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16. Abstract

The purpose of the study is to determine how distinctive social, economic, land use, governmental and political characteristics in the Vancouver - Portland area contribute to uneven growth which in turn affects the transportation system. Interviews with public and private industrial representatives to identify the reasons underlying uneven growth are discussed. A statistical analysis of population, employment, vehicle registration and traffic across the Interstate 5 bridge connecting Vancouver and Portland is also presented. Recommendations are listed which suggest ways to improve the transportation system through modification of elements contributing to uneven growth.

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TRANSPORTATION PROBLEMS ASSOCIATED WITH UNEVEN GROWTH RATES IN SEPARATE JURISDICTIONS: A CASE STUDY IN PORTLAND AND VANCOUVER

REPORT HR- 585

APRIL 1982

PREPARED BY

SYSTEMS PLANNING SECTION
PUBLIC TRANSPORTATION AND PLANNING DIVISION
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

IN COOPERATION WITH
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

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This research study was accomplished with the assistance of public administrators and business executives associated with the following agencies: Federal Highway Administration, Clark County Industrial Bureau, Regional Planning Council of Clark County, Greater Vancouver Chamber of Commerce, Economic Development Council of Clark County, City of Vancouver, Port of Vancouver, Genstar, Hewlett-Packard, Economic Development Administration (Portland), Metropolitan Service District (METRO), City of Portland, Port of Portland, Washington County, Clackamas County and Multnomah County.

DISCLAIMER

The contents of this report reflect the views of the author who is responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the Washington State Department of Transportation or the U.S. Department of Transportation, Federal Highway Administration. This report does not constitute a standard, specification or regulation.

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SUMMARY Don't start the opening paragraph of the Excutive summary out with a

Uneven rates of growth between two areas refers to differences in the growth rate in population, employment and travel demands. When problems arise in serving the transportation needs of such areas, the factors underlying uneven growth rates need to be identified to better understand and manage the growth taking place. Very poor statement of problem it is very unclear as to what is actually being studied ~~or~~ or what is actually causing the problem. Vancouver/Clark County, Washington, has been experiencing rapid industrial, commercial and residential development. Across the Columbia River in the State of Oregon, the rate of growth in Portland, a large metropolitan center, has been slower though the numerical growth is significantly greater than that in Vancouver. The location of new industries and businesses in the Vancouver-Portland area has precipitated an increase in employment and population. This in turn has resulted in a corresponding increase in the demand placed upon the transportation system serving this bi-city/bi-state study area. Uneven rates of growth have developed as a result of distinctive social, economic, land use, governmental and political considerations. This study presents an analysis of the underlying factors contributing to uneven growth rates in the Vancouver-Portland area, and their subsequent effect on travel across the Interstate 5 bridge connecting these separate jurisdictions. This ~~sh~~ statement should be placed at the begining of the paragraph.

Define specfically ~~the parame~~ the parameters of the study area

This whole page fails to achieve the function of the Ex sum.
1. Restate very clearly in the First Few sentences of the Excutive summary what the problem is.
2. State -1- ~~cons~~ exactly what the primary goal of the project is
3. State why the study is being conducted

Establi...

The excutive summary must open with a question or statement which commands the readers attention. As it is written now the reader is lost by the time he/she finishes the first page.

Findings

To assist in understanding how uneven growth rates develop and affect the transportation system, interviews of public and private industrial representatives were conducted. These interviews identified the factors underlying decisions of businesses and industries when locating in Vancouver or Portland. The persons interviewed indicated that:

This belongs under the Heading methods. Tell what questions were asked and why what type of information was being sought

- Large light manufacturing industries find Vancouver a desirable site for locating their firms due primarily to the availability of sufficient land and the presence of acceptable sewerage and transportation facilities.

- In Portland, the presence of a sizeable local market and a large urban transportation network encourages the development of office and retail businesses rather than large light manufacturing industries.

To analyze how the uneven growth that followed industrial and commercial development in Vancouver-Portland affects the transportation system, statistical analyses were performed. The analyses indicated a strong relationship between developmental growth in Vancouver and subsequent increases in travel volumes across the Interstate 5 (I-5) bridge. In Portland, however, growth was not correlated with increases in I-5 bridge travel. Two events were identified as contributing to this:

what were the statistical analysis what type of tests were preformed what ~~were~~ was the val for p what were the levels of significance.

1. In Vancouver, the rate of increase in vehicles paralleled the growth in population and employment.

2. In Portland, the rate of increase in vehicles was slower than its population and employment growth.

~~How~~ How does this relate to the preceding statement that 2 factors accounted for why growth in P. did not correlate to increase in traffic over the I5 bridge

Vancouver residents who travel to and from Portland job sites required vehicles and thereby increased travel volumes across I-5 bridge. However, as developmental growth took place in Portland, the increased travel volumes remained largely within Portland. Travel problems, include congestion within and between Vancouver and Portland, resulting in delays, safety hazards, inefficient use of fuel energy, and subsequent air quality and environmental impacts from idling vehicles.

State ments explaining the Findings do not belong under the findings section they belong under the conclusion or discussion section-

Conclusions

Give analysis above to support this ~~conclu~~ conclusion state stats to document this.

The analyses support the fundamental conclusion that underlying conditions are responsible for uneven rates of growth and its impact on travel.

Three premises served as basic hypotheses to guide the analytical procedures:

This belongs in the methods section of Executive summary

Premise 1 - Underlying social, economic, land use, governmental and political considerations play an influential role in industrial and commercial location decisions.

This is not hypothesis it does not pose a cause and effect relationship and it does not clearly state the variables which will be used to measure that relationship.

Analytical Procedure: Examination of economic development goals and status of industrial and commercial activities; design and implementation of interview survey.

This again Belongs in the methods section.

Premise 2 - The varying location of industries and businesses in Vancouver and Portland has contributed to uneven rates population and employment growth. Better ~~Re~~ write

Analytical Procedure: Examination of changes in population and employment growth.

In methods

Premise 3 - Uneven growth has an impact on travel volumes between Vancouver and Portland. Improving rapidly still needs work.

Analytical Procedure: Statistical correlations obtained by using the r squared formula measured the strength of relationship between increase in the number of vehicles registered and the increase in population; development and discussion of uneven growth model.

This is the hypothesis strength is not measured correlation direction.

It is concluded that all three premises are significant in describing the influence, relationship and impact of uneven growth considerations and I-5 bridge travel.

No evidence statistical or otherwise was ever presented to support any of the premises How do we know all of the hypotheses weren't ~~re~~ rejected

Summary Of Recommendations For Implementation

The recommendations for implementation are presented according to the Primary and Secondary Elements identified as underlying the uneven growth rates occurring in the study area.

Primary Elements:

1. Land-Related Recommendations:

   a. Continued planning efforts by regional and local transportation agencies in comprehensive regional land use, economic development and transportation.

   b. Develop a comprehensive industrial park plan among counties surrounding Portland/Multnomah County.

   c. Maintain a regional inventory of land use

   d. Facilitate rezoning procedures by providing development-related information

2. Sewerage-Related Recommendations:

   a. Increase cooperation and coordination among local agencies in planning for and providing adequate sewerage services.

3. Transportation-Related Recommendations:

   a. Complete committed projects identified in the Regional Transportation Plan, Draft Two.

b. Increased carpool and vanpool marketing efforts and technical assistance by transportation agencies.

Secondary Elements:

1. Labor Market-Related Recommendations:

   a. Continued encouragement by regional and local planning agencies toward the development of residential and employment sites in the same or nearby areas.

2. Regulation and Taxing-Related Recommendations:

   a. Continue the existing program of exempting non-Washington residents from paying the Washington State sales tax.

   b. Continue lower property taxes and lower water and power rates.

3. Water and Power-Related Recommendations:

   a. Continue present directions in providing water and power to Clark County reflecting existing land use plans.

4. Market Accessibility-Related Recommendations:

   a. Continue improving access to the urban transportation network.

need closing paragraph to sum up conclusions and recommendations and encourage the reader to continue reading as it is now the reader hanging

1.

1. Incorrectly formated
2- poor editorial style
3. No logical concept of problem
   can't see the function each section
   preforms or how they interrelate.
4- needs rewriting
5 Does grap and maintain readers attention.

INTRODUCTION

Does not meet format requirements of manual.

- Purpose, Objectives and Scope
- Background
- Literature Review
- Problem Statement
- Procedures
  - Identification of the Area's Economic Development Goals
  - Interview Survey Design and Implementation
  - Population and Employment Analysis
  - Statistical Analysis
  - Development of Uneven Growth Model
  - Development of Conclusions and Recommendations
  - Identification of Areas for Additional Research

Purpose, Objectives and Scope

The research study analyzes the range of information available from existing data sources which could contribute to improvements in transportation services. Specifically, the study was undertaken to determine how distinctive social, economic, land use, governmental and political considerations in the Vancouver-Portland area contribute to the development of uneven growth rates in these areas, and how this uneven growth affects travel across the Interstate 5 (I-5) bridge connecting these two separate jurisdictions.

Don't begin with method Begin with

Why is this project being done is it addressing a real problem.

The objectives of the study are to:

- Identify the underlying social, economic, land use, governmental and political considerations influencing industrial and business locations in the Vancouver-Portland area.

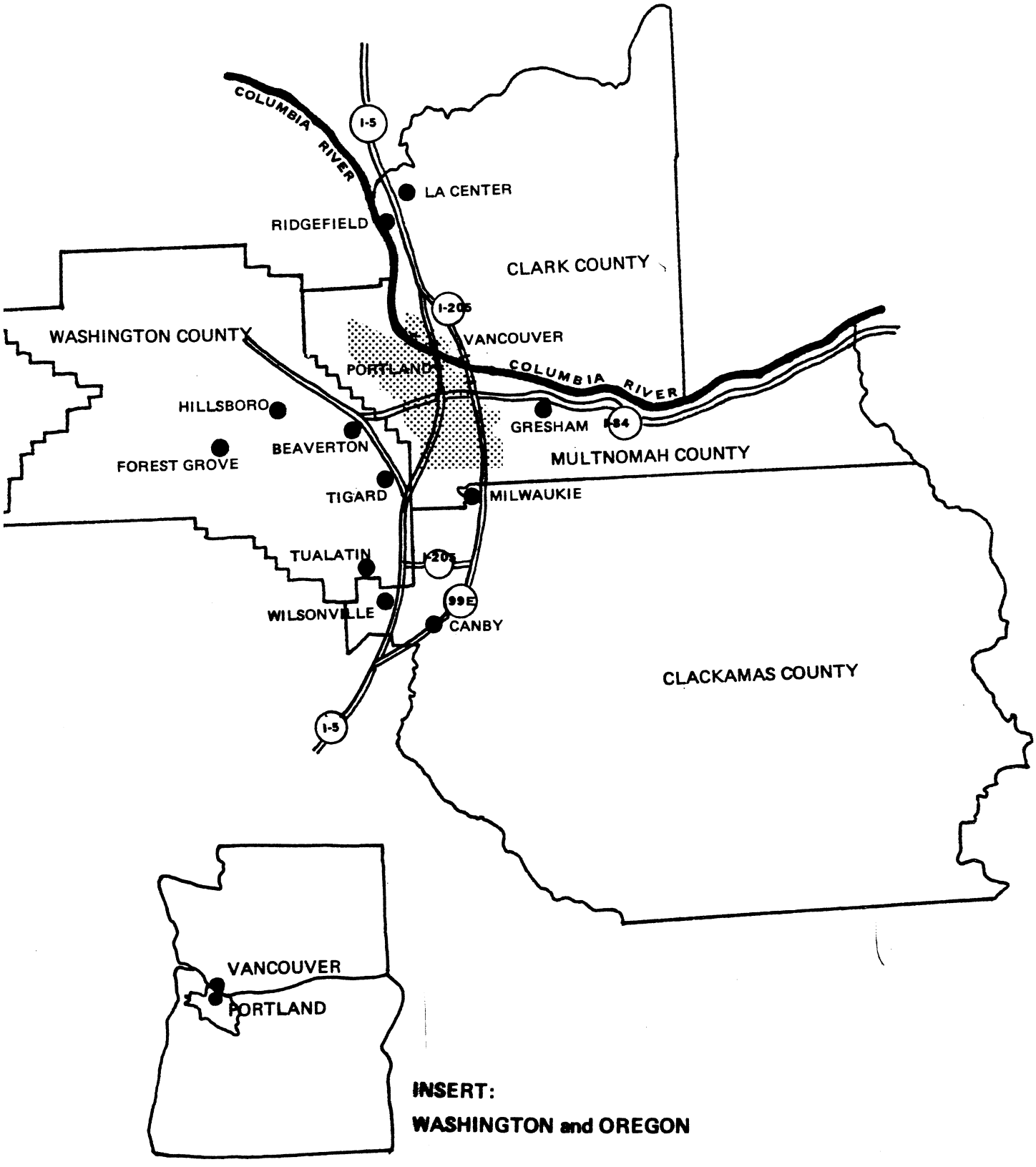
No logical evolution does not filter connect

- Statistically analyze the relationship between uneven growth rates and travel across the I-5 bridge.

- Develop recommendations for implementation which address the social, economic, land use, governmental and political considerations with the objective of improving transportation services in an energy-efficient and cost-effective manner.

- Identify pertinent areas for further research.

Figure 1 - Portland - Vancouver SMSA Map



The study area is defined by the boundaries of the Portland-Vancouver Standard Metropolitan Statistical Area (SMSA) (Figure 1) consisting of the two principal cities, Clark County in the State of Washington, and Multnomah, Clackamas and Washington Counties in Oregon.(1)

The research is limited to the analysis of how uneven rates of growth affects travel on the I-5 bridge. The I-5 bridge was selected because it currently is the principal highway link connecting Vancouver and Portland.

Background

Vancouver, Washington is located across the Columbia River, eight miles from Portland, Oregon. Vancouver was founded in 1825 as Fort Vancouver, a Hudson's Bay trading post, and was chartered as a city in 1889. Today, Vancouver contains about 43,000 people and is part of the rapidly growing Clark County urban area.

Portland is located on the Willamette River near its confluence with the Columbia River. It was incorporated in 1851. Events aiding in Portland's expansion were the Alaska Gold Rush, the Lewis and Clark Centennial Expedition (1905) and the completion of the Bonneville Dam. During World War II, Portland was a center for shipbuilding. Today, Portland

historical review to broad make it relevant to the problem.

(1) A Standard Metropolitan Statistical Area (SMSA) is a county or group of contiguous counties containing at least one city of 50,000 or more residents. Contiguous counties are included in the SMSA if they form an integral social and economic system.

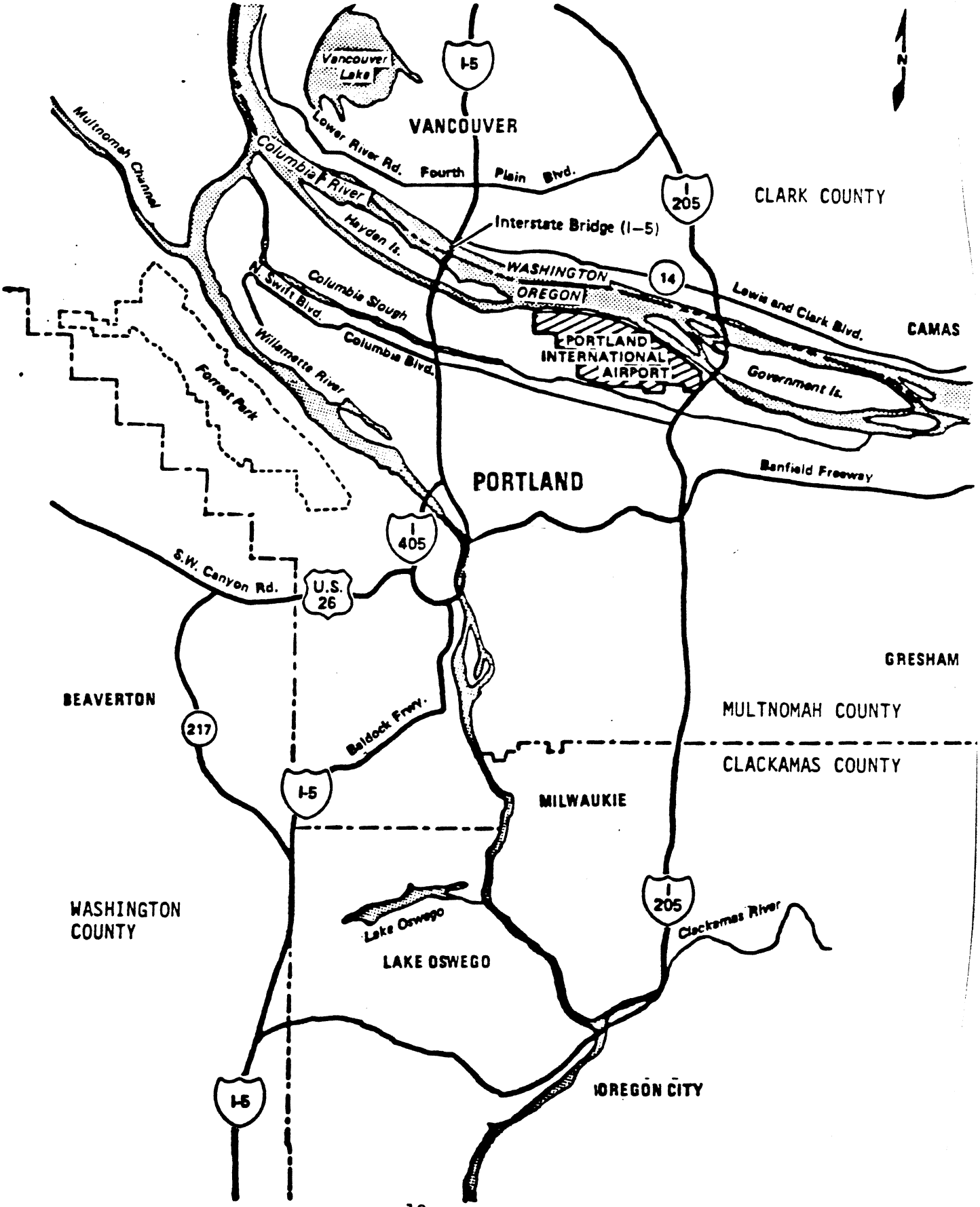
is a major industrial, commercial and educational center of the Northwest as well as being an important port and a major tourist spot. The area surrounding both Vancouver and Portland is noted for farms, timberland and orchards.

Interstate 5 is a major north-south highway connecting Seattle, Vancouver, Portland and points south. It currently is the only highway connection between Vancouver and Portland. Interstate 205 (I-205) is now under construction and is scheduled for completion by late 1983. The I-205 bridge, however, will be open to traffic by the end of 1982. When opened, I-205 will cross the Columbia River about six miles east of the I-5 bridge (Figure 2).

The I-5 Columbia River Bridge is actually two parallel bridges. The first bridge, completed in 1917, connected Interstate Avenue in Portland with Vancouver. The second bridge was opened in 1958. These twin bridges are called the Interstate 5 Bridge. The existing I-5 bridge is often cited as being the cause of congestion experienced in travelling between Vancouver and Portland. Although the bridge attracts considerable traffic, the congestion actually occurs at interchanges and sections north and south of the bridge, and is not the result of insufficient bridge capacity. These bottlenecks are described in detail in the Washington State Department of Transportation's Legislative Study: Portland-Vancouver Corridor - Columbia River Crossings, December 1980.

FIGURE 2

REGIONAL HIGHWAY SYSTEM



The Final Report of the Governors' Bi-State Task Force on Transportation for the Portland-Vancouver Corridor, March 1981 states: even with current and committed highway-improvement projects in the corridor, congestion cannot be eliminated or even substantially reduced. Reasonably acceptable service levels can be maintained through at least 1990. However, "keeping the current system serviceable until that time will not be easy."

This study has been designed to analyze some of the factors likely to contribute to that situation.

why do study/what will the results do to lessen conjestion- what need is the study addressing?

Literature Review

The research study benefitted from previous planning research efforts. Studies of particular significance to this effort are discussed below.

The subject of industrial and commercial location decisions has been studied by Hewings (1977), Mills (1977), Richardson (1969) and Stafford (1979). These studies indicate that resources of particular interest to industrial development are the availability of raw materials, sufficient land, utilities, transportation and labor supply. Commercial location decisions are primarily based on their ability to serve a local/regional market with a high priority placed on visibility of the firm while industrial location decisions place less emphasis on visibility. However, this trend is changing as larger, well-known industries locate plants in the

Increase/ Documentation-

vicinity of freeways. For such industries, name advertising and prestige are important promotional elements (Gruen Associates, 1974).

The affect of industrial and commercial development on population and employment growth has been examined by Gruen Associates (1974) and Chapin and Kaiser (1979). According to Gruen Associates, a reciprocal relationship between the availability of employment attracting workers and the availability of workers attracting industry has been partially instrumental in bringing industry into the metropolitan fringe. Chapin and Kaiser approach the subject from a systems framework in which activity systems, development systems and environmental systems are identified as the key systems affecting land use.

Changes in population and employment in an area require the development of supporting facilities and services. Population and employment growth has been studied by the City of Vancouver (1980), METRO (1981), Regional Planning Council of Clark County (1980) and the U.S. Department of Energy and Bonneville Power Administration (1979). These studies indicate a rapid rate of growth in Vancouver/Clark County in the State of Washington, and in Clackamas and Washington Counties in the State of Oregon. Also in Oregon, Portland/Multnomah County has an expanding employment base and a slowed population growth rate.

Vastly improved lit review increased Documentation of Basic assumptions.

Although a literature search did not result in locating studies which specifically addressed the impact of uneven growth on the transportation system, several studies document the effects of social and economic considerations on travel. In the NCHRP (Report 70, 1969) an inverse relationship was observed between population size and trips per capita which emphasizes the role of the small city as a trip producer and that of the large city as a trip attractor. According to the study, the logic behind this phenomena is that individuals can satisfy their needs (work, shopping, personal business) much closer to their homes in large urban areas than in smaller ones. The effect of industrial plants and shopping centers on the transportation system has been investigated in NCHRP (Report 24, 1966). Although heavy demands on the transportation system were reported, the study was conducted in 1966 before the impact of the fuel crises, and energy conservation efforts could be studied. Other studies assumed growth to have an impact on transportation systems and proposed methods of generating trip tables for different futures (TRB-710, 1979), or provided planning guidelines for bringing social and environmental consideration into transportation decision-making (NCHRP - 156, 1975).

To analyze the impact of uneven growth on the transportation system, travel data were obtained from archives which provided average daily traffic on the I-5 bridge for a thirty-year period from 1950 to 1979. Directional peak hour traffic were

Methods

not available because records older than seven years were destroyed.

A major travel problem between Washington and Oregon is congestion in the I-5 corridor serving Vancouver and Portland. Recent studies on Columbia River crossings were conducted by the Washington State Department of Transportation (1980), Bi-State Task Force (1981), Federal Highway Administration (1979) and the Washington Highway Commission (1977-79). These studies investigated the feasibility of a third Columbia River crossing. As previously noted, the Washington State Department of Transportation (1980) study concluded that a third bridge was not economically feasible and that existing congestion on I-5 is the result of bottlenecks north and south of the I-5 bridge and not related to the capacity of the existing bridge.

A complete list of studies cited and other documents reviewed are presented in the bibliography.

No flow or Connection Failed to evade problem or show no one has look at the problem in this way-

Problem Statement

An area's social, economic, land use, governmental and political characteristics influence both the magnitude and direction of its growth. However, if decisions concerning an area's growth are made without considering their effect on the transportation system, undue concentrations of traffic might result.

Procedures

The study is structured on three basic premises:

- that underlying social, economic, land use, governmental and political considerations play an influential role in industrial and business location decisions.
- that the location of industries and businesses in Vancouver and Portland has contributed to uneven rates of population and employment growth.
- that these uneven growth rates have an impact on travel between Vancouver and Portland

These three premises form the basis of the organization and subsequent procedures established in developing the research effort. The following research procedures were followed:

1. Identification of the Area's Economic Development Goals

An area's economic development goals, although general, frame an area's overall direction and aspirations. With respect to the first premise (underlying considerations influence industrial and business locations), the economic development goals of the four counties were studied to determine how the varying availability of resources is considered in the formulation of each county's economic development goals. The types and scale of desired industries, businesses and

residential development should reflect what an area can feasibly accommodate. The economic development goals of the counties provided the preliminary orientation required to design the interview survey to further define the considerations underlying industrial and commercial location decisions.

2. Interview Survey Design and Implementation

To further define and clarify the first premise (underlying consideration influence industrial and business location decisions), an interview survey was conducted to further identify these considerations and their influence. The survey sample was not random because of the nature of the information being sought. Business executives and government administrators in Vancouver and Portland were selected and interviewed. Persons interviewed were involved in economic development, long-range planning, marketing, transportation, community planning and development, and finance. Persons interviewed were from federal, state, regional and local public agencies as well as private agencies. The interview survey consisted of a discussion of 45 questions (Appendix A). The survey information obtained was used as a basis for examining subsequent uneven population and employment growth rates in Vancouver and Portland.

Redundant

What was the training or instructions to the team How did they ask the survey questions.

From Which agencies

Expand to satisfy apparatus requirements-

1. Good Mention ~~Not~~ radom more is needed with respect to national and specific process.

2. Could not duplicate study no step by step process

1. No subject data
2. No apparatus
3. No step by step design
4. How many subjects

3. Population and Employment Analyses

Investigation of the second premise (the location of industries and businesses in Vancouver and Portland has contributed to uneven population and employment growth) entailed an analysis of the changes in the study area's population and employment. This involved an examination of not only trends but also the relationship of uneven population and employment growth rates and their causes. Population and employment data used were developed by METRO (1981). This analysis developed the statistical relationships between uneven growth and travel volumes.

Very unclear what type of data rationale for relationships

Be much more specific about nature and use of data show rational behind why and how this type of data was used to analyze problem-

4. Statistical Analysis

The third premise (uneven population and employment growth has an impact on travel volumes between Vancouver and Portland) was approached using correlation analyses. Historical data were collected for the thirty-year period from 1950 to 1979 to the extent these data were available. Limitations on the amount of available data constrained the depth of certain analyses (e.g., directional traffic volumes on the I-5 bridge were available for only the most recent seven years). Data on population, employment, vehicle registrations, average daily traffic, and regulatory and taxing data were collected, evaluated and tested. These analyses measured the degree of association between uneven growth and travel across the I-5

What type of historical data

Be specific about data analysis

This should be the first sente

Data collection not statistical analysis belong in results section

Tell 1- stat test
2- Why

bridge. These statistical results together with the qualitative analysis were used in developing a model of uneven growth in the study area.

5. Development of Uneven Growth Model

The model of uneven growth provides an overall picture of the impact of uneven growth rates on travel. The model's purpose is to summarize the role of the major elements as they affect movement. The model provides a conceptual portrayal of the magnitude and direction of developmental growth and travel generated.

6. Development of Conclusions and Recommendations

Analyses of industrial and business location decisions, relationships between these locations decisions and uneven rates of population and employment growth, and the effect of this uneven growth rate on travel volumes on the I-5 bridge provide the basis for the conclusions of this study. These were used in developing recommendations to improve transportation services in an energy-efficient and cost-effective manner.

7. Identification of Areas for Additional Research

Limitations on research procedures identified areas meriting additional research.

ECONOMIC DEVELOPMENT GOALS

- Clark County, Washington
- Multnomah County, Oregon
- Comparison of Clark and Multnomah Counties
- Washington County, Oregon
- Clackamas County, Oregon
- Comparison of Washington and Clackamas Counties
- Conclusions - Economic Development Goals

ECONOMIC DEVELOPMENT GOALS

The Portland-Vancouver SMSA is a progressive, growth-oriented area which is experiencing rapid and complex changes. Appropriate economic development goals assist in the management of growth trends and their influence on industrial and commercial location decisions. This is true in Portland-Vancouver as it is in other parts of the nation. Appendix D contains a detailed examination of the industrial and commercial activities taking place in Portland-Vancouver as well as the constraints facing future development in each of the four counties.

Clark County

The goals for economic development in Clark County were developed by the Regional Planning Council of Clark County and are contained in the Clark County Overall Economic Development Plan, 1980 Update. The goals are:

- Increase industrial employment and diversification
- Increase trade and service employment
- Increase tourism employment
- Provide effective management and utilization of water resources
- Maintain agricultural production

- Use the county's mineral resources in an environmentally sound manner
- Maintain and encourage forest production industry resources
- Develop additional energy resources and increase conservation of existing energy supplies
- Provide effective management of fish and wildlife resources
- Develop the full employment potential of the unemployed
- Improve community facilities and services
- Improve the transportation system

All of these suggest a positive approach to economic development. These are goals what makes this approach positive?

Multnomah County

The economic development goals developed by the Multnomah County Economic Development Advisory Commission (documented in the Overall Economic Development Plan 1979, Volume 2) are:

- Provide present and future employment opportunities to meet the needs of citizens of Multnomah County
- Encourage economic development activities which are

compatible with the constraint and potentials of the Portland Metropolitan area.

- Maintain and encourage a stable and diversified economy in Multnomah County

- Facilitate communication and coordination of economic development activities between the public and private sectors

- Develop and implement an Overall Economic Development Plan

The economic development goals of Multnomah County reflect the large population and employment base in the Portland Metropolitan area and the need to ensure future employment opportunities. How do economic goals relate to traffic Goals do not produce growth problems Due to growth create goals. Goal not underlying factor

Comparison of Clark and Multnomah Counties

Clark County's growth emphasis is not only on diversifying its economic industrial and business base, but also on maintenance, management and utilization of Clark County's agricultural, mineral, forest, fish, wildlife and energy resources. The availability of serviced land, is a prime factor in Clark County's ability to attract major light manufacturing electronics industries. Transportation between Vancouver and Portland is an important issue requiring attention in order to assist development. Conversely,

Document availability of land and relationship to attract manufacturing

Explain how light manufacturing in Vancouver relates to traffic don't people simply live in Vancouver?

Multnomah County is experiencing some constraints in accepting major light manufacturing firms due to the lack of adequate serviced land.

Hence, Clark County will continue to experience a faster rate of population and employment growth. Multnomah County will continue to attract industries and businesses requiring smaller land parcels, resulting in the development of a diversified economic base in this county.

Washington County

Washington County expects to adopt an updated set of economic development policies in 1982. Interim policies presented in the Overall Economic Development Plan, 1980 Update, Washington County, Oregon are:

- Establish and maintain the cooperation and business climate necessary for economic development.
- Promote compatible development of diversified new employment centers near residential areas.
- Aid in improving transit service between residential and employment areas.
- Support land use planning decisions in designated areas which prevent the intrusion of urban-level development, or the continued subdivision of lands which have demonstrated capability for economic, agricultural and timber production.

No tie Between goals and traffic or growth

- Promote agricultural processing.

- Support multi-use water supply projects.

- Encourage education and research in making farming and forestry more viable economic activities.

- Promote increased productivity of both public and privately owned forest land in Washington County.

- Support development and continuation of training and education opportunities that lead to jobs for the economically disadvantaged.

These policies are also positive, suggesting that economic growth is a generally desirable feature. Support assumption

Clackamas County

Clackamas County's Board of Commissions appointed an Economic Development Commission which prepared an Overall Economic Development Plan for the county and its cities. The goals adopted by this Commission from the Planning Background Report: Economics-Review Draft, May 1979, are:

- Develop a working partnership between the county, cities, private sector and various agencies and organizations to meet the economic needs of Clackamas County.

- Provide employment opportunities to meet the needs of the county's residents.

- Retain and encourage the expansion of existing industry and business.

- Promote new industrial and commercial development which is consistent with environmental quality and congenial livine conditions.

Comparison of Washington and Clackamas Counties

How do they incourage growth document with survey Finding Goal not equal reality document traffic problem in Clackamas

Both Washington and Clackamas Counties encourage growth. However, Washington County specifically addresses the need for an improved transit service. Its traffic congestion is quite heavy and unless resolved, economic development could be severely inhibited. At present, the sewerage system in both Washington and Clackamas Counties appears to be adequate to handle existing and projected future growth.

Conclusions - Economic Development Goals

How do these goals suggest difference in types of resources

How do goals limit growth

Examination of the economic development goals of the four counties suggests differences in the availability of natural and man-made resources. The goals provide some indication of the economic development activities that can be accommodated plus a framework for identifying and assessing the elements underlying potential growth. The extent to which growth will occur, and in what directions, will depend on the joint efforts of key decision-makers in the various counties, and the provisions of an adequate and timely infrastructure.

INTERVIEW SURVEY

- Discussion
- Primary Elements
  - Land
  - Sewerage Facilities
  - Transportation
- Secondary Elements
  - Labor Market Accessibility
  - Taxing and Regulatory Environment
  - Water and Power
  - Scenic and Recreational Resources
  - Market Accessibility

INTERVIEW SURVEY

Design rational and procedure for developing survey belong in Methods section under subheadings 1. Design 2- Apparatus

Discussion

Critical factors underlying the locational decisions of large firms were further analyzed through interviews directed to those individuals having considerable knowledge about the economic potentials of the area. The list of 45 questions asked in the interviews are listed in Appendix A. A summary of the results of the interviews is presented in Appendix B.

be more specific don't rely so heavily on Appendix

How were the key elements identified

An attempt was made to identify key elements contributing to growth, and it appears that three primary elements are significant in this context. These are: land, sewerage facilities, and transportation. These elements are considered "primary" because the absence of any one will significantly alter an otherwise favorable decision. It follows, further, that differences in these factors, will lead to uneven growth in selected areas.

Support this premise document

This does not nessary follow explain connection document principles and give statistics that hold this to be true.

Secondary elements include labor market, regulatory environment, water and power, recreational amenities of the natural environment, cultural amenities of the cosmopolitan area, and low relative cost of obtaining goods and services. These factors are considered "secondary" because the differences from county to county are less significant than the primary factors.

This The use of differences between counties to define primary vs secondary is very unclear

Industrial development tends to attract additional development activities. The location of a major firm in an area eases the

Document this ~~pr~~ assumption

entry of "parallel" industries which manufacture similar goods. "Provider" industries are also attracted since they manufacture specific components required by the large firms. Next, "secondary" industries enter the area to provide goods, services, entertainment and recreation to the growing population. Each additional industry in turn generates growth in population, employment, housing and travel demands. Figure 3 presents a detailed diagram of the relationship of the primary and secondary elements underlying uneven rates of growth.

Document pattern of growth and ratio of

Words primary and secondary are mis leading

Primary Elements

Based on the interview survey the primary elements contributing to Vancouver's rapid growth are:

Document with statistic where are the discriptive stats

1. Land

Although land is available in all four counties, developers seem to subscribe to the "one chunk" (large parcel) theory (over 10 acres or just under 10 acres). It appears that adequate land, with the required infrastructure, is difficult to obtain in the Portland area. Electronics industries typically acquire land in excess of near term need to provide for long term development and expansion. A twenty year expansion potential is characteristically sought by large light manufacturing firms looking for sites. This factor, plus zoning controls, underlie the industrial park concept.

Document All of the many assamptions in this paragraph

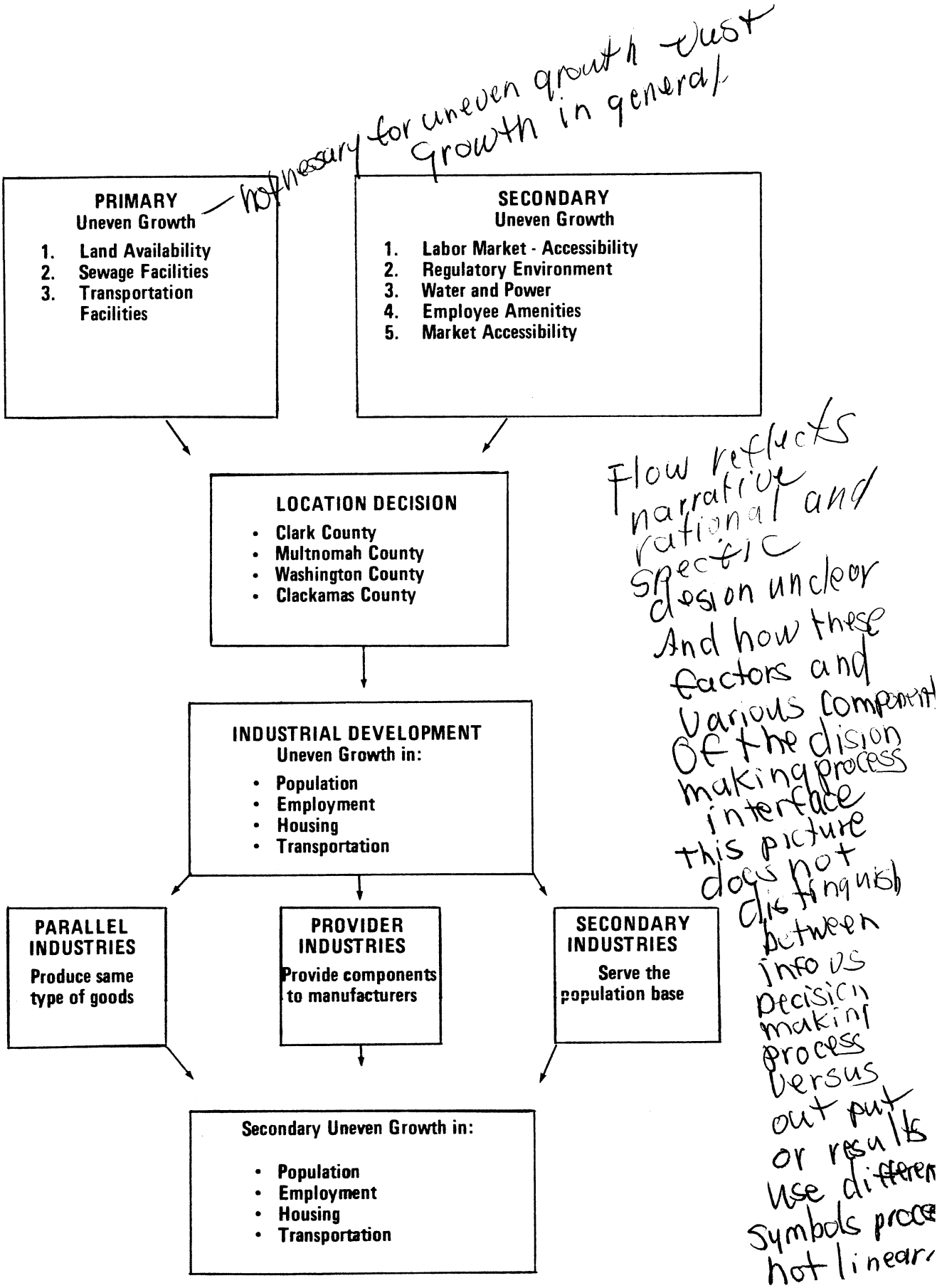


Figure 3: Uneven Growth Elements: Flow Sequence Detail

The "one chunk" theory also appears to hold for residential development. Developers in eastern Multnomah County have tended to acquire large parcels of land for resale or development in smaller parcels. This move reflects the trend toward industrial subdivision whereby an entrepreneur sells or leases land to industrial concern. The perception of the economic development specialists is that more small development activities are occurring in eastern Multnomah County than in Clark County since land restrictions tend to dampen large development in larger urbanized areas.

Use stats to document

Commercial and industrial land for development is available in Multnomah County, although significant constraints exist due to the high cost of infrastructure systems such as sewerage. Also, the available undeveloped land is less amenable to rezoning. This situation results from the desire of Oregon planners to relate economic development to the ability of the local governments to finance construction of infrastructure systems. Although this strategy is rational, some inflexibility results which appears to be a major factor contributing to the location of large industrial firms in eastern Clark County despite a long process in obtaining a zoning change.

Document land development with statistics

Conditions that were stated to contribute to the decision of industries and businesses to move out of Portland were:

Where did this data come From

- deteriorated urban industrial areas with traffic circulation problems

. unavailability of adjacent land for expansion

Such restrictions in urbanized areas make more rural areas, such as that in the corridor formed by I-205 attractive sites for development if supporting services and facilities are available or can be readily provided. In some instances, Portland has been able to ameliorate circulation problems by relocating roads and railroad tracks. With respect to residential development, a large planned community is taking shape in eastern Clark County.

Give specific Examples as illustrations document

Zoning controls also tend to concentrate industrial development in specific areas. Persons interviewed stated that developers perceive more stringent land use controls in Oregon as compared to Washington. The Urban Growth Boundary (UGB) in Oregon (adopted by METRO) establishes boundaries within which development may take place over the next 20 years (see Figure 4). Although some developers seeking approval to develop land believe that the Urban Growth Boundary is restrictive, the public concensus in Oregon is that the UGB should not be expanded and that changes would result in inadequate sewerage and transportation services for the expanded area.

Don't ~~co~~refer to interview results until results have been presented.

The public is concerned that growth should only be allowed as sewerage treatment facilities become available, thereby, avoiding the difficult and costly alternative of building infrastructure facilities after development. In the interviews, it was stated that costs associated with

Organization

1. Split analysis of planning principle and goals from empircal data experiment

1.B. Desian explaination

2- Cover experiment procedure first

1. Introduction define problem in theoretical and measurable terms.

2. Methods

1. subiect How many charactertistics

2- Aparatus - describe survey more detail donit depend upon appendey

3. Procedure - step by step process should be aple to duplicate exactly this study

4. results

statistical analysis

SL

3 Use results to support assumption made between goals and growth

Explain rational clarify ~~e~~ interrelationships

Document premises and principles.

~~Def~~ Seperat goals versus factors influencing growth

4. Once the connect between goals growth factors influencing ~~goals~~ put through model ~~to~~ use model to illustrate and thus

eporate ~~or~~ findings rom interpetations or applications of goal

ie Finding survey report

thus influenc grow

mnect growth

"redevelopment" would be recovered through higher prices for goods and services in Oregon relative to Washington. However, the resulting higher Oregon prices would place Oregon at a competitive disadvantage to Washington. Land adjacent to the Portland International Airport is affected in this manner although it is considered a desirable location for distributive (warehouse) and smaller light manufacturing industries.

give facts and examples to support

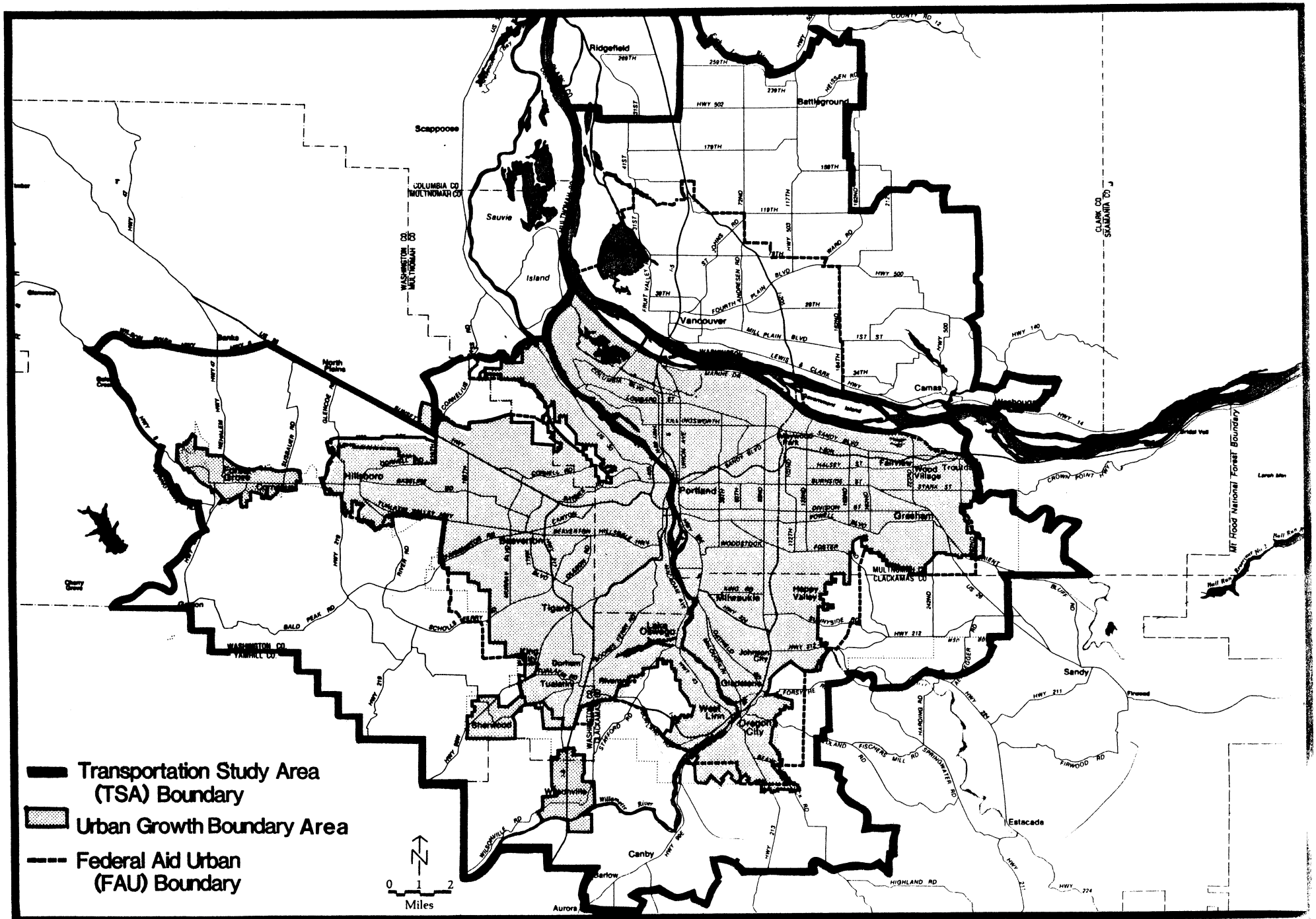
Another type of concern expressed by persons interviewed in Oregon involves the flood plain land between the Columbia River and Portland where high development costs would be incurred.

these results of survey

However, if the momentum to develop continues, even in a national climate of slow economic activity, major developments may take place in this area, similar to growth in the Rivergate area. The price of adequate land with infrastructure does not appear to be a significant factor in deterring land purchases for industrial development.

2. Sewerage Facilities:

The pace at which development can occur is heavily dependent on proper sewerage collection, treatment and disposal systems. The problem is how to dispose of a steadily increasing volume of wastes without polluting the water supply, thereby creating a health hazard or a public nuisance.



Draft Regional Transportation Plan • January, 1980

COMPARISON OF BOUNDARIES

FIG. 4

In critical locations where a public sewerage system is inaccessible or non-existent, septic tanks with drain fields have been used. However, failures of septic disposal systems are relatively common. In addition, population growth has increased the number of septic tanks discharging effluent into saturated ground. If uncontrolled, the increased septic tank disposal of sewerage from industrial, commercial and residential developments would substantially increase the potential health hazards created by sewerage flow to water supplies or appearing at the surface of the ground.

Spelling

Major sewerage conditions which continue to dampen development in the SMSA are:

Document! Give fact supporting existance of conditions

- Limitations that may exist in the capacity of the existing public sewerage system to handle current flow.

- The high cost of undertaking construction of sewerage systems.

- The relative unavailability of sufficient revenues to commence sewerage-related construction activities in many areas.

2a. Multnomah County: Presently, two regional shopping centers (Gateway and Mall 205) are on septic tanks. Concern is expressed regarding nitrates effluents leaching into underground supplies of water.

High development costs associated with major sewerage construction projects have inhibited the development of designated industrial and commercial land available in eastern Multnomah County. Hence, as the demand for large parcels adequately served by infrastructure continued, large light industry firms began to locate in Clark, Washington and Clackamas Counties rather than Multnomah County.

2b. Clark County: Development east of Vancouver includes Genstar, which is developing a planned community that also includes two large electronics firms, Hewlett-Packard and Tektronix. Sewerage facilities to support additional growth are present in this part of Clark County. Hence, additional firms are indicating their intention to locate here. Vancouver Mall has also been located in this area and will be accessible to Oregon markets upon completion of I-205 in late 1983. The area in western Clark County, along the I-5 corridor contains land designated for light industry. Due to varying needs for sewerage service this area is not as easily developable as a planned community-electronics complex.

Document such and such

Explain connection and rational

2c. Washington County: Washington County, Oregon, has continued pressures for industrial, commercial and residential development. However, in 1970, the pollution of rivers and streams forced state health agencies to restrict new construction throughout the urban areas of Washington County. With urbanization pressures reaching their height, economic development activity was halted.

The Unified Sewerage Agency (USA) was conceived to provide sewer service and correct the severe surface water contamination problem. By 1974, most cities had contracted with USA for provision of sewerage service. Federal and local funds were channeled into major plant and sewerage pipeline construction, and the majority of the restrictions lifted.

The United Sewerage Agency's three major plants located in Tigard, Hillsboro, and Forest Grove serve all major cities within Washington County. Offering one of the most advanced systems in the Pacific Northwest, these sanitary sewerage services appear to be capable of expanding to meet the needs of the county throughout the foreseeable future.

Completion of an up-to-date countywide master plan for drainage control and the formation of a regional drainage district are two additional options being considered. At present, development pressures which arise are sometimes at odds with drainage control objectives.

2d. Clackamas County: Development in Clackamas County appears to be served by an adequate sewerage system. Sewerage facilities are normally provided at approximately the time when the affected site is to be developed. Currently, large light manufacturing firms are locating in the Urbanizing East District and the Wilsonville/Canby District in Clackamas County.

Document
give stats or quote-
draw connect or state availability of sewers influences establishment of light manufacturing-

3. Transportation:

The third primary element contributing to uneven rates of growth is transportation. Planning, land acquisition, construction, maintenance, improvements and holding costs associated with transportation facilities represent a substantial financial investment, frequently the largest single public investment made by an area.

The transportation system enables growth to take place in areas previously inaccessible. Once growth begins to take place, transportation systems attract and encourage additional growth. The interactive relationship of a transportation system with the area's land use is both highly visible and dynamic.

In recent years, the economic and social costs of transportation facilities have forced a realignment of priorities upon cities and communities. Yet transportation facilities continue to be a valuable community resource. Problems associated with traffic circulation, access to local and regional markets and access to an urban transportation network are pressing issues. Travel demands generated by natural growth as well as from movements entering and leaving an area are giving rise to significant traffic pressures in urban and developing areas.

3a. Clark and Multnomah Counties: While the construction and completion of certain highway and road improvements are highly

desirable, alternatives to building additional new highways and roads in light of scarce funds are also being sought. The Legislative Study, Portland-Vancouver Corridor, Columbia River Crossing, December 1980, proposed:

- Maintenance of structural integrity and operational safety of the existing highway system, and completion of committed projects identified in the Regional Transportation Plan Draft Two for the Portland Metropolitan Area, and the Washington State Transportation Plan and the Comprehensive Plan for Clark County.

- Implementation of Transportation System Management (TSM) actions in the I-5 corridor for obtaining greater use and safety from the existing transportation network. [Proposed TSM actions include variable advisory signs on I-5 and I-205, bus pre-emptors and ramp metering, high-occupancy by-pass lanes on the on-ramps, park-and-ride lots and flyer stops, and promotion of vanpools and carpools.]

3b. Washington County: The County road system is reported in Washington County's Overall Economic Development Plan: 1980 Update to be on the verge of total collapse. In March, 1980, the approval of County Road Ballot "A" provided no increased revenues for roads. It simply made up for revenue no longer

realized from the state gas tax as a result of declining fuel consumption.

Document assertion on conjestion

Highways in Washington County during peak hour service are very heavily congested. Hillsboro and Tualatin have completed transportation plans while Beaverton and Tigard are presently developing studies. Work on plans for Forest Grove and Cornelius has not yet begun. Federal funds are being sought to develop a Westside Public Transit Study.

3c. Clackamas County: According to Clackamas County's Planning Background Report, Economics, Review Draft - May 1979, the transportation system in Clackamas County is generally adequate. Completion of I-205 is expected to facilitate further growth due to quicker access to Portland International Airport and other areas.

Clackamas County's rural areas generally do not enjoy an urban level of service. The regional transit system is considered generally inadequate in serving existing commercial and industrial areas. Insufficient public funds for improvement and dedication of roadways adds transportation facility development costs to the location costs of large firms selecting the more rural areas of Clackamas County. It appears that the constraint on highway and roadway funding will continue.

3d. Role of Transportation in Location Decisions: Another important locational factor for the electronics industries is

proximity within one-half hour to a major airport. The enormous value and compact size of silicone wafers and other electronics components and instruments sometimes require their shipment by commercial airlines rather than by air cargo. The Portland International Airport (PIA) provides this service within the SMSA.

The Portland International Airport (PIA) could placed these large firms in either Washington or Oregon. The expected completion of I-205, however, greatly enhanced the attractiveness of locating in Clark County where sufficient land with infrastructure were also available. Completion of I-205 is expected to provide shippers with faster access to PIA from Vancouver (15 minutes across the Columbia River using I-205 compared with one-half hour west along SR 14 to I-5 and across the river).

The expected completion of I-205 was also a predominant factor in the site selection of Vancouver Regional Shopping Mall, a regional center serving shoppers from both Vancouver and Portland.

Existing congestion on the I-5 bridge is considered by persons interviewed in Clark County as the most significant drawback in establishing a regional business in the county. Part of the I-5 bridge traffic will be diverted to I-205 upon its completion. Traffic congestion will also be eased by planned facility improvements on I-5 north and south of the bridge. However, increased use of paratransit and other multi-

must read between the lines

occupancy vehicles supported by high-occupancy vehicle lanes, park-and-ride lots, flyer stops and other TSM actions will be necessary to further improve mobility.

The proposed 15-mile Banfield light rail transit (LRT) line connecting downtown Portland with suburban Gresham in eastern Multnomah County is expected to relieve traffic pressures along the Banfield corridor in the Portland metropolitan area.

Explain how what will it impact

Secondary Elements

The secondary elements underlying uneven rates of growth are considered less significant to the location decisions of large industrial firms; therefore, large industries do not appear to concentrate heavily on these factors in reaching location decisions. According to those interviewed, the benefits derived from secondary uneven growth elements are considered more for their value as "extras" after a decision to locate has been reached.

Why are they less significant

what are those elements

1. Labor Market Accessibility:

The Portland-Vancouver SMSA's labor market is quite broad and diverse. Difficulties have not been experienced in obtaining the required levels of labor skill. Assembly line and technical personnel are recruited from local sources, and highly skilled personnel are usually recruited from outside the area. Approximately equal proportions of these three groups are required by the electronics industry. Regional

shopping centers (e.g. Vancouver Mall) can employ up to 1800 full-time personnel and require only a small percent of highly skilled individuals. The rest of the labor for retail and office employment is drawn from the labor pool in the local area. Quote source ie Employment Security

As increasing industrialization takes place in Clark County the labor market residing in the county (as well as in Oregon) will require a more effective means of commuting to job sites in Clark County. Therefore, the uneven growth rate of the labor force is expected to particularly affect the transportation system as commuter traffic volumes increase across the I-5 and I-205 bridges, and on east-west arterials within Clark County.

2. Taxing and Regulatory Environment:

2a. Home Purchases: Oregon has a Veterans Administration (VA) program for home purchases which is not available in Washington. Although the present decline in home purchases nationwide has affected both Portland and Vancouver, this VA program has favored the purchase of homes in Oregon over Washington. This factor will help growth in Oregon.

How has decline in Home purchases impacted growth?

2b. State Income Tax: Oregon has a state income tax and Washington does not. Washington residents working in Oregon are required to pay Oregon's state income tax. Oregon also has a corporation income tax. How does tax influence location of residences.

2c. State Sales Tax: Washington has a sales tax; Oregon does not. While Washington residents are required to pay the state sales tax, the sales tax is not imposed on out-of-state residents provided they have purchased a non-resident permit ($1.00) issued by the Washington State Department of Revenue. This non-resident program was enacted in 1967. In fiscal 1980, approximately 5100 permits were sold statewide.

2d. Summary of Impacts: Uneven growth rates in population and employment are not expected to be immediately altered by the impact of these differences in taxing and regulatory environment in the Portland-Vancouver area. The conditions are such that advantages versus disadvantages of living, working, and buying in Portland as opposed to Vancouver are expected to balance over time as Clark County develops and diversifies its economic base through growth in its office and retail industries.

Why

unclear reword sentence

How will th balance?

Possible adverse effects on location decisions due to the Washington State sales tax is offset by a state income tax in Oregon. In addition, doing business in Portland is reported to be more expensive than in Vancouver due to the relatively higher overhead costs which Portland businessmen must cover. The feeling among those interviewed is that it is therefore more expensive to do business in Portland than in Vancouver. Since the higher overhead costs are transferred to consumers, the cost of goods and services is relatively higher in

Portland than in Vancouver. However, due to Washington's sales tax, the price of goods and services is about the same in both Portland and Vancouver.

As fuel costs and travel times increase, major shopping centers in Vancouver are expected to serve a larger proportion of the existing Vancouver market and provide greater shopping opportunities to Clark County residents. With the completion of I-205, the Vancouver Shopping Mall anticipates attracting more Oregon shoppers. At the same time, I-205 can be also expected to promote retail activities in Oregon.

3. Water and Power

Adequate supplies of water are presently available but demand is increasing in both areas. Power rates are currently lower in Vancouver than Portland. Though lower power rates are an attractive feature, the cost of power in Portland is still relatively low when compared to other areas of the United States. Even if power rates rise in Vancouver, the increase is not expected to significantly affect growth rates.

4. Scenic and Recreational Resources:

Employee amenities most often referred to by those interviewed are either found in both Portland and Vancouver or are accessible to their residents. These amenities are the natural attractiveness of the Northwest, indoor and outdoor recreational opportunities, and social and cultural activities associated with a major cosmopolitan city. Large firms point

these features out to prospective employees, hoping that employees will be attracted both by their company's job opportunities and by the quality of life reflective of this area's natural surroundings.

5. Market Accessibility:

Manufacturers of silicone wafers and other electronic components are suppliers to large manufacturers of electronic instruments. Market accessibility for these firms means locating near or adjacent to the firms they supply. Other industries competing with the large manufacturers of electronic instruments are also attracted to the area. Market accessibility for major electronics firms (such as Hewlett-Packard and Tektronix) means proximity to a large aircarrier airport since their products are high-value cargo and their markets are located primarily outside the area.

How about other firms?

Secondary industries (restaurants, theaters, retail and office employment) are also a significant part of the area's total population and employment growth. These industries/businesses typically enter areas where the population base is growing. Accessibility for these service-oriented businesses, is convenient location within or near population centers since a major portion of their business depends on the local market.

Examination of the area's economic development goals and evaluation of survey results identified three primary and five secondary elements underlying industrial and business location

decisions. The second premise that industrial and business locations in Vancouver and Portland have contributed to uneven rates of population and employment growth, entails a more detailed evaluation of the changes in the area's population and employment.

POPULATION AND EMPLOYMENT GROWTH

- Discussion
- Population Growth
- Employment Growth

POPULATION AND EMPLOYMENT GROWTH

Discussion

Population growth is a key factor in economic development in industrial societies, and this factor is well illustrated in this state. Vancouver/Clark County is experiencing rapid economic development, with a population growth at the compounded rate of 4.1 percent per year. In the State of Oregon, Clackamas and Washington Counties are also experiencing similar rates of population growth (3.8 percent and 4.5 percent perspectively). However, in Portland/Multnomah County the population growth rate has been slower at 0.2 percent per year. This section discusses the relationship between rates of uneven population and employment growth, in comparison to industrial and commercial activities.

Population Growth

In 1970, Multnomah County contained over half of the SMSA population, followed in size by Clackamas and Washington Counties in Oregon, and Clark County in Washington. By 1980, Multnomah County's population percentage of SMSA population had declined to 45 percent of the total, and by the year 2000 the figure will be close to 39 percent (Figure 5). The increase in population percentages of Clark, Clackamas and Washington Counties that has occurred is due to industrial and commercial firms locating in these counties.

In Clark County, a strong growth-oriented climate resulted in a population increase of 63,800 persons between 1970 and 1980, with a forecast increase of 117,700 persons by the year 2000. In contrast, Multnomah, the largest county, experienced the smallest growth. In 1980, the population of 565,000 persons increased by 10,700 persons 1970 and is expected to increase to 651,000 by the year 2000. Table 1 presents the population estimates for each county. Appendix C summarizes population forecast assumptions.

Clackamas and Washington Counties have also experienced population growths similar to Clark County. Industrial and commercial developments have also accelerated the influx of population into these Oregon counties. A comparison of population growth rates by county is depicted in Figure 6.

Employment Growth

Document elements impacting growth

While one-fourth of the area's population growth is attributable to natural growth, migration resulting from the employment opportunities accounts for approximately three-fourths of the growth.

The relatively rapid employment growth in the Portland-Vancouver SMSA is attributable to the major development of clerical and retail industries in Portland/Multnomah County, and large light manufacturing industries in Clark, Clackamas and Washington Counties. As previously noted, the availability of land, sewerage facilities and transportation

Figure 5 - Population Distribution Portland - Vancouver SMSA

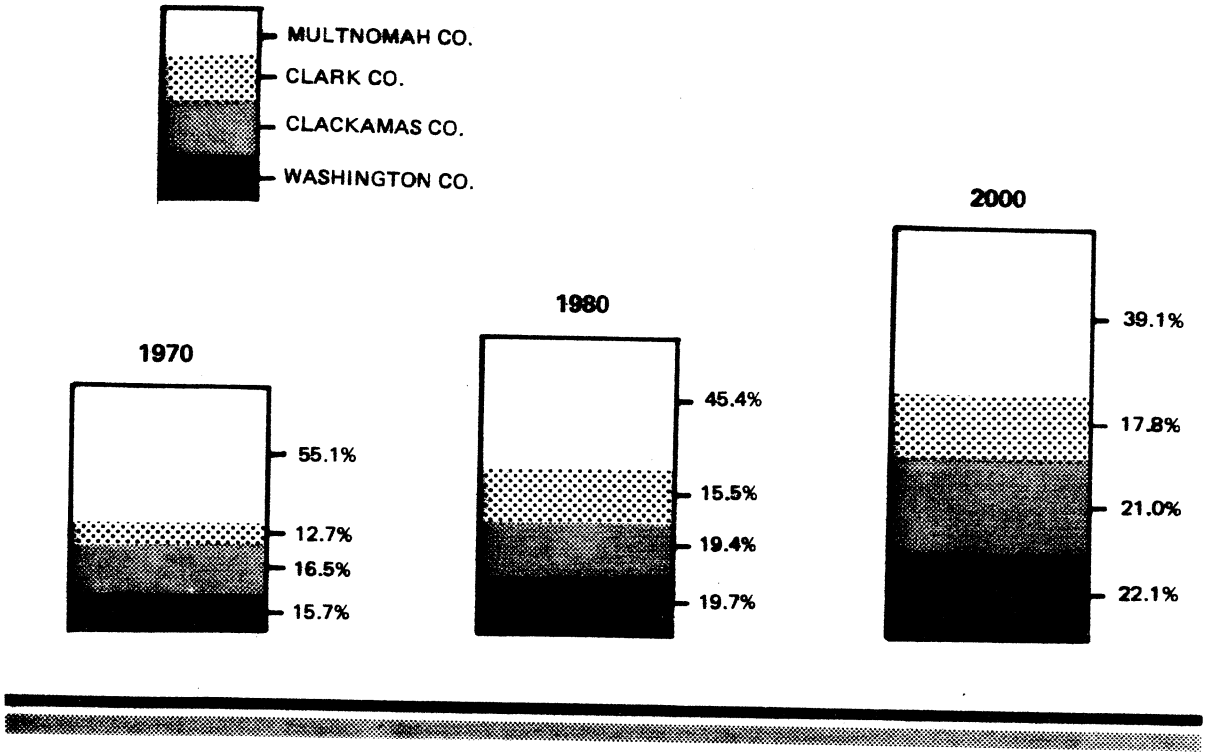


Figure 6 - Population Growth Rates Portland - Vancouver SMSA

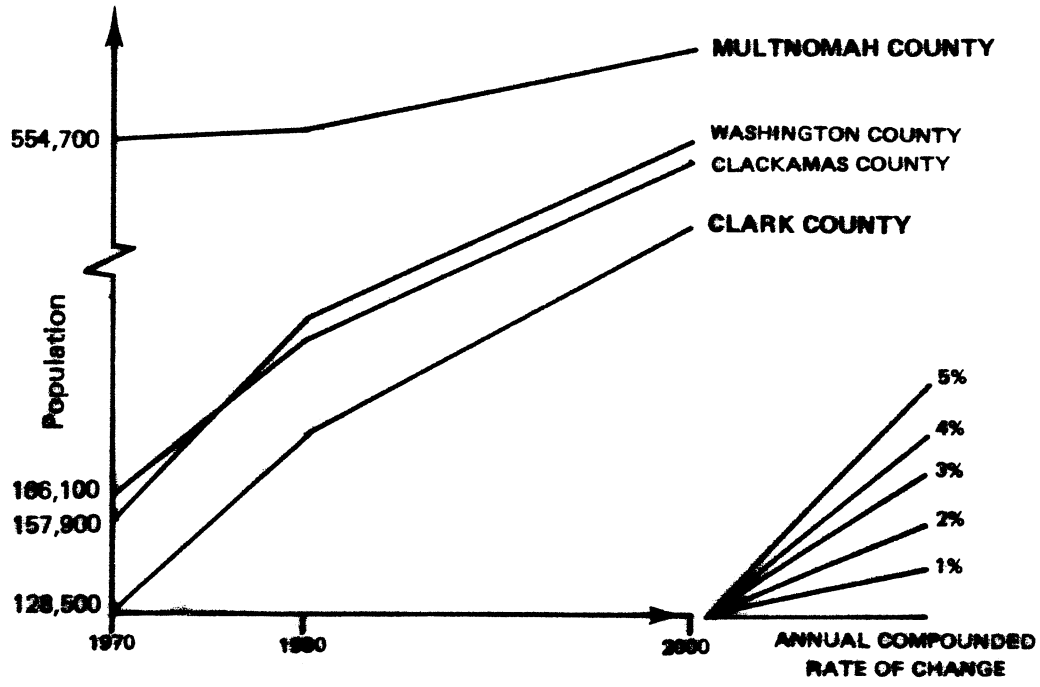


TABLE 1
POPULATION TRENDS: 1970 - 2000
PORTLAND - VANCOUVER SMSA

	1970	1980	2000	1970 - 1980		1980 - 2000		TOTAL GROWTH 1970 - 2000	
				Growth	Compounded Annual Rate of Growth	Growth	Compounded Annual Rate of Growth	Growth	Compounded Annual Rate of Growth
Clark Co.	128,500	192,300	310,000	63,800	4.1%	117,700	2.4%	181,500	3.0%
Multnomah Co.	554,700	565,400	681,000	10,700	0.2	115,600	0.9	126,300	0.7
Clackamas Co.	166,100	241,900	365,000	75,800	3.8	123,100	2.1	198,900	2.7
Washington Co.	157,900	245,400	384,000	87,500	4.5	138,600	2.3	226,100	3.0
TOTAL SMSA	1,007,200	1,245,000	1,740,000	237,800	2.1%	495,000	1.7%	732,800	1.8%

SOURCE: Adapted from Summary of Year 2000 Growth Allocation Workshop, March - April 1981, Metropolitan Service District (METRO).

facilities in Clark, Clackamas and Washington Counties accounts for attracting large light manufacturing industries and commercial enterprises. In Multnomah County, the relative scarcity of sufficient land served by adequate sewerage facilities has tended instead to attract commercial enterprises drawn by Portland's large population base.

Employment growth varies somewhat from the population growth trends. Employment growth in Multnomah County is quite high despite its relatively low population growth. In 1970, about 74 percent of the jobs in the SMSA were located in Multnomah County. Although a declining percentage was experienced, 60 percent of the SMSA's jobs were still in Multnomah County in 1980. The year 2000 forecast predicts that 51 percent of the SMSA's jobs will be in Multnomah County (Figure 7).

Document Employment Figures.

In actual numbers, Multnomah County's employment growth both historically and during the forecast period is almost twice that of Clark, Clackamas and Washington Counties combined (Table 2).

Although a comparison of employment growth rates reveals that Clark, Clackamas and Washington Counties are experiencing similar rapid rates of growth (Figure 8), Multnomah County's numerical growth is still the dominant element influencing travel in the SMSA. Portland/Multnomah County is the major employment hub in the SMSA and draws commuters from Clark, Clackamas and Washington Counties. In both Clackamas and Washington Counties, employment opportunities have been

Figure 7 - Employment Distribution Portland - Vancouver SMSA

Label tables ~~better~~ and graphs better

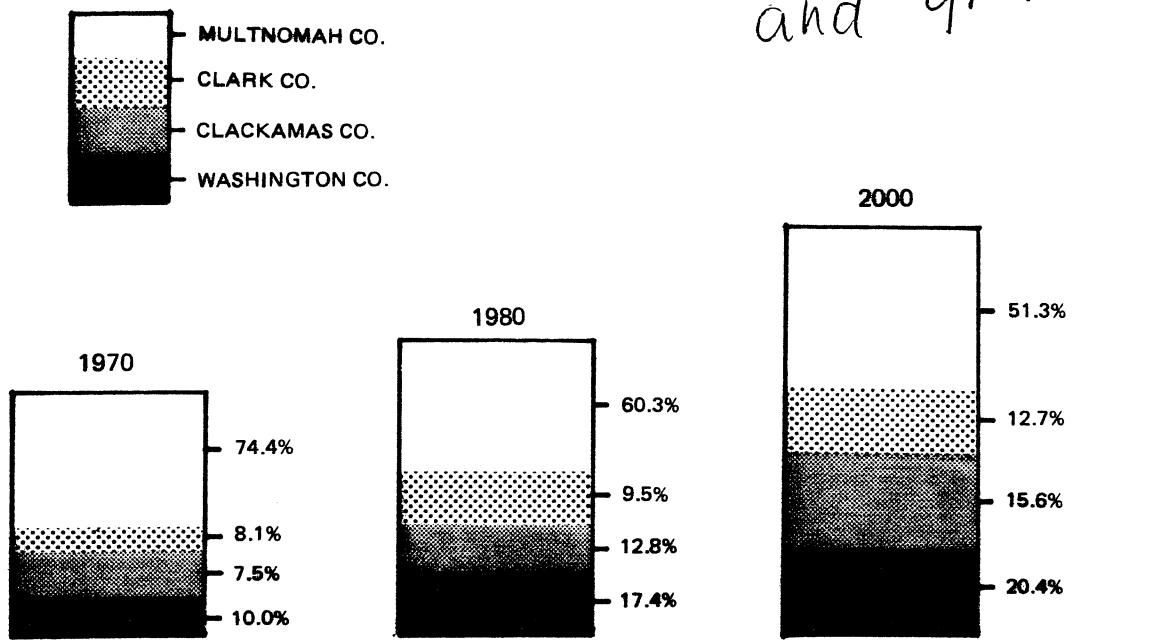


Figure 8 - Employment Growth Rates Portland - Vancouver SMSA

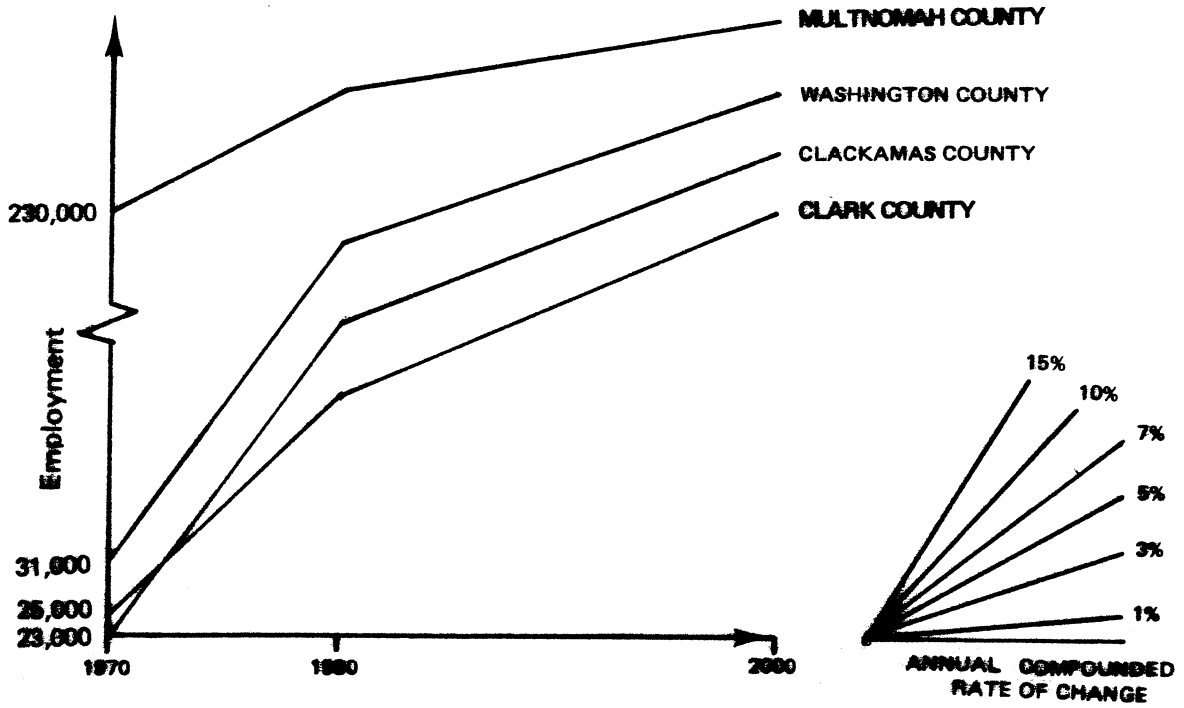


TABLE 2
EMPLOYMENT TRENDS: 1970 - 2000
PORTLAND - VANCOUVER SMSA

	1970	1980	2000	1970 - 1980		1980 - 2000		TOTAL GROWTH 1970 - 2000	
				Growth	Compounded Annual Rate of Growth	Growth	Compounded Annual Rate of Growth	Growth	Compounded Annual Rate of Growth
Clark Co.	25,000	59,100	123,000	34,100	9.0%	63,900	3.7%	98,000	5.4%
Multnomah Co.	230,000	372,900	498,000	142,900	5.0	125,100	1.5	268,000	2.6
Clackamas Co.	23,000	79,300	152,000	56,300	13.1	72,700	3.3	129,000	6.5
Washington Co.	31,000	107,500	198,000	76,500	13.2	90,500	3.1	167,000	6.4
TOTAL SMSA	309,000	618,800	971,000	309,800	7.2%	352,200	2.3%	662,000	3.9%

SOURCE: Adapted from Summary of Year 2000 Growth Allocation Workshop, March - April 1981, Metropolitan Service District (METRO).

State and Metropolitan Area Data Book, 1979, U. S. Department of Commerce, Bureau of the Census.

expanding very rapidly (Table 2). It is logical to assume that residents of these two Oregon counties are commuting to job sites within their respective counties as well as in Portland/Multnomah County.

The growth of employment opportunities in Portland is a major element contributing to increased commuter traffic volumes across the I-5 bridge. The population and employment estimates indicate that a significant number of individuals continue to choose to live in Vancouver/Clark County and commute to employment sites in Portland/Multnomah County.

The population and employment estimates also indicate that employment growth in Vancouver/Clark County is about one-half its population growth. If both employment and population growth in Vancouver/Clark County were to occur at similar levels, there would be increased potential for reducing commuter travel across the I-5 bridge since more of Vancouver/Clark County's population could be employed within the greater Vancouver area.

These evaluations support the third premise that uneven growth affects travel volumes across the I-5 bridge. Statistical correlation analyses were conducted to measure the strength of the relationship between uneven employment and population growth and I-5 bridge traffic volumes.

STATISTICAL ANALYSIS

- Collection of Data
- Analysis
- Summary of Statistical Findings

STATISTICAL ANALYSIS

The statistical analysis of the relationship between uneven growth and travel across the Interstate 5 bridge is the final analytical step in this research to test the hypothesis that underlying social, economic, land use, political and governmental conditions affect travel volumes across the Interstate 5 bridge. Through correlation analysis, measures of the strength of the relationship between uneven growth and Interstate 5 bridge traffic are determined. The data collected and the results of the analysis are presented in this section.

COLLECTION OF DATA

The search for and collection of data is a major portion of any quantitative analysis. The study did not collect new data but relied upon existing sources of data. To discuss uneven growth within the SMSA, each county was identified as a subarea so that growth of each county could be compared. Thus, comparable data had to be found for a major portion of the study period of 1950 to 1979 (a 30 year period) for all four counties. (Comparable data for each county was not available for each county for all variables.) An inventory of the data analyzed is presented in Table 3. Incomplete or otherwise unsatisfactory data sets that were investigated but found not possible to use are listed in Appendix F.

List type and source of existing data.

typo

Award rewrite

Put table 3 on ~~next~~ following page

ANALYSIS

Demographic data on vehicle registrations and population were gathered for all four counties. In analyzing that data, correlation coefficients were developed for the above variables by comparing them with traffic over the Interstate 5 bridge.

The correlation coefficients were found to have a confidence level which ranged between 70 and 100 percent. Numerical conclusions which are cited in this section were found to be statistically significant at the .05 or .01 level.

Limitations which could not be designed out of the study because of its reliance on existing data sources are as follows:

1) Lack of consistent and compatible data for both Washington and Oregon.

2) Lack of origin and destination travel data for each of the analysis years.

Describe how these intervening variables impacted results that biased conclusions.

Various theories or hypotheses were formed during the development stages of this research study. Three hypotheses were tested and the results are presented below:

HYPOTHESIS A: Does population or employment growth in a specific county affect the way travel occurs on the Interstate 5 bridge?

Syntax

TABLE 3 - INVENTORY OF DATA USED

Table Very unclear present List of Data and source

	DATA SETS				
	POPULATION	POPULATION FORECAST	TAXABLE PAYROLLS	EMPLOYMENT	RETAIL SALES
CLARK CO., WASHINGTON	1950 - 1979	5-YEAR INTERVALS TO YR. 2000	1964 - 1973	1964 - 1977	1967 - 1979
MULTN., CLARK, WASH. COUNTIES, OREGON	1950 - 1979	1977 - 2000	1964 - 1973	1964 - 1977	1950 - 1979

	DATA SETS				
	AVERAGE DAILY TRAFFIC	VEHICLE REGISTRATION	INVENTORY TAX	SALES TAX	STATE INCOME TAX
CLARK CO., WASHINGTON	1950 - 1979 (I-5)	1950 - 1979	PHASE-OUT PROGRAM	YES	NO
MULTN., CLARK, WASH. COUNTIES, OREGON	1950 - 1979 (I-5)	1950 - 1979	PHASE-OUT PROGRAM	NO	YES

FINDINGS:

1. The increase in Clark County's total population when correlated with the average daily traffic across the Interstate 5 bridge produced the highest correlation coefficient.

2. The total population of Multnomah County when correlated with the average daily traffic across the Interstate 5 bridge produced the smallest correlation coefficient.

3. Based on the above two findings, one can conclude that traffic across Interstate 5 bridge is being contributed to by people who do not live in the Portland urban area but in areas outside Portland.

4. We may also observe the converse of the above also holds in that traffic across the Interstate 5 bridge is less often contributed to by people living in Portland than by people living outside Portland.

5. Because there are more jobs in Portland than in Vancouver/Clark County, people from Washington travel to Portland for jobs. Therefore, the population growth of Clark County contributes more to traffic across the Interstate 5 bridge than the population growth in Portland/Multnomah County.

6. When correlating number of vehicles registered and increase in population, Clark County data again demonstrated a more direct impact on traffic across the bridge than did registered vehicles and population in Portland/Multnomah County.

7. Based on these findings, it can be expected that further increases in population outside of Portland/Multnomah County, especially Clark County, are going to contribute more to traffic across the Interstate bridge than population within Portland/Multnomah County.

Conclusion

HYPOTHESIS B: Do energy crises restrict outlying growth more than central city growth? Awkward re Word in cause and effect terms.

FINDINGS:

1. An effort was made to isolate the variable of increased fuel cost by eliminating the impact of the other variables (increased population, increased registered vehicles and tolls) on traffic across the Interstate 5 bridge. In examining travel between 1973 and 1979 (the years assumed to have the greatest increase in fuel cost), increased fuel cost was negatively correlated to travel over the Interstate 5 bridge. This suggests that people living farther away from Portland have to spend more money on fuel costs to get to Portland than do people living in Portland; therefore, people living in the outlying areas of Portland felt a larger economic

Conclusion

impact from increased fuel cost than did people living in the Portland area.

HYPOTHESIS C: Does an increase in population correlate with an increase in travel?

FINDINGS:

1. The previous findings demonstrated a statistical positive correlation between population increase in the outlying counties, particularly in Clark County, and travel across the Interstate 5 bridge. Intervening variables prevent us from proving that an increase in population causes an increase in travel across the Interstate 5 bridge. Explain why! How impact can not say results this

(However, the correlation of population and other supporting variables suggests a strong cause-effect relationship between increased population in the outlying counties and travel across the Interstate 5 bridge. To conclusively prove this would require another study to eliminate the intervening variables; however, the unavailability of compatible data over time for the four county area may make such a study impossible.

Is registration variable OR purchase and use-

Vehicle registrations is one intervening variable which may explain why an increase in population is not the only factor contributing to or causing an increase in travel over the Interstate 5 bridge. Correlating average daily traffic over the Interstate 5 bridge with the increase in

population produced a negative correlation coefficient. This negative correlation coefficient may be explained in two ways:

1) More families may be purchasing and using a second car.

2) The number of registered vehicles in Multnomah County did not increase and therefore contributed to the negative correlation coefficient. Explain why did not increase expand explanation

The ability of people living in Portland to commute by transit, vanpool and carpool instead of the single passenger private automobile helps explain why they are not buying a second car and why there is not an increase in vehicle registrations.

SUMMARY OF STATISTICAL FINDINGS

Be much more specific list fact for each finding

The hypotheses discussed above are generally verified by tests using correlation analysis. Comparisons of travel growth among the four counties in the Portland-Vancouver SMSA indicate the following findings:

1. Population and employment growth taking place in Vancouver/Clark County is positively correlated with increases in travel volume across the Interstate 5 bridge.

2. Vehicle registration increases tend to be correlated with population growth in Vancouver/Clark County while this is not necessarily the case in Portland/Multnomah County.

The phenomenon of more rapid growth is evident not only in Clark County, but also in Clackamas and Washington Counties in Oregon.

To explain how the underlying elements influencing uneven growth impact travel trends, a model utilizing those elements is now presented. The model is developed to assist in a discussion of the elements underlying uneven growth, the magnitude and direction of significant development trends, and the resulting travel flows generated within the study area.

Rework paragraph State more directly the use and function of model-

MODEL OF UNEVEN GROWTH

- Converging Growth Movement
- Push Growth Movement
- Pull Growth Movement
- Independent Growth Movement
- Discussion

MODEL OF UNEVEN GROWTH

The model of uneven growth summarizes the influence that underlying uneven growth rate considerations have on travel movements and how they impact the transportation system. The movements described in the model occur to some degree in each of the four counties. The Four types of travel movements are:

- Converging Growth Movement
- Push Growth Movement
- Pull Growth Movement
- Independent Growth Movement

These movements are illustrated in Figure 9.

Converging Growth Movement

The convergence of activity focusing upon Portland/Multnomah County, from the three counties surrounding it, reflects the Portland area's influential role as a major employment center. The labor force residing in Clark, Clackamas and Washington Counties commutes to Portland/Multnomah County for jobs, services, and access to other facilities. Although this predominant trend is expected to continue, two forces are acting to stabilize it. One is Portland/Multnomah County's

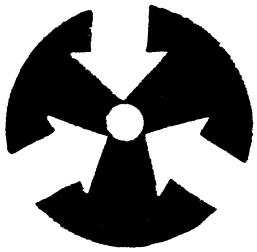
ability to increase employment opportunities within its Urban Growth Boundaries which establishes the geographic limits of allowable growth. The second is the increase in employment opportunities in Clark, Clackamas and Washington Counties which reduces the need to travel to job sites in Portland/Multnomah County.

Push Growth Movement

The greater Portland area has become highly developed and urbanized; thus subsequent new major economic development activities must either find space within the densely developed urban core or move to Clark, Clackamas or Washington County. This push growth movement to the outlying counties reduces the proportion of total travel to Portland/Multnomah County. Although large light manufacturing industries are primarily affected, secondary supportive industries are also drawn by the subsequent population and employment increases in Clark, Clackamas and Washington Counties.

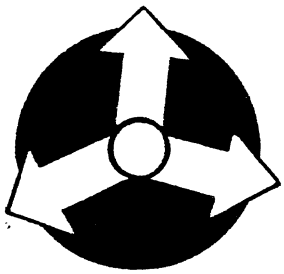
Pull Growth Movement

As growth centers develop in the counties surrounding Portland/Multnomah County, they in turn act as magnets attracting even more growth away from Multnomah County.



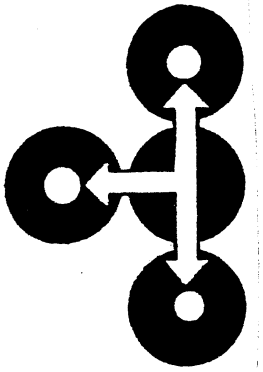
"Converging" Growth Movement

Portland/Multnomah County is a major center acting as a magnet in attracting development growth and travel from surrounding counties.



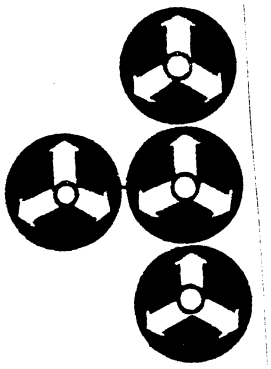
"Push" Growth Movement

Development expands outward from densely developed core in Portland to surrounding areas, viz., Vancouver/ Clark County in Washington, and Clackamas and Washington Counties in Oregon.



"Pull" Growth Movement

Growth centers developing in Clark, Clackamas and Washington Counties act as magnets pulling activity and travel from Portland/Multnomah County.



"Independent" Growth Movement

Development occurs as indigenous growth not dependent on development spilling over from Portland/ Multnomah County.

Figure 9 - Growth Movements: Portland - Vancouver SMSA

Although this outlying growth may attract additional workers residing in Portland/Multnomah County to Vancouver/Clark County, it is expected that the employment opportunities created in Vancouver/Clark County will be largely taken by the Vancouver/Clark County residents. The proportion of Clark County residents commuting to Multnomah County is expected to decrease as employment opportunities in Clark County increases.

No logic disjoint chapters do not follow logically divide paper into two sections don't mix.

Independent Growth Movement

Independent growth movement results from the efforts of industrial marketing groups within each of the four counties in the SMSA to generate and attract economic development activities within their respective areas. Clark County has been especially active in this regard. Three key factors helping shape Clark County's more self-sufficient style of growth are:

- The Columbia River (natural topographic barrier) places a high value upon development in available land adjacent to highways and connecting bridges to Multnomah County.

- Transportation access across the Columbia River is a continuing issue

- The different legal environment in Clark County compared to Oregon

While the extent to which these factors shape Clark County's growth can not be measured, it is clear that these factors do not underlie growth strategies operating in Clackamas and Washington Counties. Growth movement in these Oregon counties is more attributable to the development "push" from Multnomah County. One of Clark County's strategies is to emphasize that it possesses the necessary resources (sufficient land with infrastructure, i.e., water, power, sewerage facilities and roads) to adequately serve and sustain industrial development and expansion with the available land for development being close to Multnomah County's facilities and services.

Discussion

Push, Pull and Independent growth movements all act to reduce travel flows to Portland/Multnomah County by creating employment opportunities in Clark, Clackamas and Washington Counties. The impact of these growth movements on Vancouver/Clark County and Portland/Multnomah County is to diminish the need for travel across the Columbia River. However, the population in Vancouver/Clark County is growing at a considerably faster rate than its employment opportunities. The greater rate of increase of jobs in Portland/Multnomah County will therefore continue to attract commuters from Vancouver/Clark County. Thus, uneven growth will also continue to play a major role in increasing travel movement across the I-5 bridge. As traffic volumes increase

to current levels in the twenty-first century, the need for another bridge crossing may require further examination.

An extrapolation of these rates of growth produces the following profile beyond the year 2000:

- Uneven growth rates will be less significant as growth among the smaller counties stabilizes relative to Multnomah County.

- Gains in efficiency and productivity will be measured more on a regional basis, which will be a strong factor in the area's ability to respond to the competitive demands of national and worldwide markets.

- Although uneven rates of growth will still exist, it will be the natural outcome of more efficient regional allocation of resources, rather than intra-regional competition.

- Differing jurisdictional and legal environments between Washington and Oregon may continue to influence relocation decisions among smaller industries and businesses. However, large industrial firms will continue to rely on adequate land, sewerage facilities and transportation as the primary factors for location decisions regardless of county or state boundaries.

Although the impact of uneven growth on area travel may continue, monitoring of the conditions underlying uneven growth will provide important data to identify, assess and plan for the subsequent impacts on the transportation facilities.

RECOMMENDATIONS FOR IMPLEMENTATION

- Primary Uneven Growth Elements

- Secondary Uneven Growth Elements

RECOMMENDATIONS FOR IMPLEMENTATION

The criteria used in developing the recommendations for reducing uneven growth rate impacts are:

- low cost
- fuel-conservation
- use of existing technology
- compatibility with local and regional policies, plans and goals
- improvement of transportation mobility and access
- encouragement of economic development
- efficient use of the area's natural and man-made resources

These recommendations for implementation are grouped according to the Primary and Secondary Elements.

Primary Uneven Growth Elements

1. Land-Related Recommendations

a. METRO and the Regional Planning Council of Clark County should continue development of comprehensive

regional land use, economic development and transportation plans to encourage and sustain employment growth in Vancouver/Clark County.

b. Develop a comprehensive industrial park plan to encourage more even employment growth when possible among the counties surrounding Portland/Multnomah County.

c. Maintain a regional inventory of land use by size, extent of development required, access available or required to transportation network, and access available or required to facilitate travel within the local area.

d. Provide development-related information to facilitate rezoning procedures.

2. Sewerage-Related Facilities Recommendations

a. Increase cooperation and coordination among local agencies in planning for and providing sewerage services adequate to meet or exceed the demands for industrial and commercial employment growth in Vancouver/Clark County.

3. Transportation-Related Recommendations

a. Complete committed projects identified in the Regional Transportation Plan, Draft Two.

b. Transportation agencies should increase marketing

efforts and technical assistance in the area of vanpools and carpools as a method of reducing cross-river and east-west Vancouver/Clark County travel volumes.

Secondary Uneven Growth Elements

1. Labor Market Accessibility-Related Recommendations

a. Continue to encourage new residential and employment sites in the same or nearby areas to reduce commuter travel demands within Vancouver/Clark County.

2. Regulatory and Taxing Environment-Related Recommendations

a. Continue the existing program of exempting non-Washington residents from paying the Washington State sales tax to increase employment growth in Vancouver/Clark County.

b. Continue lower property taxes and lower water and power rates to encourage economic development activities in Vancouver/Clark County for its residents.

3. Water and Power-Related Recommendation

a. Continue present directions in providing water and power to Clark County reflecting existing land use plans to encourage employment growth.

4. Market Accessibility-Related

a. Continue improving access to the urban transportation network to facilitate economic growth throughout the area by making production and consumer markets accessible to each other.

AREAS FOR ADDITIONAL RESEARCH

AREAS FOR ADDITIONAL RESEARCH

The following areas are suggested to gain the information necessary to develop and implement more detailed procedures for identifying and interpreting the impacts of uneven growth on the transportation system. Such procedures address the need for increased energy savings and the efficient allocation of resources. The additional research areas also suggest efforts to develop methods of lessening adverse and promoting beneficial impacts as these relate to uneven growth and travel.

- Conduct additional statistical tests on the effect of uneven growth on travel in selected areas.

- Develop methods of testing the significance and reliability of uneven growth as a variable in predicting travel volumes.

- Identify, assess and determine the impact resulting from the condition whereby population growth exceeds employment growth in Vancouver/Clark County; and develop methods of reducing the subsequent impact on the transportation system.

Document factors in ~~Urban~~ that contribute to growth ie Transportation, Sewage, document primary and secondary elements put this in design section.

Overall View

1. Lack of organization understanding function of sections or how they interrelate

2. Lack of documentation for assumptions made on how goals impact growth - Goals show how people plan to direct growth or limit Goals themselves do not them selves cause growth -

APPENDICES

- Appendix A - Interview Questions
- Appendix B - Summary of Interview Findings
- Appendix C - Summary and Assumptions of Population and Employment Forecasting
- Appendix D - Status of Industrial and Commercial Activities
- Appendix E - Statistical Approach
- Appendix F - Incomplete Data Sets

3. Lack of design rational Explain how the two different method dogies interrelate -

4. Very unclear as to what actual research problem is hypothesis should be tied to problem in order to define it.
objectives non related
objectives not meet

Wiengart Paper

1. Re state problem much more clearly

2- Justify problem as real and pressing relate it to a current departmental need

3- In ~~pro~~ application section show

(A) Cost benefit analysis

(B) State Objective Concurrent with proposal and show exactly how they were meet if not the explain why

(C) Write benefits section

be specfic about benefits for department

Why was this research done

~~Did~~ Give

1. Policy recommendations
2. New Guidelines for development
3. Show how implimenting recommendations will
   1. save fuel
      maximize use of bridges and highways
   2. Increase employment
   3. " personal resources

4. ~~Rit~~ Write section on specfic implimentation plan state how who and whe

List distribution suggestion Who would this benefit.

APPENDIX A: INTERVIEW QUESTIONS

Examination of the economic development goals and the status of industrial and commercial activities provided the basis for preparing the interview survey presented below:

Location Decision

1. Do you see differences in growth rates between Portland and Vancouver?

2. What factors are industries/businesses looking at when they come to (Oregon - Vancouver)?

3. Which characteristics should be emphasized to persuade industries/businesses to relocate in this area?

4. What factors have influenced industries/businesses to turn down this area?

5. What are the main advantages of locating in the county rather than the city?

6. The main disadvantages?

7. What are the main advantages of this area as opposed to across the river?

8. The main disadvantages?

9. Are there any factors that may cause industries to relocate out of this area?

10. Are there any factors that would cause industries/businesses to relocate across the river?

11. Have firms locating in this area relocated to another area?

12. Do you know of firms with plans for expanding facilities outside this area?

Labor Market

1. We are also interested in the Vancouver/Portland situation with respect to personnel. What skills in particular are required?

2. Have industries/businesses encountered any difficulty in obtaining skilled or semi-skilled workers?

3. What kinds of difficulties have been encountered?

4. What skills in particular were a problem?

5. Have industries/businesses been able to satisfy their labor needs locally?

6. Have they had to import labor into the area?

7. What fringe benefits are available for employees?

Market

1. What is the general market in the state?

2. What is the general market outside the state?

3. Where are the major competitors in the products of this area located?

4. Does location in this area offer advantages in the production of these products?

5. Does location in this area offer disadvantages?

Transportation

1. What mode or modes of transportation did industries/businesses consider in locating in this area?

2. Is siting adjacent to or near airports an important consideration for industries in this area? Which industries?

3. What transportation services were considered in locating on one side of the river rather than the other?

4. Are employee parking and transportation, factors that were considered by industries/businesses?

5. What types of parking and transportation for employees were considered?

6. Do you see transportation problems associated with the work of industries in this area?

Energy

1. What type of energy is required?

2. How much energy is required?

3. Are the energy availability and price forecasts factors which compare favorably for this area as opposed to other areas?

Socio-Cultural

1. What has been the response to economic development activities in this area on the part of the communities affected.

2. Are the social needs of employees a factor in industrial developments?

3. Are land uses being integrated within industrial developments? (commercial, recreational, housing needs)

4. Are facilities and services comprising the communities' infrastructure, such as police, fire, schools, hospitals, government being considered as part of the economic development activities of this area?

5. Are public recreational areas such as parks being considered in these economic development activities?

Public Policy

1. What do you feel state and local governments should do that would be effective in attracting industries/ businesses to this area?

2. Do you have information from other states that would be relevant in placing this area in a favorable competitive position? Unfavorable position?

3. Have you had occasion to get state and local tax information of other states?

4. Do you see land use restrictions creating problems for economic development?

5. Do you see land use requirements an advantage to industries on this side of the river as opposed to the other?

6. Is there adequate land for expansion?

7. We are also interested in the legal climate. By legal climate we mean legislative action and court interpretations; workman's compensation; environmental requirements; local taxes; local ordinances, etc.

   In regard to such matters, would you say this area was more favorable, about the same, or less favorable to industries than across the river?

APPENDIX B: SUMMARY OF INTERVIEW FINDINGS

Although a detailed analysis of the interview findings is presented in the main body of the research, this summary highlights the information obtained through the interview survey.

A. PRIMARY UNEVEN GROWTH ELEMENTS

Vancouver/East Clark County, Washington

1. Location of large electronics firms in Vancouver/East Clark County.

2. Availability of sufficient land for large industrial development.

3. Adequate sewerage system to sustain development.

4. Existing SR-14 and Interstate 5 to access Portland International Airport. (PIA).

5. Congestion on Interstate 5 bridge across Columbia River.

6. Expected completion of Interstate 205 as major facility for transport of goods to PIA, and attracting shoppers from Oregon.

7. Proximity of electronics industries to PIA.

8. Constrained east-west traffic flow.

Portland/East Multnomah County, Washington

1. Location of smaller industrial, office and retail type employment groups in Portland/East Multnomah County.

2. Availability of smaller parcels of land for smaller development activities.

3. Difficulty in obtaining adequate sewerage service in Multnomah County due to high water table of available land and subsequent high development costs.

4. Expected completion of Interstate 205 and Banfield Light Rail Transit and highway related improvements.

5. PIA located in this area.

6. Large population and employment base.

B. SECONDARY UNEVEN GROWTH ELEMENTS

Vancouver/East Clark County, Washington

1. Labor market with diverse skills in immediate local area.

2. No corporate income tax.

3. No state income tax.

4. State sales tax imposed.

5. Lower property taxes.

6. Lower water and power rates than Oregon.

7. Lengthy rezoning hearings.

8. Lower cost of land.

9. Attractiveness of natural geographic area.

10. Diverse cosmopolitan center nearby (Portland).

11. Local, regional, national and international markets accessible through transportation network serving area.

12. Relative price of durable goods is lower than in Oregon.

Portland/East Multnomah County, Washington

1. Sufficient local labor resources in immediate area.

2. Imposes corporate income tax.

3. Imposes state income tax.

4. No state sales tax.

5. Higher property taxes.

6. Offers attractive VA home purchase program.

7. Higher property taxes, water and power rates than Washington.

8. Lengthy rezoning hearings.

9. Higher cost of land.

10. Higher cost of developing land.

11. Attractiveness of nearby geographic area.

12. Large cosmopolitan center with diverse amenities.

13. Local, regional, national and international markets accessible through transportation network serving area.

14. Relative price of durable goods is higher.

C. TRANSPORTATION ISSUES: Portland/Vancouver

1. An adequate system of highways, streets and roads is important to the continuing growth of Clark County.

2. Proximity to a major airport is a crucial factor to certain large firms.

3. Congestion on Oregon section of Interstate 5 bridge across the Columbia River is a major problem affecting the entire study area.

4. Completion of Interstate 205 is perceived as an advantage to electronics firms in Clark County seeking faster access to Portland International Airport and to Vancouver Mall seeking a larger share of the regional market by drawing shoppers from Portland.

5. The public transit system serving the bi-state study area is overfilled with little immediate relief expected.

Transit in Portland has the highest farebox rate in the entire country ($1 from Portland to Vancouver). Recently, the PTBA comprehensive plan was approved and Vancouver is now authorized to add buses and extend their route coverage in Clark County.

6. Paratransit service is not receiving very much attention.

7. Fixed guideway light rail transit (LTR) is seen as a way of achieving energy efficient mass transportation for the affected areas.

APPENDIX C: SUMMARY AND ASSUMPTIONS OF POPULATION AND EMPLOYMENT FORECASTING

The summary presented below is based on procedures contained in the Year 2000 Growth Allocation Workshops, March-April 1981, by Metropolitan Service District (METRO).

The study area consists of the Portland-Vancouver SMSA consisting of Clark County in Washington, and Multnomah, Clackamas and Washington Counties in Oregon. The comprehensive land use plans of the region's four counties and twenty five cities formed a composite of the degree to which each of the plans will be developed in the next 20 years. The resulting composite regional plan provided a year 2000 land use pattern to serve as the basis for predicting future travel demands. The Regional Transportation Plan (RPT) is intended to be finalized by this information so that a transportation system can be recommended which will serve the travel demand generated by this future arrangement of land development.

Assumptions

The following assumptions regarding existing and future conditions were taken into account:

1. The regional land use plan will consist of a composite of all city and county comprehensive plans. Future land development will be consistent with these plans.

2. No significant change will occur in the future with respect to currently adopted policies of jurisdictions influencing regional growth and development.

3. Current or projected transportation deficiencies were not considered as a constraint on the pattern of future land development.

4. How and where the next 20 years of growth will occur are based on the growth trends of the past decade.

Employment Forecast

Since 77 percent of the region's population growth in the past 10 years has resulted from in-migration due to new job opportunities rather than a net gain in births over deaths, the employment forecast was arrived at first.

To develop a regional employment forecast, two recent independent forecasts were used extensively. The forecasts used were prepared by Economic Research Associates (for the Banfield Transit Station Area Planning Program) and by the Federal Bureau of Economic Analysis. The projection method related the region's future economic growth in terms of its expected share of total U.S. economic growth over the next 20 years.

Population Forecast

A population forecast was developed by estimating the employment to population ratio.

Employment/Population Ratio's

	Metro Forecasts	Previous BEA(1).	ERA(2).	Workshop Ratio
1980	.49	.50	.45	.50
2000	.52	.55	.61	.56

The BEA projection is lower than ERA due to expected demographic changes and the post World War II baby boom. The ERA projection is high compared to BEA or Workshop projections due to its emphasis on projections of past trends.

1. BEA: Federal Bureau of Economic Analysis

2. ERA: Economic Research Associates

APPENDIX D:

STATUS OF INDUSTRIAL AND COMMERCIAL ACTIVITIES

The examination of the economic development goals of the four SMSA counties benefits from a discussion of the development activities taking place as well as the constraints acting upon future development. The information presented in this Appendix serves as supportive background material to the main objectives of the study. The sources of the information presented are the economic development plans of Clark County in the State of Washington, and Multnomah, Clackamas and Washington Counties in Oregon as listed below:

- Clark County Overall Economic Development Plan, 1980 Update
- Overall Economic Development Plan - 1979, Multnomah County, Oregon
- Planning Background Report: Economics - Review Draft, May 1979, Clackamas County, Oregon
- Overall Economic Development Plan: 1980 Update, Washington County, Oregon

Clark County

a. Vancouver: Industrial land with infrastructure in the area east of Vancouver has enabled two large electronics

firms, Hewlitt-Packard and Tektronix, to locate into the area. Other firms manufacturing electronics components are also encouraged by the availability of land with basic services. Genstar is developing a large planned community complex within which Hewlitt-Packard and Tektronix are situated. The Fruit Valley area west of Vancouver has large parcels of industrial land available for development. The Columbia Industrial Park located along the waterfront is presently fully operational since converting shipyard to industrial space in 1963. Sites zoned or planned for light industry usage is also available in the area northeast of Vancouver.

Constraints: Transportation access is a constraint to development taking place in the area east of Vancouver, mainly due to constrained traffic circulation. The Fruit Valley area requires transportation access and basic utilities for development. Northeast of Vancouver, the industrial land sites have varying needs for water service, sanitary service, drainage and land fill.

b. Additional Areas: The following areas in Clark County have parcels available for light industry: northern Clark County, Ridgefield, Camas-Washougal, and LaCenter.

Constraints: Varying needs for development include utilities, redevelopment and road access. In northern Clark County, the local perception is that

the lack of a port district to act as coordinator of local projects, a funding conduit, and a source of local matching has slowed realization of the area's potential.

Multnomah County

Within urban unincorporated east Multnomah County, three industrial employment centers have been identified by the Multnomah County Comprehensive Framework Plan. These include: (1) Cully/Parkrose; (2) Columbia; and (3) Wilkes/Rockwood. These areas are close to labor markets and accessible to the urban transportation network. The Port of Portland is continually monitoring the status of potential development in the Rivergate Industrial District. The Swan Island Industrial Park contains developable land. Guild's Lake, Central Eastside, Albina, Brooklyn, Macadam, Banfield and Hayden Island offer development possibilities through the expensive process of redevelopment.

Constraints: For east Multnomah County, sanitary sewer service needs to be generally extended for full development. Immediately developable industrial land are mostly small parcels with a few large sites available. The main constraining factor in developing Rivergate is the inadequate capacity of the transportation system connecting Rivergate to regional freeways such as Interstate 5. Major access problems also need to be

resolved for development of available land in the Swan Island Industrial Park and Hayden Island. The majority of the available land in east Multnomah County is located in areas with a high water table. Hence, redevelopment, sewerage facilities and road access are major factors inhibiting manufacturing growth.

Clackamas County

a. West Urban District: Closest to the Portland metropolitan core of the planning districts in Clackamas County, the West Urban District comprises a relatively high proportion of jobs in office and retail employment. The manufacturing sector accounts for approximately one-fourth of the employment with paper manufacturing exerting a relatively strong presence.

Constraints: Reflects county-wide development shortage of commercial land. County-wide development will require from 1,540 to 2,100 acres of commercial land whereas 425 acres are available.

b. East Urban District: Industrial development is concentrating in the East Urban District with warehousing and wholesaling activities in the Milwaukee expressway area and near Interstate 205. This area is also strong in primary and fabricated metals processing. The Milwaukee expressway/Interstate 205/Highway 212 area is served by rail, freeway and major utilities. Access to

the Portland International Airport is possible with completion of Interstate 205.

Constraints: Excessive parcellization is considered a major factor contributing to high land prices and to the slowing down of industrial location. The Milwaukee Expressway/Interstate 205 industrial area consists of left-over wetlands which forces high development costs upon industries locating in this area.

c. Urbanizing East District: Industrial manufacturing is also developing in the Urbanizing East District and is considered an east and southward extension of the Urban East District adjacent to it. Completion of Interstate 205 and the Clackamas town center are expected to encourage growth in both business and housing in this area.

Constraints: None identified at present.

d. Wilsonville/Canby District: This area reflects the county's highest proportion of machinery and instruments manufacturing. Nearly half of the development in the Wilsonville/Canby District is in the manufacturing sector with the electronics industry comprising a major portion. Traditionally agricultural, this area has experienced most of its growth in other industries since the

completion of Interstate 5. Rapid growth in manufacturing industries is facilitated by rail, freeway and utilities.

Constraints: None identified.

e. South Rural District: The lumber and wood products industry strongly influences the economy of the South Rural District. Growth movements north and northeast to adjacent districts may increase with decreasing timber sales since other industries are not well represented in this area.

Constraint: Poor access to the urban transportation network makes the South Rural District a relatively poor location for industries other than lumber and wood products at present.

f. North Rural District: Logging and sawmills comprise about one-half of the manufacturing employment in the North Rural District. The recreational industry is also quite strong but is subject to economic downturns since it is associated with the recreational second-house industry.

Constraint: Poor access to the North Rural District to the urban transportation network to the east presently makes this area a poor location for industries other than logging and sawmills.

Washington County

a. Tigard Area: Industrial and commercial activity has continued to grow in the Tigard Area which offers an attractive location for many businesses. The room needed by firms to expand, proximity to the Interstate 5 freeway and the attractiveness of the area's natural environment have contributed to making the area more independent of the converging growth effect toward Multnomah County.

Constraints: Transportation and storm sewer systems are inadequate. Transit service to industrial areas is also inadequate.

b. Forest Grove Area: Commercial activity in the Forest Grove Area includes the entry of national chain franchises and the Ballardtowne Square shopping center. Land costs in Forest Grove are somewhat lower than in other parts of Washington County, and the presence of Pacific University is an attractive element to high technology firms. Industrial development is occurring in this area with the Tektronix Corporation negotiating for a 100 acre site in Forest Grove for its electronic components manufacturing operation.

Constraints: Substantial portions of vacant commercial land are inadequate to meet anticipated demand due to high parcellization and land committed to residential uses. New commercial development is

therefore not able to gain easy entry into the area.

c. Hillsboro Area: Continued retail-office development is expected to concentrate activity in Hillsboro so that its role as a growth center will increase. The city's water supply, open spaces and relatively sparse population density are seen as valuable elements for more economic development. The Intel Corporation has indicated intention to locate its micro-computer manufacturing plant in Hillsboro.

Constraints: Although the supply of vacant commercial land is adequate for the near term, the supply of large industrial parcels is diminishing. Land use controls (Urban Growth Boundary and the city's urban planning area) are effective in serving development as infrastructure becomes available.

d. Beaverton Area: Beaverton is the largest city in Washington County. Two major arterials (Highway 217 and 26) serve this city and large commercial and industrial firms are locating to the area. "Parallel, provider and secondary" type industries are also locating to Beaverton attracted by the large firms and the growing population base.

Constraints: The adequacy of the transportation system to meet the demands created by the economic growth in Beaverton is a continuing issue.

APPENDIX B

STATISTICAL APPROACH

The statistical methods used in determining the relationship that exists between uneven growth and travel volumes across the Interstate 5 bridge are described below:

1. The Coefficient of Correlation

   The coefficient of correlation, r, measures the degree of association between two related sets of data. If two sets of data have r = + 1, they are said to be perfectly correlated; if r = -1, they are perfectly correlated negatively; and if r = 0, they are uncorrelated.

The coefficients of correlation were developed for the following variables:

x = ADT across the bridge

y1 = Vehicle Registrations

Y2 = Population by County

Y3 = Retail Sales by County

2. Significance of Correlation Coefficient

For many purposes it is sufficient merely to determine whether or not there appears to be any linear relationship between the variables. In any event, the ratio of the explained variation to total variation, called the coefficient of determination, is r2 or the square of the coefficient of correlation.

The variables in the study may then be explained: if r = 0.4 for variables x and y1, then r2 = 0.16 so that only 16% of the total variation is explained by some relationship. Also, correlation analysis assumes variables to have a linear relationship and steps were taken when necessary to modify variables analyzed in a linear mode.

3. Linear Prediction -- Regression

If two variables are significantly correlated, it is possible to predict values of one variable from those of the other. The results are generalized to the population from those of the other. The results are generalized to the population from which the sample is drawn by means of a regression equation:

$$Y' = a + bx \quad \text{or} \quad x' = a' + b'y$$

The symbol y' refers to the predicted value of y from a given value of x. This equation is obtained by a

technique known as least-squares and assumes that the relation between the variables can best be described by a straight line.

ANALYSIS SAMPLE:

Develop regression equations which may be used to predict the ADT across the bridge from:

1. Vehicle registrations by county and year (1950 - 1979)

2. Population by county (1950 - 1979)

3. Retail sales by county (1950 - 1979)

Regression Coefficients:

$$b = \frac{n\,(\Sigma xy) - (\Sigma x)\,(\Sigma y)}{n\,(\Sigma x^2) - (\Sigma x)^2}$$

$$a = \frac{\Sigma y - b\Sigma x}{n}$$

Even though the actual predictive value of the regression equation may be open to question, a regression equation often yields valuable information, even if the correlation is not significant. In cases where r is close to + 1.00 or - 1.00, the regression equation is extremely valuable.

4. Binomial Variable

A binomial experiment is an experiment with only two possible outcomes. The binomial experiment for the present study is to determine the extent of change if any when there is a possibility that a change has occurred.

Elements investigated include:

1. Tolls

2. Energy Crisis

Analysis sample: Do tolls affect travel across a bridge?

Since there are only two possible outcomes, either a change in the trend has occurred or not, the coefficient of the binomial variables will indicate the change in the trend and whether or not that change is significant.

n = 30 years

1950 0

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1970 ---- 1

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1979 1

Hypothesizing there is a trend between 1950 and 1970. If a change does not affect the trend, the coefficient of the binomial variable will be zero (or not significantly different

from zero). If a change does affect the trend, the coefficient of the binomial variable will be significantly different from zero.

APPENDIX F

INCOMPLETE DATA SETS

- Transit ridership - Not available for the period and no specific totals kept on inter-county travel.

- Inventory tax - Both states are phasing out this tax so no future differential burden is anticipated. Difficulty was encountered in determining inventory in specific counties since inventory taxes were paid statewide by companies operating in more than one county.

- Driver's Licenses - Not available by county. License applications are kept by testing stations and not separated by county of residence.

- Directional Peak Hour Traffic - Although a thorough search of the archives was made, Directional Peak Hour Traffic across Interstate 5 bridge during peak hours was only available for the most recent seven years of the study period. All previous records had been destroyed.

- Public Works - Expenditure data on roads and streets by county were not available in Oregon for the entire 30 year period. Data for Washington State are kept by biennium or fiscal years and not calendar years. For the earlier years in Washington, data were not separated from other public works projects within the city of county areas.

. Energy - Gas crisis years -- 1973, 1974 and 1979 -- were used as dummy variables. The number of years involved appears to be too small.

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- Demography
- Location of Industries
- Economic Development and Policy Planning
- Transportation

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AASHTO: American Association of State Highway and Transportation Officials

BPA: Bonneville Power Administration

CRAG: Columbia Region Association of Governments

FHWA: Federal Highway Administration

HRB: Highway Research Board

METRO (Also MSD): Metropolitan Service District

NCHRP: National Cooperative Highway Research Program

ODOT: Oregon Department of Transportation

RPCCC (Also RPC): Regional Planning Council of Clark County

TRB: Transportation Research Board

USDOE: United States Department of Energy

USDOT: United States Department of Transportation

WSDOT: Washington State Department of Transportation

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