estimates of the dependent variables. This was due in part to the nature of the dependent variables in each of the three models. In each case the dependent variable was discreet rather than continuous and the dependant variables were also dichotomus, 0-1 variables. Given these restrictions, it was to be expected that the residuals generated by the predictive equations would be large. Also, the large residuals would account for the low R^2's, the percentage of the variation in the dependent variable associated with the independent variables.

Taken at face value, these aspects of low R^2's and large residuals seem to indicate practically worthless predictive equations. However, another aspect of the statistical analysis illuminates a completely different aspect. In each of the three predictive equations the F test statistic has a significance of < 0.0005. The F value represents the ratio of the explained variance to the unexplained variance adjusted for the degrees of freedom lost. The F ratio is used to describe coefficients that may be expected to occur by chance alone among samples of uncorrelated data. Very simplistically, the F ratio provides an indication of whether or not the relationship between the dependent variables and the independent variables in the equations could have occurred by chance rather than because of some basic underlying relationship. The F ratio of < 0.0005 indicated that such relationships should be expected to occur by chance less than 5 times out of 10,000. The F test showed that while there was a relatively weak relationship between the variation in the dependent variable as associated with the independent variables, the variation associated with the independent variables did not occur by chance. The F test ratio showed that there was a definite relationship between the dependent and independent variables.

How then are the statistical results generated by the predictive equations to be interpreted and utilized? The equations illustrated the relative increase or decrease which each significant independent variable contributed to the conditional probability of approving land use planning, ordinances to enforce plans, or zoning ordinances. The regression coefficients generated by the equations illustrated the relative importance of the significant independent variables. The absolute quantitative contribution of the significant independent variables was suspect because of the violation of the 0-1 parameters established for conditional probabilities.

Thus, the models proved capable of generating predictions of approval of various land use control measures. However, the predictions were valid in a relative sense rather than an absolute quantitative sense.

It was also hoped that the study would identify variables which could be gathered from secondary data sources for use as inputs into the predictive models. This hope was not totally realized. A number of the variables which were identified as being significant are unobtainable from secondary sources and must be gathered by personal interview or questionnaire. Individual characteristics such as second occupation, father's occupation, perception of governmental service, and group participation all proved to be significant, but they are unobtainable from secondary sources.

This inability to collect data relating to many significant variables from secondary sources greatly reduces the usefulness and applicability of the predictive models. The effort required to gather much of the data related to significant variables could just as easily be spent in an attempt to directly ascertain individual views on the specific issues in question.

Objective 3. Add to the Knowledge Gained in the Preliminary Ionia Study

The study was very successful in this respect. Not only were more individual characteristics identified as influencing attitudes toward land use control measures, but new techniques were developed with which to deal with the data.

The preliminary Ionia Study must be recognized for what it was, an initial effort toward identifying individual characteristics related to influencing attitudes toward land use control measures. The Ionia Study was, for all intents and purposes, crude in nature. Very few individual characteristics were identified and utilized in the preparation of the predictive equations. This study utilized the preliminary knowledge gained in the Ionia Study as a point of departure and amplified it to a great degree.

The predictive equation generated from the Ionia Study presented in Chapter III illustrates the rudimentary nature of the initial research efforts. Very few independent variables were utilized in this equation which sought to ascertain an individual's opinion on the location of additional housing within the county. The small number of independent variables was in part due to the restrictions which had been placed upon data collection. But just as importantly, the small number of independent variables was also dictated by the lack of a conceptual framework upon which to base rational or directed data collection. The independent variables utilized in the Ionia Model were rudimentary relating only to:

Occupation

Age

Location of additional mobile homes

Location of additional shopping

Location of additional industry

Attitude toward the timing of the implementation of zoning ordinances

Township population density

These variables represented a curious mix of characteristics related to the individual and attitudes which were most likely conditioned by individual characteristics. Only two of the variables utilized could be classified as individual characteristics, age and population density. The other independent variables were really attitudinal measures which were most likely strongly interrelated. This curious mixture of characteristics and attitudes illustrated the failure to develop a logical conceptual base for the study.

As opposed to this error in conceptual logic, this study carefully selected independent variables which were measures of individual characteristics and perceptions. It was hoped that in this manner, the mixing of characteristics and strongly related attitudes would be avoided. It is thought that this effort was basically successful. While it is true that some of the independent variables utilized were proxies for basic underlying values, there seemed to be no independent variables utilized which were measurements of attitudes. This represented a major step in terms of conceptual design over the previous study.

Numerous relationships between individual characteristics and attitudes pertaining to land use control measures were identified in the course of this study. The illumination of these statistically significant relationships must be recognized as a contribution to the subject area of the relationship between individual characteristics and attitude formation.

The methods utilized in the preliminary Ionia Study were somewhat unique in this type of research. Conditional probability models are typically not utilized in this type of research. Again, in respect to the Ionia Study, the methods utilized must be recognized as being preliminary and rudimentary. The model developed, utilizing a number of dummy variables, was an initial step toward the more sophisticated modeling procedures used in this study. The dummy independent variables utilized in the Ionia Study were in a simple dichotomous form. Because of this, interdependent comparisons between various levels or classes of specific independent variables were basically impossible. The technique utilized in the course of this study involved the development of matrices relating to the dummy variables which were being used. These matrices allowed for inter-dependent comparisons within the dummy variable systems. This modeling technique represents a much greater level of sophistication than was present in the preliminary

Ionia Study. The net result of the method utilized in this study is the refinement of a technique which has not been traditionally utilized in this type of research, the development of conditional probability models incorporating inter-dependent comparisons within dummy variable systems.

It is hoped that this study could stimulate other studies which would refine both the knowledge gained and the techniques utilized.

Conclusions

A number of basic conclusions were drawn from the study in respect to both the subject area and the methods area.

In reference to the subject area, the study was successful in illuminating linkages between an individual's socio-economic characteristics and attitudes pertaining to land use control measures. This alone made the study worthwhile because of the basic knowledge which was gained in respect to the complex field of attitude formation. However, at the same time it was found that the relationship between significant socio-economic variables and attitudes was far from simple. It would not be an overstatement to say that the nature of the relationships appears to be exceedingly complex. Many variables which were thought to explain attitude formation and resulting voting behavior failed to appear as being significant in the context of this study. Other variables which were thought to be relatively insignificant in respect to attitude formation proved to be extremely significant as a result of the statistical analysis. To compound this situation, identical variables did not act the same, in both degree and direction, across the three equations.

The variable which contributed the most to increasing the conditional probability of approving land use control measures was the one which dealt with an individual's perception of governmental service. In all three equations, if the respondent felt he was being well served by local government, the probability of approving land use control measures greatly increased. This single variable was the greatest contributing factor to approval in all three equations. To a lesser degree, the population density variable and the voting behavior variable acted in the same manner. Increased population densities and increased voting participation rates both increased the probability of approving land use control measures in the three equations.

These three variables were the only ones which acted in a clear and consistent manner in all three equations. Other variables which had traditionally been related to voting behavior acted in a basically inconsistent manner. Variables such as education, income and occupation did not prove to be consistent in either direction or magnitude in the three equations. Additionally, the sex variable appeared as being significant in only a singe equation and the age variable failed to be significant in any of the three equations.

There are many possible explanations for the behavior of the socio-economic characteristics which were transformed to variables for the conduct of this study. However, two possible explanations appear to be the most plausible and rational at this time. The first deals with the context of the study while the second relates to what was attempted to be measured.

In terms of study context, it appeared logical to assume that voting behavior was a logical surrogate for attitudes pertaining to land use control measures. This was perhaps an invalid assumption. It was perhaps wrong to assume that variables would react identically in differing contexts. In retrospect it is obvious that voting behavior in general should not be equated directly with issue specific attitude formation which could or could not result in voting on that issue. In the basic study design, there was perhaps, an error of generalization. However, there is the possibility that the previous research which was used as the basis for this study has become dated. It appears plausible that the results of research conducted even a short time ago could quickly become dated and obsolete. It has yet to be proven that there are "basic laws" in respect to human behavior. Human behavior must be viewed as a dynamic entity rather than a static one. Therefore, past studies may have relected "truth" at that point in time but may now not reflect reality. Changing conditions and the pressures, roles and perceptions influencing the individual may quickly generate radical shifts in human behavior. Because of this, there is a chance that the behavior of socio-economic characteristics in the context of this study represents the "truth" of the moment. Perhaps the results generated by this study represent a truer reflection of the role of socio-economic conditions than did studies conducted several years ago.

Secondly, a problem existed in respect to what was actually being measured vis a vis what was being attempted to be measured. In most cases the independent variables which appeared to be significant were proxies for more basic values which could not, in the context of this study, be directly measured. The basic conceptual issue, expressed in simplistic terms, was the respondent's view of government in our society. An attempt was made to ascertain an individual perception of the governmental role in society pertaining to land use control measures through a series of indirect indicators. It was hoped that indirect indicators in the form of socio-economic characteristics would illuminate an individual's perception of the governmental role in respect to land use control measures. This could have been too simple an approach to an extremely complex problem. Encompassed in this generalized approach was an attempt to synthesize the entire value system of an individual which is the basic element in an individual's decision making process. Perhaps the study was overly ambitious. It will depend upon further research to establish whether or not this study was aimed conceptually in the proper direction.

The contribution made in the methods area must be considered important.

The study elaborated on the preliminary modeling efforts of the Ionia Study. Extensive knowledge was gained both in respect to the utilization of dummy variables and the construction of inter-dependent comparisons within dummy variables systems. The refinement of the utilization of fairly sophisticated dummy variable techniques will contribute greatly to the analytical capabilities in similar types of research. Techniques utilized in this study illustrate the capability of quantifying what is essentially nominal data for regression analysis. This capability greatly expands the utilization of quantitative analysis into areas which were often devoid of relatively high powered statistical analysis.

However, it must also be noted that the results generated by the statistical analysis were not always easy to interpret. The exact meaning of conditional probabilities whose values were less than 0 and greater than +1 are not completely clear. While conditional probabilities in excess of the normally specified ranges seem to be logical in a relative sense, they have little meaning in an absolute sense. This property of the conditional probabilities ranging beyond the normally accepted values may limit the application of the technique utilized in the study. Until the questions and problems raised by the excessive conditional probability values are answered, this technique should be used with caution.

Limitations

It was fully recognized that the study contained several limitations which restrict the general applicability of the results. The recognized limitations include:

1. The study was conducted in just a three county area. The limited areal extent of the data collection restricts the application of the results. A three county sample cannot be construed as being representative of the entire rural population of Michigan, let alone the entire rural population of the United States. The counties utilized as a data base differed greatly from many other rural areas of Michigan and the United States. Obvious differences such as economic structure, relationship to urban areas, population density, and age structure of the resident population are easily observable and in many cases self evident. However, more subtle differences also exist which are not nearly as evident and were not considered in the conceptual design of the study.

No consideration was given to aspects such as race, ethnic or national heritage of the resident population. There is no doubt that these facets of the resident population would have a bearing on the formation of an individual's attitudes and perceptions. The political climate in an area would also influence attitude formation. A rural area with pervasive paternalistic political and economic systems would condition very different attitudes toward land use control measures than would a rural area with a strong tradition of individual independence in respect to politics and livelihood. An individual's perceptions and attitudes are obviously conditioned in part by his heritage, social position, perceived role in society and the local political and economic systems. Since these aspects have different manifestations and vary greatly, dependent upon geographic location, there is no way the population of three counties in Michigan could be considered representative of the entire rural population of the United States.

2. Data were collected through use of a mailed survey questionnaire. Inherent weaknesses of mailed surveys also limited the validity of the study. Questionnaire bias and ambiguous questions were two items which are evident when mailed questionnaires are being utilized. It was hoped that careful development of the questionnaire and a pre-test would eliminate the majority of bias and ambiguity which would be inherient in the questionnaire.

Also, the strata of the population answering the questionnaire was an issue to be considered. There was no certainty that all segments of the population would take the time and effort required to complete and return the questionnaire. The age, educational level, income level, etc., of the surveyed population would have a bearing on the completed questionnaire return rate. This concern was shown to be valid by the telephone non-respondent follow-up to the mailed survey. Significant socio-economic differences between those who completed and those who failed to complete the questionnaire were shown to exist. Differences in respect to age, sex, occupation, education, and income were evident. This meant that only particular strata of the population within the study area were sampled. In this respect, the information generated from the returned questionnaires was biased. Therefore, questions as to the overall validity of the research effort may be raised.

3. The completeness of the sampling frame was questionable. The sampling frame for the study was a series of telephone listings for the study area. While it had been indicated that 90-95% of the area's households had telephone service, the correctness of this estimate of level of service was never verified. Therefore, it was possible that substantially fewer households had telephone service. If this was the case, the sampling frame could have conceivably provided a much less complete enumeration of households than was thought. This problem is compounded by the probability that households without telephones most likely have similar socio-economic characteristics. If this is the case, an entire subset of the population could be overlooked as a result of using telephone directories as a sampling frame.

Additionally, the telephone listings for the study area were seriously out of date. It was found that some listings were two years old. This would not create major problems in a relatively static area, but would result in major sampling errors in an area of dynamic growth. In a growth area, new listings would not be contained in outdated telephone listings. Therefore, the sampling frame would not contain a major subset of the resident population.

However, even with these mentioned weaknesses, it is felt that telephone listings, if they are utilized with caution, provide a better and less expensive enumeration of resident population than other techniques which are currently utilized.

4. The study was conducted during a single point in time. Opinions expressed by residents were more than likely a reflection

of both local and national issues which were developing and existent at the time of the study. Individual attitudes are developed, in part, as a result of an individual's perception of the society around him. This is true in regard to societal conditions on the macro level (national society) and the micro level (local society).

When the survey for this study was conducted, the national society was in a state of upheaval. The Vietnamese War was concluding, political scandel was rocking the White House, and the energy crisis was being given a great deal of publicity. What effect this had on an individual's perception of society and the future of society is pure speculation. Perhaps these events conditioned individuals to view the future in a pessimistic rather than optimistic fashion. If this were the case, then an individual's attitudes toward land use control measures could be markedly different than if the individual had an optimistic perception of the future. The same concept could hold true on the micro or local level. If local politics were in turmoil or if certain local issues had helped to create strong individual opinions and attitudes, an individual's attitudes toward land use control measures could be temporarily colored to reflect local conditions.

Therefore, it is recognized that studies conducted during a single point in time may not truely reflect long run perceptions and attitudes.

5. A complete understanding of the relationship between the selected socio-economic variables and the attitudes which were

being attempted to be measured was lacking. It would not be worthwhile at this time to belabor the point that it is very possible that the independent variables which were being utilized were merely proxies for more basic underlying values which could not be directly measured. This is illustrated by the retention and behavior of certain independent variables in the three models. As was mentioned before, the behavior of certain independent variables was difficult to explain. A much greater understanding of the relationship between a number of the independent variables and the attitudes which were being projected is necessary before the results of this study may be accepted at face value.

6. The literature reviewed for this study was mainly related to partisan voting behavior. The majority of the case studies investigated dealt with issues which could be interpreted as being decided along party lines. In the past few years party distinctions are no longer clear cut, party lines have become blurred and many issues taken to the electorate often cannot be decided on a party basis. A case in point is the series of issues, primarily in western states, which concern environmental issues and problems. It is likely that party, and the classic determinates of party affiliation, have little influence on the outcome of these referendums. This may well be the case with issues dealing with land use control measures. New dimensions of voter attitude formation may be surfacing. If this is fact, then the creation of hypotheses based on the previous notions of the determinates of voting behavior may not have been the appropriate approach.

Hypotheses based on the recent literature related to non-partisan voting behavior may be more appropriate to this type of study.

Recommendations

In recognition of the mentioned limitations and other issues which were raised during the conduct of the study, it is hoped that additional research could be conducted in this general subject area. Additional research could do much to clarify many of the relationships which were exposed during this study. Specific recommendations are:

1. Based on the knowledge gained during the course of this study, conduct similar studies in a different geographic area. By shifting the study location it would be possible to test the results in a different setting. A different study location could contribute a great deal toward minimizing the regional cultural impact upon the respondent's attitudes toward land use control measures. Selection of a new study area would provide the opportunity to choose an area of the United States which exhibited a markedly different set of characteristics than were exhibited in the Michigan study area. A rural area could be selected which had a different type of economic base, political climate, etc. Through this process, it would likely be possible to gain some indication as to the impact that regional cultural characteristics exerted upon and individual's attitudes toward land use control measures.

Additionally, a new study area could be selected within which the resident's individual characteristics differed greatly from those of the original study area. A resident population could be selected which was essentially different in terms of income, age, race, educational level, occupation, etc. This would provide a mechanism through which to judge the effects of differing population characteristics upon attitudes toward land use control measures.

Also, a study could be conducted in an area which was essentially outside the influence of a major urban area and hopefully not subject to developmental pressures. The selection of such a relatively static area would provide a measurement of attitudes concerning land use control measures which was free of a sense of immediacy. This would provide yet another dimension toward the understanding of what conditions an individual's attitudes toward land use control measures.

Essentially, through shifting the study area to accomodate differing regional characteristics and population characteristics, it would be possible to alter the constructs of the original study. The results of the original study could be utilized in a manner similar to that of a control group in psychological research. Deviations from the results of the original study could hopefully be partially explained by the different setting, cultural climate, and differing population characteristics which existed during the conduct of subsequent studies. The present study could be used as a benchmark or point of calibration from which to judge the suspected effect of other aspects of attitude formation.

Hopefully, additional research into this subject area will support the validity of this study in terms of both subject area and methodology.

2. <u>Conduct a study in a different time frame</u>. Sequential studies conducted in an area would partially answer the question of what effect pervasive national and local issues have upon attitude formation in respect to land use control issues. As mentioned previously, the national mood was one of turmoil when the survey for this study was conducted. Perhaps a differing national climate would have resulted in very different attitudes being reflected by the respondents. This could also be true in terms of pressing local issues. Perhaps the respondent's attitudes would be very different in a different time frame.

Sequential studies related to differing national and local moods would contribute greatly toward understanding how these cyclic phenomenon affect attitude formation, both generally and specifically in the context of land use control measures.

Sequential studies would also reflect how the transition of an area affected an individual's attitude toward land use control measures. Through using the original study as a benchmark, it would be possible to observe the effect change produced in respect to attitude formation. The original study would serve as a point of departure from which to document and measure change.

By controlling both geographic-cultural and temporal effects in subsequent studies, it would be possible to gain a great deal of insight into the effect these two phenomenon have upon the process of attitude formation.

3. <u>Conduct a study in an area which is about to experience a zoning or land use control referendum</u>. One of the major objectives

of this study was an attempt to develop predictive models which would anticipate an individual's attitudes toward land use control measures. The predictive models were developed but there is presently no linkage between models and reality. An investigation conducted in an area which was about to conduct a referendum in relation to land use control measures would perhaps forge the link between model and reality. The results generated by the models must be considered pure speculation before they are tested in real world conditions.

The test related to the validity of the models would, by necessity, be gross measures. An areal unit as small as possible would be selected. This would be the smallest areal unit for which votes could be tabulated. This areal unit in rural areas would most likely be an individual town or township. Data collection would be based conceptually upon the independent variables which were shown to be significant in the model which related to the specific issue which was the subject of the referendum. The population would then be divided into generally similar subsets based on criteria established by the independent variables. Subsets of population would therefore be defined by levels established by the individual independent variables. Probability statements regarding the acceptance or rejection of the land use issue in question could be generated for each population subset. Once these were established, an aggregate probability statement regarding the acceptance or rejection of the issue could be established based on the relative size of each population subset in relation to the total population.

After the referendum, the generated probability statement relating to the acceptance or rejection of the issue could be compared with the actual results of the voting. The direction and magnitude of the probability statement when compared to the actual vote would provide a basis upon which to generally validate or reject the model and the entire process.

The entire procedure as outlined would be far from simple to conduct. Data collection would be a major problem in that many of the significant independent variables are only available from primary sources. If data were collected from secondary sources, the resulting models would be truncated and much less effective than the original models. The generation of conditional probability statements based on population subsets would be imprecise to say the least. The same problem would exist in creating the aggregate probability statements.

Basic problems arise from attempting to utilize a model geared to the individual for an aggregate purpose. However, if this process was successful, it would provide another tool to enhance decision-makers' capabilities.

4. <u>Promote further research into the suggested relationships between specific socio-economic characteristics and attitudes toward land use control measures</u>. Many of the relationships between specific socio-economic characteristics and attitudes toward land use control measures were unclear or perhaps even spurious. It is

obvious that additional research pertaining to the relationship between individual characteristics and issue specific attitudes is required. Most variables used in this study were related to voting behavior which was a surrogate for what was actually under investigation. This approach was predicted by the lack of information relating to attitudes and the issue under investigation, land use control measures. Perhaps the use of a surrogate resulted in the choosing of some inappropriate independent variables. However, significant relationships were found. In this respect this study may be viewed as a preliminary step in the direction of establishing proven relationships between certain socio-economic characteristics and attitudes related specifically to land use control measures.

The tenuous nature of the illustrated relationships should prompt further investigation in this subject area. Such research would hopefully clarify questions which have been raised or suggest new characteristics which would generate additional independent variables which could be utilized in successively more sophisticated and accurate models.

5. <u>Create hypotheses based on investigation of nonpartisan voting behavior</u>. Literature is becoming available concerning the voting behavior of individuals in respect to nonpartisan issues. The recent literature dealing with nonpartisan referendums, connected with primarily ecological issues, should provide new insights into individual's voting behavior. Research into these types of issues

would perhaps open new avenues of investigation. Investigation in the realm of nonpartisan voting patterns could possibly lead to the generation of new hypotheses which would better fit the requirements of a study such as this. Perhaps, a great deal of knowledge could be gained which would more clearly illuminate the relationship between an individual's socio-economic characteristics and attitudes toward land use control measures.

6. Promote further research into the techniques utilized in this study. Techniques utilized in this study were relatively sophisticated and unique in this type of research. Because of this, results did not lend themselves readily to interpretation. Additional research and refinement is necessary in order that these techniques, particularly the complex dummy variable technique, may be utilized to their fullest potential in subsequent research. Hopefully, this preliminary effort with respect to the techniques will prompt further utilization and expanded application of similar techniques in related studies.

The preceeding recommendations have been made primarily in response to the recognized limitations of the study. The study must be recognized for what it is, a preliminary step in terms of both subject area investigation and analytical techniques. It is hoped that the findings of this study will stimulate additional research in regard to both subject and technique. It is additionally hoped that subsequent research will validate the findings and conclusions which resulted from this study.

As a final note, an assessment must be made as to the value of this study to the practitioner. What value has this study to the person who is actually dealing with land use control issues? It has been carefully stated in the text that many of the relationships between socio-economic characteristics and attitudes toward land use control measures, which were shown to be significant, were tenuous in nature. Therefore, the predictive models which were developed are not yet ready for actual practical application. The models must be viewed as preliminary and their value lies in the potential development of new methods of anticipating or understanding an individual's attitudes toward land use control measures. Through the knowledge gained in this study the practitioner has perhaps gained new insights into the complex relationships between socio-economic characteristics and attitudinal formation. Perhaps some previously held misconceptions will be removed and efforts may now be concentrated toward more productive and fruitful ends.

BIBLIOGRAPHY

BIBLIOGRAPHY

Ackoff, Russell. Scientific Method. New York: John Wiley & Sons, Inc., 1962.

Adrain, Charles R. "A Typology for Nonpartisan Elections." Western Political Quarterly, Vol. 12 (1959).

Alford, Robert R. Party and Society. Chicago: Rand McNally & Company, 1963.

Alford, Robert R. and Scoble, Harry M. Bureaucracy and Participation: Political Cultures in Four Wisconsin Cities. Chicago: Rand McNally & Company, 1969.

Barlowe, Raleigh. Land Resource Economics. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1958.

Beal, Calvin L. "Rural Depopulation in the United States: Some Demographic Consequences of Agricultural Adjustments." Demography, Vol.1, No. 1 (1964). 264-72.

Berry, Brian J. L. and Marbel, Duane F., Ed. Spatial Analysis. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1968.

Blalock, Hubert M., Jr. Social Statistics. New York: McGraw-Hill Book Company, 1960.

Bonjean, Charles M.; Clark, Terry N.; and Linberry, Robert L., Ed. Community Politics. New York: The Free Press, 1971.

Brogan, D. W. Politics in America. New York: Harper & Brothers Publishers, 1954.

Brunn, Stanley D.; Hoffman, Wayne L.; and Romsa, Gerald H. "The Youngstown School Levies: A Geographical Analysis in Voting Behavior." Urban Education, Vol. V, No. 1 (April, 1970), 20-52.

Burdick, Eugene and Brodbeck, Arthur J., Ed. American Voting Behavior. Glencoe, Illinois: The Free Press, 1959.

Campbell, Angus; Converse, Philip E.; and Miller, Warren E. The American Voter. New York: John Wiley & Sons, Inc., 1960.

Campbell, Angus; Gurin, Gerald; and Miller, Warren E. The Voter Decides. Evanston, Illinois: Row Peterson & Company, 1954.

Chao, Lincoln L. Statistics: Methods and Analyses. New York: McGraw-Hill Book Company, 1969.

Chappelle, Daniel E. Financial Maturity of Eastern White Pine in New York State. Syracuse, New York: Syracuse University, College of Forestry, 1966.

Christenson, James A. "A Procedure for Conducting Mail Surveys with the General Public." Paper presented at the annual Meeting of the Community Development Society, Wilmington, North Carolina, August 7, 1974.

Crapo, Douglas M. "Recreational Activity Choice and Weather: The Significance of Various Weather Perceptions in Influencing Preference for Selected Recreational Activities in Michigan State Parks." Unpublished Ph.D. Dissertation, Michigan State University, 1970.

Draper, N. R. and Smith, H. Applied Regression Analysis. New York: John Wiley & Sons, Inc., 1966.

Ezekiel, Mordecai and Fox, Karl A. Methods of Correlation and Regression Analysis. New York: John Wiley & Sons, Inc., 1959.

Flanigan, William H. Political Behavior of the American Electorate. Boston: Allyn & Bacon, Inc., 1968.

Florence, P. Sargant. The Statistical Method in Economics and Political Science. New York: Harcourt Brace & Company, 1929.

Goldberger, Arthur S. Econometric Theory. New York: John Wiley & Sons, Inc., 1964.

Gosnell, Harold F. Grass Roots Politics. New York: Russell & Russell, 1942.

________. Machine Politics Chicago Model. 2nd ed. Chicago: The University of Chicago Press, 1968.

Hamilton, David A., Jr. Event Probabilities Estimated by Regression. Ogden, Utah: United States Department of Agriculture, Forest Service, 1974.

Hawley, Willis D. and Wirt, Frederick M., Ed. The Search for Community Power. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1968.

Horton, J. and Thompson, F. R. "Powerlessness and Political Negativism: A Study of Defeated Local Referendums." American Journal of Sociology, 68 (March, 1962), 485-493.

Kelley, Francis J.; Beggs, Donald L.; McNeil, Keith A.; Eichelberger, Tony; and Lyon, Judy. Multiple Regression Approach. Carbondale, Illinois: Southern Illinois University Press, 1968.

Key, V. O., Jr. Politics, Parties, and Pressure Groups. New York: Thomas Y. Crowell Company, 1958.

Kimball, Solon T. "A Case Study in Township Zoning." Michigan Agricultural Experiment Station Quarterly Bulletin, 28, No. 4 (May, 1946).

King, Leslie J. Statistical Analysis in Geography. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1969.

Kmenta, Jan. Elements of Econometrics. New York: The MacMillan Company, 1971.

Lang, Kurt and Lang, Gladys Engel. Voting and Non-Voting. Waltham, Massachusetts: Blaisdell Publishing Company, 1968.

Lazarsfeld, Paul F.; Berelson, Bernard; and Gaudet, Hazel. The People's Choice. New York: Columbia University Press, 1948.

Lee, Eugene C. The Politics of Nonpartisanship. Berkeley: University of California Press, 1960.

Lipset, Seymour Martin. Political Man. Garden City, New York: Double Day and Company, Inc., 1960.

Lipset, Seymour Martin and Rokkan, Stein, Ed. Party Systems and Voter Alignment. New York: The Free Press, 1967.

Lockard, Duane. The Politics of State and Local Government. New York: The MacMillan Company, 1963.

Mauch, Arthur. "Land Use in a Changing World." Land Use in Michigan. (Extension Bulletin 610, Natural Resources Series.) East Lansing, Michigan: Michigan State University Cooperative Extension Service, 1969.

Olson, David M. Nonpartisan Elections: A Case Analysis. Austin, Texas: The University of Texas, 1965.

Pattanaik, Prasanta K. Voting and Collective Choice: Some Aspects of the Theory of Group Decision Making. Cambridge: The Cambridge University, 1971.

Picard, Giles and Juneau, Albert. A Sociological Study of Agricultural Change in the Pilot Region (BAEQ). Ottawa: Canada Department of Forestry and Rural Development, Queens Printer and Controller of Stationary, 1968. ARDA Condensed report CR-No. 15.

Pomper, Gerald. "Ethnic and Group Voting in Non-Partisan Municipal Elections." The Public Opinion Quarterly, Vol. 30 (1966).

Snedecor, George W. Statistical Methods. Ames, Iowa: The Iowa State College Press, 1968.

Spicer, Edward H., Ed. Human Problems in Technological Change. New York: John Wiley & Sons, Inc., 1952.

Sweeney, Robert E. and Ulveling, Edwin F. "A Transformation for Symplifying the Interpretation of Coefficients of Binary Variables in Regression Analysis." The American Statistician, Vol. 26, No. 5 (December, 1972).

Wonnacott, Ronald J. and Wonnacott, Thomas H. Econometrics. New York: John Wiley & Sons, Inc., 1970.

________. Michigan State University, Division of Research, Graduate School of Business Administration, Michigan Statistical Abstract, Comp. David I. Verway (9th Ed.) East Lansing: Michigan State University, 1972.

________. County and Regional Facts, State Planning and Development Region 7, William J. Kimball Coordinator, Michigan State University, Cooperative Extension Service, 1974.

________. U.S. Department of Commerce Bureau of the Census, General Population Characteristics Michigan, PC(1)-B24 Mich., 1970 Census of Population.

________. U.S. Department of Commerce Bureau of the Census, General Social and Economic Characteristics Michigan, PC(1)-C24 Mich. Social and Economic Statistics Administration 1970 Census of Population.

________. Preliminary Documentation, MSU STAT System (6500) May 17, 1972, Part 12, LSSTEP Program.

APPENDIX

COOPERATIVE EXTENSION SERVICE
Michigan State University

U. S. Department of Agriculture
and Ionia County Board of Commissioners Cooperating

Ionia County Extension Service
Courthouse - Ionia, Michigan
Phone 527-1400 Zip:48846

January 13, 1971

Dear Ionia County Resident:

We need your responses to the following questions for a public opinion survey. This information will help local leaders know your feelings and thoughts on planning and development issues in Ionia County.

Your personal opinions will be confidential, and your name is not necessary for this survey. Please return the completed questionnaire in the enclosed envelope by January 25th. (no postage is necessary). Your responses will be very useful in guiding our Extension educational programs. If you have any questions contact me at 527-1400.

Thank you for your cooperation.

Sincerely,

Wm. S. Pryer

William S. Pryer
County Extension Director

WSP:dg

P.S. Even if you previously filled out a single page survey, please complete the enclosed survey as it has been significantly revised.

LAND USE GOALS SURVEY

Ionia County

(Read all questions before marking any. Answer in terms of your county.)

I. General Information

A. Your Township ______________________________
B. Male ______ Female ______
C. Your occupation(s): ______________________________________
D. Years lived in county _______
E. Age _____.

II. Agricultural Goals

A. Do you feel that there are any conflicts between agricultural and other land uses? Yes _____ No _____ don't know ______.
B. Do you feel that good agricultural lands should be protected? Yes _____ No _____ don't know _____

III. Residential Goals

A. Do you feel that more housing would be desirable? Yes _____ No _____ don't know _____
B. If more housing were added which would you prefer?
_____ no preference
_____ mobile homes
_____ single family homes
_____ apartments
_____ don't know

C. If more single family, non-farm residences are added, where would you prefer they be located?
_____ no restrictions on location (anywhere)
_____ large rural lots
_____ rural subdivisions
_____ subdivisions adjacent or within villages and cities
_____ don't know

D. If more mobile homes are added, which location would you prefer?
_____ no restrictions on location (anywhere)
_____ rural mobile home parks
_____ mobile home parks adjacent to or within villages and cities
_____ don't know

IV. Shopping and Service Goals

A. Do you feel that more shopping and service facilities are desirable? Yes _____ No _____ don't know_____ _____

B. If more shopping and service facilities were added, where would you prefer they be located?

_____ no restrictions on location (anywhere)

_____ downtown areas

_____ shopping centers

_____ don't know _____

V. Industrial Goals

A. Do you feel that more industrial development would be desirable? Yes _____ No _____ don't know _____ _____

B. If more industrial development occurs what kind would you prefer?

_____ no preference

_____ light manufacturing

_____ heavy manufacturing

_____ don't know _____

C. If more industry were added, where would you prefer it be located?

_____ no restrictions on location (anywhere)

_____ within incorporated cities and villages

_____ only in controlled, specified, industrial parks

_____ don't know _____

VI. Recreational Goals

A. Do you feel that more recreational areas would be desirable? Yes _____ No _____ don't know _____ _____

B. Do you feel that unique lands (lakeshores river and stream banks flood plains, etc.) should be controlled for recreational use? Yes _____ No _____ don't know _____ _____

VII. Land Use Priorities

Which land uses would you give highest priority? (Number them (1) for highest (2) for 2nd. highest, etc.)

_____ agriculture

_____ residential

_____ shopping and services

_____ industrial

_____ recreational _____

VIII. What are your feelings as to the timing for use of each of the land control measures? Check one category below for each measure.

	now	later	never	don't know	
Land use planning	_____	_____	_____	_____	_____
Land use zoning	_____	_____	_____	_____	_____
Subdivision regulations	_____	_____	_____	_____	_____
Building and housing codes	_____	_____	_____	_____	_____

IX. If land use control measures are agreed upon in your county now, at what level would they be most desirable? Check one category below for each measure.

	county-wide	Township	don't know	
Land use planning	_____	_____	_____	_____
Land use zoning	_____	_____	_____	_____
Subdivision regulations	_____	_____	_____	_____
Building and housing codes	_____	_____	_____	_____

X. In general do you think the patterns of land uses in your county will have any effect on the cost of providing services--water, sewers, schools, highways, etc.? Yes _____ No _____ don't know _____ _____

XL. Your reasons for your answers to any of the above questions will help in assuring that every citizen view is included in the decisions.

____

____

____ _____

XII. What do you feel the greatest development problem is in the county at this time? ____

____

____

____ _____

Please return to:

William S. Pryer
County Extension Director
Courthouse
Ionia, Michigan Phone 527-1400

DO NOT WRITE IN THIS SPACE

THUMB AREA COMMUNITY DEVELOPMENT SURVEY

The purpose of this survey is to obtain your opinions about various possible kinds of development and land use planning and control in your area. The results of this survey will be made available to Thumb Area residents and leaders to help better plan for future community development.

DIRECTIONS: For each question, please check (✓) the blank next to the answer that most closely matches your feelings on the subject. Space is provided for your comments at the end of the questionnaire, so please feel free to give your views on any of the topics covered. This questionnaire was addressed to the person listed in the telephone directory. However any adult member of the household may complete the questionnaire.

A. Future Population

1.a. What would you like to see happen to the population of your county over the next 5 years? I'd like to see the population:

____ decrease ____ stay about the same ____ increase ____ don't know

b. Do you think there should be any definite action taken to encourage or discourage population growth at the county level?

____ No ____ Yes ____ Don't Know

2.a. What would you like to see happen to the population of your township over the next 5 years? I'd like to see the population:

____ decrease ____ stay about the same ____ increase ____ don't know

b. Do you think there should be any definite action taken to encourage or discourage population growth at the township level?

____ No ____ Yes ____ Don't Know

B. Land Use

1. Do you feel there is any competition between different uses of land in your area? (For Example: Agricultural Land being sought for Residential Development; Industrial Development taking place in Residential Areas).

____ No ____ Yes ____ Don't Know

2. Do you feel you understand what land use planning is?

____ No ____ Yes ____ Don't Know

3. What do you think of the idea of having a general overall public plan for the future uses of land? (For Example: A plan which says what land should be used for different kinds of housing, what land should be used for farming, what land should be used for industry, etc.)

____ I don't like the idea ____ I don't care one way or the other

____ I like the idea ____ I don't know

4. If such a plan were developed (even though you may not favor the idea), at which level of government would it be most acceptable to you?

____ township or municipal ____ multi-county region ____ no preference

____ county ____ state ____ don't know

5. Do you know of any such plan within this county?

____ No ____ Yes

6. Do you feel you understand what zoning means?

____ No ____ Yes ____ Don't Know

7. Do you support the general concept of having ordinances to enforce a land use plan?

____ No ____ Yes ____ Don't Know

8. In order to control and regulate land use and development, do you favor:

a. Zoning ordinances?

____ No ____ Yes ____ Don't Know

DO NOT WRITE IN THIS SPACE

b. Subdivision regulations?

____ No ____ Yes ____ Don't Know ______

c. Building regulations?

____ No ____ Yes ____ Don't Know ______

9. If such land use regulations were established (even though you may not favor the idea), at which level of government would they be most acceptable to you? (CHECK ONE BLANK IN EACH GROUP)

Zoning	Building Regulations	Subdivision Regulations	
___ township or municipal	___ township or municipal	___ township or municipal	
___ county	___ county	___ county	______
___ multi-county region	___ multi-county region	___ multi-county region	
___ state	___ state	___ state	______
___ no preference	___ no preference	___ no preference	
___ don't know	___ don't know	___ don't know	______

10.a. Generally speaking, do you feel that the different levels of government in this area cooperate in matters of land use planning and control?

____ No ____ Yes ____ Don't Know ______

b. If no, between which levels of government does this lack of cooperation exist? (For Example: Between townships; between township and city).

____ ______

11. Should the different levels of government in this area (county, township, city, village) cooperate in:

a. Land use planning?

____ No ____ Yes ____ Don't Know ______

b. Land use control, such as zoning?

____ No ____ Yes ____ Don't Know ______

12. Is there any need to have zoning for the protection of farmland from other kinds of development?

____ No ____ Yes ____ Don't Know ______

13. Should more shoreline areas in this county be acquired and reserved for public use?

____ No ____ Yes ____ Don't Know ______

C. Industrial Development

1.a. Should more efforts be made to increase industry within this county?

____ No ____ Yes ____ Don't Know ______

b. Why? ____

____

____ ______

2.a. Should efforts be made to increase industry in your local area (within your township or city or village)?

____ No ____ Yes ____ Don't Know ______

b. Why? ____

____

____ ______

3. If more industrial development took place in this county (even though you may not favor the idea), which type of location would be most acceptable to you?

____ no restriction on location; anywhere

____ within incorporated cities and villages

____ only in controlled, specified industrial parks

____ don't know

____ other; please explain below: ______

DO NOT WRITE IN THIS SPACE

D. Commercial Development

1.a. Would you favor having more commercial shopping and service facilities in your county?

____ No ____ Yes ____ Don't Know

b. If yes, what kinds would you like to have? ______________________________

____

2. If more shopping and service facilities were established in this county, where should they be located?

____ downtown areas of cities and villages
____ shopping centers at the outskirts of cities and villages
____ no preference; anywhere
____ don't know

E. Residential Development

1. Do you feel that the addition of more housing would be desirable:

a. in your county?

____ No ____ Yes ____ Don't Know

b. in your township (or local community)?

____ No ____ Yes ____ Don't Know

2. If more housing were built, which type would you prefer built in your area? (PLEASE CHECK ONE BLANK).

____ mobile homes
____ single family homes
____ duplexes
____ apartments
____ condominiums (apartment to buy)
____ a mix of various type of housing
____ no preference

3. If more single family, non-farm homes were built (even though you may not favor the idea), which type of location would be most acceptable to you?

____ large rural lots
____ rural subdivisions
____ don't know
____ no restrictions on location; anywhere
____ subdivisions adjacent to or within villages or cities

4. If more mobile homes were added (even though you may not favor the idea), which type of location would be best?

____ rural mobile home parks
____ don't know
____ no restrictions on location; anywhere
____ mobile home parks adjacent to or within villages or cities

F. Recreational Development

1.a. Generally speaking, are the majority of the recreation needs of your family being met at the present time?

____ No ____ Yes ____ Don't Know

IF "NO":

b. What additional types of recreation facilities do you feel are needed for your family? (For Example: Swimming areas, playgrounds, winter sports area, trails, skating rinks, etc.)

Within your COUNTY: Reasons Needed:

____________ ______________________________

____________ ______________________________

____________ ______________________________

Within your TOWNSHIP: Reasons Needed:

____________ ______________________________

____________ ______________________________

____________ ______________________________

DO NOT WRITE IN THIS SPACE

c. What additional types of recreation activity programs do you feel are needed for your family? (For Example: Playground activities, senior citizen recreation programs, handicapped recreation programs, types of cultural entertainment programs, etc.)

Within your COUNTY: ____ Reasons Needed: ____

Within your TOWNSHIP: ____ Reasons Needed: ____

2.a. Do you feel that the growth of tourism in your county would be beneficial?

____ No ____ Yes ____ Don't Know

b. Why? ____

G. General Information

One of the major purposes of this survey is to find out the opinions of different groups of people. For this reason, we are asking a few questions about you and your family. This information will enable us to better understand the background of the respondents. All information will be regarded as confidential, and individual responses will not be revealed.

1. What is your age? ____

2. What is your sex? ____ Male ____ Female

3. What is your marital status?

____ single ____ married ____ separated, divorced, or widowed

4.a. What is your major full-time occupation? ____

b. If you have a second job, please name it: ____

c. What was or is your father's primary occupation? ____

5. Are you active in any of the following types of organizations or groups which are active within your county?

a. Fraternal service organizations (such as Lions, Rotary, Kiwanis, Elks, Moose, Masons, VFW, etc.)

____ No ____ Yes Number of organizations: ____

b. Other community service organizations (such as PTA, church service organizations, Boy Scouts, 4-H, etc.)

____ No ____ Yes Number of organizations: ____

c. Farm organizations (such as Grange, Farm Bureau, NFO, etc.)

____ No ____ Yes Number of organizations: ____

d. Formal social or recreational organizations (such as sportsmen's clubs, country clubs, etc.)

____ No ____ Yes Number of organizations: ____

e. Unions (such as UAW, AFL-CIO, Teamsters, etc.)

____ No ____ Yes Number of organizations: ____

f. Professional organizations (such as AMA, MEA, AAUP, etc.)

____ No ____ Yes Number of organizations: ____

DO NOT WRITE IN THIS SPACE

g. Political organizations (such as the Republican Party, Democratic Party, etc.)

____ No ____ Yes Number of organizations: ____

h. Other social or service groups, formal or informal (such as card clubs, discussion groups, etc.)

____ No ____ Yes Number of organizations: ____

6.a. Are you a registered voter? ____ No ____ Yes

b. Which political party do you feel that you most closely identify with?

____ Democratic Party ____ American Independent Party
____ Republican Party ____ Other: ____________

____ None (feel no strong affiliation with any single party)

c. Did you vote in the last National Election (1972)? ____ No ____ Yes

d. Did you vote in the last County Election? ____ No ____ Yes

e. Did you vote in the last Local Election (Village, City, or Township)?

____ No ____ Yes

f. In general, do you vote in NONE (0%) ____, SOME (1-50%) ____, MOST (51-99%) ____, ALL (100%) ____ elections?

7.a. How responsive do you feel county governmental officials are to your needs and desires?

____ not responsive at all ____ very responsive
____ somewhat responsive ____ don't know
____ responsive

b. How responsive do you feel local governmental officials are to your needs and desires?

____ not responsive at all ____ very responsive
____ somewhat responsive ____ don't know
____ responsive

8.a. In what county do you live?

____ Huron ____ Sanilac ____ Tuscola ____ Other: ________

b. In what township or incorporated village or city do you live?

____

9. Do you live: (CHECK ONE)

____ in the open countryside?

____ in a built up area not within the boundaries of a village or city (an unincorporated settlement)?

____ within an incorporated village or city?

10. How many years have you lived:

a. in this township or local community? ________
b. in the county? ________
c. in the Thumb Area (Huron, Sanilac, or Tuscola County)? ________

11.a. If you have lived in the Thumb Area less than 10 years, where did you live previously? ____________________

b. Why did you choose to live here? ____________________

____

12. How many people are there living at home:

a. less than school age (under 5 years old)? ________
b. school age children? ________
c. adults? ________

13. Which of the following applies to you? (CHECK ONE)

____ own or are buying a home

____ renting or leasing a home (or apartment)

DO NOT WRITE IN THIS SPACE

14. Please indicate how much total Real Property you have in this 3-county Thumb Area (Huron, Sanilac, Tuscola). (BOTH "own/buying" AND "renting/leasing"): (PLEASE CHECK THE APPROPRIATE BLANK(S)).

	Own/Buying	Renting/Leasing
UP TO 1 ACRE	______	______
over 1 but less than 10 acres	______	______
11 - 40 acres	______	______
41 - 80 acres	______	______
81 - 160 acres	______	______
161 - 320 acres	______	______
321 - 640 acres	______	______
over 640 acres	______	______

15. What is the highest number of years you have completed in school?

____ some elementary school (but did not complete: less than 6 years)
____ completed elementary school (6 years)
____ some junior high school (but did not complete: less than eighth grade)
____ completed junior high school (eighth grade)
____ some high school (but did not complete: 1 - 3 years)
____ completed high school (4 years)
____ vocational school or other training.
____ college: 1 - 3 years
____ college: 4 years or more

16. What is your approximate yearly total family income?

____ less than $3,000
____ $3,000 - $6,000
____ $6,001 - $9,000
____ $9,001 - $12,000
____ $12,001 - $15,000
____ $15,001 - $25,000
____ $25,001 - $50,000
____ more than $50,000

H. General Outlook

1. What are your feelings about the changes you have seen in this area over the past 10 years? (Changes you feel are important; whether they've been generally for the better or for the worse; reasons why you feel this way; etc.).

____

____

____

____

____

2. What do you feel are the important issues the people of this area are faced with, concerning the future betterment of the Thumb?

____

____

____

____

____

Thank you for your cooperation! Please return this questionnaire as soon as possible in the enclosed postpaid envelope.

Alan Kirk
323 Natural Resources Bldg.
Michigan State University
East Lansing, MI 48824

DO NOT WRITE IN THIS SPACE

BUNKER HILL TOWNSHIP COMMUNITY DEVELOPMENT SURVEY

The purpose of this survey is to obtain your opinions about community services, population growth, and land use control ordinances. The results of this survey will be utilized by township officials to help evaluate current control programs and better plan for future community development.

Directions: For each question, please check (✓) the blank next to the answer that most closely matches your feelings on the subject. Space is provided for your comments at the end of the questionnaire, so please feel free to give your views on any of the topics covered.

A. Future Population

1.a. What would you like to see happen to the population of your county over the next 5 years?

I'd like to see the population:

____ decrease
____ stay about the same
____ increase
____ no preference
____ Don't Know

b. Do you think there should be any definite action taken to encourage or discourage population growth at the county level? ____No ____Yes ____Don't Know

2.a. What would you like to see happen to the population of your township over the next 5 years?

I'd like to see the population:

____ decrease
____ stay about the same
____ increase
____ no preference
____ Don't Know

b. Do you think there should be any definite action taken to encourage or discourage population growth at the township level? ____No ____Yes ____Don't Know

B. Land Use

1. Do you feel there are any conflicts between different uses of land in your area? (For example: conflicts between agricultural land and residential development; between residential areas and industrial development)
____No ____Yes ____Don't Know

2. Do you feel you understand what land use planning is?
____No ____Yes ____Don't Know

3. What do you think of the idea of having a general overall public plan for the future uses of land? (For example: a plan which says what land should be used for different kinds of housing, what land should be used for farming, what land should be used for industry, etc.)

____ I like the idea.
____ I don't like the idea.
____ I don't care one way or the other.
____ I don't know.

DO NOT WRITE IN THIS SPACE

4. If such a plan were developed, even though you may not favor the idea, at which level of government would you prefer to have it?
____ township or municipal
____ county
____ multi-county region
____ state
____ no preference
____ Don't Know

5. Do you know of any such plan within this county?
____No ____Yes

6. Do you feel you understand what zoning means?
____No ____Yes ____Don't Know

7. Do you support the general concept of having ordinances to enforce a land use plan?
____No ____Yes ____Don't Know

8. In order to regulate and control land use, do you favor:

a. Zoning ordinances?
____No ____Yes ____Don't Know

b. Subdivision regulations?
____No ____Yes ____Don't Know

c. Building regulations?
____No ____Yes ____Don't Know

9. If such land use regulations were established, even though you may not favor the idea, at which level of government would you prefer to have them? (CHECK ONE BLANK IN EACH GROUP)

Zoning
____township or municipal
____county
____multi-county region
____state
____no preference
____Don't Know

Building Regulations
____township or municipal
____county
____multi-county region
____state
____no preference
____Don't Know

Subdivision Regulations
____township or municipal
____county
____multi-county region
____state
____no preference
____Don't Know

WRITE IN THIS SPACE

10.a. Generally speaking, do you feel that the different levels of government in this area cooperate in matters of land use planning and control?

____ No ____ Yes ____ Don't Know

b. If no, between which levels of government does this lack of cooperation exist? (For example: between townships; between county and township; between township and city.)

____

11. Should the different levels of government in this area (county, township, city, village) cooperate in:

a. land use planning? ____ No ____ Yes ____ Don't Know

b. land use control, such as zoning?
____ No ____ Yes ____ Don't Know

12. Is there any need to have zoning for the protection of farmland from other kinds of development?
____ No ____ Yes ____ Don't Know

C. Industrial Development

1.a. Should more efforts be made to increase industry within this county? ____ No ____ Yes ____ Don't Know

b. Should efforts be made to increase industry in your township?
____ No ____ Yes ____ Don't Know

2. If more industrial development took place in this township where would you prefer it be located?
____ no restrictions on location; anywhere
____ within incorporated cities and villages
____ only in controlled, specified industrial parks
____ other; please explain: ______________________
____ Don't Know

D. Residential Development

1. Do you feel that the addition of more housing would be desirable:
a. in your county? ____ No ____ Yes ____ Don't Know
b. in your township?
____ No ____ Yes ____ Don't Know

2. If more housing were built, which type would you prefer built in your area? (PLEASE CHECK ONE BLANK.)
____ mobile homes
____ single family homes
____ duplexes
____ apartments
____ condominiums (apartments to buy)
____ a mix of various types of housing
____ no preference
____ Don't Know

DO NOT WRITE IN THIS SPACE

3. If more single family, non-farm homes were built, where would you prefer they be located?
____ no restrictions on location; anywhere
____ large rural lots
____ rural subdivisions
____ subdivisions adjacent to or within villages or cities
____ Don't Know

4. If more mobile homes were added, which type of location would you prefer?
____ no restrictions on location; anywhere
____ rural mobile home parks
____ mobile home parks adjacent to or within villages or cities
____ Don't Know

Recreational Development

1.a. Generally speaking, are the majority of the recreation needs of your family being met at the present time?

____ No ____ Yes ____ Don't Know

IF "No":

b. What additional types of recreation facilities do you feel are needed for your family? (For example: swimming areas, playgrounds, winter sports areas, trails, skating rinks, etc.)

1) within your county: ____________________

2) within your township: ____________________

c. What additional types of recreation activity programs do you feel are needed for your family? (For example: playground activities, senior citizen recreation programs, handicapped recreation programs, types of cultural entertainment programs, etc.)

1) within your county: ____________________

2) within your township: ____________________

2.a. Do you feel that the growth of tourism in your township would be beneficial?

____ No ____ Yes ____ Don't Know

b. Why? ____________________

DO NOT WRITE IN THIS SPACE

F. General Information

One of the major purposes of this survey is to find out the opinions of different groups of people. For this reason, we are asking a few questions about you and your family. This information will enable us to better understand the background of the respondents. All information will be regarded as confidential, and individual responses will not be revealed.

1. What is your age? ________
2. What is your sex? ____ Male ____ Female
3. What is your marital status?
   ____ single ____ married ____ separated, divorced, or widowed

4.a. What is your major full-time occupation? ______________
   b. If you have a second job, please name it: ______________
   c. What was or is your father's primary occupation?
   ____

5. Are you active in any of the following types of organizations or groups which are active within your county?
   a. Fraternal service organizations (such as Lions, Rotary, Kiwanis, Elks, Moose, Masons, VFW, etc.)
      ____ No ____ Yes Number of organizations: _____
   b. Other community service organizations (such as PTA, church service organizations, Boy Scouts, 4-H, etc.)
      ____ No ____ Yes Number of organizations: _____
   c. Farm organizations (such as Grange, Farm Bureau, NFO, etc.)
      ____ No ____ Yes Number of organizations: _____
   d. Formal social or recreational organizations (such as sportsmen's clubs, country clubs, etc.)
      ____ No ____ Yes Number of organizations: _____
   e. Unions (such as UAW, AFL-CIO, Teamsters, etc.)
      ____ No ____ Yes Number of organizations: _____
   f. Professional organizations (such as AMA, MEA, AAUP, etc.)
      ____ No ____ Yes Number of organizations: _____
   g. Political organizations (such as the Republican Party, Democratic Party, etc.)
      ____ No ____ Yes Number of organizations: _____
   h. Other social or service groups, formal or informal (such as card clubs, discussion groups, etc.)
      ____ No ____ Yes Number of organizations: _____

6.a. Are you a registered voter? ____ No ____ Yes
   b. Which political party do you feel that you most closely identify with?
      ____ Democratic Party
      ____ Republican Party
      ____ American Independent Party
      ____ other: ______________
      ____ none (feel no strong affiliation with any single party)

DO NOT WRITE IN THIS SPACE

c. Do you vote in ALL____, MOST____, SOME____, or NONE____ of the national elections?

d. Do you vote in ALL____, MOST____, SOME____, or NONE____ of your county elections?

e. Do you vote in ALL____, MOST____, SOME____, or NONE____ of your township elections?

7.a. How responsive do you feel county governmental officials are to your needs and desires?
____ not responsive at all
____ somewhat responsive
____ responsive
____ very responsive
____ Don't Know

b. How responsive do you feel township governmental officials are to your needs and desires?
____not responsive at all
____somewhat responsive
____responsive
____very responsive
____Don't Know

8.a. How many years have you lived in this county? ______

b. How many years have you lived in your township? ______

c. If you have lived in the township less than 10 years, why did you choose to live here? ____________________

____

9. How many people are there living at home:
a. less than school age (under 5 yrs. old)? ________
b. school age children? ______
c. adults? ______

10. Do you live: (CHECK ONE)
____in the open countryside?
____in a built up area not within the boundaries of a village or city?
____within an incorporated village or city?

11. Which of the following applies to you? (CHECK ONE)
____own or are buying a home
____renting or leasing a home (or apartment)

12. Please indicate how much total Real Property you have in Bunker Hill Township (BOTH "own/buying" AND "renting/leasing"): (PLEASE CHECK THE APPROPRIATE BLANK(S))

	own/buying	renting/leasing
UP TO 1 ACRE....................	______	______
over 1 but less than 10 acres...	______	______
11 - 40 acres....................	______	______
41 - 80 acres....................	______	______
81 - 160 acres...................	______	______
161 - 320 acres..................	______	______
321 - 640 acres..................	______	______
over 640 acres...................	______	______

DO NOT WRITE IN THIS SPACE

13. What is the highest number of years you have completed in school?
____ elementary school - junior high: 1 - 8 yrs.
____ high school: 1 - 3 yrs.
____ high school: 4 yrs.
____ vocational school or other training
____ college: 1 - 3 yrs.
____ college: 4 yrs. or more

14. What is your approximate yearly total family income?

____ less than $3,000
____ $3,000 - $6,000
____ $6,001 - $9,000
____ $9,001 - $12,000
____ $12,001 - $15,000
____ $15,001 - $25,000
____ $25,001 - $50,000
____ more than $50,000

G. General Outlook

1. What are your feelings about the changes you have seen in this area over the past 10 years? (changes you feel are important; whether they've been generally for the better or for the worse; reasons why you feel this way; etc.)

____
____
____
____
____
____

2. What do you feel are some important issues the people of this area are faced with, concerning the future betterment of Bunker Hill Township? (For example: roads, police protection, fire protection, waste disposal, shopping and service facilities, etc.)______________
____
____
____
____
____
____

This space is for any comments you may wish to make concerning any of the topics covered in this questionnaire. We are interested to know why you feel the way you do about population growth, land use, industrial development, and other kinds of development in your area.

Thank you for your cooperation! Please return this questionnaire as soon as possible in the enclosed postpaid envelope.

James E. Mulvany, Director
Cooperative Extension Service, Ingham Co.
127 E. Maple St.
Mason, Michigan 48854

COOPERATIVE EXTENSION SERVICE

MICHIGAN STATE UNIVERSITY AND

U. S. DEPARTMENT OF AGRICULTURE COOPERATING

INGHAM COUNTY

Cooperative Extension Bldg.
127 E. Maple St.
Mason, Michigan 48854
Telephone 677-9411

November 9, 1973

Dear Bunker Hill Township Property Owner:

The Bunker Hill Township officials are currently evaluating the present zoning ordinances and a need for other land use ordinances. They are interested in how Bunker Hill property owners feel about many issues relative to zoning ordinances, population growth, community services, and kinds of growth the community desires. Therefore; they have asked the Cooperative Extension Service to assist them in conducting a survey of property owners.

If you complete the enclosed card and return it without postage, you will receive the questionnaire soon. The questionnaires will take about 10 to 15 minutes of your time to complete. The information you volunteer on this questionnaire will be categorized and presented back to your elected township officials to consider in their task of studying land use planning.

If you choose to participate you may also receive a summary of the survey findings. Just check on the enclosed card to have one mailed to you.

The survey will be confidential as you will not be asked to identify yourself on the questionnaire.

Mr. Bob Roller and Allen Kirk, Michigan State University graduate students, will be conducting the survey and summarizing the results.

Sincerely yours,

James E. Mulvany
County Extension Director

JEM:kb

encl.

BUNKER HILL TOWNSHIP

November 9, 1973

Dear Bunker Hill Township Property Owners:

Al Kirk and Bob Roller are graduate students in Resource Development, M.S.U., who have prepared an opinion survey for purposes of being distributed in the township. This survey is designed to determine how property owners of Bunker Hill Township feel about township zoning ordinances, land use activities, and community services. These are issues which growing communities like ours must consider in planning for immediate and future community needs.

I hope you will fill out and return the survey when it comes to you so that the Planning and Zoning Committee can better evaluate the desires of the people of Bunker Hill Township concerning the above issues.

Sincerely,

Ward Vicary

Ward Vicary
Supervisor, Bunker Hill Twp.

COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS

U. S. DEPARTMENT OF AGRICULTURE AND MICHIGAN STATE UNIVERSITY COOPERATING

November 9, 1973

Please complete this card and mail it back as soon as possible.

Would you be willing to participate in this project, by completing a survey questionnaire?

__________yes   __________no

If you choose to participate, would you be interested in receiving a summary of the survey findings?

__________yes   __________no

Information requested by

Thank you.

Inf

James E. Mulvany

James E. Mulvany
County Extension Director
County Extension Director

COOPERATIVE EXTENSION SERVICE

INGHAM COUNTY

MICHIGAN STATE UNIVERSITY AND

U. S. DEPARTMENT OF AGRICULTURE COOPERATING

Cooperative Extension Bldg.
127 E. Maple St.
Mason, Michigan 48854
Telephone 677-9411

November 21, 1973

Dear Bunker Hill Township Property Owner:

Thank you for responding to my letter of November 9, and indicating your willingness to complete this questionnaire. Your participation will greatly help Bunker Hill Township elected officials to have a better picture of how property owners feel about such issues as population growth, land use planning and control, and community development.

Please fill out the enclosed questionnaire and return it as soon as possible in the enclosed postpaid envelope.

Your responses will be confidential, and you need not sign your name on the questionnaire.

The returned questionnaires will be tabulated, and a summary of the survey findings will be mailed to you as soon as it is available.

Thank you again for your cooperation.

Sincerely yours,

James E. Mulvany

James E. Mulvany
County Extension Director

JEM:kb

encl.

COOPERATIVE EXTENSION SERVICE

MICHIGAN STATE UNIVERSITY AND

U. S. DEPARTMENT OF AGRICULTURE COOPERATING

INGHAM COUNTY

Cooperative Extension Bldg.
127 E. Maple St.
Mason, Michigan 48854
Telephone 677-9411

November 24, 1973

Dear Bunker Hill Township Property Owner:

The Bunker HIll Township officials are currently evaluating the present zoning ordinances and a need for other land use ordinances. They are interested in how Bunker Hill property owners feel about many issues relative to zoning ordinances, population growth, community services, and kinds of growth the community desires. Therefore; they have asked the Cooperative Extension Service to assist them in conducting a survey of property owners.

In a few days you will receive a questionnaire in the mail. It will take about 10 to 15 minutes of your time to complete. The information you volunteer on this questionnaire will be categorized and presented back to your elected township officials to consider in their task of studying land use planning.

If you choose to participate you will also receive a summary of the survey findings as soon as it is available.

The survey will be confidential as you will not be asked to identify yourself on the questionnaire.

Mr. Bob Roller and Allen Kirk, Michigan State University graduate students, will be conducting the survey and summarizing the results.

Sincerely yours,

James E. Mulvany

James E. Mulvany
County Extension Director

JEM:kb

COOPERATIVE EXTENSION SERVICE

MICHIGAN STATE UNIVERSITY AND

U. S. DEPARTMENT OF AGRICULTURE COOPERATING

INGHAM COUNTY

Cooperative Extension Bldg.
127 E. Maple St.
Mason. Michigan 48854
Telephone 677-9411

November 27, 1973

Dear Bunker Hill Township Property Owner:

The Bunker Hill Township Officials are currently evaluating the present zoning ordinances and a need for other land use ordinances. They are interested in how Bunker Hill property owners feel about many issues relative to zoning ordinances, population growth, community services, and kinds of growth the community desires. Therefore, they have asked the Cooperative Extension Service to assist them in conducting a survey of property owners.

Enclosed is a questionnaire which will take about 10 to 15 minutes of your time to complete. The information you volunteer on this questionnaire will be categorized and presented back to your elected township officials to consider in their task of studying land use planning. If you wish, you may also receive a summary of the survey findings.

The survey will be confidential as you will not be asked to identify yourself on the questionnaire.

Mr. Bob Roller and Alan Kirk, Michigan State University graduate students, will be conducting the survey and summarizing the results.

Sincerely yours,

James E. Mulvany

James E. Mulvany
County Extension Director

JEM:kb

encl.

CALCULATION OF SAMPLE SIZE FOR THE THUMB AREA QUESTIONNAIRE DISTRIBUTION

The process which led to the generation of the sample sizes for each county is summarized as follows:

Formula for an unbiased estimate of the variable p:

$$v(p) = S_p^2 + \frac{N-n}{(n-1)N} pq = \frac{N-n}{N} \left(\frac{pq}{n-1}\right)$$ [1]

Where: N = population size.

n = sample size.

p = proportion of one response in a two response choice (yes-no).

q = the proportion of the other response in a two response choice.

Thus $S_p = \sqrt{\frac{N-n}{N} \left(\frac{pq}{n-1}\right)}$

The confidence interval, ε, was calculated from the standard deviation, Sp, and the value from the z distribution corresponding with the chosen level of significance, α.

$$\varepsilon = z(S_p)$$ [2]

Thus $\varepsilon = z \sqrt{\frac{N-n}{N} \left(\frac{pq}{n-1}\right)}$

---

[1] William G. Cochran, Sampling Techniques (2nd edition) New York: John Wiley and Sons, Inc., 1963, p. 51.

[2] Ibid., p. 75.

The confidence interval was expressed as a plus or minus quantity:

$$p \pm \varepsilon$$

or

$$p \pm z\sqrt{\frac{N-n}{N}\left(\frac{pq}{n-1}\right)}$$

The above formula for the confidence interval was solved for n, the sample size.

$$\varepsilon = z\sqrt{\frac{N-n}{N}\left(\frac{pq}{n-1}\right)}$$

$$\varepsilon^2 = z^2\left(\frac{N-n}{N}\right)\left(\frac{pq}{n-1}\right)$$

$$\varepsilon^2 \simeq z^2\left(\frac{N-n}{N}\right)\left(\frac{pq}{n}\right)$$

$$\varepsilon^2 \simeq z^2\left(\frac{1}{n} - \frac{1}{N}\right)(pq)$$

$$\varepsilon^2 \simeq \frac{z^2(pq)}{n} - \frac{z^2(pq)}{N}$$

$$\frac{z^2(pq)}{n} \simeq \varepsilon^2 + \frac{z^2(pq)}{N}$$

$$n \simeq \frac{z^2(pq)}{\frac{z^2(pq)}{N} + \varepsilon^2}$$

When $\alpha = .10$; thus $z = 1.65$

$\varepsilon = .05$

$p = .5$

$q = .5$

N = Total number of households in each county[3]

Huron County = 10,325

Sanilac County = 10,551

Tuscola County = 13,709

---

[3] County and Regional Facts, State Planning and Development Region 7, Section I, Table 8A, p. 30.

MICHIGAN STATE UNIVERSITY

DEPARTMENT OF RESOURCE DEVELOPMENT
NATURAL RESOURCES BUILDING

EAST LANSING · MICHIGAN · 48824

April 15, 1974

Dear Thumb Area Resident:

In many parts of Michigan dramatic changes are underway, involving population growth, commercial and industrial development, residential development, and increased demand for land use planning and control. The Thumb Area is also faced with these issues.

Your help is needed in determining how people in the Thumb Area feel on these subjects. The enclosed questionnaire is being sent to a sample of residents randomly chosen from telephone listings in Huron, Tuscola, and Sanilac Counties, and to a selection of officials in these counties. This survey is being conducted by Michigan State University, with the cooperation of your county Board of Commissioners, your Cooperative Extension Service office, and the Thumb Area Human Development Commission.

The questionnaire should take about 15 or 20 minutes to complete, based on pilot study findings. If you are married, either you or your spouse may fill out the questionnaire. All responses will be confidential; no names will be identified with individual responses or with tabulated results.

With the findings of this survey, local leaders and community groups should be better able to represent citizen interests and desires. The more people who reply to this questionnaire, the more reliable and useful the results will be. Please take time to fill it out and return it as soon as possible in the enclosed business reply envelope.

Thank you very much for your cooperation.

Sincerely,

Alan Kirk

Alan Kirk
Research Coordinator
Thumb Area Community
Development Survey

AK/jo

The general findings of the Community Development Survey will be presented in local newspapers. If, however, you would like a summary of the survey findings, please fill out this form and return it with your completed questionnaire.

NAME______________________________________

ADDRESS___________________________________

____
(zip code)

Dear Resident:

A questionnaire concerning community development was recently mailed to you from Michigan State University. Your response is needed in order to make accurate conclusions.

If you have not yet responded, I hope you will please take a few minutes now to fill out the questionnaire and return it in the prepaid envelope. If you have already completed and returned the questionnaire, thank you for your cooperation.

Thank you,

Alan Kirk
Research Coordinator

Dear Thumb Area Resident,

Several weeks ago a questionnaire concerning issues in community development was mailed to you from Michigan State University. If you have not had a chance to respond, I hope you will take a few minutes to fill it out and return it to us. A greater number of responses will make the results of the study much more useful.

I am enclosing an extra copy of the questionnaire for your convenience.

Thank you very much for your help.

Sincerely,

Alan Kirk

Alan Kirk
Research Coordinator
Thumb Area Community
Development Survey

CALCULATION OF CHI SQUARE TEST STATISTICS FOR THE NON-RESPONDENT SURVEY

Question A.1.a

What would you like to see happen to the population of your county over the next 5 years?

	Decrease		Stay the Same		Increase		Don't Know		Total
	No.	%	No.	%	No.	%	No.	%	
Non-respondents	8	7.0	76	66.7	20	17.5	10	8.8	114
Mail Survey	59	4.8	814	66.6	300	24.5	50	4.1	1,223

H_o: There is no difference between the non-respondent distribution and the mail survey distribution.

with $\alpha = .10$ Tabled x^2 value with 3 degrees of freedom = 6.25

Calculated $x^2 = 8.29$

Reject H_o

Question B.3

What do you think of the idea of having a general overall public plan for the future uses of land?

	No		Yes		No Preference		Don't Know		Total
	No.	%	No.	%	No.	%	No.	%	
Non-respondents	29	25.4	65	57.0	5	4.4	15	13.2	114
Mail Survey	478	39.2	617	50.6	43	3.5	81	6.6	1,219

H_o: There is no difference between the non-respondent distribution and the mail survey distribution.

with $\alpha = .10$ Tabled x^2 value with 3 degrees of freedom = 6.25

Calculated $x^2 = 12.46$

Reject H_o

Question B.7

Do you support the general concept of having ordinances to enforce a land use plan?

	No		Yes		Don't Know		Total
	No.	%	No.	%	No.	%	
Non-respondents	25	21.9	77	67.5	12	10.5	114
Mail Survey	311	25.6	789	65.0	113	9.3	1,213

H_o: There is no difference between the non-respondent distribution and the mail survey distribution.

with $\alpha = .10$ Tabled x^2 value with 2 degrees of freedom = 4.61.

Calculated $x^2 = 0.85$

Accept H_o

Question C.1.a

Should more efforts be made to increase industry within this county?

	No		Yes		Don't Know		Total
	No.	%	No.	%	No.	%	
Non-respondents	45	39.5	54	47.4	15	13.2	114
Mail Survey	366	30.7	641	53.7	187	15.7	1,194

H_o: There is no difference between the non-respondent distribution and the mail survey distribution.

with $\alpha = .10$ Tabled x^2 value with 2 degrees of freedom = 4.61

Calculated $x^2 = 3.80$

Accept H_o

Question E.1.a

Do you feel that the addition of more housing would be desirable in your county?

	No		Yes		Don't Know		Total
	No.	%	No.	%	No.	%	
Non-respondents	45	39.5	54	47.4	15	13.2	114
Mail Survey	366	30.7	641	53.7	187	15.7	1,194

H_o: There is no difference between the non-respondent distribution and the mail survey distribution.

with $\alpha = .10$ Tabled x^2 value with 2 degrees of freedom = 4.61

Calculated x^2 = 3.80

Accept H_o

Question F.2.a

Do you feel that the growth of tourism in your county would be beneficial?

	No		Yes		Don't Know		Total
	No.	%	No.	%	No.	%	
Non-respondents	36	31.9	62	34.9	15	13.3	113
Mail Survey	453	39.0	463	39.8	247	21.2	1,163

H_o: There is no difference between the non-respondent distribution and the mail survey distribution.

with $\alpha = .10$ Tabled x^2 value with 2 degrees of freedom = 4.61

Calculated x^2 = 10.2

Reject H_o

Question G. 1

What is your age?

	18-29		30-39		40-49		50-59		60-69		70+		Total
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
Non-Respondents	15	13.2	19	16.7	22	19.3	19	16.7	20	17.5	19	16.7	114
Mail Survey	147	12.3	183	15.4	213	17.9	226	19.0	247	20.7	175	14.7	1,191

H_o: There is no difference between the non-respondent distribution and the mail survey distribution.

with $\alpha = .10$ Tabled x^2 value with 5 degrees of freedom = 9.24

Calculated $x^2 = 10.2$

Reject H_o

Question G.2.

What is your sex?

	Male		Female		Total
	No.	%	No.	%	
Non-respondents	52	45.6	62	54.4	114
Mail Survey	810	67.4	391	32.6	1,201

H_o: There is no difference between the non-respondent distribution and the mail survey distribution.

with $\alpha = .10$ Tabled value of x^2 with 1 degree of freedom = 2.71

Calculated $x^2 = 21.91$

Reject H_o

Question G.4.a

What is your major full-time occupation?

	Profess. & Manager		Sales Clerical & Crafts		Labor & Service		Farmer		Retired & Unemploy.		House-wife		Total
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
Non-Respondents	7	6.1	15	13.2	20	17.5	17	14.9	28	24.6	27	23.7	114
Mail Survey	185	15.9	192	16.5	192	16.5	145	12.5	268	23.0	182	15.6	1,164

H_o: There is no difference between the non-respondent distribution and the mail survey distribution.

with $\alpha = .10$ Tabled x^2 value with 5 degrees of freedom = 9.24

Calculated x^2 = 12.09

Reject H_o

Question G.9.

Do you live: ___in the open countryside?

___in a built up area?

___in an incorporated village or city?

	Open Countryside		Built up Area		Incorpor. Vil. or City		Total
	No.	%	No.	%	No.	%	
Non-respondents	62	24.4	21	18.4	31	27.2	114
Mail Survey	551	46.6	205	17.3	427	36.1	1,183

H_o: There is no difference between the non-respondent distribution and the mail survey distribution.

with $\alpha = .10$ Tabled x^2 value with 2 degrees of freedom = 4.61

Accept H_o

Question G.15.

What is the highest number of years you have completed in school?

	Elementary & Junior High School		High School		Vocat. Train.& College		Total
	No.	%	No.	%	No.	%	
Non-resondent	31	27.2	47	41.2	36	31.6	114
Main Survey	223	18.6	534	44.4	445	37.0	1,202

H_o: There is no difference between the non-respondent distribution and the mail survey distribution.

with $\alpha = .10$ Tabled x^2 value with 2 degrees of freedom = 4.61

Calculated x^2 = 5.12

Reject H_o

Question G.16.

What is your approximate yearly total family income?

	<\$9,000		\$9,001- \$15,000		>\$15,000		Total
	No.	%	No.	%	No.	%	
Non-respondents	51	49.0	39	37.5	14	13.5	104
Mail Survey	450	40.3	376	33.7	291	26.1	1,117

H_o: There is no difference between the non-respondent distribution and the mail survey distribution.

with $\alpha = .10$ Tabled x^2 with degrees of freedom = 4.61

Calculated x^2 = 8.24

Reject H_o

Thumb Area Project Coding Key

Column	Question	Original Variable Number
1-6	Individual Response Number	X_1
7	Mailing Wave 0 - Not Known 1 - First Wave 2 - Second Wave	X_2
8	Card Number 1 - First Card	
9	Blank	
10	A-1-a County Population 0 - No Response 1 - Decrease 2 - Stay About the Same 3 - Increase 9 - Don't Know	X_3
11	A-1-b County Population Growth Policy 0 - No Response 1 - No 2 - Yes 9 - Don't Know	X_4
12	A-2-a Township Population 0 - No Response 1 - Decrease 2 - Stay About the Same 3 - Increase 9 - Don't Know	X_5

Column	Question	Original Variable Number
13	A-2-b Township Population Growth Policy	X_6
	0 - No Response	
	1 - No	
	2 - Yes	
	9 - Don't Know	
14	Blank	
15	B-1 Land Use Competition	X_7
	0 - No Response	
	1 - No	
	2 - Yes	
	9 - Don't Know	
16	B-2 Understand Land Use Planning	X_8
	0 - No Response	
	1 - No	
	2 - Yes	
	9 - Don't Know	
17	B-3 Land Use Plan Acceptance	X_9
	0 - No Response	
	1 - Don't Like the Idea	
	2 - Like the Idea	
	8 - Don't Care	
	9 - Don't Know	
18	B-4 Level of Land Use Plan	X_{10}
	0 - No Response	
	1 - Township or Municipal	
	2 - County	
	3 - Multi-County Region	
	4 - State	
	8 - No Preference	
	9 - Don't Know	

Column	Question	Original Variable Number
19	B-5 Knowledge of Land Use Plan Within County 0 - No Response 1 - No 2 - Yes	X_{11}
20	B-6 Zoning Understanding 0 - No Response 1 - No 2 - Yes 9 - Don't Know	X_{12}
21	B-7 Ordinances to Enforce Plan o - No Response 1 - No 2 - Yes 9 - Don't Know	X_{13}
22	B-8-2 Zoning Ordinances 0 - No Response 1 - No 2 - Yes 9 - Don't Know	X_{14}
23	B-8-b Subdivision Regulations 0 - No Response 1 - No 2 - Yes 9 - Don't Know	X_{15}
24	B-8-c Building Regulations 0 - No Response 1 - No 2 - Yes 0 - Don't Know	X_{16}

Column	Question	Original Variable Number
25	B-9 Zoning Level	X_{17}
	0 - No Response	
	1 - Township or Municipal	
	2 - County	
	3 - Multi-County Region	
	4 - State	
	8 - No Preference	
	9 - Don't Know	
26	B-9 Building Regulations	X_{18}
	0 - No Response	
	1 - Township or Municipal	
	2 - County	
	3 - Multi-County Region	
	4 - State	
	8 - No Preference	
	9 - Don't Know	
27	B-9 Subdivision Regulations	X_{19}
	0 - No Response	
	1 - Township of Municipal	
	2 - County	
	3 - Multi-County Region	
	4 - State	
	8 - No Preference	
	9 - Don't Know	
28	B-10-a Land Use Planning and Control Cooperation	X_{20}
	0 - No Response	
	1 - No	
	2 - Yes	
	9 - Don't Know	

Column	Question	Original Variable Number
29	B-10-b Level of Lack of Cooperation	X_{21}
	0 - No Response	
	1 - City-Township	
	2 - Township-Township	
	3 - Township-County	
	4 - County-City	
	5 - County-County	
	6 - County-State	
	7 - State-Local (Township, City or Village)	
	8 - Other	
	9 - Don't Know	
30	B-11-a Should There Be Cooperation-Planning	X_{22}
	0 - No Response	
	1 - No	
	2 - Yes	
	9 - Don't Know	
31	B-11-b Should There be Cooperation-Control	X_{23}
	0 - No Response	
	1 - No	
	2 - Yes	
	9 - Don't Know	
32	B-12 Should Farm Land be Protected	X_{24}
	0 - No Response	
	1 - No	
	2 - Yes	
	9 - Don't Know	

Column	Question		Original Variable Number
33		B-13 Should Shoreline Areas be Reserved	X_{25}
		0 - No Response	
		1 - No	
		2 - Yes	
		9 - Don't Know	
34		Blank	
35		C-1-a Increase Industry Within the County	X_{26}
		0 - No Response	
		1 - No	
		2 - Yes	
		9 - Don't Know	
36-37		C-1-b Why Increase County Industry	X_{27}
		00 - No Response	
	No	01 - Unsuitable environment: area should be kept in farming, residences, and resorts-raises land prices too high for agriculture-industry belongs in urban areas.	
		02 - Costs too much: causes increases in taxes, industry does not carry fair share of costs	
		03 - Insufficient facilities to support industry: water, sewage, manpower.	
		04 - Undesirable effects: noise, pollution, population growth, traffic problems, loss of land.	
		05 - Not needed: have enough industry now, growing too fast now.	
		06 - Other miscellaneous negative reasons.	

Column	Question	Original Variable Number
36-37 (cont.)	Yes 07 - Increased employment opportunities, decreased unemployment.	
	08 - Broadened tax base: increase tax revenues.	
	09 - Eliminate need for long distance commuting: keep people closer to home, use less gas, keep money in area.	
	10 - Keep young people from leaving the area: more jobs for young people.	
	11 - Diversify the economic base: reduce dependence on farming.	
	12 - Reduce welfare.	
	13 - Conditional upon cleanliness: non-polluting, type, small size, location.	
	14 - Generally contribute to community development: the economy, more business, buying, people, progress, build up the community, increased standard of living, more services possible, add to the value of the area.	
	15 - Increase incomes, supplement farm incomes, seasonal work.	
	16 - Other miscellaneous positive reasons.	
	17 - Other	
38	C-2-a Increase Industry Within Local Area	X_{28}
	0 - No Response	
	1 - No	
	2 - Yes	
	9 - Don't Know	
39-40	C-2-b Why Increase Local Industry	X_{30}
	00 - No Response	
	No 01 - Unsuitable environment: area should be kept in farming, residences, and resorts-raises land prices too high for agriculture-industry belongs in urban areas.	

Column	Question	Original Variable Number
39-40 (cont.)	02 - Costs too much: causes increases in taxes, industry does not carry fair share of costs	
	03 - Insufficient facilities to support industry: water, sewage, manpower.	
	04 - Undesirable effects: noise, pollution, population growth, traffic problems, loss of land.	
	05 - Not needed: have enough industry now, growing too fast now.	
	06 - Other miscellaneous negative reasons.	
	Yes 07 - Increased employment opportunities, decreased unemployment.	
	08 - Broadened tax base: increase tax revenues.	
	09 - Eliminate need for long distance commuting: keep people closer to home, use less gas, keep money in area.	
	10 - Keep young people from leaving the area: more jobs for young people.	
	11 - Diversify the economic base: reduce dependence on farming.	
	12 - Reduce welfare.	
	13 - Conditional upon cleanliness: non-polluting, type, small size, location.	
	14 - Generally contribute to community development: the eocnomy, more business, buying, people, progress, build up the community, increased standard of living, more services possible, add to the value of the area.	
	15 - Increase incomes, supplement farm incomes, seasonal work.	
	16 - Other miscellaneous positive reasons.	
	17 - Other.	
41	C-3 Location of Additional Industry	X_{30}
	0 - No Response	
	1 - No restrictions	
	2 - Within incorporated cities and villages	
	3 - Only in controlled, specified industrial parks	
	4 - Other	
	9 - Don't k	

Column	Question	Original Variable Number
42	Blank	
43	D-1-a More Commercial Shopping and Services in the County 0 - No response 1 - No 2 - Yes 9 - Don't know	X_{31}
44	D-1-b What Type of Shopping and Services 1 - General unspecific answer: any kind, all kinds, specialty shops, general stores, retail, wholesale, shopping services, etc. 2 - Shopping center, mall, plaza. 3 - Department store, chain store, discount store (Yankee, K-mart, Sears, Wards, etc.) 4 - Supermarket, grocery, food store 5 - Clothing, shoes. 6 - Doctors, dentists, pharmacy, hospital. 7 - Recreation-rollerrink, theater, etc. 8 - Restaurants, drive-ins. 9 - Specialty and other stores- lumber, plumbing, hardware, farm supplies, appliance repair, sporting goods, automotive.	X_{32}
45	D-1-b (Second response) 0 - No response 1 - Better selection; lower prices; more competition and comparison; more in small communities-independently owned businesses.	X_{33}

Column	Question	Original Variable Number
45 (cont.)	2 - Shopping Center, mall, plaza.	
	3 - Department store, chain store, discount store (Yankee, K-Mart, Sears, Wards, etc.)	
	4 - Supermarket, grocery, food store.	
	5 - Clothing, shoes.	
	6 - Doctors, dentists, pharmacy, hospital	
	7 - Recreation-rollerrink, theater, etc.	
	8 - Restaurants, drive-ins.	
	9 - Specialty and other stores - lumber, plumbing, hardware, farm supplies, applicance repair, sporting goods, automotive.	
46	D-2 Location of Additional Shopping Facilities	X_{34}
	0 - No response	
	1 - No preference; anywhere.	
	2 - Downtown areas of cities and villages	
	3 - Shopping centers at the outskirts of cities and villages.	
	6 - Mix of locations.	
	9 - Don't know.	
47	Blank	
48	E-1-a Additional Housing in County	X_{35}
	0 - No response	
	1 - No	
	2 - Yes	
	9 - Don't know	
49	E-1-b Additional Housing in Township of Local Community	X_{36}
	0 - No response	
	1 - No	
	2 - Yes	
	9 - Don't know	

Column	Question	Original Variable Number
50	E-2 Additional Housing Type 0 - No response 1 - Moble homes 2 - Single family homes 3 - Duplexes 4 - Apartments 5 - Condominiums 6 - A mix of various types of housing 8 - No preference	X_{37}
51	E-3 Additional Housing Location 0 - No response 1 - No restrictions on location; anywhere 2 - Large rural lots 3 - Rural subdivisions 4 - Subdivisions adjacent to or within villages or cities 6 - Multiple or mixed answers 9 - Don't know	X_{38}
52	E-4 Mobile Home Location 0 - No response 1 - No restrictions on location; anywhere 2 - Rural mobile home parks 3 - Mobile home parks adjacent to or within villages or cities 6 - Multiple or mixed answers 9 - Don't know	X_{39}
53	Blank	
54	F-1-a Are Family Recreation Needs Being Met 0 - No response 1 - No 2 - Yes 9 - Don't know	X_{40}

Column	Question	Original Variable Number
55-56	F-1-b Additional Recreation Facilities in County	X_{41}

(First Answer)

00 - No response
01 - Archery range
02 - Athletic field
03 - Band Shell
04 - Ball diamond - softball
05 - Ball diamond - baseball
06 - Basketball courts
07 - Bathhouse
08 - Beaches
09 - Boat launching ramps, Harbor facilities
10 - Campground - trailer
11 - Campgound (general)
12 - Campground Day-camps
13 - General recreation center
14 - Senior citizen center - program
15 - Handicapped center - program
16 - Cultural programs - theaters, plays, etc.
17 - Other center
18 - Docks, piers, waterfronts
19 - Fencing
20 - Football fields
21 - Golf courses
22 - Horseshoe courts
23 - Ice rink - outdoor artificial
24 - Ice rink - indoor artificial
25 - Ice rink - outdoor natural
26 - Land acquisition
27 - Landscaping
28 - Lighting - baseball
29 - Lighting - softball
30 - Lighting - football
31 - Lighting - tennis - tennis courts
32 - Lighting - basketball
33 - Magic square

Column	Question	Original Variable Number
55-56 (cont.)	34 - Marina's	
	35 - Parking	
	36 - Picnic areas (tables, grills)	
	37 - Playground	
	38 - Rest rooms	
	39 - Roads	
	40 - Shelters	
	41 - Shuffleboard	
	42 - Site preparations	
	43 - Skiing areas	
	44 - Sled and toboggan areas	
	45 - Swimming, pool expansion, renovation, improvements	
	46 - Swimming pool - indoor	
	47 - Swimming pool - outdoor	
	48 - Tennis courts	
	49 - Trails - bicycle	
	50 - Trails - hiking or unspecified	
	51 - Trails - nature	
	52 - Trails - snowmobile	
	53 - Trails - off road recreation vehicle	
	54 - Utility service	
	55 - Program development	
	60 - Political (establishment of departments)	
	61 - Social open land	
	62 - Economic	
	63 - Scenic drives and over looks	
	64 - Bridle, horse trails	
	65 - Winter sports	
	66 - Parks	
	67 - Youth recreation programs or center	
	68 - Hunting	
	69 - Fishing	
	70 - All examples given; anything	
	80 - Other	

Column	Question	Original Variable Number
57-58	F-1-b Additional Facilities in County (Second Answer) (Same as First Answer)	X_{42}
59-60	F-1-b Additional Recreation Facilities In Township (First Answer) (Same as Additional Recreation Facilities in County)	X_{43}
61-62	F-1-b Additional Recreation Facilities in Township (Second Answer) (Same as First Answer)	X_{44}
63-64	F-1-c Additional Recreation Programs in County (First Answer) (Same as F-1-b Additional Recreation Facilities in County)	X_{45}
65-66	F-1-c Additional Recreation Programs in County (Second Answer) (Same as F-1-b Additional Recreation Facilities in County)	X_{46}
67-68	F-1-b Additional Recreation Programs in Township (First Answer) (Same as F-1-b Additional Recreation Facilities in County)	X_{47}
69-70	F-1-b Additional Recreation Programs in Township (Second Answer) (Same as F-1-b Additional Recreation Facilities in County)	X_{48}

Column		Question	Original Variable Number
71		F-2-a Tourism Growth	X_{49}
		0 - No response	
		1 - No	
		2 - Yes	
		9 - Don't know	
72		F-2-b Why Tourism Growth	X_{50}
		0 - No response	
	No	1 - Enough now, too crowded already, too many tourists already, we have plenty.	
		2 - Conflict with community or lifestyle; keep our town small and pleasant, like peace and quiet, we live very well without them, mostly residential, agricultural, conflicts with farming.	
		3 - Create problems; environmental degradation, overcrowding, drugs, litter, traffic, undesirable people, vandals, need for more police, etc.	
		4 - Nothing to attract tourists; nothing of interest here, not conducive to tourism, inadequate facilities to have tourism.	
		5 - Other negative reasons.	
	Yes	6 - Good for business, economy, jobs, brings in money, income for local residents, yearround business.	
		7 - Generally contributes to growth of the community; more people, developers, more facilities, social benefits.	
		8 - Good location; lakeshore, hunting, camping, fishing, resort homes, facilities available.	
		9 - Other positive reasons.	

Second Card

Column	Question	Original Variable Number
1-6	Individual Response Number	
7	Mailing Wave 0 - Not known 1 - First wave 2 - Second wave	
8	Card Number 2 - Second card	
9-10	G-1 Age (Actual age will be coded) 00 - No response	X_{51}
11	G-2 Sex 0 - No response 1 - Male 2 - Female	X_{52}
12	G-3 Marital Status 0 - No response 1 - Single 2 - Married 3 - Separated, divorced, or widowed	X_{53}
13-14	G-4-2 Occupation 00 - No response 01 - Professional, technical, and kindred workers (Engineers, physicians, dentists, nurses, pharmacists, veterinarians, teachers (except administrators), technicians, accountants, librarians, reporters, lawyers, clergymen, social workers)	X_{54}

Column	Question	Original Variable Number
13-14 (cont.)	02 - Managers, administrators, self-employed, salaried (assessors, bankers, wholesale and retail buyers, railroad conductors, school administrators, public administration inspectors, "business men", "contractors," "merchants")	
	03 - Sales and Clerical Workers (real estate agents, brokers, sales clerks, bookkeepers, secretaries, bank tellers, cashiers, library attendents, mail carriers, mail handlers, mail clerks, teacher aids, telephone operators)	
	04 - Craftsmen and Foremen (builders, mechanics, repairmen, machinists, carpenters, masons, electricians, painters, road machine operators, plumbers)	
	05 - Operative (Manufacturing, transportation, etc.) and Laborers (Gas station attendants, meat cutters, welders, bus drivers)	
	06 - Farmers	
	07 - Service workers (Military, janitors, maids, bartenders, cooks, waiters, health aides, orderlies, LPN's, barbers, housekeepers, welfare aides, firemen, policemen, guards)	
	08 - Retired	
	09 - Unemployed or handicapped	
	10 - Housewife	
15-16	G-4-b Second Occupation (Same as G-4-2 Occupation except, 02 office-holder with some other primary occupation.)	X_{55}
17-18	G-4-c Father's Occupation (Same as G-4-a Occupation except, 00 indicates both No response or Deceased)	X_{56}
19	Blank	

Column	Question	Original Variable Number
20	G-5-a Fraternal Organizations 0 - No response 1 - No 2 - Yes	X_{57}
21	G-5-a Number of Fraternal Organizations (Actual number will be coded.)	X_{58}
22	G-5-b Community Service Organizations (Same as G-5-a Fraternal Organizations.)	X_{59}
23	G-5-b Number of Community Service Organizations (Actual number will be coded.)	X_{60}
24	G-5-c Farm Organizations (Same as G-5-a)	X_{61}
25	G-5-c Number of Farm Organizations (Actual number will be coded.)	X_{62}
26	G-5-d Formal Social or Recreational Organizations (Same as G-5-2.)	X_{63}
27	G-5-d Number of Formal Social or Recreational Organizations (Actual number will be coded.)	X_{64}
28	G-5-e Unions (Same as G-5-a.)	X_{65}
29	G-5-e Number of Unions (Actual number will be coded.)	X_{66}

Column	Question	Original Variable Number
30	G-5-f Professional Organizations (Same as G-5-a)	X_{67}
31	G-5-f Number of Professional Organizations (Same as G-5-a.)	X_{68}
32	G-5-g Political Organizations (Same as G-5-a.)	X_{69}
33	G-5-g Number of Political Organizations (Actual number will be coded.)	X_{70}
34	G-5-h Other Groups (Same as G-5-a.)	X_{71}
35	G-5-h Number of Other Groups (Actual Number will be coded.)	X_{72}
36-37	Total Number of Organizations (The total number of all types of organizations belonged to will be coded.)	X_{73}
38	Blank	
39	G-6-a Registered Voter 0 - No response 1 - No 2 - Yes	X_{74}
40	G-6-b Political Party Identification 0 - No response 1 - Democratic 2 - Republican 3 - American Independent Party 4 - Other 5 - None	X_{75}

Column	Question	Original Variable Number
41	G-6-c Voting in National Election 0 - No response 1 - No 1 - Yes	X_{76}
42	G-6-d Voting in County Election 0 - No response 1 - No 2 - Yes	X_{77}
43	G-6-e Voting in Local Election 0 - No response 1 - No 2 - Yes	X_{78}
44	G-6-f Voting Rate 0 - No response 1 - None (0%) 2 - Some (1-50%) 3 - Most (51-99%) 4 - All (100%)	X_{79}
45	G-7-a Response of County Governmental Officials 0 - No response 1 - Not responsive at all 2 - Somewhat responsive 3 - Responsive 4 - Very responsive 9 - Don't know	X_{80}
46	G-7-b Response of Local Governmental Officials (Same as G-7-a.)	X_{81}
47	Blank	

Column	Question	Original Variable Number
48	G-8-a County of Residence	X_{82}

1 - Huron

2 - Sanilac

3 - Tuscola

4 - Other

Column	Question	Original Variable Number
49-50	G-8-b Township or Incorporated Place of Residence	X_{83}

Huron County - Incorporated Places

01- Bad Axe	06 - Owendale
02 - Caseville	07 - Pigeon
03 - Elkton	08 - Port Austin
04 - Harbor Beach	09 - Port Hope
05 - Kinde	10 - Sebewaing
	11 - Ubly

Huron County - Townships

20 - Bingham	34 - McKinley
21 - Bloomfield	35 - Meade
22 - Brookfield	36 - Oliver
23 - Caseville	37 - Paris
24 - Chandler	38 - Pointe Aux Barques
25 - Colfax	39 - Port Austin (Grindstone City)
26 - Dwight	40 - Rubicon
27 - Fairhaven (Bay Port)	41 - Sand Beach
28 - Gore	42 - Sebewaing
29 - Grant	43 - Sheridan
30 - Hume	44 - Sherman (Ruth)
31 - Huron	45 - Sigel
32 - Lake	46 - Verona
33 - Lincoln	47 - Winsor

99 - Outside the Thumb Area

Column	Question	Original Variable Number
49-50 (Cont.)	Sanilac County - Incorporated Places	

Sanilac County - Incorporated Places

01 - Applegate
02 - Brown City
03 - Carsonville
04 - Croswell
05 - Deckerville
06 - Forestville
07 - Lexington
08 - Marlette
09 - Melvin
10 - Minden City
11 - Peck
12 - Port Sanilac
13 - Sandusky

Sanilac County - Townships

20 - Argyle (Argyle)
21 - Austin
22 - Bridgehampton
23 - Buel
24 - Custer
25 - Delaware
26 - Elk
27 - Elmer
28 - Evergreen
29 - Flynn
30 - Forester (Forester)
31 - Fremont
32 - Greenleaf
33 - Lamotte (Decker)
34 - Lexington
35 - Maple Valley
36 - Marion
37 - Marlette
38 - Minden (Palms)
39 - Moore (Snover)
40 - Sanilac
41 - Speaker
42 - Washington
43 - Watertown
44 - Wheatland
45 - Worth

99 - Outside Thumb Area

Tuscola County - Incorporated Places

01 - Akron
02 - Caro
03 - Cass City
04 - Fairgrove
05 - Gagetown
06 - Kingston
07 - Mayville
08 - Millington
09 - Reese
10 - Unionville
11 - Vassar

Column	Question	Original Variable Number
49-50 (Cont.)	Tuscola County - Townships	
	20 - Akron; 21 - Almer; 22 - Arbela; 23 - Columbia; 24 - Dayton; 25 - Denmark; 26 - Elkland; 27 - Ellington; 28 - Elmwood; 29 - Fairgrove; 30 - Fremont; 31 - Gilford; 32 - Indianfields; 33 - Juniata; 34 - Kingston; 35 - Koylton; 36 - Millington; 37 - Novesta (Deford); 38 - Tuscola (Tuscola); 39 - Vassar; 40 - Watertown (Fostoria); 41 - Wells; 42 - Wisner	
	99 - Outside Thumb Area	
51	G-9 Location of Residence 0 - No response 1 - Open countryside 2 - Built up area not within city or village (unincorporated settlement) 3 - Within an incorporated village or city	X_{84}
52-53	G-10-a Years Lived in Township or Local Community 00 - No response (Actual number of years will be coded.)	X_{85}
54-55	G-10-b Years Lived in the County (Actual number of years will be coded.)	X_{86}
56-57	G-10-c Years Lived in Thumb Area 00 - No response (Actual number of years will be coded.)	X_{87}

Column	Question	Original Variable Number
58	G-11-a Previous Residence 0 - No response 1 - South Eastern Michigan Urban - within 5 miles of a large city (S.M.S.A.) 2 - South Western Michigan Urban - within 5 miles of a large city (S.M.S.A.) 3 - South Eastern Michigan Rural 4 - South Western Michigan Rural 5 - Michigan - Northern Lower Peninsula and Upper Peninsula 6 - Out of state 7 - Other	X_{88}
59	G-11-b Why Chose to Live in Thumb 0 - No response 1 - Employment; business, transfer. 2 - Property; owned cottage here, property was cheap. 3 - Personal/family reasons: folks moved here; raised here. 4 - Retirement 5 - Positive attractions; amenities; liked area and people; enjoy the lake; peace and quiet; nature; small population; wanted to live in country. 6 - Rejection of city life; to get away from city; problems of city living; racial issues; crime; unsafe; too many people. 7 - Other miscellaneous reasons.	X_{89}
60	G-12-a Less than School Age Children at Home (Actual number will be coded.)	X_{90}
61	G-12-b School Age Children at Home (Actual number will be coded.)	X_{91}

Column	Question	Original Variable Number
62	G-12-c Adults at Home (Actual number will be coded.)	X_{92}
63-64	Total Family Size (Actual number will be coded)	X_{93}
65		
65	Blank	
66	G-13 Home Ownership 0 - No response 1 - Own or buying 2 - Rent or leasing	X_{94}
67	G - 14 Property Owned or Buying 0 - No response 1 - up to 1 acre 2 - Over 1 but less than 10 acres 3 - 11 to 40 acres 4 - 41 to 80 acres 5 - 81 to 160 acres 6 - 161 to 320 acres 7 - 321 to 640 acres 8 - Over 640 acres	X_{95}
68	G-14 Property Rented or Leased (Same as G-14 Property Owned or Buying)	X_{96}
69	G-15 Education 0 - No response 1 - Some elementary school but did not complete (less than 6 years)	X_{97}

Column	Question	Original Variable Number
69 (Cont.)	2 - Completed elementary school (6 years)	
	3 - Some junior high school but did not completed (less than eighth grade)	
	4 - Completed jurnior high school (eighth grade)	
	5 - Some high school (but did not complete: 1-3 years)	
	6 - Completed high school (4 years)	
	7 - Vocational School or other training	
	8 - College: 1-3 years	
	9 - College: 4 years or more	
70	G-16 Family Income	X_{98}
	0 - No response	
	1 - Less than $3,000	
	2 - $3,000 to $6,000	
	3 - $6,001 to $9,000	
	4 - $9,001 to $12,000	
	5 - $12,001 to $15,000	
	6 - $15,001 to $25,000	
	7 - $25,001 to $50,000	
	8 - More than $50,000	
71	H-1 General Outlook - Tone of Response	X_{99}
	0 - No response	
	1 - Con-response; not enough, need more, needs improvement.	
	2 - Con-response; bad changes, too much, changes for worse, problems.	
	3 - Neutral response	
	4 - Pro-response; good changes, changes for the better, O.K.	

Column	Question	Original Variable Number
72-73	H-1 General Outlook - Subject of Response	X_{100}

00 - No response

01 - Little change or no change; slow change

02 - Great change, fast change

03 - General response

04 - General growth, population growth, in-migration

05 - Farming; loss of land; preservation; decrease

06 - Land use planning and control (zoning, code enforcement)

07 - Shoreline reservation for public use; harbor

08 - Industrial development

09 - Economic development; employment; standard of living

10 - Economy; inflation; prices; wages; cost of living

11 - Commercial services and facilities development

12 - Residential development; housing; home improvement; land buying for homes

13 - Mobile homes increase

14 - Recreation development

15 - Tourism development

16 - Government; increased control

17 - Increased taxation; too high; need broader base; alternative system

18 - Schools; vocational education development

19 - Roads, streets development

20 - Sewers, septic systems development

21 - Water supply development

22 - Solid waste garbage service development

23 - Law enforcement; police; crime; vandalism; judicial system

24 - Youth needs and problems; recreation; employment; rehabilitation; delinquency; hippies

Column	Question	Original Variable Number
72-73 (Cont.)	25 - Morality; religion; care for others; values	
	26 - Health; hospital, clinic facilties; physicians; dentists	
	27 - Land prices, valuation increases	
	28 - Community appearance, attractiveness; appearance or housing and buildings	
	29 - Pollution littering	
	30 - Resistance to change, narrow mindedness, conservatism	
	31 - Planned organized approach to community change development	
	32 - Racial issues; bussing	
	33 - Welfare; subsidization for housing, low-income needs, problems	
	34 - Competition, conflict in use of land	
	35 - Increased size	
	36 - Communication with government; public trust in government; government policy; cooperation in government; home rule; government responsiveness	
	37 - Drug abuse, including alcohol	
	38 - Area economic decline; population out-migration (including youth); small business decline	
	39 - Senior citizens needs and problems; housing, transportation	
	40 - City people adaptation, rural urban conflicts	
	41 - Wildlife preservation, wildland preservation	
	42 - Transportation services; railroad, bus, air service	
	43 - Army Corps of Engineers Project	
	44 - Shortages of fuel	
	45 - Mental health; retardation; handicapped facilities	
	46 - Shoreline erosion	
	47 - Cultural development	
	48 - Drainage	
	49 - Fire protection	

Column	Question	Original Variable Number
72-73 (Cont.)	50 - Farming; costs of inputs; returns on outputs; technology; productivity	
	51 - Commuting	
	52 - Vocational education; community college	
	90 - Don't know; not here long enough	
	99 - Other	
74	(Same as H-1- General Outlook - Tone of Response)	X_{101}
75-76	(Same as H-1 - General Outlook - Subject of Response)	X_{102}
77-78	(Same as H-1 - General Outlook - Subject of Response)	X_{103}
79-80	(Same as H-1 - General Outlook - Subject of Response)	X_{104}

Coding Format for Completed

Transformation Deck

First Card Column		
1-6	Identification Number	
7	Mailing wave 0 - not known 1 - first wave 2 - second wave	
8	Blank	
9	Card Number 1 = first card	
10	Blank	
11	Land Use Planning 0 - don't like the idea 1 - like the idea	
12	Ordinance to Enforce Plan 0 - no 1 - yes	
13	Zoning 0 - no 1 - yes	
14-15	Age Actual age coded (F2.0)	
16	Sex 1 - male 0 - female	
17-18	Martial Status single married separated, widowed, divorced	 +1 -1 0
19-20	Martial Status single married separated, widowed, divorced	 +1 +1 -2

Marital Status

		x	x
Single	1	+1	+1
Married	2	-1	+1
Separated, widowed, divorced	3	0	-2

21 Blank

22-23 Occupation
01 - +1
02 - +1
03 - +1
04 - +1
05 - +1
06 - -1
07 - -1
08 - -1
09 - -1
10 - -1

24-25 Occupation
01 - -3
02 - -1
03 - -1
04 - -2
05 - 0
06 - +1
07 - +2
08 - +1
09 - +1
10 - +2

26-27 Occupation
01 - +1
02 - -1
03 - +1
04 - -1
05 - +1
06 - -1
07 - +1
08 - -1
09 - +1
10 - -1

28-29 Occupation
01 - -1
02 - +1
03 - 0
04 - +1
05 - -1
06 - +1
07 - -2
08 - +1
09 - -1
10 - +1

30-31	Occupation 01 - 0 02 - +1 03 - +1 04 - +1 05 - +1 06 - 0 07 - -1 08 - -1 09 - -1 10 - -1
32-33	Occupation 01 - +1 02 - 0 03 - -1 04 - 0 05 - +1 06 - -1 07 - +1 08 - -1 09 - +1 10 - -1
34-35	Occupation 01 - +1 02 - -1 03 - -1 04 - +1 05 - 0 06 - -2 07 - -1 08 - +1 09 - 0 10 - +2
36-37	Occupation 01 - +2 02 - -1 03 - +1 04 - -1 05 - +1 06 - -2 07 - 0 08 - +2 09 - -2 10 - 0

38-39	Occupation 01 - -2 02 - -2 03 - +2 04 - +2 05 - -1 06 - +1 07 - +2 08 - 0 09 - -1 10 - -1
40	Blank
41-42	Second Occupation 00 - +1 01 - +1 02 - 0 03 - +1 04 - +1 05 - +1 06 - -1 07 - -1 08 - -1 09 - -1 10 - -1
43-44	Second Occupation 00 - -3 01 - -1 02 - -1 03 - -2 04 - 0 05 - +1 06 - 0 07 - +2 08 - +1 09 - +1 10 - +2
45-46	Second Occupation 00 - 0 01 - +1 02 - -1 03 - +1 04 - -1 05 - +1 06 - -1 07 - +1 08 - -1 09 - +1 10 - -1

47-48 Second Occupation
00 - -1
01 - +1
02 - 0
03 - +1
04 - -1
05 - +1
06 - -2
07 - 0
08 - +1
09 - -1
10 - +1

49-50 Second Occupation
00 - 0
01 - +1
02 - +1
03 - +1
04 - +1
05 - 0
06 - -1
07 - -1
08 - 0
09 - -1
10 - -1

51-52 Second Occupation
00 - +1
01 - -1
02 - +2
03 - -2
04 - -1
05 - +1
06 - +2
07 - -2
08 - +2
09 - +1
10 - -3

53-54 Second Occupation
00 - +3
01 - -1
02 - -2
03 - 0
04 - -3
05 - +3
06 - +1
07 - -1
08 - +3
09 - -1
10 - -2

55-56	Second Occupation 00 - -2 01 - +2 02 - +3 03 - -3 04 - +1 05 - -1 06 - -1 07 - -1 08 - +1 09 - +1 10 - 0
57-58	Second Occupation 00 - +3 01 - +3 02 - +3 03 - 0 04 - -3 05 - -3 06 - -3 07 - +2 08 - -2 09 - +2 10 - -2
59-60	Second Occupation 00 - -1 01 - -1 02 - -3 03 - +2 04 - +2 05 - +1 06 - -3 07 - +1 08 - +1 09 - +2 10 - -1
61-62	Fathers Occupation 00 - +1 01 - 0 02 - 0 03 - +1 04 - +1 05 - +1 06 - -1 07 - -1 08 - -1 09 - -1 10 - -1

63-64 Fathers Occupation

00 - -3
01 - -1
02 - -1
03 - -2
04 - 0
05 - +1
06 - 0
07 - +2
08 - +1
09 - +1
10 - +2

65-66 Fathers Occupation

00 - 0
01 - +1
02 - -1
03 - +1
04 - -1
05 - +1
06 - -1
07 - +1
08 - -1
09 - +1
10 - -1

67-68 Fathers Occupation

00 - -1
01 - +1
02 - 0
03 - +1
04 - -1
05 - +1
06 - -2
07 - 0
08 - +1
09 - -1
10 - +1

69-70 Fathers Occupation

00 - 0
01 - +1
02 - +1
03 - +1
04 - +1
05 - 0
06 - -1
07 - -1
08 - 0
09 - -1
10 - -1

71-72 Fathers Occupation
00 - +1
01 - -1
02 - +2
03 - -2
04 - -1
05 - +1
06 - +2
07 - -2
08 - +2
09 - +1
10 - -3

73-74 Fathers Occupation
00 - +3
01 - -1
02 - -2
03 - 0
04 - -3
05 - +3
06 - +1
07 - -1
08 - +3
09 - -1
10 - -2

75-76 Fathers Occupation
00 - -2
01 - +2
02 - +3
03 - -3
04 - +1
05 - -1
06 - -1
07 - -1
08 - +1
09 - +1
10 - 0

77-78 Fathers Occupation
00 - +3
01 - +3
02 - +3
03 - 0
04 - -3
05 - -3
06 - -3
07 - +2
08 - -2
09 - +2
10 - -2

79-80 Fathers Occupation

00 - -1
01 - -1
02 - -3
03 - +2
04 - +2
05 - +1
06 - -3
07 - +1
08 - +1
09 - +2
10 - -1

01 - Professional, Technical, and Kindred Workers
(Engineers, physicians, dentists, nurses, pharmacists, veterinarians, teachers (except administrators), technicians, accountants, librarians, reporters, lawyers, clergyman, social workers)

02 - Managers, Administrators, Self employed, Salaried
(Assessors, bankers, wholesale and retail buyers, railroad conductors, school administrators, public administration inspectors, "Business Men", "Contractors", "Merchants")

03 - Sales and Clerical Workers
(Real estate agents, insurance agents, brokers, sales clerks, bookkeepers, secretaries, bank tellers, cashiers, library attendants, mail carriers, mail handlers, mail clerks, teacher aids, telephone operators)

04 - Craftsmen and Foremen
(Builders, mechanics, repairmen, mechinists, carpenters, masons, electricians, painters, road machine operators, plumbers)

05 - Operatives (Manufacturing, transportation, etc.) and
Laborers (Gas station attendants, meat cutters, welders, bus drivers)

06 - Farmers

07 - Service Workers
(Military, janitors, maids, bartenders, cooks, waiters, health aides, orderlies, LPN's, barbers, housekeepers, welfare aides, firemen, policemen, guards)

08 - Retired

09 - Unemployed or Handicapped

10 - Housewife

Second Job (same as Occupation except, 02 indicates office holder with some other primary occupation. 00 - NO RESPONSE)

Father's Occupation (same as Occupation except, 00 indicates both no response or deceased)

Occupation

	x	x	x	x	x	x	x	x	x
01	+1	-3	+1	-1	0	+1	+1	+2	-2
02	+1	-1	-1	+1	+1	0	-1	-1	-2
03	+1	-1	+1	0	+1	-1	-1	+1	+2
04	+1	-2	-1	+1	+1	0	+1	-1	+2
05	+1	0	+1	-1	+1	+1	0	+1	-1
06	-1	+1	-1	+1	0	-1	-2	-2	+1
07	-1	+2	+1	-2	-1	+1	-1	0	+2
08	-1	+1	-1	+1	-1	-1	+1	+2	0
09	-1	+1	+1	-1	-1	+1	0	-2	-1
10	-1	+2	-1	+1	-1	-1	+2	0	-1

Second Occupation and Father's Occupation

	x	x	x	x	x	x	x	x	x	x
00	+1	-3	0	-1	0	+1	+3	-2	+3	-1
01	+1	-1	+1	+1	+1	-1	-1	+2	+3	-1
02	0	-1	-1	0	+1	+2	-2	+3	+3	-3
03	+1	-2	+1	+1	+1	-2	0	-3	0	+2
04	+1	0	-1	-1	+1	-1	-3	+1	-3	+2
05	+1	+1	+1	+1	0	+1	+3	-1	-3	+1
06	-1	0	-1	-2	-1	+2	+1	-1	-3	-3
07	-1	+2	+1	0	-1	-2	-1	-1	+2	+1
08	-1	+1	-1	+1	0	+2	+3	+1	-2	+1
09	-1	+1	+1	-1	-1	+1	-1	+1	+2	+2
10	-1	+2	-1	+1	-1	-3	-2	0	-2	-1

Second Card Column	
1-6	Identification Number
7	Mailing wave 0 - not known 1 - first wave 2 - second wave
8	Blank
9	Card Number 2 - second card
10	Blank
11	Fraternal Organization Participation 0 - no response, no 1 - yes
12	Service Organization Participation 0 - no response, no 1 - yes
13	Farm Organization Participation 0 - no response, no 1 - yes
14	Formal Social or Recreation Organization Participation 0 - no response, no 1 - yes
15	Union Organization Participation 0 - no response, no 1 - yes
16	Professional Organization Participation 0 - no response, no 1 - yes
17	Political Organization Participation 0 - no response, no 1 - yes
18	Other Group Participation 0 - no response, no 1 - yes

19 Blank

20-21 Total Number of Groups
Actual Number of Groups Will Be Coded

22 Blank

23-24 Political Party Identification
1 - +1
2 - +1
3 - +1
4 - -1
5 - -2

25-26 Political Party Identification
1 - -2
2 - -1
3 - 0
4 - +1
5 - +2

27-28 Political Party Identification
1 - +1
2 - -1
3 - +1
4 - 0
5 - -1

29-30 Political Party Identification
1 - +1
2 - 0
3 - -2
4 - -1
5 - +2

Political Party Identification

		x	x	x	x
Democrat	1	+1	-2	+1	+1
Republican	2	+1	-1	-1	0
American Independent	3	+1	0	+1	-2
Other	4	-1	+1	0	-1
None	5	-2	+2	-1	+2

31 Blank

32 Voting in County Elections
0 - no
1 - yes

33 Voting in Local Elections
0 - no
1 - yes

34 Blank

35-36 General Voting Behavior
1 - +1
2 - +1
3 - -1
4 - -1

37-38 General Voting Behavior
1 - +2
2 - -1
3 - +1
4 - -2

39-40 General Voting Behavior
1 - -1
2 - -2
3 - +2
4 - +1

General Voting Behavior

		x	x	x
None (0%)	1	+1	+2	-1
Some (1% - 50%)	2	+1	-1	-2
Most (51% - 99%)	3	-1	+1	+2
All (100%)	4	-1	-2	+1

41 Blank

42 Response of County Government Officials
0 - not responsive
1 - somewhat responsive, responsive, very responsive

43 Response of Local Government Officials
0 - not responsive
1 - somewhat responsive, responsive, very responsive

44 Blank

45-46 County of Residence
1 - +1
2 - -1
3 - 0

47-48 County of Residence
1 - +1
2 - +1
3 - -2

49-50 Residence Location
1 - +1
2 - -1
3 - 0

51-52 Residence Location

1 - +1

2 - +1

3 - -2

53 Blank

54-55 Years Lived in Local Community

Actual Years Will be Coded

County of Residence

		x	x
Huron	1	+1	+1
Sanilac	2	-1	+1
Tuscola	3	0	-2

Residence Location

		x	x
Open Country side	1	+1	+1
Built-up Area	2	-1	+1
City or Village	3	0	-2

56-57 Years Lived in County

Actual Number Will be Coded

60 Blank

61 Home Ownership

1 - own or buy

0 - rent or lease

62 Blank

63-64 Property Owned

0 - +1

1 - +1

2 - +1

3 - 0

4 - -1

5 - -1

6 - -1

7 - 0

8 - 0

65-66 Property Owner

0 - +1

1 - -1

2 - +1

3 - -1

4 - 0

5 - -1

6 - +1

7 - -1

8 - +1

67-68 Property Owned
0 - -1
1 - 0
2 - +1
3 - 0
4 - -1
5 - 0
6 - +1
7 - +1
8 - -1

69-70 Property Owned
0 - -1
1 - +1
2 - 0
3 - +1
4 - -1
5 - +1
6 - 0
7 - 0
8 - -1

71-72 Property Owned
0 - +2
1 - -2
2 - +1
3 - -1
4 - -2
5 - +2
6 - -1
7 - -1
8 - +2

73-74 Property Owned
0 - -2
1 - +2
2 - -3
3 - +1
4 - +2
5 - -2
6 - +3
7 - +1
8 - -2

75-76 Property Owned
0 - -2
1 - 0
2 - +2
3 - 0
4 - +2
5 - +2
6 - -2
7 - -2
8 - 0

77-78	Property Owned 0 - +2 1 - 0 2 - -2 3 - -1 4 - -1 5 - +1 6 - +1 7 - -2 8 - +2
79-80	Blank

Third Card

Column	
1-6	Identification Number
7	Mailing Wave 0 - not known 1 - first wave 2 - second wave
8	Blank
9	Card Number 3 - third card
10	Blank
11-12	Property Leased 0 - +1 1 - +1 2 - +1 3 - 0 4 - -1 5 - -1 6 - -1 7 - 0 8 - 0
13-14	Property Leased 0 - +1 1 - -1 2 - +1 3 - -1 4 - 0 5 - -1 6 - +1 7 - -1 8 - +1

15-16 Property Leased
0 - -1
1 - 0
2 - +1
3 - 0
4 - -1
5 - 0
6 - +1
7 - +1
8 - -1

17-18 Property Leased
0 - -1
1 - +1
2 - 0
3 - +1
4 - -1
5 - +1
6 - 0
7 - 0
8 - -1

19-20 Property Leased
0 - +2
1 - -2
2 - +1
3 - -1
4 - -2
5 - +2
6 - -1
7 - -1
8 - +2

21-22 Property Leased
0 - -2
1 - +2
2 - -3
3 - +1
4 - +2
5 - -2
6 - +3
7 - +1
8 - -2

23-24 Property Leased

0 - -2
1 - 0
2 - +2
3 - 0
4 - +2
5 - +2
6 - -2
7 - -2
8 - 0

25-26 Property Leased

0 - +2
1 - 0
2 - -2
3 - -1
4 - -1
5 - +1
6 - +1
7 - -2
8 - +2

Property Owned and Leased

		x	x	x	x	x	x	x	x
None	0	+1	+1	-1	-1	+2	-2	-2	+2
1 acre	1	+1	-1	0	+1	-2	+2	0	0
1-10 acre	2	+1	+1	+1	0	+1	-3	+2	-2
11-40 acres	3	0	-1	0	+1	-1	+1	0	-1
41-80 acres	4	-1	0	-1	-1	-2	+2	+2	-1
81-160 acres	5	-1	-1	0	+1	+2	-2	+2	+1
161-320 acres	6	-1	+1	+1	0	-1	+3	-2	+1
321-640 acres	7	0	-1	+1	0	-1	+1	-2	-2
640 acres	8	0	+1	-1	-1	+2	-2	0	+2

27 Blank

28-29 Education

1 - +1
2 - +1
3 - +1
4 - 0
5 - -1
6 - -1
7 - -1
8 - 0
9 - 0

30-31	Education 1 - +1 2 - -1 3 - +1 4 - -1 5 - 0 6 - -1 7 - +1 8 - -1 9 - +1
32-33	Education 1 - -1 2 - 0 3 - +1 4 - 0 5 - -1 6 - 0 7 - +1 8 - +1 9 - -1
34-35	Education 1 - -1 2 - +1 3 - 0 4 - +1 5 - -1 6 - +1 7 - 0 8 - 0 9 - -1
36-37	Education 1 - +2 2 - -2 3 - +1 4 - -1 5 - -2 6 - +2 7 - -1 8 - -1 9 - +2
38-39	Education 1 - -2 2 - +2 3 - -3 4 - +1 5 - +2 6 - -2 7 - +3 8 - +1 9 - -2

40-41 Education

1 - -2
2 - 0
3 - +2
4 - 0
5 - +2
6 - +2
7 - -2
8 - -2
9 - 0

42-43 Education

1 - +2
2 - 0
3 - -2
4 - -1
5 - -1
6 - +1
7 - +1
8 - -2
9 - +2

Education

		x	x	x	x	x	x	x	x
Some Elementary School	1	+1	+1	-1	-1	+2	-2	-2	+2
Elementary School	2	+1	-1	0	+1	-2	+2	0	0
Some Junior High School	3	+1	+1	+1	0	+1	-3	+2	-2
Completed Junior High School	4	0	-1	0	+1	-1	+1	0	-1
Some High School	5	-1	0	-1	-1	-2	+2	+2	-1
Completed High School	6	-1	-1	0	+1	+2	-2	+2	+1
Vocatoinal School	7	-1	+1	+1	0	-1	+3	-2	+1
Some College	8	0	-1	+1	0	-1	+1	-2	-2
Completed College	9	0	+1	-1	-1	+2	-2	0	+2

44 Blank

45-46 Income

1 - +1
2 - +1
3 - +1
4 - 0
5 - -1
6 - -1
7 - -1
8 - 0

47-48 Income

1 - -1
2 - -1
3 - -1
4 - +1
5 - 0
6 - 0
7 - +1
8 - +1

49-50 Income

1 - +1
2 - -1
3 - +1
4 - -1
5 - +1
6 - -1
7 - +1
8 - -1

51-52 Income

1 - +2
3 - -2
3 - +2
4 - -2
5 - +2
6 - -2
7 - +2
8 - -2

53-54 Income

1 - 0
2 - -1
3 - -1
4 - +1
5 - +1
6 - +2
7 - -2
8 - 0

55-56 Income

1 - -2
2 - +2
3 - 0
4 - -1
5 - +1
6 - -2
7 - 0
8 - +2

57-58 Income
1 - +2
2 - 0
3 - +2
4 - 0
5 - -2
6 - 0
7 - -2
8 - 0

Income

		x	x	x	x	x	x	x
< $3000	1	+1	-1	+1	+2	0	-2	+2
$3000-$6000	2	+1	-1	-1	-2	-1	+2	0
$6001-$9000	3	+1	-1	+1	+2	-1	0	+2
$9001-$12000	4	0	+1	-1	-2	+1	-1	0
$12001-$15000	5	-1	0	+1	+2	+1	+1	-2
$15001-$25000	6	-1	0	-1	-2	+2	-2	0
$25001-$50000	7	-1	+1	+1	+2	-2	0	-2
$50000 +	8	0	+1	-1	-2	0	+2	0

59-80 Blank

Fourth Card

Column

1-6 Identification Number

7-8 Blank

9 Card Number
4 - fourth card

10-11 Blank

12 County
1 - Huron
2 - Sanilac
3 - Tuscola

13 Blank

14-15 Minor Civil Division Code

16	Blank
17-20	1970 Minor Civil Division Population (F4.0)
21	Blank
22-25	1960 Minor Civil Division Population (F4.0)
26	Blank
27-36	1970 Minor Civil Division Population Density (F10.6)
37	Blank
38-47	1960 Minor Civil Division Population Density (F10.6)
48	Blank
49-55	1960-1970 Minor Civil Division Population Density Change 49 Sign (+ or -) (F7.6)

Minor Civil Division Codes

Huron County

Incorporated Places

01 Bad Axe
02 Caseville
03 Elkton
04 Harbor Beach
05 Kinde
06 Owendale
07 Pigeon
08 Port Austin
09 Port Hope
10 Sebewaing
11 Ubly

Townships

20 Bingham
21 Bloomfield
22 Brookfield
23 Caseville
24 Chandler
25 Colfax
26 Dwight
27 Fairhaven (Bay Port)
28 Gore
29 Grant
30 Hume
31 Huron
32 Lake
33 Lincoln
34 McKinley
35 Meade
36 Oliver
37 Paris
38 Pointe Aux Barques
39 Port Austin (Grindstone City)
40 Rubicon
41 Sand Beach
42 Sebewaing
43 Sheridan
44 Sherman (Ruth)
45 Sigel
46 Verona
47 Winsor

Sanilac County

Incorporated Places

01	Applegate	08	Marlette
02	Brown City	09	Melvin
03	Carsonville	10	Minden City
04	Croswell	11	Peck
05	Deckerville	12	Port Sanilac
06	Forestville	13	Sandusky
07	Lexington		

Townships

20	Argyle (Argyle)	33	Lamotte (Decker)
21	Austin	34	Lexington
22	Bridgehampton	35	Maple Valley
23	Buel	36	Marion
24	Custer	37	Marlette
25	Delaware	38	Minden (Palms)
26	Elk	39	Moore (Snouer)
27	Elmer	40	Sanilac
28	Evergreen	41	Speaker
29	Flynn	42	Washington
30	Forester (Forester)	43	Watertown
31	Freemont	44	Wheatland
32	Greenleaf	45	Worth

Tuscola County

Incorporated Places

01	Akron	07	Mayville
02	Caro	08	Millington
03	Cass City	09	Reese
04	Fairgrove	10	Unionville
05	Gagetown	11	Vassar
06			

Townships

20	Akron	32	Indianfields
21	Almer	33	Juniata
22	Arbela	34	Kingston
23	Columbia	35	Koylton
24	Dayton	36	Millington
25	Denmark	37	Novesta (Deford)
26	Elkland	38	Tuscola (Tuscola)
27	Ellington	39	Vassar
28	Elmwood	40	Watertown (Fostoria)
29	Fairgrove	41	Wells
30	Fremont	42	Wisner
31	Gilford		

56	Blank
57-59	Minor Civil Division Area - Square Miles (F3.1)
60-80	Blank

Fifth Card

Column	
1-6	Identification Number
7-8	Blank
9	Card Number 5 - Fifth Card
10-11	Blank
12	County 1 - Huron 2 - Tuscola 3 - Sanilac
13	Blank
14-18	1970 County Population (F5.0)
19	Blank
20-24	1960 County Population (F5.0)
25	Blank
26-33	1970 County Population Density (F8.6)
34	Blank
35-42	1960 County Population Density (F8.6)
43	Blank
44-50	1960-1970 County Population Density Change 44 Sign (+ or -) (F7.6)
51-52	Blank
53-56	County Area - Square Miles (F4.1)
57-80	Blank