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Recent ballot measures and organized opposition to comprehensive state planning have indicated the need for research on some of the causes of discontent with the state planning system. Satisfaction with land use in the city of Eugene, Oregon was modeled and analyzed in this study. The purpose of the study was to determine some of the underlying causes of dissatisfaction with land use planning in the state.

A model based on previous studies in social indicators research was developed. Data from a survey of Oregon residents were used in conjunction with data from planning and census documents in multiple regression analysis. Econometric tests were used to determine the presence of, and correct for, problems of multicollinearity and heteroscedasticity. The use of principal components analysis was explored.

The results indicate that a combination of personal and area demographic factors combine to explain a significant amount of variation in satisfaction with land use in Eugene. Additional testing revealed the importance of individual attitudes about aspects of planning and development that play an important role in explaining variation in the overall satisfaction with land use. The model and results are somewhat useful to planning officials who need

to know more about the preference structure of the public with respect to land use decisions. The study is also useful for researchers interested in applying more precise quantitative methods to social indicators research on public policy issues.

An Estimation of Public Preferences for Land Use in Eugene, Oregon

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TABLE OF CONTENTS

LIST OF TABLES

AN ESTIMATION OF PUBLIC PREFERENCES FOR LAND USE IN EUGENE, OREGON

INTRODUCTION

This study combines the economics of public choice with social indicators research in order to assess important factors in public involvement in land use planning decisions. The purpose of the research is to analyze the underlying determinants of the public's satisfaction with the land-use planning process in their area. Community growth and development provide analytical challenges to a broad range of disciplines. The causes of growth have been researched and revealed, as have many of the problems. This project is designed to take a new approach to some land use problems as they relate to area residents.

Rapidly growing non-metropolitan areas are facing increasing demands for public services to meet community needs. Economic and sociological research has addressed this problem to some extent. Researchers have helped to clarify many policy and research needs by examining the population turnaround, rapid growth communities, public perception of the quality of life, and indicators of satisfaction with and preferences for various public services.

A very important aspect of population growth and non-metropolitan development is the land-use planning process and how well it deals with conflicting demands for resources. In dealing with the land utilization and distribution requirements of the citizenry, land use planning becomes a political process which comes under the scrutiny of the population it serves. This political nature of land use planning is of particular importance in Oregon where land use planning is not just a service provided by local governments, but an aspect of state land use laws.

Statewide planning has met with criticism in recent years, as many residents' priorities have shifted from protection of the environment to promotion of economic development. Voters have been asked in recent elections to state their preference for either abolishing the state planning laws and administration or keeping them intact. This choice represents two extremes of a complex problem which has not been considered extensively. The most recent vote on the abolishment of the Department of Land Conservation and Development was that only 56% were opposed to abolishment, indicating that a large percentage of the public is dissatisfied with statewide planning.

While these voting percentages reveal disillusionment with the laws and agency responsible for administering the state system, they do not reveal any specific causes for dissatisfaction. Many analysts agree that, short of abolishment, changes are needed in the planning system, yet very little research has been done on this problem. Governor Vic Atiyeh's office issued a report in September of 1982 by his Task Force on Land Use in Oregon. The report outlines general recommendations for improving the various goals and guidelines which are to be incorporated into area comprehensive plans. These recommendations primarily are based on written and oral testimony from officials and members of the general public during hearings staged by the Task Force. The Task Force report is one of the most in-depth studies of land use problems to date, yet it contains no quantitative analysis of people's opinions.

This project is designed to analyze responses on various questions pertaining to land use, planning, and development in this state. This analysis is based on a survey of Oregon residents and forms the basis for a more accurate study of the public's concerns about problems considered by the Task Force. Goal One of the Oregon Land Conservation and Development Commission's statewide

planning goals and guidelines is to develop a citizen involvement program that insures the opportunity for citizens to play an active role in all phases of the land-use planning process. The guidelines of this goal of citizen involvement include the recognition that educational institutions with interests in land use planning should provide information on land use to citizens. Goal 5.b of Goal One specifically states that "a process for quantifying and synthesizing citizen's attitudes should be developed and reported to the general public" (LCDC, 1978 p.3).

In the spirit of these guidelines, this thesis is an attempt to identify some of the important determinants of citizen's support for, or opposition to, land use planning in their area. Using data from survey results and publications on land use distributions, a model is developed which explains, in part, variation in public satisfaction with land use planning. This is the first time, to this author's knowledge, that social indicators research has been applied to land use issues. Consequently, there are few previous studies on which this one is based.

The primary purpose is not just to report citizen's attitudes on land use in a more scientific way than the Task Force Report, but to explore new possibilities and techniques for keeping public officials informed of citizen's demands for public goods and services. By developing a model for Eugene, Oregon, and by applying econometric analysis to the determinants of satisfaction with land use, a new area of study is opened.

The objectives of this study are to:

(1) develop a model which provides information to policy-makers on preferences for land use,

(2) determine the most significant factors which are significantly associated with individual satisfaction with land use,

(3) and evaluate the usefulness of the model for policy purposes and examine the policy implications of the results.

Some of the provisions of Oregon's land use system and the theoretical underpinnings of state land use control will be discussed in Chapter II. Chapter III reviews work that has been done on models which measure preferences and satisfaction of individuals with respect to public services. The data set and model are developed in Chapter IV. Analysis of regression results and problems with OLS regression are presented in Chapter V. Chapter VI provides policy implications and a summary and conclusions of the study.

CHAPTER II

LAND USE PLANNING IN OREGON

Current Legislation

In order to develop a model which correctly specifies determinants of satisfaction with land use in Oregon, some of the peculiarities of the state's system must be understood. Oregon's statewide land use planning system leads to many environmental benefits, but it has also led to conflict over issues of development. With rapid population growth has come a burden on the land use system to control urban boundary growth and organize industrial development. Yet at the same time, the growing population and declining employment in the timber industry and other sectors have increased demand for jobs and new industry.

To meet with these demands from rapid growth, Oregon passed legislation in 1973 instituting a statewide comprehensive land management program. The Oregon Land Use Act established a system which requires local governments to develop land use plans in accordance with state goals and guidelines. Senate Bill 100 created the Land Conservation and Development Commission (LCDC), a group of seven members responsible for establishing the goals and guidelines on which local comprehensive plans must be based. The commission is responsible for reviewing and approving the local plans, as well as reviewing alleged violations of guidelines which are, in effect, law.

This enabling legislation originally called for all of Oregon's 278 planning jurisdictions to have plans acknowledged by January, 1976. When no city or county plan was approved by that date, the Department of Land Conservation and Development (DLCD), the administrative branch of the

Commission, provided extensions and financial assistance to local jurisdictions to help speed the process of plan implementation. This has continued to be more complicated than originally thought by the 1973 Legislature.

Several changes have been made by the Legislature since 1973 in order to deal with some of the problems which have developed. Until 1977, the Department had the power to assume planning authority for jurisdictions which had not moved toward compliance with planning laws. The Legislature changed this to Departmental authority to impose moratoria on land use actions through enforcement orders (Task Force, 1982). The process for appealing land use decisions changed in 1979 when the Land Use Board of Appeals was created to take on the work which had previously been the responsibility of the State Circuit Court system.

Throughout its history the statewide land use planning system has met with considerable criticism from state residents. This criticism has included specific allegations, such as that firms have failed to locate in an area because of the maze of laws and regulations, or that individuals have been unable to put additional buildings on their property. Much of the opposition to state controls is on a philosophical level, especially in terms of individual property rights and governmental interference with the market forces that would otherwise determine land use distributions.

To develop the framework for gauging citizen attitudes and preferences concerning land use, the Oregon system must be understood in the context of planning theory. This provides a foundation for assessing personal attitudes that favor no controls at all as well as those attitudes which support full control over land resources. If land use controls are instituted to serve the population's needs by bringing about a more efficient allocation of resources,

then the foundations of Oregon's system should be discussed in an attempt to identify where dissatisfaction might arise among the people the system is meant to serve.

Theoretical Justification for State Control

Land Use in an Open Market System

The major determinant of land utilization and distribution is individual action to buy or sell land and alter it according to personal needs and incentives. The land market responds to individual wants and resource availability as land is distributed among competing uses and users. In addition to this resulting distribution of uses, changes in the distribution of wealth and income take place. Different demands, such as for roads and utilities, are placed on the provision of services as a result of these land market forces. Under certain critical assumptions, standard economic theory would have these forces interacting in order to produce "socially optimal" or most "efficient" resource use. If such a system did exist, and all needs for land utilization were met, then little dissatisfaction would exist among the population and land resources would either be put to their most highly valued uses or the cost to society would be minimized.

There are two major factors which prevent this free flowing market structure from efficiently distributing land. Many interrelated public policies affect the market for land even if they are not intended primarily to affect land use. Real estate taxes, public service provisions, and location of public buildings and operations are types of policies which influence land use distribution. These policies which affect infrastructural and financial aspects

of the land use market have subtle but important effects on individual land use decisions.

The more obvious, and perhaps more problematic factor which hinders "socially optimal" resource allocation, is the common property problem arising out of private land use decisions. There are many positive and negative externalities which may be involved with the utilization of private land. Air, noise, and visual pollution are types of factors which may arise in certain uses on one parcel of property that affect other properties. In an open market for land, these costs or gains often are not internalized in the market price a property owner must pay for his land. Owners of neighboring property bear these "costs" in the form of reduced property values, adverse health effects, or reduced utility. Basically, the rights of one property owner to do as he pleases with his land may inhibit the rights of others.

Where cases of conflicting uses of land occur, the system of allocation breaks down and fails to produce efficient property distribution because all costs are not internalized and reflected in the market price. Public intervention in land use is necessitated , or at least warranted, when "explicit public policies in land use allocation may lead to increases in social benefits that would not be obtainable in the absence of such policies" (Ervin et al.,1977 p.6). Thus, when the markets are unable to allocate resources efficiently, land use planning should be designed to correct or compensate for the failure of the market.

Public Planning and Efficiency Gains

Land use control, particularly comprehensive planning in Oregon, can be evaluated in terms of how well it leads to gains in efficiency that are not

possible in the open market. Such gains in efficiency may mean that "the land values are greater, or that the sum of satisfactions from land use are greater, or that the costs of attaining given satisfactions are less, or some combination of these advantages" (Clawson, 1975b, p.475).

In terms of policy, increases in satisfaction and/or cost reductions can be achieved in three basic ways. First, some of the negative external effects on firms and individuals resulting from conflicting land uses can be reduced by regulation. For example, zoning helps to keep industrial and residential uses separate so that negative externalities from factories are not borne by neighboring communities. A second efficiency gain can be made in the provision of public goods. This case can be made for statewide comprehensive planning and public acquisition of lands, where attractive open space and other public areas which are subject to joint-consumption are protected by long range planning. The attractive value of open space near a residential area can be accounted for by public planning and that land can be protected from some form of development that is irreversible. Perhaps the strongest case for planning providing the optimal level of public goods is that flexibility with land such as open space and prime agricultural land is achieved at a lower cost to society than if the land were converted, resulting in suboptimal uses in the long run. (Ervin et al, 1977, p.15).

The third area of efficiency to be gained by public land use planning is the appropriate provision of public services. Urban growth boundaries in comprehensive plans provide a clear example of how overall social costs can be lowered by public intervention. If water and sewer lines had to be extended to randomly spaced housing, the costs of providing those services would be prohibitively high. Efficient provision of public services is difficult to

achieve with decentralized decision-making based on market signals. This is due to pricing structures which do not accurately distribute costs among consumers of public services.

Theoretical Critique of the Oregon System

If it is accepted that efficient resource allocation at socially optimal levels is desired by a majority of the public, and that public intervention can facilitate efficiency where the market fails, then the role of land use planning in Oregon should be examined with respect to how well it improves efficiency. According to Clawson's definition, efficiency gains mean that greater satisfactions are achieved at lower costs. The impact of Oregon's planning system might be judged on this basis, recognizing the fact that many individuals are dissatisfied with the system.

Some of the legal provisions of the Oregon land use system are outlined in the first section of this chapter. This section examines the process from a critical perspective, comparing it to the open market system it was designed to improve upon. In an article in Land and Water Law Review, James Huffman and Reuben Plantico examine the Oregon system to establish "clearly the relationship between regulatory means and ends as well to clarify what information is needed to proceed intellegently with land use problems" (Huffman, 1979, p. 140).

Huffman and Plantico assume that market failure and the inadequacy of local controls were the motivating factors for the imposition of land use planning in Oregon. In the years when rapid population growth was increasing the competition for land, controls were left to local governments. Land use change was being regulated by a "piecemeal" approach. "Dissatisfaction with the results of this piecemeal approach was a major factor behind the adopton of

Oregon's landmark statewide land use management program in 1973" (Gustafson et al., 1982). The private decisions during Oregon's rapid growth period were producing socially injurious results which had to be corrected by statewide planning.

The basis of the planning system is the requirement that local jurisdictions must adopt comprehensive plans consistent with statewide guidelines and standards. These standards and how they are established thus become the major factors which will, or should, produce a more efficient system of resource allocation. It is how these standards are set, however, which gives rise to problems and dissatisfaction with Oregon's system. As outlined above, the seven appointed members of LCDC set these standards and guidelines which must be followed by local jurisdictions.

A major characteristic of this decision making process is that redistribution of authority and wealth takes place. State versus local control of land use decisions has been an ongoing source of debate for some time, and has been the crux of many complaints in Oregon. The problem arises because a decision-making body, the Commission, is responsible for establishing guidelines on which local planning laws must be based. These decisions are both wealth-creating and wealth-distributing. "It is the wealth-distributing effect which makes land planning and zoning so difficult administratively" (Clawson, 1975, p.483).

The designation of "prime lands" for conservation and zoning of urban lands for commercial development clearly affect the market value of those types of parcels. "The public action creates a value, large or small, for one landowner, and denies it to another" (Clawson.1975, p.484). One of the major problems with land use decisions under no state control is that private property

owners tend to adversely affect the value of others' lands. By taking some of the freedom away from individual property owners and compelling them to adhere to standards set by a small, law making body, the state land use laws cause a redistribution of wealth. The most important problem with the system is that planning may not clearly improve equity over a system with no controls. The law making body is incapable of applying external criteria for deciding which distribution of land is best because there are too many factors involved. Instead, the decision making body must rely on a system of identifying the public interest through the political system.

If the planning system and the allocative decisions truly represent the public's interest, then it can be argued that improvement has been made over the open market system of distribution. Oregonians who voice dissatisfaction with land use planning are often those who feel their property rights and land values have diminished because their best interest is not being served by planning decisions. "The political decision-maker in land use is not typically concerned with the efficiency questions of interest to the economist. He is, rather, constantly involved in disputes over the distribution of rights and goods" (Ervin et al., 1977, p.19).

The Land Conservation and Development Commission is an administrative branch of the state government, not a body of legislators held accountable by its voters. If legislators were given the task of establishing the goals and guidelines for state land use, the standards would be too broad and general to be useful. Legislators are restricted by the specific interests of their constituents and these political considerations lead to generalized compromises in the legislature. "By shifting the standard writing task to a commission of seven members, it is possible to write increasingly specific standards only as

the commission is able to increasingly isolate itself from the people of the state" (Huffman and Plantico, 1979, p.143). Promoting "socially optimal" land uses is a difficult task for any administrative agency, but especially so when little is known about the values and preferences of the people who are affected by land use policies.

The Role of the Citizen in Oregon's System

"The need to determine the public's preference for land use policies is the ostensible purpose for encouraging citizen involvement and access" (Ervin et al., 1977, p.42). When land use decisions are left to individual action, assessing needs and preferences of the population is not a great problem because needs get translated into market demands. For a statewide system such as Oregon's, provisions for citizen involvement become more important. Information about the values and preferences of people in the diverse localities of the state is essential if the planning process is going to effectively optimize resource use in the public interest. Among other reasons, it is difficult for people to reveal their true preferences because no or few markets exist besides the actual land market.

The first goal set out by the Commission is to develop a citizen involvement program that insures the opportunity for citizens to be involved in all phases of the planning process. The guidelines for implementing this goal are rather broad, leaving it up to the governing body in charge to adopt a program for citizen involvement. Huffman and Plantico argue that the program appears to be included in the goals and guidelines for the mere purpose of involving citizens rather than having any specific purpose of involving them in the planning process.

Regardless of the purpose, the opposition to LCDC and state regulation in Oregon over the years suggests that more information about public preferences is needed. Statewide land-use planning, as stated earlier, was instituted during a period of rapid growth in Oregon. The guidelines reflect the values of the times when conservation and control of rapid development were important to the citizenry. Recently, as the growth has slowed, the needs and desires of state residents have become more complicated.

The public interest must be better known and understood in order to be better served. In Oregon, the continued operation of a statewide system might depend on how responsive its administrators are to local needs. Because the Commission is not directly held politically accountable for political decisions, mechanisms for gauging citizen preferences, other than voting, need to be developed. Individual satisfaction with planning decisions will undoubtedly play an important role in future votes which will determine the fate of statewide planning. An examination of individual preferences is particularly important when strongly organized groups can have an influence on the future of Oregon's planning system. "In the private market, one tends to assume that resources will be allocated efficiently among private goods because demand is a function of relationship between price and quantity. For public goods it is more difficult to get people to reveal their true preferences" (Ervin et al., 1977, p.44).

Researchers have made progress in developing models to help determine the preferences of community residents. The following chapter briefly discusses some of these efforts. Special attention is given to models which have been developed to use various indicators of personal characteristics and attitudes to explain satisfaction with public services. This is the type of model that was

developed for this study in order to systematically organize and analyze information on residents' preferences for land use.

CHAPTER III

PAST RESEARCH

In this chapter, work on developing indicators of preferences for land use and satisfaction with public services is reviewed. The literature relevant to this study includes several studies on public choices in land use. These studies are discussed briefly in order to examine the methodology used. Then, work that has been done on the more general objectives of developing social indicators of satisfaction with public services is discussed in order to develop the methodology and model for doing a more in-depth analysis of land use issues.

Review of Studies on Land Use

A point made by authors contributing to "Economic Issues in Land Use Planning" (Sorenson and Stoevener, eds., 1977) is that efficient land use is hindered by a lack of relevant information. The publication is a compendium of articles drafted for the purpose of giving focus to future economic research on land use issues. In addition to addressing issues such as transferable development rights, distribution of impacts and costs, and agricultural land conversion, some of the authors recognize the challenge to economists to develop means to evaluate peoples' values concerning open space, property rights, and public planning. The editors point out that "the economist is confronted with the problem of working with an ill-defined or non-explicit social objective function. As such, application of some traditional analytical tools becomes difficult" (Sorenson and Stoevener, 1977, p.8). The obvious drawback of the literature in this publication is that it lacks any quantitative studies, but it does serve as a thorough guide to future study.

Analytical work on residents' preferences for land use is done in "Local Control of Land Use: Profile of a Problem" (Geisler and Martinson, 1976). One of the many problems that have arisen since the institution of a statewide planning program in Oregon is the conflict over state versus local control of land use policies. Many delays in plan approval and appeals for changes result from conflicts between state and local statutes. Determining the level of control desired by the citizens of an area is the purpose of Geisler and Martinson's study on Wisconsin residents.

The objective of the Geisler and Martinson study is to examine attitudes toward public control over land use. The study primarily addresses the questions of:

(1) whether opposition to land use control is aimed at encroachment on property rights or at the responsible governmental level,

(2) whether or not there is variation in opinions on specific policies in comprehensive laws,

(3) what personal characteristics are related to varying attitudes.

In addition to demographic characteristics, indicators of respondents' levels of awareness of environmental problems are used to analyze attitudes toward land use controls. The analysis consists of cross tabulations to determine the structure of support for local control of land use and three types of zoning; shoreland, mobile home, and agricultural land protection. The question relating to state versus local control is "Would you be in favor of the state playing a stronger role in the planning and zoning of land use in your area, or do you feel it is better if the responsibility is left to local government," with favor or oppose as the possible answers. Demographic characteristics include place of residence, age, education, and family income.

According to the authors' interpretation of the results, 87% of the respondents opposed state control, although the responses to specific questions on the types of zoning show that the opposition is not to land use planning altogether. There is little statistical relationship between demographic characteristics and attitudes towards level of control, but some relationships between personal characteristics and the three zoning questions are clear. The authors conclude that comprehensive land use planning can succeed if local discretion is allowed and that, on the basis of survey results, environmentally aware people feel that local control is adequate in protecting the environment.

This study is important in that it is one of the few which goes directly to the residents of an area in order to determine their attitudes on planning laws. Improvements could be made on the study. Additional factors besides the four basic demographic characteristics could be included. The environmental awareness indicator is not clearly discussed and its effects are inferred secondarily on the basis of assumptions that younger, more educated town-dwellers are more environmentally aware.

A possible flaw with the methodology and conclusions of this study is pointed out by Weber (1978). Weber's criticism of the study centered on the inferences drawn on the responses to the question on state control. Weber contends that a better conclusion might be that people are less concerned about the level of government at which planning decisions occur and more concerned about content and substance of regulations (Weber, 1978). Regardless of which inference is correct, Weber does make an important point in that future research concern itself not so much with determining the appropriate level of government, but that research "...be directed at the underlying relationships between local

attitudes toward specific controls and the effect of such regulations on local perceptions of community interest" (Weber,1978, p.97).

Following the direction of establishing the relationship between local attitudes and land use regulation, Albrecht and Geertsen undertook a study to determine how well elected officials respond to the public interest on land use issues. In "Land Use Planning: Attitudes and Behavior of Elected Officials and Their Constituents" (Albrecht and Geertsen, 1978), the authors investigate the failure of a Utah state land use planning bill to gain approval at the polls. The study involves surveys of state citizens and legislators to examine the relationship between lawmakers and their constituents on the land use issue.

The analysis entails computation of correlations between legislators' early positions on the state land use bill, perceptions of constituent attitude and roll-call vote. In addition, the constituent attitudes on land use planning prior to the referendum vote, their referendum vote, and attitudes following the referendum vote were analyzed. Albrecht and Geertsen found that legislators voted "...in a manner they assumed was generally consistent with the opinions of their constituents, but their assessments of constituents' attitudes were very inaccurate" (Albrecht and Geertsen, 1978, p.30). The results also indicated that opponents of the state land use act had been very successful in influencing public opinion between the time the legislators passed the bill and the referendum was voted upon.

This study is instructive in showing the importance of the relationship between officials' perceptions of public preferences and their legislative behavior, especially since those perceptions were generally incorrect. As is the problem with the Geisler and Martinson study, the research centers on the question of whether or not respondents wanted state control or not. The survey

of state citizens reportedly included questions on a range of environment-related issues, yet no specific aspects of land use regulations are modeled. The authors' own conclusions confess the inadequacy of the correlation model in linking public preferences to successful legislation. They stress the "...need to identify additional factors that may take precedence in certain types of issues," hoping that "...further identification of these factors will somehow alleviate the rather dismal picture of the functioning of representative democracy that is implied in (their) findings" (Albrecht and Geertsen, 1978, p.35).

While few, if any, studies have been developed to examine specific aspects of preferences for land uses and planning regulations, some studies have examined public opinions in the development process. Eklund (1977) attempted to establish the preferences of suburban community residents for land use developments and the factors which predict those preferences. In an Oregon Alternative Futures Growth Center Project Paper, Wyckoff (1976) surveyed citizen attitudes toward services in Union County, Oregon and perceptions of some acceptable resource trade-offs for economic growth. Mason's study on "Public Assessment of Selected City Services" (1978) in Corvallis, Oregon included variables which rated Corvallis as a place to live, satisfaction with local government, and attitudes toward growth and related issues (taxes, commercial development, etc). These variables are related to a small range of demographic variables.

Some agricultural economists and rural sociologists have expanded work on gauging citizen preferences for public services in light of growth and development in local communities. These studies on public services in general

are briefly examined in the following section to establish the methodology for this study.

Studies on Satisfaction with Public Services

This section outlines some of the work that has been done on developing social indicators of personal satisfaction and preferences. These studies have attempted to link objective indicators, such as personal and demographic charateristics, and subjective indicators of opinions and preferences to attitudes of citizens toward services in their areas.

In an article entitled, "Community Satisfaction: A Study of Contentment with Local Services" (Rojek et al., 1975), a model for analyzing determinants of community satisfaction is developed. This study follows the work of Marans and Rogers (1974), who "presented a conceptual model of community satisfaction where objective attributes of the environment are linked to the subjective experiences of individuals in that environment" (Rojek et al., 1975, p. 178). This concept is that the individual's perception of his/her environment is not necessarily the same as the physical state of the environment.

In the study by Rojek et al, respondents to a survey were asked to rate their satisfaction with fifteen community services on a scale of one to five. Community services included items such as fire and police protection, recreational facilities, and job opportunities. The analysis involved clustering the various types of community services through factor analysis. Four categories produced (satisfaction with medical services, public works, commercial services, and educational services) were tested for covariance with eleven independent variables. The various personal indicators, sex, age, education, etc., did not significantly explain satisfaction.

The authors' conclusions to this study are that it is beneficial to develop "social indicators based on the attitudes of individuals toward conditions in a particular environment. The use of only objective information appears to be inadequate" (Rojek et al. 1975 p.90) This is consistent with the findings of Marans and Rogers (1975) and Ladewig and McMann (1980).

Stevens addressed the problem of proper specification of a model to explain satisfaction with public services in an article entitled, "Objective Indicators, Personal Characteristics, and Satisfaction with Safety from Crime and Violence: An Interaction Model" (1984). Safety from crime and violence is used as the domain of public services to test the usefulness of both objective indicators (such as crime rates) and personal characteristics explaining satisfaction. Stevens takes a new approach of also testing the interaction between objective and personal characteristics to see how information is interpreted differently over varying types of people.

In this study, Stevens points out the need to disaggregate the domains of interest in order to identify objective indicators that are known by the general public. In this case, crime rates and ambient air quality figures are used in comparison to subjective satisfaction for recent in-migrants to southern Oregon. Stevens finds significant association between subjective and objective indicators. The interaction terms reveal that this association is affected by various personal characteristics of the study group. Steven's findings indicate the need to further research the interaction between personal characteristics, objective indicators and subjective satisfaction.

This project is designed to expand on the Geisler and Martinson (1976) report by breaking down aspects of land use controls and disaggregating data to form a more accurate profile of constituent attitudes. In the research outlined

above, little or no work has been done to reveal the basic components of satisfaction at a disaggregated level such as local planning policy. There are challenging conceptual and practical considerations in developing a more accurate model on land use. The data needs and model specification are discussed along with these considerations in the following chapter on methodology.

CHAPTER IV

METHODOLOGY

Data Set

An important stage in developing this study is identification of the important variables which represent determinants of satisfaction with land use policy and preferences for particular uses for the land. Specification of an accurate model requires use of data which can be readily quantified and interpreted. This chapter discusses some of the necessary steps in putting together the model. This model can then be used to produce information which may be of use to local planning officials and others involved in the land use law making process.

Some of the steps in developing this variable set are the identification of relevant objective and subjective indicators, specification of the proper aggregation levels, and acquisition and quantification of data to represent these variables. The primary source of data is a survey of Oregon residents that is designed to probe various aspects of satisfaction with public services. The survey was developed and administered under the leadership of Robert Mason and Joe Stevens through the Survey Research Center at Oregon State. The survey was supported by a Western Rural Development Center grant. The independent research firm, Bardsley and Haslacher administered the survey to 400 residents of Clackamas, Deschutes, Jackson, and Lane counties. The sampling was weighted to make the best use of crime data for the section on satisfaction with safety from crime and violence. In addition to the subjective and basic demographic information provided by the survey, objective indicators are developed from information in secondary sources such as census and planning publications.

These data are then introduced into a regression equation which identifies how the characteristics and attitudes of local citizens combine to explain variation in their satisfaction levels.

Level of Spatial Aggregation

There are several important considerations in choosing these variables and acquiring the data to represent them. It is not clear what level of spatial aggregation is appropriate for many of the objective measures. In many previous social indicators studies, the level of aggregation for data varied. In most cases, large samples were modeled with highly aggregated data, and it was difficult to interpret any consistent trends in the explanatory variables. This study on land use satisfaction is based on the idea that more disaggregated data would increase the explanatory power of a social indicators model. In the survey from which this study was developed, respondents may have been thinking of the state, county, local area, or neighborhood level when addressing questions on satisfaction with land use. The survey did not include any information on appropriate level of aggregation. One possible way of addressing the problem is to introduce objective data for the various levels in the model and test to determine which levels prove to be satistically significant.

Even if it can be determined which level or levels of aggregation are appropriate, it is difficult to represent cognitive boundaries with physical and statistical boundaries. Census county divisions have been designated for Oregon in lieu of minor civil divisions. These census county divisions (CCDs) are statistical areas established by the census bureau. The divisions provide a good basis for disaggregating data at the subcounty level. These CCDs are determined by census and county officials on the basis of major trade and

service areas and major land use or geographic differences. While not providing totally accurate partitioning of various areas for each individual in the study, these CCDs might provide a good starting point for the sample as a whole. For the Eugene sample, the city is broken down into eight major planning districts which represent distinct neighborhoods.

Static and Dynamic Indicators

Another conceptual problem that must be dealt with is whether static or dynamic indicators of land use patterns and policies are appropriate. At the time of the survey, there were probably certain conditions that came to mind for the respondents. They may think of land use conditions and policies in terms of the current state of affairs. In this sense, static indicators are appropriate and cross-sectional data for the time period of the survey should be used. However, if increasing rates of population growth, industrial development, and land use conflicts are underlying factors in respondents' evaluations of land use, then dynamic indicators should also be included in the model. This would be possible if this same survey were administered again at a later time. As with determining the appropriate level of disaggregation, information is not readily available on the appropriateness of static versus dynamic indicators. Therefore, assumptions must be made. Static indicators seem best, given the availability of data and the cross-sectional nature of the survey, but percentage rates of change can be introduced into the model for indicators of economic development and growth. The possible uses of both types of data are discussed below with reference to specific variables.

Variable Identification

In this section, general considerations in selecting the variable set are discussed. The section on model specification, which follows, identifies the specific variables which are introduced into the model. One other purpose is to explore variable types which would ideally be included in this study and to examine factors which might hinder their inclusion in the model. The data set should be developed in such a way that information readily recognizable by the general public is represented. Public cognition and data availability are the major constraining factors on an ideal data set. There are four basic categories of variables that are considered here. The actual survey questions used to obtain information for the data set are presented in Appendix D.

Measures of Satisfaction

The first set of variables are those which measure satisfaction with land use. This information is derived in two ways. The survey elicits responses to the question: "Which number best represents how satisfied you are with land use in your city/town/part of county". Responses on an eleven point scale rate satisfaction from 0 to 10, with 10 representing highest satisfaction levels. This is the scale developed by Cantril (1965), and its use follows Stevens' (1980,1984) work on quality of life studies. Andrews and Withey (1976) concluded that this scale is an appropriate measure of satisfaction. Satisfaction is considered to be the gap between aspirations and achievements. In this study, satisfaction represents how individual perceptions of land use compare to expectations of optimal land-use policies. In addition to this rating scale, respondents are also asked to state any problems they perceive with land use in an open ended question.

Personal Characteristics

The second data requirement concerns the personal characteristics of the respondents. In order to determine the influence of personal characteristics on peoples' perceptions of their environment (a point of contention in the literature), basic information on age, income, property ownership, etc. is recorded in the survey. This is the general type of information that is taken in most public opinion surveys.

Attitudes and Opinions

Possibly the most important set of indicators for public information concerns certain attitudes and perceptions of problems and priorities held by the respondents, in contrast to the 11-point satisfaction scale. These indicators of opinions and attitudes can be used to explain some of the specific points of satisfaction and dissatisfaction. Scaled questions about economic development, property rights, specific choices for uses of the land, and the effect of laws on property values are included in the survey. These types of indicators have not been extensively researched in the literature, but are touched on in the study by Geisler and Martinson (1976). These are the factors which were shown in the second chapter to be very important to improving the land use planning system by bringing information about the public's needs closer to public decision makers.

Objective Indicators

The final category of variables consists of the objective indicators that have been examined in social indicators research. Similar to Stevens' (1980) use of crime rates in models to determine components of satisfaction with

police protection services, this model includes indicators relevant to variation in physical characteristics of the area. These characteristics influence residents' perceptions of how the land use planning system affects them. Some of the conceptual and practical considerations which are involved in developing this objective data set are discussed here.

Two types of objective indicators might be included in this model. One is the land use characteristics of the area, the other is aspects of the planning laws themselves. The land use characteristics of an area influence how residents are affected by the laws. Rural residents might be expected to be concerned with different provisions of the laws than those living in rapidly developing metropolitan areas. Another perspective is to represent information about particular aspects of the planning process itself to determine how variation in planning procedures affects residents' appraisals of land use in their area. This is the type of approach taken by Geisler and Martinson (1976) in their attempt to distinguish between preferences for local versus state control of land use, for instance. The two categories of objective indicators, physical land use characteristics and indicators of the land use planning process are discussed in the following two sections.

Physical Land Use Characteristics. The first set of objective indicators to be considered for the model represent the physical state of land use. These physical characteristics can be broken down into three main categories: information pertaining to the surrounding neighborhood, site specific characteristics of the residence, and indicators of the building type and ownership of the residence.

At the neighborhood level, specific variables representing population density, housing units, industrial units and other indicators of the

concentration of economic activity can be employed. These data could be used at the county level but might be more appropriately broken down to a CCD or city level. The rationale for inclusion of these variables is that the landform of the area, and indicators of neighborhood configuration, may influence residents' perception of land use in their area. As discussed above, some of these indicators might be coded as percentage change in units over one to ten year time periods to account for the effect of changing land use patterns on residents' satisfaction.

One possible approach to representing the physical characteristics is suggested in the Standard Land Use Coding Manual (Department of Commerce, 1965) as a way to code land use activities. The manual breaks activities into nine general categories of land use activities: residential; manufacturing; transportation; communications and utilities; trade; services; cultural, entertainment and recreational; resource production and extraction; undeveloped land and water areas. These categories are given as percentages that each use comprises of total land area. Data for these land use activities are readily available at the city level for Eugene. Use of this information in the model will give indications of which types of land use activities are important in determining satisfaction levels of area residents.

In addition to indicators of physical characteristics of the neighborhood, site-specific characteristics of the respondents' residences may be useful in explaining variation in satisfaction. Indicators of site-specific characteristics include the distance from nearest recreational area or open space, and the type of zoning for the individual place of residence. These micro-characteristics represent immediate factors that may influence individuals' evaluations of land use. Ideally, some of the indicators such as

population density and congestion would be incorporated at this level of disaggregation, but data availability is a major constraint.

The final category of physical characteristics concerns the respondents' dwellings in particular. The type of dwelling, such as single family or apartment in a commercial building, may be an important factor in the type of land use patterns and issues of concern to the individual respondent. Additionally, whether or not the property is owned or rented by the respondent as well as the value of the property may be important factors in determining respondents' personal stake in land use and the planning process. These data are readily available from the survey.

Land Use Planning Process. A second set of objective indicators to be considered concern the administration of land use planning. In addition to physical characteristics that can be interpreted as being, in part, an outcome of the planning process, the regulatory process itself might be included in the modeling. In Oregon, much of the public opposition to land use planning has been voiced over the use of statewide planning laws and administration. It is important to establish whether individuals who are dissatisfied with land use planning are against public control over the land altogether, or merely in opposition to particular aspects of the planning process and how it is administered.

A major conceptual difficulty with developing a variable set to represent the land use planning process is distinguishing between market and regulatory forces which produce the mixture of uses of land. The discussion in Chapter II identifies the interplay between market and regulatory forces which characterize a land use planning system. The indicators of physical characteristics of the land should be interpreted as representing outcomes of

both forces, rather than an exclusive result of either. Similarly, identifying indicators of the land use planning process introduces the possibility of placing too much emphasis on these forces specifically.

The indicators of the regulatory process of land use planning should clearly represent output of the public services of land use planning such as zoning changes or appeals hearings. Additionally, these indicators should include factors of which most citizens of a county can be reasonably expected to be aware. An important part of this analysis is to determine at what level and to what degree people are aware of land use planning in Oregon.

In addition to the development and approval of the comprehensive plans, the planning process involves zoning changes, annexations and amendments to the existing plans. Many of these procedures arise out of land use conflicts which must be resolved through some changes in existing regulations. The process involved in these changes is often criticized as too intricate and lengthy. Indicators of the frequency of these conflicts at the county and local levels would represent activity of the process in the model. The open-ended responses to the survey question which asked respondents to identify problems with land use provide a good starting point for determining the level of awareness of process issues. The importance that people place on the role of planning efforts in economic development and the protection of or infringement on their property rights can also be determined from survey information.

Acquisition of consistent data on specific planning process indicators was not possible. Information that is available on the workings of the planning process in the Eugene area is not the type of which the layman, or average survey respondent, would be aware. The collection of specific data which represents the planning process, thus, does not appear to be warranted.

Model Specification

The primary objectives of developing a model for this study are to determine the most significant factors which influence individual satisfaction with land use and provide information on preferences for land uses. Development of the model follows Stevens' (1984) work on expanding models on social indicators to explain satisfaction with public services. His work involved using a broader set of personal and objective indicators than those used in previous research.

A random sample of 54 respondents from the city of Eugene was selected to make use of the largest set of variables permitted by data availability. The City of Eugene Planning Department has published a 1983 document, City of Eugene Neighborhood Analysis, which provides information on various demographic and geographic characteristics of the city in 1980. The study primarily summarizes Census data for the city. It breaks down the information according to the seven city planning districts. A map of the planning district boundaries is included in Appendix A. The purpose of the document is to provide citizens, policy makers, and researchers with a hard copy of much of the information that makes up the planning department's computer data base. In addition to these data, the study also includes analysis of changes in the structure and economic conditions of the City of Eugene and the various planning districts. Some of this analysis will be included here in interpreting the results of the analysis for the Eugene subsample. The Lane County study includes data on land use distribution within the entire city and in each of the planning districts. Similar to the land use coding system, the Eugene data set breaks down land uses into seven categories that comprise the total of all land area in each particular district.

The full model contains four sets of explanatory variables upon which satisfaction with land use is regressed. These sets of variables are personal characteristics, personal attitudes concerning land use issues, population and residential densities, and land use distributions. No interaction terms are used because the initial variable set is too large. The primary objective of regressing satisfaction on all of these four types of indicators is to establish the more significant indicators in the entire set to be included in a refined model.

The indicators of personal attitudes are introduced in the model in place of the indicators of the planning process. Data are very limited on most of the types of "process" indicators that are discussed in the above section. For this sample of Eugene residents, there is insufficient variability in any indicators of the process which might be used. It is recognized that indicators of attitudes toward land use are used to explain variation in satisfaction in land use, which is itself an attitude. The rationale for this is that individuals' expressed opinions will give a more accurate representation of the major determinants of their satisfaction than using variables which vaguely represent aspects of the planning process.

The full model can be specified as:

$LNSATLU_i = b_o + b_j P_{ij} + b_k A_{ik} + b_m C_{xm} + b_n D_{xn} + u_i$ where

$LNSATLU_i$=natural log of satisfaction with land use for individual i

P_{ij} = personal characteristic j of individual i; j=6

A_{ik} = attitude k about land use for individual i; k=6

C_{xm} = population and residential density m for district x where i lives: m=3

D_{xn} = land use characteristic n for district x; n=6

u_i = unknown disturbance term

b_o, b_j, b_k, b_m, b_n = unknown parameters to be estimated.

The personal characteristics (P_{ij}) include AGE of respondent, total household INCOME before taxes in 1982, the number of years of education (EDUCYRS) completed by the respondent, and whether or not the respondent is FEMALE. Two other personal characteristics entered into the model are the number of years the respondent has lived in the county (YRSCO) and a dummy variable indicating whether or not the respondent owns property (OWNPROP).

These variables represent the highest possible level of disaggregation of data. They supply information from respondents so that the model includes variation across individual characteristics that might account for variation in satisfaction not directly explained by land use indicators.

In addition to the personal characteristics of the respondents, several indicators of attitudes concerning land use (A_{ik}) are included in the model. In the survey, respondents were asked whether they thought that present land use planning efforts in their communities encouraged (DENCO) or discouraged (DDISCO) economic development. These variables help to explain how individuals'

perceptions of land use planning influence their overall satisfaction. A common criticism of land use planning in Oregon is that it is a hindrance to economic development efforts. Interpretation of these variables might be facilitated by introducing an interaction term or some indicator of whether or not the individual places a high priority on economic development, but these data were not available.

Three other attitudinal variables represent property owners' perceptions of the effect, if any, of land use laws on their property values. DEFFECT is a dummy variable which takes a value of one if a respondent who owns property feels land use laws have affected his or her property values in any way. If the value has increased, as represented by DPVALIN=1, this variable should have a positive relationship with satisfaction. If value has decreased, DPVALDE, the variable should have a negative relationship with satisfaction. It is only necessary to introduce one of the variables representing increase or decrease in value.

A variable representing individual attitudes was formulated from a survey question in which individuals were asked to respond to the statement: "A person has the right to do anything he wants with his or her property." If their responses on a five-point scale (strongly agree to strongly disagree) were that they strongly agreed or agreed, then the dummy variable DPRIGHA takes a value of one. Intuitively, this variable is expected to have a negative relationship with satisfaction with land use planning since it represents a very libertarian type of attitude.

The survey included a question on whether respondents felt that land use was a problem (DLUPROB) in their area or not. This question was followed by an open ended question probing the ways in which land use was a problem for the

respondent. This variable is not included because it represents an attitude that is the same as satisfaction with land use. This variable is tested in a model in Appendix C.

There are three variables included in the model to account for population and residential densities (Cxm) in the seven planning districts. Taken from 1980 Census data, the variables POPDENS,POPDIF, and RESDENS, represent population differences among districts. POPDENS is the total population per acre for each district in 1980. POPDIF is the percentage change in total population for each district from 1970 to 1980. This variable is used to represent varying growth rates between districts. The variable RESDENS represents the number of residential units per acre and is therefore very similar to the POPDENS variable.

The land use distribution variables (Dxn) break down uses into commercial (COMMPER), single-family (SFAMPER), multi-family (MFAMPER), industrial (INDPER), roads and parking (ROADPER), and undeveloped land (UNDPER). These variables are included in the model in order to determine relationships between a respondent's neighborhood and his present satisfaction with land use in the city. The land use distribution variables indicate whether the respondent lives in a suburban, residential type area with a high percentage of single family residences and undeveloped land, or a more urbanized area. The latter would be indicated by a higher percentage of commercial or industrial land and multi-family residences.

These land use distribution variables indicate, to a certain extent, the planning policies of the city with respect to the various districts. For example, the Bethel-Danebo district, located in the northwest section of Eugene, is a rapidly growing area. This district has a large amount of undeveloped land

which is planned for accomodating industrial and residential growth. Besides the Central District, which incorporates the downtown area, the Bethel-Danebo District has the highest percentage of industrial and commercial land uses.

The Southeast Planning District is much more suburban in contrast to the Central and Bethel-Danebo Districts. The Southeast District has a relatively higher percentage (36.6%) of single-family residences. This district, the South, and Southwest Districts comprise the areas of the city which are primarily planned for single family residences and little industrial or commercial growth. The South and Central Districts have the lowest percentages of undeveloped land and are least affected by plans for future growth.

The land use distribution variables that represent the degree of urbanization in the districts are COMPER, INDPER, and ROADPER. These are the percentage of land in commercial, industrial, and road uses, respectively, and would theoretically have a negative relationship with satisfaction because they represent the more "undesirable" uses of the land for most people.

The full set of variables considered for the model are presented in Table 1. Not all of these variables are used in the regression because of econometric and practical considerations. The variables chosen for the initial regression run are discussed in the next chapter.

This model is much more limited than the one which was originally conceptualized. Survey design and availability of accurate and uniform objective data were the major limiting factors. With these limitations in mind, however, the model can be tested to see how well it to explains the variation in satisfaction. If the model has significant explanatory power (and is not dominated by some single factor), then the importance of individual factors in

determining satisfaction with land use can be identified and investigated in more detail.

Variables in the Model

AGE	Age of respondent computed from birth date
FEMALE	Dummy variable=1 if respondent is a female
INCOME	Total household income before taxes in 1982
EDUCYRS	Highest level of education completed
YRSCO	Years of residence in Lane county
DOWPROP	Dummy variable=1 if respondent owns property
POPDENS	Population per acre in respondent's district
POPDIF	1980 district population minus 1970 population
MFAMPER	Percentage of district land in multi-family use
SFAMPER	Percentage of land in single-family use
INDPER	Percentage of land in industrial use
COMMPER	Percentage of land in commercial use
UNDPER	Percentage of undeveloped land in the district
DPRIGHA	Dummy=1 if individual wants full property rights
DENCO	Dummy=1 if respondent thinks planning encourages development
DPVALDE	Dummy=1 if respondent thinks planning has decreased property values

TABLE 1

CHAPTER V

RESULTS

The analysis consists of several regression runs and modifications on the model to correct for econometric problems. An initial run is made on a set of variables drawn from the full set developed in the previous chapter. After this initial run, the problems associated with the presence of multicollinearity in the model will be discussed and the model modified. One of the solutions to multicollinearity. principal components, is tested. Those results are discussed in Appendix B. A second regression run is made to remove non-significant variables and some variables associated with multicollinearity. Results from this regression will then used to test for heteroscedasticity. Heteroscedasticity is identified and a weighted-least squares regression is run to produce the final results.

Initial Regression

Variable Set

The first step is to refine the variable set as econometric procedures necessitate. Not all of the variables can be included in the initial run. With the initial variable set, the model is experimented with in order to define a model with significant explanatory power. The variables that are used in this initial regression run are listed in Table 2.

Variables in the Initial Regression

Personal	Population	Land Use	Attitude
AGE	POPDENS	MFAMPER	DENCO
FEMALE	POPDIF	UNDPER	DPVALDE
INCOME		INDPER	DPRIGHA
EDUCYRS			
YRSCO			
DOWPROP			

TABLE 2

Several of the variables were removed from the original set because they provide redundant information. One of the land use distribution variables, ROADPER, is deleted to alleviate the problem of having all six of these variables totaling to 100%. Without this omission, the correlation matrix can not be computed. The attitude variables, DEFFECT, DPVALIN and DDISCO, are omitted because they provide no additional information to DPVALDE and DENCO. On the basis of an examination of partial correlations for these variables, several other variables are removed. RESDENS is highly correlated with POPDENS and is removed. Additionally, COMMPER is removed because the same information is provided by INDPER. MFAMPER has a high negative correlation with SFAMPER and is therefore used without including SFAMPER.

Regression

An ordinary least squares regression was initially run on this reduced model. This regression was primarily intended to identify which of the variables are most significant in explaining variation in satisfaction with land

use planning. The dependent variable is calculated by taking the natural log of the values from zero to ten for the response to the survey question on present satisfaction with land use in order to linearize the data. Where values of zero were recorded for satisfaction, the log of .01 was taken so that these important observations were not deleted. This variable, LNSATLU, has a mean value of 1.835 with a standard deviation of .288. This suggests a relatively high level of satisfaction.

The initial run entailed regressing LNSATLU on these 14 variables to determine how well the available variables explain variation and which ones are most significant. The results of this run indicate that one third of the variation in satisfaction is explained by the model, with an R2 of .34. The entire regression has an F-value of 1.369. With 52 observations and 14 explanatory variables, this model appears to be adequate although not highly accurate. The results are presented in Table 3.

Results of Initial Regression

Variable	beta	t-value	Significance
AGE	.0079	2.69	.010
DOWPROP	-.2096	1.59	.119
POPDIF	.0047	1.34	.187
DENCO	.1609	.92	.361
MFAMPER	-.0515	.91	.371
INDPER	-.013	.79	.431
YRSCO	-.0026	.61	.547
FEMALE	.038	.46	.648
POPDENS	.100	.45	.654
EDUCYRS	.005	.29	.790
DPVALDE	-.092	.25	.803
INCOME	.0004	.11	.912
UNDPER	.002	.07	.942
DPRIGHA	.008	.06	.951

TABLE 3

The main problems that surface in the full model are that only a limited number of variables are highly significant and that the t-values are suspect due to multicollinearity. In interpreting the results on individual variables, it is important to consider the effects of the covariance between explanatory variables. If there is a high degree of intercorrelation between explanatory variables, the regression results in inefficient estimates of the coefficients and estimates of the standard errors that are very large. The implications are that the t-values for the explanatory variables are too low. Interpretation of the results of this initial run must take these factors into account.

The estimated coefficients, standard errors, t-values and significance levels for each variable are presented in Table 3 in descending order of significance. These results indicate that only three variables are significant

at the @=.20 level or better (@=alpha:level of significance). The most important information that can be obtained from these results is the sign of the relationship between the dependent variable and each of the various explanatory variables.

Analysis

Personal Characteristics. Of the personal characteristics, AGE is most significantly related to satisfaction. The results suggest that older respondents are more satisfied with land use. AGE is correlated with other explanatory variables. The correlation coefficients between AGE and DOWPROP is .45 and between AGE and DPRIGHA is -.41. These figures indicate that older people own property and disagree with the idea that individuals should have full personal control over property. This might suggest that older individuals are more satisfied with land use in their area because they recognize that need for some controls over how property is used and protected.

The other personal characteristic variable that is highly significant is the dummy variable representing property ownership, DOWPROP. The negative relationship indicates that property owners tend to be less satisfied with the present state of land use, which might be expected since they are highly affected by land use development restrictions.

Of the other personal characteristic only YRSCO, years lived in present county, is moderately significant at the @=.547 level. It is negatively related to satisfaction but only accounts for a one percent reduction in the total variation in satisfaction. FEMALE, EDUCYRS and INCOME are all negatively related to satisfaction but are not sufficiently significant to be kept in a reduced model.

Attitude Indicators. The attitude indicator, DENCO, is positively related to satisfaction and moderately significant. This might indicate that people who perceive that economic development is promoted by land use planning are more satisfied with land use. The other indicators in this category, DPRIGHA and DPVALDE, have a probability of less than 50% that their estimated coefficients are not equal to zero, according to the t-tests.

Population Characteristics. Of the variables representing population differences, POPDIF is most significant. The estimated coefficient, .0047 has an 80% probability of being not equal to zero. This might seem to suggest that people prefer rapid population growth as a policy. More accurately, the data indicate that the rapidly growing areas of Eugene are less densely populated, and more open and suburban in character. The correlation between change in population, POPDIF. and population density, POPDENS, is -.68 and the correlaton between POPDIF and UNDPER, the percentage of land that is undeveloped, is .57. This type of indicator would be more easily interpreted if it dealt with a shorter, more recent time span.

The other variable, POPDENS, has an estimated coefficient of .100 with a mean value of 5.8 persons per acre. This coefficient is significant at the @=.654 level. The variable contributes minimally to explaining variation in satisfaction.

Land Use Characteristics. The MFAMPER variable is negatively related to satisfaction, as expected. The estimated coefficient, -.9061, is significant at the @= .371 level. For the Eugene neighborhoods represented here, the mean value of 2.8% of land in multifamily residential use is a reflection of the fact that most of the Eugene surveys were taken in the more suburban, single family

unit areas. The results indicate that the presence of the more urban type of housing reduces satisfaction with land use.

The results of the land use percentage variables serve more to verify expected relationships than to provide any meaningful insights into the relationships between planning policy and individuals' satisfaction with land use. Probably the most meaningful results come from the attitudinal indicators with respect to how individuals' expectations and perceptions of the land use system are a reflection of their attitudes.

Before further analysis can be made it is necessary to examine some of the econometric problems that are present in the model. The multicollinearity problem is obvious, as well as problems of specification error and heteroscedasticity.

Multicollinearity

The high correlation between several of the explanatory variables has been briefly pointed out. In order to achieve more accurate results from the model, the problem of multicollinearity must be dealt with in order to reduce some of the complicating effects it has on ordinary least squares regression. The main problem with multicollinearity in this model is that the estimates of the standard errors of the explanatory variables become too large and confound the interpretation of results.

There are several solutions proposed for the multicollinearity problem in various econometric texts. The simplest, referred to above, is to exclude unimportant variables in the model which are affected by multicollinearity.

An alternative to removing problem variables from the equation in order to deal with multicollinearity is the method of principal components. A form of

factor analysis, principal components is a useful device where a large number of variables (relative to sample size) is involved, as is the case here. This method constructs artificial variables out of combinations of the independent variables which are linearly related. In this case, no perfect linear combinations exist, but a high degree of intercorrelation is present in some variables.

The main value from using principal components in this particular study is to determine relationships among the various variables for explaining variation in satisfaction with land use. Rather than arbitrarily dropping variables from the equation, factor analysis can be used to determine how the four different types of explanatory variables are interrelated. The explanation of the principal components method employed and the results are outlined in Appendix B. Principal components is most useful when specific meaning can be attributed to each of the artificial factors and the variables that they represent. Whenever this meaning is not clear, principal components is less useful because it uses only a portion of the information suppied by the independent variables.

In this study, a factor analysis was run on the original 14 variables to reduced them to five principal components. These components produced residential, demographic, urban, and attitudinal groupings of the variables. A fifth factor loaded moderately on most of the variables. After these five components were formed, LNSATLU was regressed on them. The regression did provide interesting results although only the fourth factor, representing attitudes, significantly explained variation in satisfaction. One of the conclusions to be drawn from the factor analysis is that it does serve to simplify the data and reveal relationships among the independent variables.

However, information is definitely lost because the effects of individual variables are obscured by the grouping of data. The methods and results of the experimentation with principal components are discussed in detail in Appendix B.

Multicollinearity Corrections

Having concluded that information is lost by principle components analysis, the alternative is to delete variables from the equation which are causing the problem. An appropriate test for detecting variables which cause multicollinearity is the Farrar-Glauber test. This test detects the existence of multicollinearity, locates the correlated variables and determines which variables are causing the problem.

In order to carry out the tests for variables causing multicollinearity, the variable set was first reduced by removing the highly insignificant variables. A backstep regression was used to remove variables until all remaining variables were significant at the @=.50 level or better. There are theoretical arguments against the use of the stepwise regression technique, primarily because it ignores the theoretical relationships among the specified variables in the model. The trade-off involved is between proper specification of the model and the accuracy of estimates of the coefficients and standard errors of those factors which remain in the model. The high number of variables relative to the sample size reduces the degrees of freedom for the original equation so it would be helpful to remove some of the unnecessary variables. This second regression reduced the model to eight variables. The results are summarized in Table 4.

Results of Second Regression Run

Variable	beta	t-value	Significance
AGE	.0078	2.71	.001
DOWPROP	-.2323	2.47	.017
POPDIF	.0052	2.75	.008
DENCO	.1502	1.11	.274
MFAMPER	-.0552	2.14	.037
INDPER	-.0103	.89	.377
YRSCO	-.0022	.62	.540
POPDENS	.1191	2.62	.012

R2=.34 adj.R2=.23 F=3.09 SIGNIFICANCE=.007

TABLE 4

For all eight remaining variables, the signs of the coefficients are unchanged and significance increases. The dropping of meaningless variables allows more degrees of freedom for the model and the significance of the regression is increased substantially. With these improved results, the tests for multicollinearity can now be carried out to identify any remaining problem variables in the equation.

The Farrar-Glauber test determines if multicollinearity exists, locates multicollinear variables and identifies the variables causing multicollinearity. It was performed on the eight variables which remain in the model. The chi-square test for the presence and strength of the multicollinearity problem indicates a high degree of correlation among the independent variables. The test statistic of chi-square = 131.20 is highly significant, indicating strong multicollinearity. The second part of this test regresses each independent variable on all of the others to find the R2 values

and associated F-statistics to identify specific multicollinear variables. This test clearly identifies POPDIF as highly correlated with the other variables. The problem is evident in this case because of aggregation of the data according to planning districts. Variables representing similar land use characteristics are only varying across values for seven planning districts, causing problems with manipulation of the data matrix. YRSCO is highly correlated with AGE, DOWPROP and DENCO, as indicated by the third part of the test.

There are two remedial measures for this type of problem other than using principal components. One is to create a single new variable which is actually a scalar of highly related variables. This approach would be similar to a simplified principal components method in that one variable, or factor, actually represents the variation of several variables. Such similarity also brings about the problems of obscuring the information provided by similar variables.

The second, and more feasible, remedy is to delete the problem variables, based on the Farrar-Glauber tests, and to retain the most significant variables as proxies for all highly related variables. Resorting to this second method, the variables POPDIF and YRSCO are dropped from the equation because of low t-values as well as high R2 values in the second part of the Farrar-Glauber test. The variation in these variables is represented by those remaining in the model. MFAMPER is a proxy for POPDIF and AGE represents YRSCO because of high correlation between these variables.

Another Farrar-Glauber test was run on the six remaining independent variables. It indicated that multicollinearity has been substantially reduced with a test statistic of 59.96. There is still some correlation between MFAMPER and INDPER, which would be expected, but both variables are left in the

equation. The final model to be tested consists of six variables: AGE, DENCO, DOWPROP, INDPER, MFAMPER, and POPDENS.

Heteroscedasticity

The remaining variables in the model must be tested to determine if the assumption of normal distribution of the disturbance term is satisfied for this ordinary least squares regression on the model corrected for multicollinearity. If the variance of each disturbance term is a function of one or more of the explanatory variables and is not random, then tests of significance on the variables are not accurate and the estimates of coefficients are inefficient. In order to effectively reduce the problems associated with heteroscedasticity, the variables causing the non-constant variance in the disturbance must be identified and the nature of that variance must be determined. The model can then be adjusted to reduce constant variance in the disturbances.

Direct examination of the residuals plotted against values of the explanatory variables is the first step in identifying a heteroscedasticity problem. The residuals are obtained by computing the difference between the estimated value of the dependent variable and its true value for the regression on the six variables in the model. The residuals are the best estimates of the value of the theoretical disturbance term. These residuals are then plotted against increasing values of each of the continuous explanatory variables.

The plots indicate that the variance of the residuals is fairly constant, but decreasing over the range of values for AGE. The variance increases over values for INDPER. Heteroscedasticity is clearly indicated for INDPER. For POPDENS and MFAMPER, the variance fluctuates, but appears to be fairly random. For all four of these variables, the assumption of constant

random variance of the disturbance is not clearly upheld. This necessitates determining if the variance can be accurately attributed to some function of these variables. An appropriate test in this case is the Glejser test for homoscedasticity (Koutsoyannis, p.186).

Glejser test for homoscedasticity

To perform the Glejser test, the absolute value of the residuals obtained from the regression are regressed on the explanatory variable or variables suspected of causing heteroscedasticity. The purpose here is to determine the function of the independent variables which cause unequal variance in the residuals. To determine this, various transformations of the explanatory variables, such as the square, inverse, and square root, are used in seperate regressions with the residual as the dependent variable. The form of the regression of the residuals on the functions of the X's which gives the best fit identifies the nature of the heteroscedasticity. The forms of the X's which are statistically significant, according to the t-tests, and which yield a significant regression in explaining variation in the residuals, give the best estimates of the variance of the disturbance.

For the regression on the corrected model, INDPER is indicated as the cause of heteroscedasticity. The regression of the absolute value of the residual on AGE, INDPER, POPDENS and MFAMPER produces a t-statistic of 2.09 for INDPER, and an R2 of .11. Further experimentation indicates that the square of INDPER, IND2, most significantly explains variation in the residual.

Correction for heteroscedasticity

To correct for heteroscedasticity when the cause has been determined, the model is transformed in order to give the disturbance constant variance so that the ordinary least squares estimators are accurate. If the fit of the regression is measured by finding the least squares of the error term, then a regression which assigns less weight to errors having large variance will be more accurate. The larger dispersion of the residuals associated with higher values of INDPER, in this case gives a less accurate measure of the true regression. Thus, by weighting the disturbances according to the inverse of the variance of the disturbances, less weight will be given to error terms of large variance. Since large values of INDPER squared cause larger variance, it is appropriate to weight the regression by 1/IND2, which is the inverse of the variable INDPER squared.

Regression on the final model

A weighted least squares regression, with IND2 as the weight, divides the values of all variables including the dependent variable, constant, and error terms by IND2, so that less weight is given to cases with large values of INDPER. When LNSATLU is regressed on AGE, DOWPROP, DENCO, MFAMPER, POPDENS, and INDPER, the adjusted R square increases to .62. These results are listed in Table 5.

Results of Weighted Regression

Variable	beta	t-value	Significance
*AGE	.015	8.37	.0001
*DENCO	-.033	1.16	.270
*DOWPROP	-.429	6.19	.0005
*INDPER	-.012	2.54	.015
*MFAMPER	.012	.23	.710
*POPDENS	-.019	.33	.620

R2=.66 adj.R2=.62 F=16.038 SIGNIFICANCE=.001
(* indicates variable is transformed by weight)

TABLE 5

These results indicate that personal characteristics and land use characteristics combine to explain a significant amount of variation in satisfaction with land use. The estimates in this final regression reflect the effect of the weighted regression.

Throughout the testing of the original model and the reduced forms, the personal characteristic, AGE, has been highly significant. AGE is positively related to satisfaction while most of the other variables are negatively related, according to the correlation coefficients. AGE has a positive relationship with YRSCO and DOWPROP, and a negative relationship with DPRIGHA. The significant positive relationship with satisfaction might reflect the older land owners appreciation for the necessity of managing land use over the long run. Consistent with Mason's (1978) findings that with older age comes higher achievements and lower aspirations. The other significant personal indicator, DOWPROP, has a negative relationship with satisfaction, indicating that property owners are adversely affected by restrictions on development.

It is interesting to note that income, education, and sex all had non-significant relationships with land use satisfaction. This suggests that the particular ways in which people are affected by the land use regulations and how they perceive those regulations are more important than the traditional social and economic factors that are generally significant.

DENCO is the only attitude variable remaining in the final regression. Individuals who feel that planning encourages economic development are dissatisfied. This sign changes in the weighted regression. Since less weight is given to observations in areas with a higher percentage of industrial uses, the sign sign for DENCO changes. This might reflect that people feel that development is important so long as it does not take place in their neighborhood. The other attitude indicators that were not significant, DPRIGHA and DPVALDE, both had negative partial correlations with LNSATLU. This suggests that opposition to land use planning is not primarily the result of personal beliefs about the freedom of private property owners. It might be the result of how people perceive land use laws as affecting their community or state. The results of the regression in Appendix C, showing the significance of individual preferences for development objectives support this evaluation.

The most significant land use indicator, INDPER, has a negative relationship with satisfaction. People living in areas of industrial activity are probably dissatisfied with this undesirable use of the land or how it has been zoned and managed. Because of high correlation with INDPER, the variables POPDENS and MFAMPER drop in significance. This indicates that whether or not people live in an area of high density is not an important factor in explaining satisfaction.

Although specification of the model was basically achieved through an inductive approach and few of the original variables remained in the final model, a model with significant explanatory power was developed. The use of the econometric tests and corrections on the least squares regression are important contributions to the use of social indicators in policy studies. The implications of these results are discussed in the final chapter.

CHAPTER VI

SUMMARY AND CONCLUSIONS

In this final chapter three aspects of the study are discussed. First, the objective of evaluating the usefulness of the model for policy purposes and examining the policy implications of the results is discussed. The second item is the contribution of this study to research in developing social indicators to explain satisfaction with public services. Finally, some of the problems encountered are discussed in order to guide further research on this topic.

The results do represent a more in-depth quantitative analysis of peoples' opinions on land use than was present in the literature. The study presents an analysis of information that is used by planning officials by combining several data sources in one model. Because of the data that were available and the form of the dependent variable, the results serve more to form a profile of the type of people that oppose or support land use planning than they do to reveal specific preferences for changes in land use laws. In this respect, an important objective of the study was not achieved.

With respect to specific results, the model serves more to verify anticipated relationships than it does to uncover any new causes of dissatisfaction with land use planning in Oregon. The broad nature of the questions asked of the respondents and the general information contained in the data set make the results of limited usefulness to a professional planner. Improvements that can be made are discussed below. The study would probably be of greater use to the field of social indicators research.

The use of satisfaction with a public service is commonly used in social indicators research. However, most previous studies have attempted to explain

satisfaction with a general set of demographic variables and few specific objective indicators of the service being studied. In this study on land use, an attempt was made to use more specific data at a more disaggregated level than in previous studies. Although the data set was not detailed enough to provide specific information critical to planning decisions, it did provide a fairly accurate explanation of satisfaction.

The high significance levels for the variables in the final model did explain two-thirds of the variation in satisfaction. The relatively small sample size and availability of specific data for the Eugene area contributed to the explanatory power of the model. The use of econometric techniques facilitated the accuracy of the model and uncovered underlying problems that have hindered previous studies on public services. Multicollinearity has been very prevalent in the data used for many of these studies. None of the previous studies reviewed in this paper attempted to identify variables causing multicollinearity before examining tests of significance. Heteroscedasticity may be a less common problem, but the failure to identify and correct for it results in inefficient regression estimates and reduced explanatory power of the model.

The use of principal components in social indicators research can contribute to efforts to identify significant groups of variables. Much of the debate in social indicators centers on the significance of personal versus objective indicators in explaining satisfaction. The results of the principal components analysis in this study revealed that large data sets can be simplified to examine the explanatory power of groups of data. The use of principal components is warranted where very large variable sets decrease the degrees of freedom in the equations.

The results of the principal components that showed attitude indicators to be of greatest importance when factored together, suggest that models would be specified more accurately if indicators other than personal and objective were also employed. After the full regression analysis was completed and the importance of the attitude indicators was identified, another regression was run on a model that includes additional attitude indicators. As stated earlier, variables such as DLUPROB, which represent the same thing as the dependent variable, LNSATLU, were not introduced into the model in the previous chapter. In Appendix C, the results of a regression on a model expanded to include more attitude indicators are presented. The results suggest that indicators of peoples preferences for land uses and increases in planning efforts to achieve those uses explain significantly more variation in satisfaction than the model developed in the above study.

The limited usefulness of the results of the primary model can be attributed in part to the specification of the model. The study was based primarily on the survey results. The survey itself was a very large one which asked respondents a multitude of questions on satisfaction with air quality, public safety, and income security, in addition to land use. Because it was directed toward a very broad audience and sampling was primarily based on supporting air quality data, the questions and responses on land use were not very detailed. This hindered accurate specification of the model to address specific questions on land use preferences.

One way to alleviate this problem would be to include more detailed questions on planning policy in a questionnaire. The model tested in Appendix C indicates that questions on specific planning problems and policies can improve the explanatory power significantly. There is difficulty, however, in defining

and quantifying a dependent variable to accurately represent views on land use. The eleven-point responses to the question on satisfaction do provide a range of values to regress on other indicators, but the variable is not truly continuous. Similarly, questions asking respondents to state choices for specific land use policy changes would produce finite ranges for a dependent variable.

The independent variables used in the study did tend to explain a significant amount of variation in satisfaction, but had obvious limitations. The personal characteristics varied over each respondent and represented the highest level of disaggregation. Only two of these characteristics proved to be significant. The other indicators only varied over seven planning districts and tended to be highly related to each other. Thus, out of a relatively large initial variable set, only five or six variables proved to be useful. This problem could be rectified by developing a variable set from more varied sources. The methodology chapter outlined some of the variables that might have been appropriate for the model. The major constraint on better specification of the model is data availability.

Future studies might benefit from experimenting with alternatives to regression in analyzing these types of data. Responses to yes/no questions could be applied to a logit analysis to form a profile of the backgrounds and ideas of people who favor certain policies. Similarly it might be interesting to model votes for or against land use planning with variables representing different attitudes. A cross-tabulations analysis might be an appropriate alternative.

This study will ideally lead to others which make an attempt to quantify and synthesize citizens attitudes so that the important goal of citizen involvement in land use planning might be better achieved. The current

statewide planning policies in Oregon certainly have inefficiencies and uneven distributions of their impact. Improvements can be made on the system without completely abolishing it. If changes are to be made to the satisfaction of the people the policies are meant to serve, those people must have a stronger voice in the planning system.

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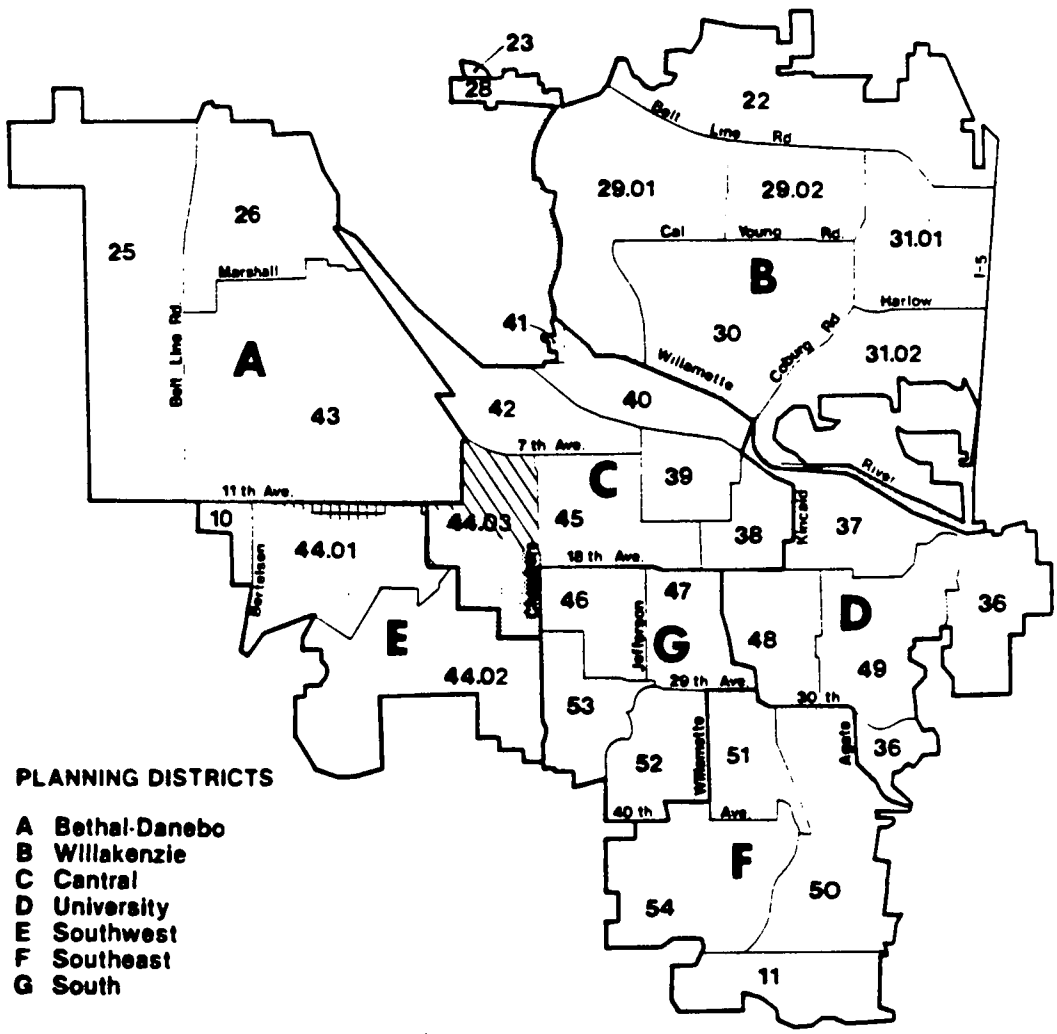
APPENDIX

APPENDIX A

MAP OF EUGENE PLANNING DISTRICTS



APPENDIX B

PRINCIPAL COMPONENTS

The factor analysis procedure used to derive the principal components uses the correlation coefficient matrix for all of the explanatory variables to derive a smaller set of factors. The first principal component is made up of loadings of all of the variables in the correlation matrix in such a way that the greatest amount of variation in the set of all the variables is represented by this linear combination of the variables. The second component is then the linear combination of variables that best accounts for the remaining variance in the data not taken up by the first. There can be as many principal components as there are variables or as many as are necessay to account for all of the variance in the data. A variable can be represented by more than one component.

The SPSS Factor Analysis package was used to form the principal components of the Eugene data. This procedure involves extracting initial factors from the correlation matrix for all of the variables, excluding the dependent variable. From these initial factor loadings, the factor matrix is rotated to obtain the factors which provide interpretable results. For this study, an orthogonal rotation that maximizes the variance for variables within each component is used to facilitate accurate identification of the variables represented by each factor.

This factor analysis run was programmed to produce orthogonal principal components which have an eigenvalue of one or greater. The rationale for including only factors with eigenvalues greater than one is that each component should include at least as much variation as one of the individual variables. The sum of squares of the loadings for each component forms its eigenvalue,

which indicates the variation accounted for by each component. The loadings are, in effect, correlation coefficients between the variables and factors. The highest loadings for each variable indicate which principal component represents that particular variable.

In this analysis, there are five factors which meet the minimum eigenvalue criterion. These factors are rotated to the final solution of five principal components which account for 75.6 percent of the total variation in the independent variables. The factor loadings delineate meaningful categories represented by each component.

The first component loads highly on UNDPER, POPDIF, and -POPDENS, with coefficients of .86, .87, and, -.91, respectively. With an eigenvalue of 3.05, this factor accounts for 23.5% of the variation in the X's. The high loading variables, in addition to the loadings of -.20 for MFAMPER and .15 for DOWPROP, indicate that this component represents respondents in the low density, residential type areas, and is the locational component.

The second component which is demographic, represents the older, property owners. AGE loads with a coefficient of .58, YRSCO loads at .78, and DOWPROP loads highest at .79. This factor accounts for 17.7% of the variation with an eigenvalue of 2.31.

The indicators of urbanized areas, MFAMPER and INDPER, are represented by the third principal component with loadings of .90 and .84 respectively. The urban characteristics of this factor are also indicated by moderate loading of .35 for POPDENS and -.25 for UNDPER. The third component accounts for 14 percent of the variation in all independent variables. These first three components comprise 55.2 percent of the total variation.

The next component seems to represent respondents with negative attudes toward comprehensive planning. DPVALDE, DPRIGHA, AND DLUPROB all load at approximately .66. The only other factor which loads significantly on the fourth component is AGE with a -.58 value. This component has an eigenvalue of 1.48 and accounts for 11.4 percent of the variation. This factor has low loadings for all of the remaining variables except for DENCO, with a value of .18.

The final component has an eigenvalue of 1.18 and is the last to pass the minimum criterion of 1.0 eigenvalue. The factor accounts for only 9.1 percent of the variation, which results in a total of 75.6% of the variation being explained by the five components. The remaining factors that were initially extracted are left out of the final analysis. This fifth component is less clearly defined than the previous ones because it loads moderately on nearly all of the variables. This factor serves more to account for residual variation than it does to define a meaningful subset of variables.

The principal components method does appear to be useful for data simplification. It also facilitates analysis of relationships between explanatory variables that goes beyond examination of the simple correlation coefficient matrix. The individual components represent identifiable categories of variables that make intituitive sense. The next step in the analysis was to regress satisfaction on these five principal components to determine which of the components are significant and to see how well variation in satisfaction is explained by 75% of the variation in the explanatory variables.

Regression on principal components

The results of the regression run on the principal components indicate that the deletion of 25% of the variation in the independent variables reduces the explanatory power of the equation. The five components only account for 75% of the total variation in independent variables because not all of the factors which were produced met the criterion for eigenvalue. The principal components are exact mathematical transformations of the original variables, so if all thirteen factors were included, the results would be the same. The R2 drops from .34 for the regression on separate variables to .187 for the principal components regression.

The most important information to be gained from the run on the principal components is the significance and signs of the coefficients for each factor. Only the second principal component, representing the characteristically older respondents who own property, has a positive relationship with satisfaction. This factor, however, is only significant at the @=.569 level. The third component is significant at the @=.246 level and bears a negative relationship with satisfaction because it represents the urbanized area dwellers.

The most significant factor is the fourth, which loads highly on the attitude indicators which represent dissatisfaction with land use. With a t-value of -3.17, this component accounts for approximately 15% of the variation in satisfaction. This might suggest that one of the most important factors in explaining satisfacion is an individual's values and opinions concerning land use control rather than the outcomes of the process.

Although the regression of satisfaction on the principal components does not explain as much variation in satisfaction, the regression is significant at

the @=.04 level. The value of the transformation of the independent variables into principal components is questionable in this case, primarily because the number of variables relative to sample size is not great enough to warrant the need for data reduction. The analytical value of the principal components is decreased by the fact that variation is left out, and that the results are more difficult to interpret with respect to how changes in individual indicators affect satisfaction. A major problem with the principal components method is that information is lost in the analysis.

APPENDIX C

SUPPLEMENTAL REGRESSION RESULTS

Variable	B	t-value	Significance
AGE	.006	2.87	.006
DOWPROP	-.202	2.56	.014
INDPER	-.015	1.83	.074
POPDENS	-.015	3.98	.0005
DENCO	.182	1.69	.098
PROBP	-.185	2.99	.004
NEWIND	-.124	1.96	.056
EXPIND	.112	1.73	.090
SUBS	-.315	2.00	.051
DTOWN	-.127	1.69	.098

R2=.55 F=5.58 SIG.=.0005

TABLE 6

These results were obtained by running a backstep regression on the six variables in the final model of the study in addition to five new attitude variables. One of the new attitude indicators was coded from the open end response to how land use is a problem. The variable reflecting problems being in planning (PROBP) has a highly significant, negative coefficient. This variable defines a specific aspect of dissatisfaction with land use planning.

The other four new variables represent land uses which respondents would like to see local governments encourage. The variables of this type are significant and represent pro-development attitudes. The three variables that have negative coefficients for the regression with satisfaction represent attitudes of people who would like to see subdivisions (SUBS) and downtown (DTOWN) areas developed more, and new industry brought in (NEWIND). EXPIND

signifies those who would like to see present industries expanded and is positively related to satisfaction.

The main purpose in presenting the results of this run is to identify the types of variables that could be used to provide more specific information to policy makers. The regression is highly significant and over half of the variation is explained. A weighted regression on this same model reduced the significance levels of some of the variables but increased the R2 to .80.

APPENDIX E

MEAN VALUES AND CORRELATION COEFFICIENTS

Mean Values for Full Variable Set

VARIABLE	MEAN	STANDARD DEV	CASES
LNSATLU	1.8346	.2857	52
AGE	49.4231	16.9337	52
YRSCO	19.5769	13.4198	52
DENCO	.0962	.2977	52
DFVALDE	.0192	.1387	52
DOWPROP	.6538	.4804	52
INDPER	3.4962	3.7447	52
MFAMPER	2.9173	2.0325	52
POPDENS	5.7615	1.8168	52
POPDIF	26.0654	38.0127	52
DPRIGHA	.1346	.3446	52
UNDPER	20.8115	10.9323	52
DLUPROD	.3846	.4913	52
FEMALE	.4423	.5015	52
INCOME	23.2212	13.1203	52
EDUCYRS	13.6346	2.7155	52

TABLE 7

Correlation Coefficients

AGE	.32925										
YRSCO	.03586	.54407									
DENCO	-.06235	-.15000	.20181								
DPVALDE	-.11144	-.06290	.22572	.42932							
DOWPROP	-.07009	.47776	.54561	-.03692	.10189						
INDPER	-.16481	.25055	.27180	-.05771	-.12068	.17473					
MFAMPER	-.20352	-.06501	.07403	-.02873	.04749	-.20260	.55027				
POPDENS	-.01024	.06178	.09089	-.18445	-.05849	-.09194	.29794	.52985			
POPDIF	.08053	.04465	.05143	-.01720	-.02777	.26873	-.07336	-.23759	-.01783		
DPRIGHA	-.11535	-.26431	-.07223	.23361	-.05523	-.18676	.07485	.18976	.15310	-.20438	
UNDPER	-.05016	-.12249	-.14404	.28344	.14083	-.06046	-.29462	-.35932	-.94584	.69615	-.09670
DLUPROB	-.37961	-.03892	.03112	.01031	.17712	.15978	.13299	-.07946	-.01100	-.03938	.15145
FEMALE	-.05652	-.09856	.09827	-.02778	.15724	.07026	-.10035	.09814	.15332	-.15696	-.01091
INCOME	-.07975	.01019	.05439	.08231	.23171	.42626	-.18701	-.27511	-.18009	.13905	-.26039
EDUCYRS	-.09054	-.21470	-.18619	-.19826	-.23340	.17170	-.31541	-.20916	-.07870	.06710	.05359

	LNSATLU	AGE	YRSCO	DENCO	DPVALDE	DOWPROP	INDPER	MFAMPER	POPDENS	POPDIF	DPRIGHA

DLUPROB	-.00121			
FEMALE	-.13328	-.14693		
INCOME	.10394	.13665	.11447	
EDUCYRS	-.00481	.01922	.16420	.30336

	UNDPER	DLUPROB	FEMALE	INCOME

TABLE 8

APPENDIX E

SURVEY QUESTIONS ON LAND USE

6. [HAND CARD A] Next, will you please look at this card which contains what we might call a "quality of life" scale. Let's suppose the top of the scale represents the highest and the bottom of the scale represents the lowest quality-of-life.

   6a. Now, which one number represents how satisfied you are with your present quality of life. If you are completely satisfied you would say "ten". If you are completely dissatisfied you would say "zero". If you are neither completely satisfied or dissatisfied, you would put yourself somewhere from one to nine; for example, five means you are just as satisfied as you are dissatisfied. Which number comes closest to how satisfied or dissatisfied you feel? (RECORD OPPOSITE "A" BELOW)

   6b. Which one number best represents the quality-of-life you feel you are presently living? The higher the number, the higher the quality of life you feel you now have. The lower the number, the lower quality of life you feel you now have. Remembering that 10 is the highest, which number would you select as standing for your present quality of life? (RECORD OPPOSITE "B" BELOW)

   6c. Now, looking at the scale again, which one number best represents the highest quality of life you might realistically hope to achieve? (RECORD OPPOSITE "C" BELOW)

(a) Sat:	10	9	8	7	6	5	4	3	2	1	0
(b) Present:	10	9	8	7	6	5	4	3	2	1	0
(c) Highest:	10	9	8	7	6	5	4	3	2	1	0

LAND USE

1. Thinking about land use, do you think it is a problem in your city/town/part of county or not?

YES, PROBLEM	2
NO	1 (SKIP TO Q 2)
DK/NA	9 (SKIP TO Q 2)

1a. What kind of problem or problems are there with land use in your area? (PROBE!)

What else?

2. Do you own (or are buying) property in Oregon ?

OWN (OR BUYING)	2
NOT OWN	1 (SKIP TO Q 4)
DK/NA	9 (SKIP TO Q 4)

3. Do you feel that land use laws in Oregon have had an effect on the value of your property or not?

EFFECT	2
NO EFFECT	1 (SKIP TO Q 4)
DK/NA	9 (SKIP TO Q 4)

3a. Have these laws increased or decreased your property values?

INCREASED	2
DECREASED	1 (SKIP TO Q 4)
DK/NA	9 (SKIP TO Q 4)

3b. How or in what way or ways have land use laws (increased) (decreased) your property values? (PROBE!)

4. Do you think present land use planning efforts in your community encourage or discourage economic development?

ENCOURAGE	3
NO DIFFERENCE	2
DISCOURAGE	1
DK/NA	9

5. Here's a statement that is sometimes heard: "A person has the right to do anything he wants with his or her property." Do you strongly agree, agree, neither agree nor disagree, disagree or strongly disagree with this statement?

STRONGLY AGREE	5
AGREE	4
NEITHER AGREE NOR DISAGREE	3
DISAGREE	2
STRONGLY DISAGREE	1
DK/NA	9

6. Local government can do several things to affect the type of land use that goes on within its boundaries. [HAND R CARD D] Looking at the card would you please tell me which are the three most important things government should encourage for your area? And, which are the three least important things government should encourage? (JUST CALL YOUR ANSWERS BY LETTER, PLEASE.)

		MOST IMPORTANT	LEAST IMPORTANT
(a)	ATTRACT NEW INDUSTRY	____	____
(b)	EXPAND LOCAL INDUSTRY	____	____
(c)	SELL BONDS TO SUPPORT INDUSTRIAL DEVELOPMENT	____	____
(d)	CONSTRUCT PARKS OR PLAYGROUNDS	____	____
(e)	RETAIN OPEN SPACE	____	____
(f)	DEVELOP SUBDIVISIONS	____	____
(g)	STRIP DEVELOPMENT ALONG HIGHWAYS	____	____
(h)	ZONING	____	____
(i)	ANNEX NEW AREAS	____	____
(j)	IMPROVE NEIGHBORHOODS	____	____
(k)	DEVELOP WATER AND SEWERS	____	____
(l)	DEVELOP DOWNTOWN AREAS	____	____
(m)	PROTECT FARMLAND	____	____

7. Would you prefer to have more, the same amount, or less land used for each of the following activities in your local area?

		MORE	SAME	LESS	DK/NA
(a)	SINGLE FAMILY RESIDENCES.....	3	2	1	9
(b)	MULTIPLE FAMILY RESIDENCES.....	3	2	1	9
(c)	MOBILE HOMES.....	3	2	1	9
(d)	FARMING.....	3	2	1	9
(e)	MINING.....	3	2	1	9
(f)	MANUFACTURING.....	3	2	1	9
(g)	PARKS.....	3	2	1	9
(h)	PUBLIC UTILITIES (lights, gas, telephone).....	3	2	1	9
(i)	FORESTS.....	3	2	1	9
(j)	OPEN RANGE.....	3	2	1	9
(k)	RETAIL BUSINESSES.....	3	2	1	9
(l)	SCHOOLS.....	3	2	1	9
(m)	ROADS AND HIGHWAYS.....	3	2	1	9
(n)	OTHER_____...	3	2	1	9

8a. Looking at the scale again, which number best represents how satisfied you are with land use in your city/town/part of county. Which number comes closest to how satisfied or dissatisfied you feel? (RECORD OPPOSITE "A" BELOW)

8b. Looking at the scale again, which one number best represents how well land might realistically be used in your city/town/part of county? (RECORD OPPOSITE "B" BELOW)

(a) Sat: 10 9 8 7 6 5 4 3 2 1 0

(b) Best: 10 9 8 7 6 5 4 3 2 1 0