# PERCEPTIONS OF SERVICE QUALITY OF RURAL RAIL BRANCHLINES: A CASE STUDY OF SOUTHEAST BENTON COUNTY

By

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# PERCEPTIONS OF SERVICE QUALITY OF RURAL RAIL BRANCHLINES: A CASE STUDY OF SOUTHEAST BENTON COUNTY

ABSTRACT. American railroads have faced a declining share of freight traffic relative to other modes. Although a variety of reasons have been identified for this decline, most experts agree that a contributing problem is that the rail system is overdeveloped with unprofitable branchlines. Many economic models have been utilized to analyze relative branchline value, but the literature is insufficient in defining quality of service from the user viewpoint. The principal objective of this paper is to determine the rail service needs of shippers on rural branchlines, using a segment of the West Side Branchline located in Southeast Benton County, Oregon as a case study. Personal interviews were conducted with the shippers on this rural branchline to identify rail service attributes and deficiencies in meeting the transport requirements of various resource commodities, particularly agricultural products, wood products and Christmas trees. Several techniques were employed to compare and interpret the responses of the shippers. A "trade-off analysis" by monotone analysis of variance, was used experimentally in this study and proved to be a useful technique in quantifying judgemental data. It was found that shippers of like commodities expressed similar preferences regarding service needs, often in contradiction to the findings of other studies. Overall rates, total transit time and car availability were of highest concern to most shippers.

## STUDY PROBLEM FORMULATION

### Introduction

The relative decline of railroad transportation in the United States has been attributed to many causes. At the risk of oversimplification, generally three points-of-view may be identified that attempt to explain why the railroad problem has developed, and how this problem may be rectified.

One perspective is the public's point-of-view. The federal government, after witnessing the bankruptcy of several railroads, adopted several progressive legislative acts to relieve this situation. Federal studies determined that the Northeast railroads faced an overabundance of intramodal competition and unprofitable branch lines. Thus, the federal government initiated the merger of all the bankrupts into one large carrier, Conrail, and authorized the abandonment of hundreds of branchlines. Conrail represented a massive planning effort involving various federal agencies, seventeen states and many community and shipper groups. This was the first major public rail planning project initiated by the government since before the Civil War. Because the railroad system developed in an era of minimal government control and regulation, planning was confined totally to the private sector and oriented toward market penetration and growth rather than orderly regional development. By the time public planning emerged in the twentieth century, the rail system was essentially in place and public policy focused on rate regulation rather than rail network planning.[1]

The public recognizes the benefits of maintaining a viable rail system. Rail transportation offers an energy efficient, economic mode of inter-regional movement for many commodities, and helps to stabilize the local economy of many dependent urban and rural communities. The public point-of-view has generally been that railroads have an obligation to provide services, even if unprofitable, to these dependent areas, and that railroad management has been too conservative and ineffective in developing new strategies for system planning, marketing, and sales promotion for a dynamic modern society.

The carriers' point-of-view is substantially different than that of the public sector. At one time, high profits from traffic on some lines would cross-subsidize unprofitable operations on branchlines. However, bankruptcy of formally stable railroads provided evidence that these off-setting profits no longer exist. The carriers' point-of-view is, in essence, that railroads developed in the private sector and want to remain there.[2] The railroads feel that traffic has been lost to competing modes due to discriminatory taxing policies, inconsistent public investment and cumbersome regulation. The most blatant example of inequitable economic regulation is the motor carrier industry which is heavily subsidized from general tax funds and highway trust fund and is cross-subsidized by the automobile. Taxation is a nemesis not faced by other modes and states have intentionally and unintentionally taxed railrods with high assessments.

A third point-of-view is that of the shipper. The shipper is typically less concerned with the question of regulation than the public or the carrier, but merely how the highest level of service can be obtained with the lowest cost. The shipper's point-of-view has been generally neglected in the literature, yet without customer satisfaction of service, there is no business. A better understanding of the shipper's point-of-view of what is "good service" yields results that are essentially aimed at improving the rail system regardless if instituted by the carriers or public policy. Therefore, the perception of the shipper regarding rail service quality is the focus of this research paper.

## Objectives

The principal objective of this case study is to determine the rail service needs of shippers on rural branchlines. Objectives that will facilitate the principal objective are:

1. To report on service deficiencies and other problems that have historically accelerated rail branchline abandonment.
2. To examine recent public policy addressing rail transportation and evaluate current policies in revitilizing railroads.
3. To identifiy the unique characteristics of the Oregon rail economy and, in particular, the case study branchline.

4. To compare the service attributes of rail and its principal competitor, trucks, as perceived by individual shippers of various commodities.

5. To identify current rail service deficiencies and service characteristics - service level combinations that satisfy the perceived needs of individual shippers on the case study branchline.

## Methods Utilized

Several methods are utilized to meet the study objectives. A literature search was conducted to obtain information on general history and characteristics of railroad freight transportation. Primary literature sources included articles on public policy for railroads, reasons for and impacts of branchline abandonment, historical accounts of railroads in Oregon, the Oregon Rail Plan and other official State Rail Plans and Southern Pacific Transportation Company activity data.

A majority of the information assimilated for the case study was derived through personal interviews with the major shippers on the branchline. The questionnaire that served as the basis for the survey is presented in Appendix B-1.

Trade-off analysis (by monotone analysis of variance) was performed on the responses of individual shipper interviews to determine the preferred service characteristics/service level combinations of each shipper. The interview technique and background information on trade-off analysis is presented in Appendix B-2 and Appendix B-3.

# GEOGRAPHY OF BRANCHLINE STUDY AREA

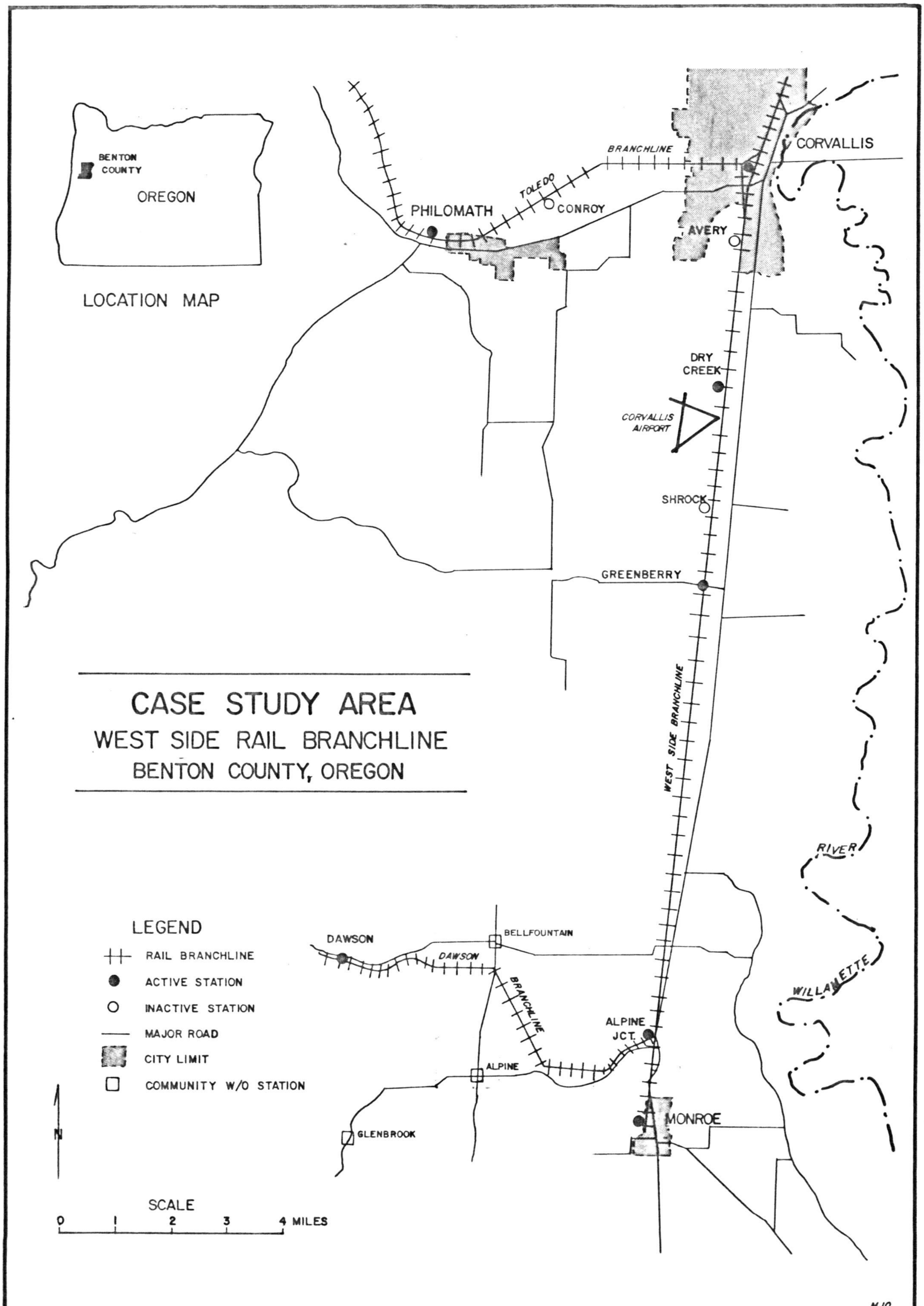
## Branchline Case Study Selection

The branchline chosen for this case study is the southernmost segment of the Willamette Valley West Side Branch of the Southern Pacific rail system. This branchline extends south from Corvallis to Monroe and includes the Bailey Branch (essentially a portion of the Corvallis-Monroe line) which runs from Alpine Junction just north of Monroe and west to Dawson.

The selection of this branchline as a case study was based on several criteria. Because the Oregon Rail Plan specifies that particular attention to the Willamette Valley rail network should be considered, a Willamette Valley branchline was chosen[3]. Also, this branchline moves a variety of commodities from several active shippers and stations. A branchline that is dominated by a particular commodity or a particular shipper would not exhibit the wide variety of service level perceptions and service attribute preferences found on the case study branchline. According to other studies, rail branchlines moving high-bulk, low value commodities in rural areas are particularly vulnerable to branchline abandonment.[4,5,6] The primary commodities on the case study branchline are forest products, grain and fertilizer - which are not only high bulk, low value in nature, but also represent the principle rail commodities of the state as well. This branchline also ships significant movements of Christmas trees. The "time-constrained" and "peak seasonal activity" nature of this commodity caught the interest of the author.

Resources and Economy of the Case Study Area

The case study area is located in southeast Benton County, Oregon (see Figure 1). The study area is within the Willamette River drainage basin, and like most of the valley, the natural resource base is highly conducive to agriculture. Nearly all of the immediate branchline area exhibits land capability of Class II or Class III with the 300 foot contour interval being the approximate division between the classes. The valley floodplain and immediate


BENTON COUNTY
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WEST SIDE RAIL BRANCHLINE
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ALPINE JCT.
ALPINE
MONROE
GLENBROOK
LEGEND
RAIL BRANCHLINE
ACTIVE STATION
INACTIVE STATION
MAJOR ROAD
CITY LIMIT
COMMUNITY W/O STATION
N
SCALE
0 1 2 3 4 MILES
MJO

terraces contain deep, silty, poorly drained, moderately dark and moderately acidic soils, while the eastern foothills of the Coast Range are highly variable but are mostly dark, clayey, moderately acidic. Annual rainfall in the study area ranges from 40" to 42" between Corvallis and Monroe, 49" to 51" in Alpine and Bellfountain and approaching 70" just west of Dawson.[7] The forested areas in the foothills west of the valley are predominately Douglas fir, Western Hemlock and Grand Fir species with Site Class III designations.[8]

The leading agricultural commodities produced in Benton County are grass and legume seeds, vegetables, grains, specialty field crops and Christmas trees[9]. Those products account for approximately 84% of the county agricultural income. County totals (1978) for these commodities are displayed in Table 1 (Appendix C).

Forestry products contribute $1,200,000 (1978) to the annual county income, but most of the productive areas are located in county areas west and northwest of the case study area. Nearly all the Christmas trees, cereal grains and a significant share of the field seed crops are estimated to be produced in the case study area, thus demonstrating the important role of this area in the county agricultural income.

## Historical Perspective of the Case Study Branchline[10]

In the 1850's, Portland businessmen recognized the need to link Oregon and California with dependable land transportation. After the Gold Rush, California became a growing market for Oregon commodities and a center for trade with the rest of the nation. Various railroad routes had already been developed in the Willamette Valley, but these shortlines primarily reinforced the river transportation for the movement of agricultural and forest products to Portland. Congress announced that one major land grant would be authorized to the first railroad to complete 20 miles of line from Portland to the south to eventually become a Portland-San Francisco railroad route. A considerable rivalry developed between businessmen and municipalities favoring either a "west-side" link or an "east-side" link (of the Willamette River) in an effort to get the federal land grant. Although Portland favored the "west-side" option (and donated money and land as support), Salem, Albany, and Oregon City favored the "east-side" link and were successful in securing the federal grant for the "east-side".

Activity was not neglected on the "west-side" as Henry Villard and German bond holders completed the Portland-Corvallis rail line in 1879, under the title of the Oregon and California Railroad. The Oregon Pacific Railroad tied Corvallis with Albany and the mainline to San Francisco in 1887. The case study branchline was originally part of the Corvallis and Alsea River Railroad which connected Corvallis with Eugene in 1912. The Monroe-Eugene link was abandoned in the 1940's with improved highways being rapidly developed. Through-line connectivity of the branchline was ended and the remaining stations were served from both ends.

## DESCRIPTION OF BRANCHLINE ACTIVITY

### Branchline and System Operations

The Corvallis-Monroe Branchline is recognized by Oregon Department of Transportation as an FRA Density "A" branchline, carrying approximately one million tons of freight annually[11]. The Bailey Branchline carries less than one million tons annually and thus categorized as a FRA Density "B" branchline.[12] The Bailey Branchline density is believed to be much higher than indicated by the Oregon Rail Plan; one shipper claims well over a million tons of traffic a year from his operation alone.

The Bailey Branchline is designated FRA Class 1, thus has a speed restriction of 10 m.p.h. or less. Given the topography, curves and grades, structures, road bed and rail quality and short length (6.9 miles), the class designation is appropriate. The Corvallis-Monroe Branchline exhibits much fewer physical restrictions and therefore, has been designated FRA Class 2, thus speed restrictions of 25 m.p.h. This major segment is 18 miles in length. The case study branchline has service five days per week from Corvallis to Alpine Junction to Dawson. The 1.5 mile segment from Alpine Junction to Monroe receives service on a "on demand" basis.

The branchline obtains switching and intermodal services from the Albany Southern Pacific Traffic Control Office[13]. Southern Pacific operates freight classification yards in Portland and Eugene. A majority of the freight from the case study branchline is southbound and is classified at Eugene. This city utilizes a "hump-yard" to classify cars which is fast and inexpensive. A hump-yard uses the force of gravity to propel and sort cars onto proper tracks. The Southern Pacific main line (Portland to Eugene, 124 miles) operates 30+ trains a day and moves about 30 million gross tons per year making it by far the most active line in the Willamette Valley[14].

Branchline Stations

The Corvallis-Monroe-Dawson branchline currently has five active stations: Dry Creek, Greenberry, Alpine Junction, Monroe, and Dawson. Two stations on the branchline that had previously received service, Avery and Shrock, are now inactive. There is an active station in Corvallis at the junction of the case study branchline and the Toledo Branchline, but this study is concerned only with rural rail service and will therefore focus on stations south of this branchline junction. Branchline spurs had once served

Glenbrook and Alpine, west of Alpine Junction, and a spur south of Monroe once served stations at Ferguson, Bear Creek and Cheshire, but these stations and branchlines were abandoned in the 1950's and 1960's.[15]

Dry Creek Station is located at MP (mile post) 685, or three and one-half miles south of Corvallis Station, and adjacent to the Corvallis airport. This station has two major shippers - a plywood manufacturer and a pulp products manufacturer, each of which has a siding serving the establishment. As distinguished from other stations on the branchline, Dry Creek may be recognized as a station serving secondary economic activities, thereby exhibiting a higher "value-added" function than other establishments on the branchline which are for the whole, engaged in primary activities, or direct procurement of natural resources products such as forestry and agriculture. This station also serves one grain farmer, but the majority of this shipper's products are served at Greenberry Station. These three shippers generated 550 rail cars in 1978, with the plywood manufacturer being dominant with 91% of the shipments from this location.[16]

Greenberry Station is situated at MP 682, approximately half-way between Corvallis and Alpine Junction. This station features two sidings, one serving a grain elevator and the other a team track. The principal shipment from this location is grass seed (approximately 4440 tons, 1978) and wheat (1500 tons) which generated 87 rail cars. The other major commodity shipped from this station is Christmas trees from several shippers who in total generate an estimated 40-50 cars per year, all in November and December. Grain shipments exhibit a seasonal shipment peak in Autumn, with 87% of the shipments being made in August-October. A team-track siding one-half mile south of Bellfountain Junction places occasional LCL (less-than-carload) orders.

Alpine Junction Station (MP 673) is the only station on the branchline that is primarily a terminating station with a majority of its activity being inbound movements. This station serves a fertilizer distributor with 27 (1978) rail cars, mostly covered hoppers and occasionally boxcars if the fertilizers are bagged. Most shipments arrive in the months March-May (74% seasonal peak) to serve farmers in the study area with over 5,000 tons of nitrates, phosphates and potassium from Eastern Washington, British Columbia, and Idaho. Alpine Junction also serves a Christmas tree farmer with 25 cars in November and 19 cars in December for 30,000 trees.

Monroe Station (MP 671) is served with on-call service only, with all orders in November to serve the needs of primarily one Christmas tree shipper who generated 32 rail cars in 1978 with 27,000 trees.

Dawson Station (MP 680) serves two active lumber and chip shippers. In 1978, 1180 cars were generated from this station, mostly flat cars and chip cars, with a majority of shipments occurring April through September. The Dawson facilities include two sawmills and employ 100-150 people.

Branchline Shippers

There are nine major shippers on the case study branchline, which represent an estimated 95% of the total traffic generated from the case study branchline.[17] The major shippers are: one pulp product manufacturer, one plywood manufacturer, one grain farmer, one fertilizer distributor, two lumber mill operators, and three Christmas tree farmers. The modal split of these businesses and other comparative statistics of these shippers are displayed in Table 2 and Table 3 (Appendix C).

## PERSPECTIVES OF BRANCHLINE ABANDONMENT

### Previous Studies of Abandonment

With the enactment of the 3R Act, the 4R Act and the Local Rail Assistance Act, it is apparent that the issue of railway abandonment and associated impacts are considered critical, and has accordingly attracted much federal legislation. This paper is not intended to solely address abandonment however, it may be viewed as a means of evaluating rail service for the extreme case of comparing existing service vis-a-vis no service.

In an attempt to revive the rail industry, federal policy has, in essence, increased the likelihood of additional abandonments while preparing for subsidization of certain branchlines to retain service. For this reason, methodologies for assessing the value of branchlines to communities, shippers and rail companies are needed to ensure a cost-effective funding program. Some studies have been undertaken to explain the relationship of rail service to local prosperity.[18, 19] Many have been concerned with analyzing the actual effects of rail abandonment upon communities[20, 21, 22] others have seeked to ascertain the types of economic activities affected most by abandonment[23,24], and others have attempted to identify certain community characteristics (e.g., isolation, industry mix, etc.) that may potentially lead to abandonment.[25,26]

Contrary to popular opinion, most studies indicate that the adverse rural or community impacts attributable to the loss of rail service are minor, primarily due to the availability of alternative modes. Many branchline abandonments were merely the end of a series of unfavorable local encomic events. The episode of rail abandonment provided the shocking realization that there were problems already; loss of rail service was a result, not a reason for economic decline. Local employment impacts have often been found to be limited to the loss of jobs of the railroad employees. Local increases in trucking provides additional local purchases of fuel, meals, supplies, etc., and hence, beneficial multiplier effects. After an initial readjustment period, shippers often found that the reorganization of distribution patterns required by adopting trucking over rail service resulted in a reduction in total operating costs.[27]

However, rail abandonment has been found to have serious negative impacts to certain business firms which are forced to quit, relocate, or experience slower growth due to loss of rail service. As expected, the greatest impacts are felt by shippers of high-bulk, low-value commodities - lumber, grain, coal and fertilizer. Switching from rail to truck service often results in cost increases. Not only may the transport costs increase, but also capital outlay for facilities and equipment to handle trucks may be needed, and changes in inventory procedures may be necessary[28]. Often the additional costs resulting from alterations in established logistical operations are passed to the consumer in the form of higher prices. Some studies indicate that the most significant effect of abandonment is the reduction of local economic potential. Industries and wholesaling activities requiring rail service can no longer be influenced to locate in the area.

Predicted Response of Shippers to Abandonment

In an effort to determine the economic impact of rail service abandonment on the case study branchline, shippers were asked to predict their management response to loss of rail service. Response options and shippers predictions are as presented in Table 4 in Appendix C.

Nine shippers responded to this item. The two shippers that predicted "no impact on production or cost" would result from rail service abandonment were both Christmas tree shippers. These trees can apparently be shipped by refrigerated trucks at nearly the same cost as by rail. Because the trees are shipped in winter, there is light demand for refrigerated trucks and rail cars, thus the boxcar shortage that is typical to Oregon in winter is not a major problem with this industry. Christmas tree shippers, however, do prefer rail service to trucking (refer to discussion on "Evaluations of Service Attributes".) The remaining Christmas tree shipper predicted that transport costs would increase if a shift to "truck-only" service was unavoidable.

The two manufacturing operations on the branchline predicted production reduction, job loss or relocation would be their response to rail service loss. This author suggests that perhaps because manufacturers are faced with complicated combinations of factors-of-production, their responses are oriented either toward a reallocation of inputs (e.g., labor reduction) or output decline (production reduction). Likewise, whereas the lumber mill operations, Christmas tree farms, grain farms and fertilizer outlet located on the branchline are economically tied to the natural resource base of the study area, these manufacturers are more "foot-loose" to relocate in another area that would minimize transport costs. Thus, one response to rail service loss is to transfer to another location with another railhead.

The grain shipper for the branchline predicted that loss of rail service would increase transport costs by 20% and may "cause a one-time capital cost to modify facilities or purchase new equipment." This shipper felt that rail service was more regular and reliable than trucking for such commodities, thus the one time capital cost or new equipment purchase would likely be a warehouse to increase inventory capabilities or purchase of their own trucks.

Three shippers predicted that loss of rail service would likely cause them to "close operations at plant completely". This response came from the two lumber mill operations and the fertilizer outlet. This finding supports the literature in that lumber and fertilizer operations have historically been of the most critically affected by railroad abandonment. All three shippers felt that "truck costs are too high" for their commodities. One lumber mill specilizes in long-cut lumber that is "too bulky to handle by truck".

## EVALUATIONS OF RAIL SERVICE ATTRIBUTES

### Modal Choice Variables in Transportation

A number of models have been developed that attempt to predict choice of one mode over another. The four variables that are usually compared are:

1. cost difference
2. time difference
3. comfort difference
4. convenience difference[29]

No doubt that cost differences influence the patterns of freight and passenger movement by different modes of transport between points of origin and destinations. Practically all goods and services have built into their final value the outlays required to have them available when and where they are required[30]. However, the quality of transport service is not judged by freight rates alone. Depending on the nature of the commodity being transported and the individual shipper's perception of need, other important variables such as time and convenience may play important if not deciding roles in modal choice.

As discussed in Appendix A-2, much of the freight in the United States that formally moved by rail is now being transported by motor carriers. Initial highway systems were irrationally developed and used mainly for ensuring local movements "get out of the mud". However, since that time active federal involvement in road construction and improved technology in vehicles have made motor carriers become increasingly more competitive for the freight transport needs previously served by rail.

Modal Choice of Branchline Shippers

In an attempt to determine the factors involved in modal choice decisions of rural shippers, a list of transport service attributes was presented to the shippers on the case study branchline. Each was requested to identify service attributes that may be associated with truck and/or rail transportation. The results are presented in Table 5 in Appendix C.

Of the shippers on the case study rail branchline, truck was favored to rail service in terms of fast service, frequency of service, links to many markets, and relations with transport firms. Rail service was favored by the same shippers in terms of ability to handle perishables, minimization of theft or damage, traceability of consignments and low cost. Rail and truck service was rated equal by the shippers in terms of regularity of service and ability to handle bulk items.

Many of the shippers responded to the service attributes in a predictable manner. For example, fast service was viewed by all nine shippers to be characteristic of trucking. One shipper (lumber mill) also identified rail to offer fast service. Another predictable resonse was that the shippers as a whole felt that rail provided a lower cost service than trucks. The three shippers that identified trucks as having low cost service were the Christmas tree shippers.

Unlike lumber, grain and fertilizer, Christmas trees are relatively high-value per unit weight, and therefore do not capitalize on the competitive advantage of rail transportation. Furthermore, rail cars have a rate structure that includes a minimum weight charge; the trees are light-weight and often do not meet the minimum weight but are nonetheless charged for such. One lumber shipper claims exceptionally low rail rates can be established with long-standing, reliable customers by a milling-in-transit rate which is a special lower rate for certain point-to-point shipments.

Trucks were viewed as providing "high frequency of service" and "good links to many markets" by the shippers. These were also predictable responses in that trucks exhibit much greater route and schedule flexibility than railroads. Trucks operate on most public roads and are therefore free to travel between nearly any two points, whereas railroads of course can serve only those points with rail service. Trucks also have generally more flexible schedules than railroads and can thus often offer more frequent service.

Some of the results from this survey were contrary to the literature and other surveys. Surprisingly, the shippers favored rail to offer "ready traceability of consignments". One previous survey by the Oregon Public Utilities Commission (PUC) identified poor tracing to be a major complaint of rail shippers[31]. The literature also suggests that rail offers a better ability to handle bulk items, whereas the shippers on the case study branchline rated rail and trucks equal on this attribute. One Christmas tree shipper commented that the trucks were easier to load than rail cars. Irregular service is another frequent complaint of rail transportation. However, the five of nine responding shippers characterized rail to have "good regularity of service".

As a whole, the shippers on the case study branchline felt that the business relationships with the trucking industry and the railroads were equally good. However, two shippers did specifically claim to have poor relationships with Southern Pacific Transportation Company.

Rail service was considered to have a "good ability to handle perishables". Only the three Christmas tree shippers responded to this attribute as that the other commodities on the branchline are not perishable. The tree shippers unanimously considered the refrigerated rail cars ("refers") to be better design to handle Christmas trees - although at a higher cost than trucks. The Christmas tree shippers also felt that rails offered "minimization of theft or damage" whereas trucks did not.

Rail Service Deficiencies

In an effort to determine the needs of rail shippers, the Oregon PUC conducted a railroad service survey of 450 shippers.[32] The variables of highest concern of the shippers were:

1. insufficient communications
2. car availability
3. transit time
4. switiching problems

Insufficient communications is a major complaint of rail service for many shippers. Often shippers are uninformed about the status of their shipments after leaving points of origin. Their customers may be anxious for car arrivals, especially if late, and with inadequate communciations from the railroad the shippers are unable to respond to customer concerns. Important communications include notice of arrival, notice of delay, constructive placement notice, and general information such as tracing, and rate quotes.

Car availability, or more specific car unavailability, is also a frequent concern of shippers. As mentioned earlier, freight car shortages is a national problem, but one that seems to be more of a critical problem in Oregon than elsewhere in the nation. In addition to the actual shortage of cars and costs associated with delay of shipments to customers, demurrage (charges placed for detaining or reserving cars) also affect car supply and contributes another financial burden for shippers.

Transit time problems are not only related to the actual through-put time required of shipments to destinations. Erratic and therefore unreliable quotes on transit time also make it difficult for shippers and receivers to adequately plan inventory requirements. The same movement can have drastically different transit times in addition to the extra time associated with adverse weather or the time required to repair a bad order.

Switching problems are actually another form of time delay. Transit time is considered to be the time required from origin terminal to destination terminal without switching operations. However, in nearly all movements, switching operations occur during the haul and at the terminals which may add time delay. Frequently, bunching of cars is reported at destination terminals, thus although the cars may arrive "on time", switching problems prevent the timely unloading of the consignments.

Desired Rail Service Improvements

One objective of the case study is to determine the desired service improvements from the shipper's perspective. To a certain extent, this can be derived from summaries regarding service attributes (as presented earlier). Those attributes that were rated low identify service deficiencies. But this does not specify which service characteristics need more improvement than others. To meet this task, the shippers were provided with a list of characteristics which describe ways in which rail service could be improved, and were asked to rank these from most important (1st) to least important (6th). The choices for ranking and the responses of the shippers are presented in Table 6, in Appendix C.

The results of the rank order test indicate that reducing total transit time is the aspect of service that needs the most improvement in rail transportation according to the branchline shippers. Reducing rates also carries a high priority overall, but this opinion is much more variable as indicated by standard deviation measure. All Christmas tree shippers were most concerned with rates, and secondly delivery time to market. Christmas trees are obviously a "time-constrained" commodity. The functional cycle between product procurement and delivery to the consumer must occur in a very short time interval, much like fresh produce. However, unlike produce which exhibit a fairly steady year-round demand, Christmas trees likewise have leptokurtic seasonal peak demand in late November-early December. Reducing rates is also a critical concern of this industry because trees have a relatively high-value per unit weight unlike most commodities moved by rail and cannot benefit from natural rail economies. Whereas grain and fertilizers do benefit from rail economies due to their low value per unit weight nature, and the shippers indicate relative satisfaction in rail rates. The plywood manufacturer was also concerned with rail transit time. A seasonal peaking is also witnessed by this industry with housing construction (major commodity use) primarily occurring within a few months. The shippers from the lumber mills are also tied into the construction season and therefore, have the same needs. However, the product at this early stage of transformation is not as susceptible to value reduction due to damage as is plywood, therefore the lumber shippers ranked "loss/damage" lower than the plywood shipper as a desired service improvement. The fertilizer shipper was highly concerned with time and less so with rates which is a response that does not support the literature.

The grain shipper was highly concerned with car availability. This response supports the literature. The Oregon grain industry is very sensitive to this problem (refer to Appendix A-5). There is a widespread shortage of railcars for grain shipments nationally and the overall demand for cars is greater in the "wheat belt" of the Midwest United States than Oregon. However, much of Oregon's grain industry is dependent upon international demand and pricing, which are very unpredictable therefore, a responsive and reliable transportation mode is essential. The shippers of lumber and chips are faced with similar situations in their industries and therefore responded to car availability in the same manner. Overall, car availability exhibited a wide variety of ranked responses.

As discussed earlier, one of the critical variables in modal choice is inconvenience. This may be expressed in many ways in freight transport. In the PUC survey "switching problems" and "insufficient communications" were two of the four most frequently cited problems of rail transportation. Both of these problems may be considered as convenience problems - they create an element of uncertainty in the transaction between shipper and consignee, usually expressed in unforeseen delivery time delays without notice. In the questionnaire used in the case study, inconsistency in transit time is a category that may also fall into this category of convenience problems - inconsistency is an inconvenience. Although "improved consistency of transit times" was ranked only fourth overall in the desired rail service improvements selection, three shippers ranked it first or second; the pulp product manufacturer, the grain farmer, and the fertilizer distributor. The fertilizer distributor, unlike all the other shippers on the branchline, is solely in business for inbound shipments, and is therefore on the very noticeable "waiting-end" of a shipment delay. The manufacturer also receives substantial amounts of inbound freight.

Loss and damage and frequency of service were not viewed as significant current problems in rail transportation service by the shippers.

The results of the rank order test indicate that reducing total transit time is the aspect of service that needs the most improvement in rail transportation according to the branchline shippers.

## ALTERNATIVE COMBINATIONS OF SERVICE LEVELS

### "Trade-off" Analysis

As indicated by the results of the rank order test (Table 6), individual firms have individual preferences regarding desired rail improvements. This exercise is useful in identifying the comparative importance of various needed service improvements as perceived by individual shippers. However, the rank order test does not quantify the incremental difference between choices, i.e. "how much" more important is rates (1st choice) than transit time (2nd choice), for example.

Another limitation in the rank order test is that it compares transportation characteristics in an isolated manner, i.e. rates vs. transit time, for example. Whereas in reality, "good service" is a combination of many attributes - rates, transit time, frequent service, etc. One attribute may be "more important" than another, and most shippers are willing to accept a lower level of service of a "less-important" attribute if a higher level of service can be obtained for "more-important" attributes. Consumers of products and services must make judgements about the relative values of multi-attribute alternatives, and a choice is made based on complex personal trade-offs. This trade-off situation may also be applied to evaluating transportation service from the point-of-view of the shipper. A method that has been developed to quantitatively assess "trade-offs" is conjoint measurement. A brief explanation of conjoint measurement and the experimental design used for this study is presented in Appendix B-3.

The objective of the trade-off analysis performed in this study was to gain insight on how shippers of various commodities, and therefore various transport needs, differ in terms of alternative combinations of service characteristics and service levels.

## Research Approach and Applications

The rank order test identified that the four characteristics of highest concern are: rates, total transit time, variability of transit time and car availability. All shippers were presented with a common scenario as a basis for their trade-off decisions (see Appendix B-2) regarding the above selected transportation characteristics. For each transportation characteristic, two alternative service levels were identified; one offering a high level of service, the other offering a low level of service. Therefore, the shippers were presented with sixteen possible alternative combinations of service characteristics and service levels. Two service levels and four service characteristics equals sixteen combinations. Then the shippers were asked to rank these sixteen service combinations. The results were quantitatively assessed by applying a monotone analysis of variance which is a mathmatical procedure for transforming data from a factorial experiment into the highest possible percentage of variance accounted for by combining various factors.[33] Or more simply, each service characteristic is assigned a utility estimate that expresses its quantitative value among the field of all service characteristics based on the trade-off choices of individual shippers. The rank order test indicated that the four most important attributes of rail service according to the responding shippers were rates, total transit time, car availability and time variability. Thus, these four attributes were selected for the trade-off analysis.

Service Level Utilities

The results of the trade-off analysis were quantified by a FORTRAN IV program entitled MONANOVA. This produced a numerical value for each attribute for each shipper, or a service level utility. For example, if comparing the utility levels of 1.735 for rates and .868 for car availability, one could reasonably deduce that to that individual, rates as a service characteristic is twice as important as car availability in measuring service utility. The results are presented in Table 7 in Appendix C.

It is interesting to compare the results of the rank-order test with those of the trade-off analysis. In many cases, shippers that ranked a certain attribute as highest priority in terms of rank did not respond consistently in a trade-off situation, i.e. they are only willing to allow a lesser attribute to decrease in service a certain amount before sacrificing a high level of service for a more important attribute.

In some cases, rates were viewed as a more important consideration in a trade-off situation than in isolated ranking. For example, Firm "A" (pulp products) ranked time variability first and rates third in rank-order. However, in the trade-off situation, the same shipper considered rates eight-times higher than time variability. However, some shippers (such as Firm "B") responded to both situations identically; still the trade-off analysis established a utility value for each attribute, thus enabling one to note the decimal value of each attribute for each shipper.

Firm "C" (grain) expressed very similar (and modest) utilities for rates, transit time and time variability (.540, .660, .559, respectfully), yet expressed an extremely high utility value for car availability (1.759). To this shipper, without available cars, no other service attribute is of importance. This similar attitude was expressed by Firm "I" (lumber, logs). One Christmas tree shipper (Firm "D") found transit time and time variability to be quite important in a trade-off situation, whereas in isolated ranking, this shipper ranked rates as most important. Whereas another Christmas tree (Firm "F") shipper found all four attributes to be nearly equal in importance.

## SUMMARY CONCLUSIONS

### Case Study Findings

Many of the findings from the case study support the literature on rural rail branchlines. For instance, the lumber and fertilizer shippers felt that loss of rail service would force these firms to close operations completely due to lack of suitable transportation alternatives; likewise the grain shipper also expressed severe financial impact would occur from loss of rail service. Those commodites are universally quite dependent on rail service. The shippers as a whole found rail transport to provide lower cost service than trucks, whereas trucking was viewed to offer fast delivery of products. The rank order test indicates that reducing transit time is the aspect of service that needs the most improvement in rail transportation.

The grain shipper was highly concerned with car availablility. This finding is support by both the rank-order test and the trade-off analysis. The literature indicates that lack of rail cars is a critical problem nationwide for grain shippers. The shippers of lumber and chips also indicated car availability to be a typical rail problem.

The case study also produced findings that do not support the literature on rural rail branchlines. "Regularity of service" and "ready traceability of consignments" are often viewed as rail service problems, and these aspects of service were found to be frequent complaints in one recent Oregon PUC survey. However, the shippers of the case study branchline feel that these aspects of service are not a major problem.

Several findings of the case study could be considered original in that literature has not yet addressed certain interesting aspects of rail service. For example, the unique characteristics of Christmas tree transportation. Certainly this commodity is not of significant national concern, however Christmas trees are of considerable local concern being the leading Benton County agricultural product in terms of cash receipts. Consistently the three Christmas tree shippers responded to the case study survey in similar fashion, and often expressed priorities and concerns quite different from the other branchline shippers. Tree shippers, unlike the other shippers, identifed trucks as having lower cost service than rail due to the rate structures offered by each mode, however the tree shippers prefer rail service because for their product trucks do not handle perishables as well as refrigerated rail cars. Furthermore, Christmas trees exhibit a very high seasonal demand and are very sensitive to fast, on-time delivery and the case study reflected these conditions.

The case study also explored the use of trade-off analysis for identifying rail service needs. This technique, principally used in product marketing, has not to the author's knowledge been applied to transportation service perceptions. The trade-off analysis provides a way to quantify the utility of individual service attributes within the complex situations in which service is offered, i.e. a combination of various service attributes at various service levels. Overall, the shippers gave similar responses to both the rank-order test and the trade-off analysis with transit time, rates, and car availability being of highest concern, depending upon the nature of the commodity being transported.

Case Study Limitations and Assets

Several limitations must be recognized with this case study and the techniques that were implemented. The conclusions of any case study should be understood with a certain degree of caution. The conditions of a particular study area and particular problem resolution can not be applied uniformally to all situations. However, case studies do provide valuable tests of fundamental generalizations and often expose new theses for further academic endeavor. Such were the ambitions of this case study.

# APPENDIX A

## BACKGROUND DISCUSSIONS

A-1. The Growth of Railroads in the United States

A-2. The Decline of Railroads in the United States

A-3. Federal Role in Railroad Revitalization

A-4. State Rail Planning

A-5. The Oregon Rail Economy

# APPENDIX A:

# BACKGROUND DISCUSSION

## A-1. The Growth of RaiLroads in the United States

Railroads in the U. S. initially developed as supplements to canal-river transport. By 1850, however, the era of rail trunklines began. Although canal traffic continued to increase, the railroads established their supremacy and canals soon became absorbed into the national system as feeders to rail trunklines.[34] The Civil War proved the military and economic advantages of rail transportation as midwestern linkages strengthened the industrial East and the river-based movements between the Midwest and South declined. Postwar speculation and industrial expansion gave further impetus to railway expansion. Penetration lines continued to extend westward leading to the first transcontinental link in 1869.

The next two decades witnessed the construction of almost 115,000 miles of rail line. Expansion continued until a peak of 254,000 miles was attained in 1916. In a relatively short period of time, 1850 to 1890, the railroads developed into the backbone of the national transportation system. Generous local, State and Federal aid, and active promotion fostered radical growth in this new industry.

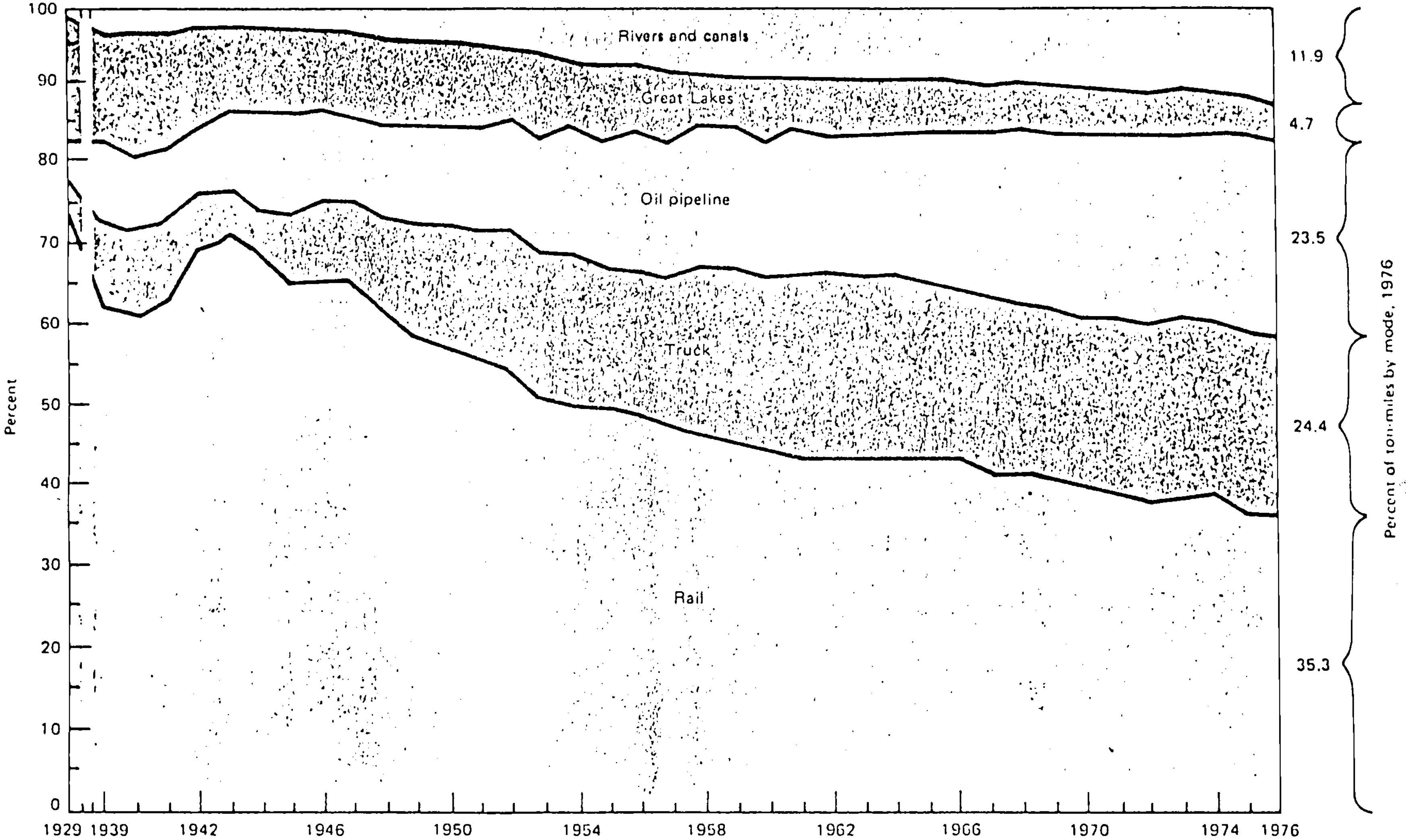
The period roughly between the Civil War and World War I has been referred to as the Era of Railroad Dominance[35]. Railroads were the most effective and efficient means of transporting goods and people between cities and regions. Tapering fare structures and lower promotional rates for some long-haul commodities permitted new Western producers to compete in Eastern markets. Patterns of regional specialization began to emerge with the opening of new markets. Western regions were able to capitalize on their comparative advantage economies. This principle has been demonstrated by the development of agriculture in California and wood products and lumber in the Pacific Northwest.

A-2. The Decline of Railroads in the United States

Certainly the dominance exhibited by railroads at the turn of the century has faded. In fact, the American railroad industury has suffered financial straits for several years. Rates of return in railroading are among the lowest of all major U. S. industries (see Table 8).

Several historical trends are usually identified as the major causes for decline of the U. S. railroads. One of the more commonly cited reasons is the extremely strong intermodal competition from barges and especially trucks over the past several years (see Figure 2). Although railroads are still the dominate mode in terms of ton-mile freight traffic, its share is decreasing. Furthermore, when computed for revenue-ton freight traffic, railroads are found to be subordinate to to trucks[36]. Due to route flexibility, lesser specialized terminal requirements and comparative regulatory freedom, trucks have proven to be more economical for short and medium distance hauls of most commodities.

Because most of the rail system was built prior to 1900, the physical plant of the industry is very old and deteriorating in many locations. Although many railroad companies are engaged in renovation and reconstruction, others are not. Increased operational costs, particularly fuel and labor, have deferred needed stock maintenance alloca-




NOTES Including mail and express and for hire and private carriers. To date total air ton-miles are insignificant.

SOURCES Association of American Railroads, *Yearbook of Railroad Facts*, 1977 edition, p. 36. Transportation Association of America, *Transportation Facts and Trends*, 1977 edition, p. 8, Quarterly Supplement, October 1977 for revisions and updates

FIGURE 2. TON-MILES OF INTERCITY FREIGHT BY MODE, 1929-1976.
(Percent)

tions. Poor track conditions compounds other problems - railroads are forced to operate at slower speeds, which induces longer transit times, thus increasing customer dissatisfaction and a further loss of revenue.

It is frequently maintained that the sizable traffic shifts from rail to competing modes is also the result of advantages realized by other modes through discriminatory taxing policies, inconsistent public investment policies, or regulatory imbalance. Other critics feel that railroad management has been too conservative and ineffective in developing new strategies for system planning, marketing and sales promotion for a dynamic modern society.

The search for explanations for the demise of U. S. railroads is academic and not an objective of this paper. However, what is of concern is the means employed by the depressed rail industry to relieve its downward economic spiral. Perhaps the industry's principle (or at least most conspicuous) tactic has been the abandonment of unprofitable branchlines. The Era of Railroad Dominance produced what is now an overdeveloped rail system. Many critics feel that aggressive abandonment of marginal rail lines will result in a profitable core system. Others contend that if outdated regulatory practices, unfair subsidy of competing modes, poor management, and other problems were rectified the current marginal branchlines could again become profitable, and rail service to rural shippers and dependent communities could be retained.

## A-3. The Federal Role in Railroad Revitalization

During the Era of Railroad Dominance, the industry enjoyed a new monopoly situation. Water carriers offered competition only in limited situations and motor carriers had not yet reached its potential. Because of this, the railroads were able to establish differential pricing (discrimination) according to the exigencies of demand. The costs of the railway system were distributed on an "ability to pay" rate structure between classes of commodities communities and particular hauls. The Interstate Commcerce Act of 1887 condoned differential pricing but designed regulations to prevent selective short term rate cutting, and thus protect railroads from destructive competition against one another, shippers and localities, and other modes[37]. This act of legislation was the primary harbinger of a period of regulation designed to prevent abuses and jeopardy to the public interest. A historical chart of earmark transportation legislation is presented in Appendix D.

Of particular significance to this study is the Regional Rail Reorganization Act of 1973 (3R Act) and the Railroad Revitalization of Regulatory Reform Act of 1976 (4R Act). The 3R Act was a response to the financial collapse of railroads in the Northeast. The 3R Act created the United States Railway Association (USRA), a quasi-public organization given the responsibility of reorganizing the bankrupt carriers. The USRA determined that the Northeast faced an overabundance of intramodal competition and unprofitable light density branch lines. To relieve this situation, the USRA recommended the merger of all the bankrupts into one large carrier, Conrail, and authorized the abandonment of hundreds of light density lines. In order to offset the impacts upon shippers and communties burdened with the loss of rail service, federal grants would be provided to the states for the purpose of preserving service of selected branchlines.

Growing criticism of ICC abandonment procedures and the bankruptcy of several railroads in the Midwest encouraged Congress to pass the Railroad Revitalization and Regulatory Reform Act (4R Act). Title VIII of the Act addresses local service continuation, and in essence extended the basic idea of local rail service preservation used in the Northeast to the rest of the nation. A more recent bill, the Local Rail Assistance Act of 1978, provides funds for the rehabilitation or upgrading of light density lines prior to abandonment provided the track density is less than three million gross tons per year.

A-4. State Rail Planning

Title IV of the 3R Act, entitled "Local Rail Services" enables state governments to become actively involved in long term rail planning by establishing federal funds in the form of grants to the states for the purpose of preserving service on branchlines "worthy of retention" in the rail system, i.e., lines that are not economically self-sustaining but are important to local government for some other reason. The federal funds can be used to subsidize continued service, purchase, or rehabilitate lines, or provide an alternative to rail service. If the ICC approves abandonment of service, the state or individual shippers may offer financial assistance.

Title IV identifies the following conditions for subsidy eligibility: (1) the state must have an approved state rail plan, and (2) the state must have a designated agency with the authority and administration to conduct a "comprehensive, coordinated and continuing" rail planning process. The State of Oregon has prepared the Oregon Rail Plan (September 1978) and has designated Oregon Department of Transportation (ODOT) as the agency responsible for rail planning in Oregon.

It should be noted that recent public policy that are of relevance to this paper regarding rail freight service exhibit two important trends: (1) state governments have been delegated a significant role in rail planning, and (2) the need to study light density rail branch lines has been recognized in major public policy action.

A-5. The Oregon Rail Economy: Trends and Outlook

The economy of Oregon is highly reliant upon rail transportation. Few other states, if any, depend so heavily upon long distance rail transportation for the marketing of such a large portion of their outputs[35]. Oregon is relatively isolated and distant from major consuming, manufacturing and population centers. Furthermore, the mainstays of Oregon's economy - forest products and agricultural products - are in general, bulky and low value in proportion to weight. Thus, the characteristics of Oregon's export products and the distance to markets makes railroads particularly well-suited for the freight transportation demands of the state. A fair financially stable rail system with efficient service to customers is essential to the state economy.

The rail system in Oregon is in relatively good condition when compared to other parts of the U. S. The ubiquitous problems of branchline abandonment, track and roadbed deterioration, and equipment depreciation exist in the state, but they are less critical than those found in the East and Midwest.

Two basic reasons account for the comparative success of the Oregon rail system. First, this region was one of the last in the U. S. to experience railroad expansion. Thus, the physical plant of its rail carriers is generally newer than elsewhere. Second, of the four Class I carriers serving Oregon, three are reasonably sound financially. Thus, plant and equipment acquisition and maintenance have not been deferred as has been the case for some Eastern railroads[39].

Although rail problems in Oregon are not as severe as in other states of the nation, they do exist and should not be ignored. After reaching peak mileage in 1932 with 4137 miles of rail line, a steady depletion has occurred, leaving a total of 3043 miles of rail line in 1975[40]. Abandonment of unprofitable branchlines is the principal reason for this decline.

Freight car shortages is one nationwide problem in which Oregon is particularly vulnerable. Oregon originates considerably more railroad freight tonnage than it terminates. As indicated in Table 9, more tonnage left Oregon in 1976 than entered by a ratio of 1.6 to 1. The state is faced with an "empty-backhaul" situation which is unprofitable and therefore car availability is unreliable. It is encouraging to note that the inbound/outbound imbalance has been declining, primarily due to raising internal demand for manufactured products from other states to satisfy a steadily growing Oregon population[41]. The grain industry is very sensitive to this problem in the form of unavailability of hopper car shortages. Much of Oregon's grain is linked to international markets. In order to take advantage of changing international prices, responsive and reliable transportation is essential.

The future of Oregon rail commodities is somewhat uncertain. Lumber and wood products dominate Oregon rail traffic, especially in Western Oregon. The industry relies on rail to reach long distance Eastern markets, but recent competition from the South has forced Oregon to seek customers in the West which can also be economically served by trucking. This industry is also faced with a declining supply of timber harvest and a decline in national softwood demand due to a depressed housing industry. Rail-shipped agricultural products are also witnessing a shift to closer markets and therefore, truck competition. Railroads are particularly vulnerable to truck competition because trucking is unregulated for agricultural products. Export grain is increasingly being transported by truck-barge combination rather than rail transport. This industry also has the problem of hopper car shortages as mentioned earlier.

The uncertainty of dependable rail service to rural shippers for the export of natural resource commodities initiates a downward spiral of declining demand - reduced service which will have significant impact to Oregon's economy.

# APPENDIX B

## SURVEY TECHNIQUES

B-1. The Questionnaire

B-2. Trade-off Analysis Scenario

B-3. Conjoint Analysis: Rationale and Approach

# APPENDIX B:
# SURVEY TECHNIQUES

## B-1. The Questionnaire

### FREIGHT TRANSPORTATION SURVEY

I. BACKGROUND

The information collected from this survey will provide the data for a research project at Oregon State University. Responses from individual shippers will be presented in aggregate, annonymous, or other disguised forms to insure confidentiality of specific data on sales and customers. The surveys will be destroyed after cummulative tabulation. Your answers will help identify important transportation needs of the southeast portion of Benton County. If you have any questions, please call John Gillam at Oregon State University - Department of Geography (754-3141).

II. IDENTIFICATION

Company name: ______________________________

Mailing address: ______________________________

Person reporting: ____________________ Title: __________

Telephone: ____________________

Name of Parent Company (if any): ____________________

Parent Company address: ____________________

III. OPERATIONS INFORMATION

1. What is the approximate truck/rail split of all outbound commodities shipped from this point?

   truck _____% rail _____% other _____%

2. What is the average number of persons employed at this location?

   ____________

3. What percent of total sales are transportation costs? ______%

4. Indicate typical seasonal activity of inbound rail freight by percent of yearly total volume:

| Jan-Mar | Apr-Jun | Jul-Sep | Oct-Dec |
|---|---|---|---|
| _____% | _____% | _____% | _____% |

5. Indicate typical seasonal activity of outbound rail freight by percent of yearly total volume:

| Jan-Mar | Apr-Jun | Jul-Sep | Oct-Dec |
|---|---|---|---|
| ____% | ____% | ____% | ____% |

IV. OUTBOUND COMMODITIES

1. List the principal outbound commodities shipped from this location by rail. For each commoditiy, estimate the relative tonnage for 1978:

Rail: #1 commodity ____________________; tons __________

Rail: #2 commodity ____________________; tons __________

Rail: #3 commodity ____________________; tons __________

Rail: remaining commodities ____________________; tons __________

2. List the principal outbound commodities shipped from this location by truck. For each commoditiy, estimate the relative tonnage for 1978:

Truck: #1 commodity ____________________; tons __________

Truck: #2 commodity ____________________; tons __________

Truck: #3 commodity ____________________; tons __________

Truck: remaining commodities ____________________; tons __________

3. Identify the four leading commodities shipped from this location by rail and/or by truck (from those listed in question 1 and 2 above).

#1 commodity ________________________

#2 commodity ________________________

#3 commodity ________________________

#4 commodity ________________________

For each of these commodities, draw boundary lines on the attached maps that approximately represents the areas where each outbound commodity is produced for eventual shipment from this location.

4. Consider the four leading commodities shipped from this location (identified in question #3 above). Estimate the relative share of market locations of each of these commodities (by percent of total volume).

| Market Location | #1 commodity | #2 commodity | #3 commodity | #4 commodity |
|---|---|---|---|---|
| Willamette Valley | ____% | ____% | ____% | ____% |
| Rest of West. Oregon | ____% | ____% | ____% | ____% |
| Eastern Oregon | ____% | ____% | ____% | ____% |
| Washington | ____% | ____% | ____% | ____% |
| California | ____% | ____% | ____% | ____% |
| Rocky Mtn. States | ____% | ____% | ____% | ____% |
| Southwest U. S. | ____% | ____% | ____% | ____% |
| North Plains States | ____% | ____% | ____% | ____% |
| South Plains States | ____% | ____% | ____% | ____% |
| Eastern U. S. | ____% | ____% | ____% | ____% |
| Great Lakes States | ____% | ____% | ____% | ____% |
| Far East (over seas) | ____% | ____% | ____% | ____% |
| Other: ________ | ____% | ____% | ____% | ____% |
| | 100% | 100% | 100% | 100% |

Rocky Mtn. States: Idaho, Wyoming, Montana
Southwest U. S.: Nevada, Utah, Colorado, New Mexico, Arizona
North Plains States: North Dakota, South Dakota, Nebraska, Iowa
South Plains States: Kansas, Missouri, Oklahoma, Arkansas, Louisiana, Texas
Great Lakes States: Minnesota, Wisconsin, Michigan, Ohio, Indiana, Illionis
Eastern U. S.: All remaining states (east of Mississippi-Ohio River)

## V. INBOUND COMMODITIES

1. List the principal inbound commodities shipped from this location by rail. For each commoditiy, estimate the relative tonnage for 1978:

   Rail: #1 commodity ____________________; tons __________

   Rail: #2 commodity ____________________; tons __________

   Rail: #3 commodity ____________________; tons __________

   Rail: remaining commodities ____________________; tons __________

2. List the principal inbound commodities shipped from this location by truck. For each commoditiy, estimate the relative tonnage for 1978:

Truck: #1 commodity ____________________; tons __________

Truck: #2 commodity ____________________; tons __________

Truck: #3 commodity ____________________; tons __________

Truck: remaining commodities ____________________; tons __________

3. Identify the four leading commodities shipped from this location by rail and/or by truck (from those listed in question 1 and 2 above). For each leading inbound commodity, list the locations from which it originates.

#1 commodity ________________; origins ________________

#2 commodity ________________; origins ________________

#3 commodity ________________; origins ________________

#4 commodity ________________; origins ________________

VI. SERVICE CHARACTERISTICS

1. Below is a list of transport service attributes. Place an "X" beside each attribute that may be associated with truck and/or rail service.

| Attribute | Rail | Truck |
|---|---|---|
| a. fast service | ________ | ________ |
| b. high frequency of service | ________ | ________ |
| c. good regularity of service | ________ | ________ |
| d. good ability to handle bulk items | ________ | ________ |
| e. good ability to handle perishables | ________ | ________ |
| f. good links to many markets | ________ | ________ |
| g. good relations with transport firms | ________ | ________ |
| h. minimization of theft or damage | ________ | ________ |
| i. ready traceability of consignments | ________ | ________ |
| j. relatively low cost | ________ | ________ |

2. The following list of characteristics describe ways in which rail service could be improved. Rank these characteristics in order from most important (1st), second most important (2nd), etc., to least important (6th).

Rank

a. ________ Reduce rates, while maintaining present service conditions

b. ________ Reduce loss or damage

c. ________ Reduce total transit time

d. ________ Greater availability of cars for outbound loading

e. ________ Increase frequency of service

f. ________ Improve consistency of transit times

VII. RESPONSE TO RAIL SERVICE LOSS

1. If rail servie on the West Side Branch Line were discontinued from Corvallis to Dawson/Monroe, which of the following would most likely occur to your operation? Place an "X" by those items.

a. ________ No impact on production or cost

b. ________ Reduction in production by _____%

c. ________ Jobs would be eliminated (how many?) _____

d. ________ Transport costs would increase by _____?

e. ________ Cause a one-time capital cost to modify facilities or purchase new equipment

f. ________ Transfer to another location (where?) ________

g. ________ Close operations at plant completely

2. If you are forced to close operation at the plant completely due to discontinuance of rail service, what would be the reason?

a. ________ Truck costs are too high

b. ________ No other adequate transport service available

c. ________ Loads are too bulky to handle by truck

d. ________ Special facilities would be needed for loading or storage if trucks were used

e. ________ Other (explain) ____________________

THANK YOU FOR YOUR COOPERATION

## B-2. Trade-off Analysis Scenario

Consider the following situation:

You are a shipper on a rural rail branchline in Benton County, Oregon, served by Southern Pacific Transportation Company. One of the destinations for your products is Texas and this is a prime market that you want to protect. The railroad company is facing financial problems and may have to alter present service levels in order to prevent higher operation costs. The service characteristics and service levels the railroad is analyzing are:

| Characteristics of Service | Service Level 1 | Service Level 2 |
|---|---|---|
| A. Shipment rates on commodites | maintain present rates | 10% increase in rates |
| B. Total transit time to prime market | eight days | eleven days |
| C. Variability expected in quoted transit time | ± three days | ± six days |
| D. Availability of cars as requested | usually available | availability unreliable |

You are asked to compare and rank various combinations of service characteristics and service level based on your business needs. Arrange the sixteen combinations of service characteristics - service levels in order from most preferred to least preferred.

## B-3. Conjoint Analysis: Rationale and Approach

To a certain degree, this study was formulated with the concept of "trade-offs." Seldom are trade-offs not considered in any decision-making process. Given a set of options, one usually considers (either consciously or subconsciously) what benefits are lost and gained by a particular choice. Furthermore, the values that are placed on the decision criteria are not innate, they are personal, i.e. each individual perceives a unique value system.

This rendering can surely be applied to perceptions of transport service; for example when faced with a modal choice decision of using either truck or rail transportation. Trucking may offer fast service, but rail offers lower cost service. Thus, in deciding which mode to select a trade-off is considered--the attribute of fast service vs. the attribute of low cost service. The value placed on each attribute is unique to each shipper, depending on the needs of the shipper.

One form of trade-off analysis is conjoint measurement. This technique originated from the fields of mathematical psychology and psychometrics[42], and later introduced into the marketing literature[43]. More recently various trade-off analysis techniques (conjoint measurement[44], utility theory[45], non-metric scaling[46], and conjoint scaling[47]) have attracted much attention in marketing literature. The techniques begin with the consumer's overall judgements about a set of complex alternatives. The alternatives are then ranked in order of preference by the consumer. Then the original evaluations are transformed into compatible utility scales by which the original judgements can be reconstituted. Thus, ordinal data is transformed into ratio scaled utility values. With the aid of various multi-dimensional scaling computer programs (e.g. MONANOVA[48]) the output is expressed in decimal units, thus enabling a quantitative assessment of the perceived utility to be interpreted.

To initiate the analysis, a personal interview was requested with each shipper. Because of the small sampling and the need for a high rate of quality responses, personal interviews were preferred to questionnaires. The shippers were all presented with a common rail transportation scenario, as presented in Appendix B-2.

The service characteristics presented in the scenario were the attributes that ranked highest overall by the shippers in the rank-order test (rates, total transit time, variability of quoted transit time, rail car availability). Texas was selected as the market in the scenario because nearly all the shippers had customers in Texas or of comparable distances. The transit time and variability of transit time components associated with the two service levels were based on standard Southern Pacific transit time quotes and common time delays experienced by the shippers. The rate differential expressed in the two service levels were based on rate increases experienced by the shippers over a period of several years. Car availability was merely stated as "usually available" or "availability unreliable". During the interview, the shippers were told to consider the idea of the trade-off situation involving the alternative combinations of service characteristics/service levels.

The shippers were presented with sixteen 3"x 5" cards, each with a unique combination of service characteristics/service levels. To ease in the decision-making process, shippers were presented with only two cards at a time (randomly chosen by the author) and were asked to select the preferred situation depicted by the two cards; this process was repeated several times until the shipper agreed upon the rank order of the cards from first choice to sixteenth choice. The responses were recorded and entered as input into the FORTRAN IV program, MONANOVA[49]. The MONANOVA output assigned a decimal value to each service characteristic to be derived from each shipper. The utility values are presented in Table 6 (Appendix C) and a discussion of the results is offered in Section VI, "Alternative Combination of Service Levels."

# APPENDIX C

## TABLES OF SURVEY FINDINGS AND BACKGROUND DATA

Table 1

Benton County Agricultural Production (1978)[9]

| Principle Crops | Acres | Production* | Cash Receipts |
|---|---|---|---|
| field seed crops | 25,950 | 15,681 tons | $5,207 |
| vegetables | 7,962 | 59,176 tons | $4,682 |
| cereal grains | 13,600 | 490,900 bu. | $1,147 |
| specialty field crops | 4,010 | 131 tons | $2,573 |
| Christmas Trees | n/a | 1,150,000 trees | $5,460 |

*note dissimilar units

Table 2

MODAL SPLIT OF BRANCHLINE BUSINESSES

| Businesses | Principle Commodities | Rail | Truck |
|---|---|---|---|
| Establishment "A" | pulp product | 20% | 80% |
| Establishment "B" | plywood | 67% | 33% |
| Establishment "C" | grass seed, wheat | 90% | 10% |
| Establishment "D" | Christmas trees | 20% | 80% |
| Establishment "E" | fertilizers | 100% | 0% |
| Establishment "F" | Christmas trees | 20% | 80% |
| Establishment "G" | Christmas trees | 15% | 85% |
| Establishment "H" | lumber, chips, fuel, sawdust | 90% | 10% |
| Establishment "I" | lumber, logs | 75% | 25% |

All figures are shipper estimates. Establishment "A" utilizes TOFC and is assumed in this study to be rail traffic only.

Table 3
COMPARATIVE SHIPPER STATISTICS

| Establishment | Station | Commodities | Principle Rail Market Regions | Rail Modal Split | 1978 Rail Car Generation | 1978 SPRR Revenue |
|---|---|---|---|---|---|---|
| Shipper "A" | Dry Creek | pulp product | Rocky Mtn. States, South Plains States | 20% | 22 | $ 13,780 |
| Shipper "B" | Dry Creek | plywood | Eastern US States, Great Lakes States | 67% | 559 | $507,067 |
| Shipper "C" | Greenberry/ Dry Creek | grass seed wheat | Florida, Carolinas[1.] | 90% | 117 | $219,143 |
| Shipper "D" | Greenberry | Christmas trees | Texas, California, New York | 20% | 40 (estimate) | $ 53,300 (estimate) |
| Shipper "E" | Alpine Junction | fertilizers | local consumers[2.] | 100% | 27 | $ 12,158 |
| Shipper "F" | Alpine Junction | Christmas trees | Southwest States, California | 20% | 44 | $ 58,645 |
| Shipper "G" | Monroe | Christmas trees | Texas, California | 15% | 32 | $ 42,650 (estimate) |
| Shipper "H" | Dawson | lumber, chips | Southwest States, California[3.] | 90% | 244 | $237,000 (estimate) |
| Shipper "I" | Dawson | lumber, logs | California, South Plains States | 75% | 936 | $910,489 |

1. All wheat is shipped to Portland for export.
2. All rail freight is inbound from British Columbia, Eastern Washington and Idaho.
3. Nearly all chips are shipped to Port of Toledo for export.

Table 4

PREDICTED RESPONSES TO ABANDONMENT

| | Response Option | Affirmative Prediction |
|---|---|---|
| a. | No impact on production or cost | 2/9* |
| b. | Reduction in production | 1/9 |
| c. | Jobs would be eliminated | 1/9 |
| d. | Transport costs would increase | 4/9 |
| e. | Cause a one-time capital cost to modify facilities or purchase new equipment | 2/9 |
| f. | Transfer to another location | 1/9 |
| g. | Close operations completely | 3/9 |

Table 5

TRANSPORT SERVICE ATTRIBUTES

| | Attribute | Rail | Truck |
|---|---|---|---|
| a. | fast service | 1/9* | 9/9* |
| b. | high frequency of service | 4/9 | 7/9 |
| c. | good regularity of service | 5/9 | 5/9 |
| d. | good ability to handle bulk items | 7/9 | 7/9 |
| e. | good ability to handle perishables | 3/3 | 0/3 |
| f. | good links to many markets | 4/8 | 7/8 |
| g. | good relations with transport firms | 6/9 | 8/9 |
| h. | minimization of theft or damage | 6/8 | 4/8 |
| i. | ready traceability of consignments | 6/9 | 2/9 |
| j. | relatively low cost | 6/9 | 3/9 |

*Numerator represents the number of shippers that had an affirmative response to the attribute. Denominator represents the total number of shippers that responded to the attribute.

Table 6

DESIRED RAIL SERVICE IMPROVEMENTS

| | Rank Score By Establishments | | | | | | | | | Results | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Improvements | Firm "A" | Firm "B" | Firm "C" | Firm "D" | Firm "E" | Firm "F" | Firm "G" | Firm "H" | Firm "I" | Average Rank Score | Standard Deviation | Overall Value |
| a. Rates | 3 | 2 | 5 | 1 | 5 | 1 | 1 | 1 | 3 | 2.44 | 3.52 | 2 |
| b. Loss/Damage | 5 | 4 | 6 | 6 | 3 | 6 | 6 | 5 | 6 | 5.22 | 3.16 | 6 |
| c. Total Time | 4 | 1 | 3 | 2 | 1 | 2 | 2 | 3 | 1 | 2.11 | 2.71 | 1 |
| d. Availability | 2 | 3 | 1 | 3 | 6 | 4 | 5 | 2 | 2 | 3.11 | 3.37 | 3 |
| e. Frequency | 6 | 6 | 4 | 4 | 4 | 5 | 4 | 6 | 5 | 4.88 | 2.67 | 5 |
| f. Consistency | 1 | 5 | 2 | 5 | 2 | 3 | 3 | 4 | 4 | 3.22 | 3.19 | 4 |

| Type of Establishment | |
|---|---|
| Establishment "A" | pulp product |
| Establishment "B" | plywood |
| Establishment "C" | grass seed, wheat |
| Establishment "D" | Christmas trees |
| Establishment "E" | fertilizers |
| Establishment "F" | Christmas Trees |
| Establishment "G" | Christmas Trees |
| Establishment "H" | lumber, chips, fuel, sawdust |
| Establishment "I" | lumber, logs |

Desired Improvements

a. Reduce rates, while maintaining present service conditions.

b. Reduce loss or damages.

c. Reduce total transit time.

d. Provide greater availability of cars for outbound loading.

e. Increase frequency of service.

f. Improve consistency of transit times.

Table 7

SERVICE LEVEL UTILITIES

| Establishment* | Rates | Transit Time | Time Variability | Car Availability |
|---|---|---|---|---|
| Firm "A" | 1.735 | .434 | .217 | .868 |
| Firm "B" | 1.118 | 1.464 | .506 | .591 |
| Firm "C" | .540 | .550 | .559 | 1.759 |
| Firm "D" | .541 | 1.307 | 1.306 | .541 |
| Firm "F" | 1.001 | 1.014 | .994 | .992 |
| Firm "H" | 1.325 | .667 | .028 | 1.341 |
| Firm "I" | .715 | .987 | .534 | 1.493 |

*Refer to Table 2 for establishment identification

Table 8

COMPARATIVE RATES-OF-RETURN,1976

| Industry | Net income after taxes as percent of net worth* |
|---|---|
| Class I railroads | 1.8 |
| Telephone and telegraph companies | 11.6 |
| Electric and gas utilities | 11.8 |
| Commercial banking | 11.8 |
| Air transportation | 13.1 |
| Common carrier trucking | 14.8 |
| Total manufacturing (U.S.) | 15.0 |
| Total, all industries | 13.3 |

*Net worth is defined as stockholders' equity.

SOURCE: Monthly Economic Letter, First National City Bank, Economics Department, New York, April 1977.

Table 9
RAILROAD COMMODITY FLOW, OREGON
1960 and 1976

| Commodity 1/ | Inbound Shipments | | Outbound Shipments | | Intrastate Shipments | | Total Handled | |
|---|---|---|---|---|---|---|---|---|
| | Million Ton | Percent | Million Ton | Percent | Million Ton | Percent | Million Ton | Percent |
| 1976 | | | | | | | | |
| All Commodities | 8.74 | 100.00 | 13.99 | 100.00 | 4.42 | 100.00 | 27.16 | 100.00 |
| Agricultural Products | 2.14 | 24.5 | .49 | 3.5 | .32 | 7.3 | 2.96 | 10.9 |
| Wood Products | 1.83 | 20.9 | 9.16 | 65.4 | 3.49 | 79.0 | 14.48 | 53.3 |
| Manufactured and Misc. | 3.91 | 44.7 | 4.15 | 29.6 | .39 | 8.9 | 8.45 | 31.1 |
| Mineral Products | .87 | 9.9 | .20 | 1.4 | .21 | 4.8 | 1.28 | 4.7 |
| 1960 | | | | | | | | |
| All Commodities | 5.08 | 100.00 | 12.19 | 100.00 | 4.88 | 100.00 | 22.16 | 100.00 |
| Agricultural Products | 1.85 | 36.4 | 1.06 | 8.7 | .43 | 8.8 | 3.34 | 15.1 |
| Wood Products | .16 | 3.2 | 8.74 | 71.7 | 2.93 | 60.0 | 11.83 | 53.4 |
| Manufactured and Misc. | 2.17 | 42.8 | 2.15 | 17.6 | .77 | 15.7 | 5.09 | 23.0 |
| Mineral Products | .89 | 17.6 | .25 | 2.0 | .76 | 15.5 | 1.90 | 8.6 |
| Change 1960 - 1976 | | | | | | | | |
| All Commodities | | 72.0 | | 14.8 | | - 9.4 | | 22.6 |
| Agricultural Products | | 15.6 | | - 53.3 | | - 24.4 | | - 11.4 |
| Wood Products | | 1006.8 | | 4.8 | | 19.5 | | 22.4 |
| Manufactured and Misc. | | 79.9 | | 92.6 | | - 49.7 | | 65.9 |
| Mineral Products | | - 3.2 | | - 19.1 | | - 72.0 | | - 32.7 |

1/ Manufactured and miscellaneous includes paper products and excludes wood products.

Source: ICC 1% Waybill Sample for Class I Railroads

As reprinted by Oregon Rail Plan

Table 10
FRA LINE AND TRAIL CATEGORIES

FRA DENSITY CATEGORIES

| FRA Category | Line Density |
|---|---|
| "B" Branchline | 0.0 to 1.0 million gross tons |
| "A" Branchline | 1.0 to 5.0 million gross tons |
| "B" Mainline | 5.0 to 20.0 million gross tons |
| "A" Mainline | over 20.0 million gross tons |

FRA SPEED RESTRICTIONS

| FRA Track Class | Freight Train | Passenger Train |
|---|---|---|
| Class 1 | 10 miles per hour | 15 miles per hour |
| Class 2 | 25 miles per hour | 30 miles per hour |
| Class 3 | 40 miles per hour | 60 miles per hour |
| Class 4 | 60 miles per hour | 80 miles per hour |
| Class 5 | 80 miles per hour | 90 miles per hour |
| Class 6 | 110 miles per hour | 110 miles per hour |

NOTE: Certain dimensional and weight restrictions are often used to describe railroad lines. For the purposes of the Oregon Rail Plan, a line was considered to have a dimensional restriction if it could not accomodate a "plate F car", i.e., a maximum height of 17 feet above the rails - approximately the height of a large wood chip car. A line is considered to have a weight restriction if it could not accommodate a 263,000 pound four axle car. However, neither the dimensional nor weight restrictions apply to the case study branchline.

# APPENDIX D

## SYNOPSIS OF TRANSPORTATION LEGISLATION

SOURCE: Michael V. Martin, et. al, The Transporation System Serving Agriculture in the Pacific Northwest (Oregon State University, Department of Agricultural and Resource Economics, May 1979), pp. I-13 to I-21.

# APPENDIX D

# SYNOPSIS OF TRANSPORTATION LEGISLATION

Historical Chart of Government Actions and Legislation
Affecting Transportation

| Year | Event or Act | Major Provisions of Act | Reasons for Legislation |
|---|---|---|---|
| Early 1870's | Granger Movement | Several Western States (Illinois, Iowa, Wisconsin, Minnesota) enacted laws subjecting railroads to legislation - generally maximum rate control. | Agrarian revolt. Strong public resentment of railroad practices. |
| Late 1870's | Granger Laws were replaced | Even though the laws were repealed, with the exception of Illinois, they had initiated the idea of the regulatory agency. | Panic of 1873 perhaps most important reason. Vigorous campaign by railroads that the laws were bad for business. Basic unsoundness of some of the provisions- they were vague and did not work well in practice. |
| 1886 | Wabash Case | Supreme Court ruled that a state could not control rates on interstate traffic. | Made a sharp distinction between interstate and intrastate commerce. Federal action on interstate commerce was made necessary. |
| 1887 | Act to regulate Commerce | Section 1- required that all rates be just and reasonable<br>Section 2- prohibited personal discrimination in rates<br>Section 3- prohibited preferencial treatment in any form<br>Section 4- prohibited charging more for a short haul than for a longer haul of similar circumstances<br>Section 5- prevented pooling of freight by carriers (idea was that enforced competition was the best regulator)<br>Section 6- stated that all rates and fares were to be published<br>Created Interstate Commerce Commission to administer the new laws. Commission made up of 5 members, 6 yr. terms, appointed by the president. Changed to 11 members, 7 yr. terms in 1920. | At this time the railroads generally exercise monopoly control over the markets they served. This legislation was a reflection of that economic fact. |

| Year | Event or Act | Major Provisions of Act | Reasons for Legislation |
|---|---|---|---|
| 1893 | Compulsory Testimony Act | Grants ICC witnesses immunity with respect to their testimony. | Eliminates Fifth Amendment refusal to testify in ICC proceedings. |
| 1896 & 1897 | Supreme Court Ruling | Supreme Court ruled ICC did not have power to prescribe either actual or maximum rates. Supreme Court invalidated Section 4-Long and Short Haul clause of Act to to Regulate Commerce. | Legal setbacks to authority of ICC |
| 1903 | Mann-Elkins Act | Gave ICC cases priority over other cases in the Federal Court System | Reduce time-log in processing of ICC cases. |
| 1903 | Elkins Act | Every railroad departure from published tariff was declared a misdemeanor. Unlawful to receive rebates or concessions. | Strengthen law relating to personal discrimination and rebating. |
| 1906 | Hepburn Act | Expanded ICC regulation to include express companies, sleeping car companies, and oil pipelines. Gave ICC power to prescribe maximum rates. Gave ICC power to establish through routes. Required carriers to give 30 day notice of rate change. Declared it illegal for railroads to carry goods which they produced, with the exception of lumber and goods which they produced for their own consumption. Increased size of ICC from 5 to 7 members and changed length of terms from 6 to 7 years. | Further strengthen authority of ICC in order to make railroad legislation more effective. |
| 1910 | Mann-Elkins Act | Permitted ICC to suspend proposed rate changes for up to 120 days while it addressed reasonableness of proposal. An additional 6 months suspension was permitted if 120 days proved inadequate. Shifted burden of proof in rate change proposal to the railroads. Revived Section 4 of the Act to Regulate Commerce. Forbid carriers to charge more for short haul than for long haul. | Main thrust was to prevent economic harm to shipper, and also carrier, by creating a set procedure for handling rate change proposals. |
| 1913 | Valuation Act | Directed ICC to conduct an economic valuation of all railroad property in the United States. | Give ICC economic information with which to better judge proposed rate changes. |

| Year | Event or Act | Major Provisions of Act | Reasons for Legislation |
|---|---|---|---|
| Dec. 28, 1917 | Proclamation of President Wilson | By proclamation of President Wilson the federal government took over the railroads in order to facilitate the movement of troops and supplies. Movement of needed supplies was promoted by holding down rates. Created United States Railroad Administration to control operations. | Facilitate War effort |
| 1920 | Transportation Act of 1920 | Gave ICC authority over minimum and actual rates, strengthened its intrastate rate making role, and clarified ICC approach to aggregate industry rate making. Directed ICC to allow railroads to make a fair return on the fair value of their property. ICC could require intrastate rates to be increased if it considered them to be too low or burdensome to interstate commerce. ICC conferred authority over new railroad construction. Railroads required to obtain certificate of public convenience and necessity. ICC granted authority over rail abandonment. ICC given control over issuance of railroad securities. ICC given broad powers to regulate utilization of rail equipment in times of emergency. Created nine member railroad Labor Board to help resolve labor disputes. Expanded ICC to eleven members. | Guide transition from wartime operation of railroads by federal government back to private operation. |
| 1925 | Hoch-Smith Resolution | ICC directed to establish lowest possible lawful rates for agricultural products. ICC to consider condition of shipping industry when determining minimum rates. | Aid to agriculture which had been in depressed condition since 1920 |
| 1926 | Railway Labor Act | All labor disputes must be considered and decided between representatives of the two parties involved. Created National Railroad Adjustment Board to referee negotiations. Created National Mediation Board to handle disputes not settled by conference of two parties involved. Dispute may be submitted to non-compulsory arbitration. As last resort, President may create an Emer- | Procedure developed for settling railway labor disputes. |

| Year | Event or Act | Major Provisions of Act | Reasons for Legislation |
|---|---|---|---|
| | | gency Board to investigate and find solutions, however solution is not binding. | |
| 1920's-1930's | Regulation of motor carriage at the state level. | Individual states established regulatory standards that governed such factors as motor vehicle speed, weights, lengths, and lighting systems, and driver qualifications. There was also some economic regulation by states: certification and rate control. | There were diverse reasons for state regulation: Governance of highway use, protection of shippers and passengers from carrier irresponsibility, and protection of railroads from new competitors. |
| 1933 | Amendment to Bankruptcy Act of 1898 | Railroad reorganization after bankruptcy placed under jurisdiction of only one court. Only 2/3 of any creditor class had to agree to reorganization. | Attempt to aid with serious financial condition confronting carriers as a result of the industrial depression which began in 1929. Diversion from rail traffic to motor carriage intensified problem. |
| 1933 | Emergency Transportation Act | Created office of Federal Coordinator of Transportation. Task was to better plan and coordinate industry. Lack of labor and management support caused abolishment of office in 1936. Modified 1920 rule of rate making to consider economics and efficiency of rail transportation service. | Aid to railroads. Declining traffic, reduced earnings, and financial distress of railroads was nearing crisis situation. |
| 1935 | Motor Carrier Act | Established ICC control over interstate motor carriage. The act divided motor carriage into common, contract, exempt, and private carriage. A fifth grouping for truck brokers was also established. Stability of rates, prevention of discrimination, financial soundness, and dependable service were main issues addressed. | Result of inability of states to control the operations of interstate buses and trucks. There was strong general public support for the regulation of motor vehicles. |
| 1925 | Kelly Act | Permitted Post Office Department to award airmail contracts through competitive bidding. | Helped to provide steady source of income for early airlines and promoted air transport industry. |
| 1926 | Air Commerce Act | Established Bureau of Air Commerce and directed it to develop, operate, and maintain all necessary air navigation facilities except airports. Directed Department of Commerce to regulate air safety. | Provided promotion for the air industry and set the precedent for federal regulation of air carriers. |

| Year | Event or Act | Major Provisions of Act | Reasons for Legislation |
|---|---|---|---|
| 1930 | McNary-Watres Act | Postmaster permitted to award airmail contracts without competitive bidding. Post Office Department granted power to certify routes, control carrier consolidations, and prescribe a system of accounts for carriers. | Attempt to help stabilize and unify the air carrier industry. |
| 1934 | Special Senate Committee Action | Senator Hugo Black sought and obtained cancellation of all domestic airmail contracts. Initiated a period during which the U.S. Army carried the mail. | Suspected collusion between air carriers and Post Office officials. |
| 1934 | Air Mail Act | Post Office Department empowered to award airmail contracts and enforce airmail regulation. Created Federal Aviation Commission to study all phases of aviation. | Prevent further deterioration of the financial condition of the air industry and to tighten regulatory controls. |
| 1938 | Civil Aeronautics Act | Created Civil Aeronautics Authority. Directed CAA to "recognize and preserve" inherent advantages of air transportation, and to promote "adequate", economical, and efficient air service. In addition to economic regulation, CAA responsibilities included safety regulation,and the construction, maintainance, and operation of federal airways. | More effectively deal with financial and safety problems of the air industry. Set up a system of regulation of air carriers comparable to that which had been provided for railroads and motor carriers. |
| 1940 | Transportation Act of 1940 | Established ICC control of water carriers, made changes in railroad regulation, and contained a national transportation policy to guide ICC regulation of the different transportation modes. Empowered ICC to control entry and rates in water carriage industry. Lobbying efforts by shippers of bulk commodities and agricultural interests led to several major regulatory exemptions: 1) Cargo of not more than three bulk commodities in one shipment are exempt. 2) Liquid commodities are similiarly exempted. 3) Mixing of exempt and regulated commodities in one shipment was not allowed until a 1973 amendment changed the ruling. Changes in railroad regulation stated that consolidations would not have to conform to an ICC master plan. | Attempt to deal with changes in the nature of the transportation problem since 1920. Intermodal competition was of prime concern. |

| Year | Event or Act | Major Provisions of Act | Reasons for Legislation |
|---|---|---|---|
| | | **Burden of proof in rate change proposals** was placed on railroads. Railroads were released from land grant obligation to carry government property at reduced rates. | |
| 1942 | Freight Forwarding Act | Established ICC control over surface freight forwarders. Included a grandfather clause. Entry and rates were regulated. | ICC reported that freight forwarding rates were very unstable and that general chaos existed in the industry. ICC requested and received from Congress power to regulate freight forwarders. |
| 1948 | Railroad Modification Act | Authorized the alteration or modification of the terms of railroad securities (i.e., extending maturity date of bonds, reducing interest rate on bonds, refunding existing obligations, etc.) if approved by ICC and 75 percent of holders of principle amount or number of shares of each class of securities affected. | Help carriers ward off pending financial difficulties by appropriate measures. Attempt to avoid forcing railroads into receivership or trusteeship when financial troubles were of a temporary nature. |
| 1948 | Reed-Bulwinkli Act | Granted an antitrust exemption to the collective rate making activities of ICC regulated carriers. Legalized rate bureaus if their rules, regulations, and procedures were approved by the ICC. | General belief that rate bureaus perform a useful function because they provide machinery by which proposals for rate changes can be carefully considered. |
| 1958 | Transportation Act of 1958 | Granted ICC authority over passenger train service (was under state authority till this time). Allowed railroads to give 30 day notice of passenger route discontinuance. (At this time, passenger train losses were absorbing 44 percent of railroads net operating revenues.) ICC given power to raise intrastate rates if undue burden on interstate commerce. Loan guarantees - federal loan guarantees of up to $500 million for needed capital expenditures. Congress directed ICC not to hold up rail rates for explicit purpose of protecting other modes of transportation. Attempted to prevent further diversion of traffic from regulated to unregulated modes by ending several specific exemptions: frozen fruits, vegetables, and berries. | Basic goal was to strengthen financial position of the nation's railroads. Intense water and motor carrier competition deteriorated physical plant, economic recession, increasing losses from passenger train service, and the resulting difficulty in attracting capital were difficulties of railroads. |

| Year | Event or Act | Major Provisions of Act | Reasons for Legislation |
|---|---|---|---|
| 1958 | Federal Aviation Act | Created Federal Aviation Agency to replace Civil Aeronautics Administration. Act was largely concerned with matters of safety regulation. Civil Aeronautics Board continued role of economic regulation. | Several serious air crashes in the 1950's promoted Congress to pass this legislation. |
| 1944 | Federal-Aid Highway Act | Provided for the selection of a system of highways to be known as the "National System of Interstate Highways" to be, "so located as to connect by routes, as direct as practicable, the principal metropolitan areas, cities, and industrial centers, and to serve the national defense, and to connect at suitable border points with routes of continental importance in the Dominian of Canada and the Republic of Mexico." | To improve the national highway system. |
| 1956 | Federal-Aid Highway Act | Changed name of system to "National System of Interstate and Defense Highways." Financing of construction is on a 90-10 basis, with the federal government paying 90 percent of the cost of developing the system. Highway Trust Fund, which received proceeds from the federal motor-fuel tax and certain other taxes, was set up to finance the Interstate High-Way System. | Continue development of 42,500 mile Interstate Highway System. |
| 1962 | President Kennedy's Transportation Message | Kennedy criticized the existing regulatory system as being inconsistent and outdated. | Reform legislation was blocked by modal interest groups. |
| 1964 | Urban Mass Transportation Act | Provided direct grants for comprehensive transportation planning by state and local governments. Provided low interest loans to improve mass transportation facilities. | Effort on part of federal government to aid states and local governments in dealing with increasing problem of highway congestion in urban areas. |
| 1966 | President Johnson's Transportation Message | Focused on need for coordination of national transportation system. Reorganization and promotion of safety were goals. Proposed creation of Department of Transportation. | There was general support for the President's recommendations. |

| Year | Event or Act | Major Provisions of Act | Reasons for Legislation |
|---|---|---|---|
| 1966 | Department of Transportation Act | Created Department of Transportation. Many transportation activities formally carried on by other departments and agencies of the federal government were transferred to the new department. DOT exercises no regulatory control over any mode of transportation, save for the matter of safety. Federal Maritime Administration not included in the DOT due to lobby efforts of maritime interests. Secretary of DOT may intervene in ICC cases, however he has same standing as any other party, with no special authority. | Facilitate better planning and coordination of the nation's transportation system. |
| 1970 | Rail Passenger Service Act | Created National Rail Passenger Corporation, AMTRAK. Amtrak is to contract with the railroads to provide crews and operating facilities, however equipment is owned by the corporation. Railroads joining the system must pay an amount (cash, equipment, or future services) related to the amount of their passenger rail deficits. Once a railroad joins the system Amtrak takes over operation of the passenger rail routes. | Effort to upgrade intercity passenger service to an acceptable standard and provide a viable rail passenger service between major population centers. |
| 1973 | Regional Rail Reorganization Act (3R Act) | Created United States Railway Association (USRA) to function as the planning and financing agency for reconstructing the Northeastern Railroad System. Created consolidated Rail Corporation (Conrail) which was to operate restructured system as a private, for-profit organization. Conrail initiated operations April 1, 1976. | Attempt to deal with the financial collapse of the Northeastern railroad system. Deteriorating service, cash flow and deferred maintainance problems, and growing operating deficits resulted in Congressional action. |
| 1976 | Railroad Revitalization and Regulatory Reform Act (4R act) | Made several changes in degree of ICC regulation and procedure by which regulation is exercised. Railroad rate making-rates greater than or equal to variable costs were not to be found unjust or unreasonable on basis that they were too low. Rates cannot be ruled too high unless ICC can prove market dominance. ICC should not hold RR rates up to | Financial problems of the Northeastern railroads brought to the attention of the nation and Congress that changes in transportation regulation were necessary. |

| Year | Event or Act | Major Provisions of Act | Reasons for Legislation |
|---|---|---|---|
| | | protect any other carrier or mode. Railroads are to be left free to raise or lower specific rates by up to 7 percent and ICC cannot suspend these rate increases (2 year experiment). Changes in ICC duties: ICC may exempt certain railroad activities from regulation if public interest is not adversely effected. ICC is to rule on merger and consolidation proposals within 2 years after filing date. ICC given exclusive jurisdiction over intrastate rates if state fails to rule within 120 days after railraod filing date. Railroad Funding-$2.1 billion made available to Conrail. $600 million for rehabilitation of RR plant and equipment. $1 billion in loan guarantees. $1.75 billion for upgrading rail passenger service. Other provisions-$360 million made available over three year period to subsidize unprofitable branch lines. Federal share of branch line deficits is 100% the first year, 90% the second, 80% third, and 70% the last two years. Further subsidation is then up to the local governments involved. Railroads permitted to seek relief from state tax discrimination in federal courts. | |

# FOOTNOTES

1. Francis H. Parker and Gorman Gilbert, "Rail Planning - Crises and Opportunity", Journal of American Institute of Planners, Vol. 43 (January, 1977), p. 14.

2. John W. Barriger, "One Railroad's View of State Rail Planning," Transportation Research Record, no. 656: Rail Planning, (1977), pp. 11-13.

3. Oregon Department of Transportation, Oregon Rail Plan, (September, 1978), p. I-7.

4. U. S. Small Business Administration, "Efforts of Railroad Abandonment on Small Business," (April, 1977), p. 4.1.

5. U. S. Department of Agriculture, "Railroad Abaondnments and Alternatives: A Report on Effects Outside the Northeastern Region" (PL 94-210), (May, 1976), pp. 36-54.

6. Benjamin J. Allen, The Economic Effects of Railroad Abandonment: A Case Study (Ph.D. dissertation, University of Illinois, 1974).

7. Oregon Agricultural Experiment Station, Soil Survey of Benton County Area, Oregon, (Soil Conservation Service, July, 1975), p. 111.

8. University of Oregon, Department of Geography, Atlas of Oregon, (1976) pp. 126-127.

9. Oregon State Univeristy Extension Service, "1978 Estimated Cash Receipts from Farm Marketings: Benton County, Oregon," (Benton County Office Extension Service Bulletin, January, 1979).

10. Donald Gordon Holtgrieve, Historical Geography of Transportation Routes and Town Populations in Oregon's Willamette Valley (Ph.D. dissertation, University of Oregon, 1973).

11. FRA represents the Federal Railroad Administration. FRA has developed a Line Density Classification for all rail lines in the United States. Track classes are determined in Oregon by the track inspection program of the Oregon Public Utility Commissioner to provide an indication of the quality of track in the state (refer to Table 10, Appendix C).

12. Track class is a FRA designation of track quality which is directly related to the maximum speed which can safely be operated. Track classes are determined by the track inspection program of the Oregon Public Utility Commission (PUC) (refer to Table 10, Appendix C).

13. Intermodal services in this case refers to TOFC (trailer-on-flatcar).

14. Oregon Rail Plan, op.cit., p. IV-14.

15. Information on exact dates of abandoned branchline spurs were difficult to obtain. Estimates were derived from historical Benton County parcel maps from Oregon State University Kerr Library Map Room.

16. All figures for rail car generation and seasonal split of branchline shippers were calculated from Southern Pacific Transporation Company Coummulative Monthly Traffic Activity Analysis (year 1978).

17. Estimate provided by Southern Pacific Transportation Company personnel, Salem office.

18. Benjamin J. Allen, op. cit.

19. A 1973 study by Simat, Helliesen and Eichner, Inc, "Retrospective Rail Line Abandonment Study" (1973), reviewed the predictions and allegations of various shippers threatened by branchline abandonment and compared them with the actual consequences.

20. Tom Gordon, "All Aboard! A new Era Dawns for the Railroads," Journal of the American Planning Association, vol. 44 (December, 1978), pp. 12-18.

21. Benjamin J. Allen and John F. Due, "Railway Abandonments: Effects Upon the Communties Served," Growth and Change, (April, 1977), pp. 8-14.

22. John F. Due "The Effects of the Abandonment of a Railway Line on Agricultural Areas: A Case Study," Illinois Agricultural Economics, vol. 15 (July, 1975), pp. 14-22.

23. "Railroad Abandonments and Alternatives...," op. cit.

24. C. A. Theodore and F. S. Doody, "The Economic Impact of the Discontinuance of the Rutland Railway," (Boston University Bureau of Business Research, 1966).

25. J. Gloss, T. J. Humphrey, and F. N. Krutter, "An Analysis and Evaluation of Past Experience in Rationalizing Railroad Networks," (Massachusetts Institute of Technology, Report R74-54, 1975).

26. Iowa Commerce Commission, "Economic Impact of Railroad Abandonment in Iowa," (Office of Planning and Programming, 1973).

27. Association of American Railroads, "A Review of Retrospective Railroad Line Abandonment Studies," (AAR Staff Studies Group, Memorandum 78-19, December 1978) p. 9.

28. Feed and fertilizer dealers were determined to experience transport cost increases of $10.00 to $15.00 per ton with rail service loss in a study by: U. S. Department of Agriculture. "Effects of the Proposed Northeast-Midwest Rail Reorganization on Rural Areas," (for U. S. Senate Committee on Agriculture and Forestry, 1975).

29. R. M. Michaels, "User Preferences for Urban Transportation: An Overview," (The Transportation Center, Northwestern University, 1971).

30. C. C. Kissling, "The Quality of Freight Transport in the Nelson District: the User Viewpoint," New Zealand Geographer, vol. 29 (October, 1973), p. 151.

31. Public Utility Commissioner of Oregon, "Investigation to determine that the railroads are furnishing reasonably adequate service, equipment and facilities to the users of rail service in Oregon (RF-279)," (Rate and Service Section, Railroad Division, PUC, 1974).

32. ibid.

33. Joseph B. Kruskal, "MONANOVA: A FORTRAN IV Program for Monotone Analysis of Variance," (Bell Telephone Laboratories, Murray Hill, New Jersey) (date unknown).

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