AN ABSTRACT OF THE THESIS OF

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Abstract approved: _____

The wine grape is one of the oldest cultivated plants and is grown on all continents. Although the wine grape and wine industry is concentrated mainly in California, this does not mean that wine production in the Pacific Northwest is inconsequential. The Oregon wine industry has shown a rapid growth over the last decade. There is a need for economic information about wine grape, wine production and the wine market.

This study describes: (1) the development of the Oregon wine industry; (2) climatic and soil requirements and the situation in Oregon; (3) cultural practices and relevant cost factors influencing production decisions; (4) wine making process and cost characteristics of wineries and wine production; (5) market and demand characteristics exhibited by the wine grape and wine market in the U.S. and Oregon; (6) recommendations for further development of the wine industry.

Wine grape growing in Oregon started with the first settlers coming the last century. The growth of the industry however did not start until the last 15 years, when the demand of wines of Vitis vinifera varieties increased in the United States. Oregon has several areas with climates similar to northern European grape growing regions.

These areas can produce the quality wine which is currently in demand in the U.S.. The actual and potential grape growing areas are mainly located west of the Cascades.

Production of wine grapes and wine requires technical knowledge, high investment cost, and special equipment. The high investment costs of wine grape and wine production must be amoritized over a long time period. Unit costs in wine production decrease as production is expanded. Analysis showed that risk involved in wine grape production is lower than with some other crops currently grown in Oregon. Yield levels are relatively low. A production of 3-5 tons per acre is necessary to give a satisfying return on investment. The grape cost is the single most important cost component of wine production.

The wine market in the U.S. and Oregon is showing oligopsonistic and oligopolistic tendencies. Few wineries purchase most of the wine grapes. The national wine market is highly concentrated, a few large wine companies supply the bulk of the wine. Wine production is concentrated on the West and East coast.

Wine is a heterogeneous commodity leading to a high degree of product differentiation and promotion. Differing state regulations influence wine production, distribution, and consumption. Wine imports from foreign countries are important in the wine market.

Wine consumption increased substantially over the last decade and is expected to increase further as the adult population in the U.S. increases. The Oregon wine industry is still in the introductory stage of the product life-cycle. Huge promotional efforts are needed in the future to increase the demand for Oregon wine. Consumer uncertainty

about wine underlines the need for product promotion and education about wine.

High investment costs and the advantage of some degree of vertical integration of wine and wine grape production leads to the conclusion that a cooperative as an alternative business form might be helpful for further development of the industry.

A commodity commission for wine is suggested for effective promotion of Oregon wine. A commodity commission might encourage the establishment and control of quality standards which appear necessary to improve product loyalty and thus the demand for Oregon wine.

Further research is needed for viticultural, enological and economic aspects of wine production. Research in the wine market and wine consumer has to account for the heterogeneous character of wine.

THE OREGON WINE INDUSTRY: AN ECONOMIC ANALYSIS

by

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CHAPTER I

Background

The Oregon wine industry has shown a rapid growth in the last decade, having expanded from a few acres to approximately 2,000 acres. There were 36 licensed wineries in 1980. Although California accounts for 85 percent of all wine produced in the United States, this does not mean that the wine production in the Pacific Northwest (PNW) is inconsequential. The PNW states have already distinguished themselves as producers of very unique and quality wines. There is reason to believe the growth of the Oregon wine industry will continue. It is estimated that the wine produced in Oregon will have a retail value of $20 million by 1985 compared to about $7 million in 1980 [25]. A larger industry can offer many opportunities for employment, the use of marginal crop land, and tourism.

In a study by Folwell, total wine consumption in the U.S. is shown to have increased by 8.5 percent between 1973 and 1978 [16]. Contributing to this rising wine consumption are the liberalization of drinking laws, lower legal drinking ages, and shifts in the age distribution of the population [10]. The changing age distribution is a very important factor for the future. Approximately one third of the population was born between 1946 and 1965. The aging of this generation is important to determine the level and structure of the wine consumption in the U.S. [19]. According to TIME (May 28, 1979), the average houshold

income for people in this age group will be close to $30,000 in real terms in 1990, and total spending power will have grown by 70 percent. "Wine makers are also preparing to reap a rich harvest as the Pepsi generation trades its aluminum pop tops for corkscrews", to quote TIME.

The Oregon wine industry has a great potential for participation in this increasing market for the following reason: the PNW states have several areas with climates similar to northern European wine growing regions. These areas in the PNW states can produce the kind of quality wine of the Vitis vinifera grape which is currently in demand in the United States [26].

There has been a strong growth in the consumption of domestic wine relative to imported wine. Several factors have contributed to this overall phenemenon: overpricing in the early 1970's and smaller yields in France caused by adverse climatic conditions in 1977 - 1979 as well as additional pressure of dollar devaluation against the French franc and the German mark.

The potential of the U.S. wine market can be illustrated, in part, by current per capita consumption in California, which is approximately more than twice as much as the national average of 2.09 gallons per person in 1980. There is an immense potential for the wine industry if the per capita consumption rises only by a small amount. An increase of the per capita consumption by one percent would increase the demand for wine by approximately 4.5 million gallons, which is about one half of the amount of wine consumed in Oregon in 1980.

The results of the study by Reitzenstein of wine consumers and

retailers show that there is a relative lack of wine knowledge in these groups [46]. It seems to reinforce the premise that the wine market is in an early stage of development.

In the Oregon wine market imports from other states and foreign countries dominate. The statement of the Oregon Liquor Control Commission of wine manufactured within or imported into Oregon shows a total supply of 8,233,107.87 gallons for 1980 [35]. California accounts for 88.5 percent, other states two percent, foreign countries 6.5 percent, and Oregon itself supplies only three percent. The regional wine industry has a substantial opportunity to increase its market share.

Problem Statement

So far not enough is known about the wine in Oregon to give helpful direction for the wine industry. There have only been a few studies conducted which consider the economic aspects of wine growing and the wine market. The studies from Folwell [16], Moulton [29], and Shea [9] cover the whole United States. Cost and market studies have been conducted by Folwell in Washington and Moulton in California. There are a few agricultural products with as many regional characteristics as wine. That is what, in fact, makes wine so fascinating and desirable to so many people. These studies can serve as good guidelines but they have to be adopted to the specific problems of the Oregon wine industry.

This research attempts to combine these studies with knowledge

about viticulture[a/] and enology[b/] as well as information from representatives of the wine industry, in order to conduct an economic analysis of the Oregon wine grape and wine industry.

Although wine production can be divided into two stages of production, the growing of wine grapes and the making of wine, the two stages cannot be treated separately. The recent development in the Oregon wine industry shows a concentration on wine grapes of the Vitis vinifera varieties. These wine grapes are exclusively used for wine production. Consequently, this study concerns only wine grapes and wine production of Vitis vinifera varieties. The study is designed to provide a basic economic analysis of this industry.

Objectives

The specific objectives of the study were:

(1) To describe the development of the wine industry in the Pacific Northwest.

(2) To describe the production characteristics, cultural practices, wine making process, as well as the institutional factors.

(3) To identify the relevant cost factors influencing the production decisions of both wine grapes and wine.

(4) To describe the demand characteristics, market structure, and consumption behavior of the wine market.

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a/ Viticulture is defined in Webster's dictionary as the science or art of grape growing.

b/ Enology means the science of wines and wine making.

Overview

Chapter II begins with a brief historical review of the wine grape production in the world, on the West Coast, and in Oregon. The chapter continues with the description of the climate and soil requirements which are necessary for successful wine grape growing. The specific Oregon conditions are described and compared with the requirements. Viticultural practices are outlined to give an understanding of the peculiarities of wine grape growing. The next chapter is devoted to costs involved of producing wine grapes and wine in Oregon. The first part of the chapter begins with a general discussion about problems of cost studies. Then investment and production costs of a vineyard are presented and analyzed. The chapter continues with a brief description of the wine making process gives a basis to the following presentation of investment and production costs of wine making. In Chapter IV the wine grape and especailly the wine market is described. The theoretical framework is presented at the beginning of the chapter. Then the economic characteristics of the wine market are analyzed. Chapter V concludes the study with a summary of the important economic characteristics. In this chapter two recommendations for further development of the Oregon wine industry are presented: On the wine grape production level, a cooperative as an alternative business form is suggested. On the wine industry level, the formation of a commodity commission is examined.

CHAPTER II

INDUSTRY SETTING

History

The grape is one of the oldest cultivated plants [2]. Like the banana the grape dates back to prehistoric times. Seeds of grapes have been found in the oldest tombs of Egypt. The Egyptians probably grew grapes and made wine 6000 years ago. The oldest Hebrew, Greek, and Roman writings refer to grapes and wine making. Grape culture began in Asia Minor, in the region between the Black and Caspian Seas. Most botanists agree that this region is the home of the Vitis vinifera, the species from which most of the cultivated varieties of grapes were derived.

The first wine law dates back 1700 years before Christ in Mesopotamia. Techniques of sulfuring, distillation, and lime treatment were described. Through the migration of the Greek, Phoenicians, and Romans the wine culture spread all over the Mediterranean and finally to northern Europe. Many years later when Europeans colonized new lands, the grape was always among the plants taken with them.

World Production and Utilization

The total area of grapes planted in the world was about 10,197 million ha (25,196,787 acres) in 1979 (Table 1). Grape vines are planted in very different climatic areas, including hot and dry, as well as in relatively cool areas. Grape vines are grown up to the 50th

TABLE 1. WORLD GRAPE AND WINE PRODUCTION IN 1979 FOR CONTINENTS AND SELECTED COUNTRIES*

	Area (1000 ha)	Yield (kg per ha)	Production (1000 m. tons)	Wine (1000 m. tons)	Raisins (1000 m. tons)
AFRICA	444	4,615	2,049	976	21
NORTH AMERICA	335	15,043	5,039	1,686	137
United States [F]	260	17,181	4,467	1,583	133
SOUTH AMERICA	577	9,019	5,208	3,440	8
ASIA	1,457	4,487	7,063	195	491
EUROPE	6,017	6,941	41,764	26,894	151
Spain [F]	1,630	4,753	7,748	5,058	4
Italy [F]	1,450	8,090	11,730	7,968	-
France [F]	1,260	10,076	12,696	8,456	-
Germany [F]	90	11,048	993	714	-
USSR	1,300	4,385	5,700	2,920	-
Australia, N. Zeal.	66	11,698	773	427	61
World Total	10,197[a/]	6,629	67,597	36,540	869

Source: FAO Production Yearbook Vol. 33, 1980. F = FAO estimate a/ = 25,196,787 acre

* Amount of Table grapes not listed in the statistic

parallel on the northern hemisphere in Germany and England. On the southern hemisphere they are planted up to the 39th parallel in Chile and New Zealand.

About two thirds of the production areas was in Europe (Table 1). Among the European countries, Spain, Italy, and France accounted for 43 percent of the total world production area. The United States accounted for about two percent in 1979. The data in Table 1 should be used with caution. Certain important countries like Algeria, Austria, Chile, France, and Germany do not publish data on total grape production. The numbers in Table 1 represent FAO estimates. In the second column of Table 1, the yields per ha for the various countries are shown. The U.S. accounted for the highest yields per ha for 1979, whereas the U.S.S.R. had the lowest yield per ha. Europe was the largest grape producer (see column three) with over two thirds of the total grape production. Spain, France, and Italy accounted for seven percent.

About 73 percent of the wine in the world was produced in Europe (Table 1). The U.S. accounted for four percent. The largest production of raisins was in Asia. The U.S. supplied about 15 percent of the world raisin production. The statistics did not give information about the amount of grapes used fresh as table grapes. The world production of grapes was about 67,597,000 metric tons in 1979 which was more than the amount of any other of the deciduous tree fruits. In 1979, there were about 25 million of grape vines planted worldwide [2].

Grapes were produced for various purposes [2]:

(1) about 70 - 80 percent were used for wine production

(2) 8 percent were used as table grapes for fresh consumption

(3) 6 percent were dried to produce raisins

(4) some grapes were made into juice and jelly

(5) in the Middle East some grapes were made into syrup which is used as sugar

History of Wine Production on the West Coast

In North America the Vikings apparently found wild grapes so abundant that they called North America "Vineland". Viticulture was brought to the west coast of America by Spanish conquistadores in the sixteenth century. As the unexplored frontiers were pushed back, grape culture advanced. Native grape vines were first planted on California soil at Mission San Francisco Xavier about the year 1697. From there vines were taken to the other missions. The first European grape vines were introduced to Alta California[a/] at the end of the eighteenth century [60]. During the seventeenth and eighteenth centuries the spread of grape and wine culture was, as in Eurpoe, largely associated with the Catholic church.

Commerical grape production began around Los Angeles in the 1830's and the industry was well in it's way to maturity by the end of the nineteenth century. However, shortly after the turn of the century the industry was increasingly disrupted by the Prohibition movement. Finally the passage of the Eighteenth Amendment in 1919 resulted in a complete destruction of all that the industry had built up over the preceeding 85 years of production, forcing the closure of about 700

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a/ Upper California

commercial wineries. Heads of households were permitted to make up to 250 gallons of wine annually. Prohibition caused reallocations of acreage resulting in unstable prices and income for the grape industry. Significant adjustments in acreage allocations by the wine growers lead to almost balanced demand and supply conditions in both grape and wine production in California in the 1950's [21].

In the 1950's proportionally more wine grapes, particularly of the premium quality varieties, were planted in California. Rapid expansion of the market for table wines in the late 1960's and early 1970's created a pressing demand for the planting of more wine grapes.

Today's American varieties were derived from native wild grapes; in the South, the Muscadine varieties from the species, Vitis rotundifolia, and in the North, varieties like the Concord and Niagara from Vitis labrusca [60]. Grapes from Vitis labrusca tend to be fragrant and flavorful, well suited for juices and jellies but not highly regarded for wines [60].

Varieties belonging to a single species produce more than 90 percent of the world's grapes. This species, Vitis vinifera, is commonly refered to as the Old World grape or European grape. Even in the United States about 90 percent of the total production is of pure vinifera varieties. They are grown mainly in California and with limited acreage in Arizona, Oregon, and Washington. V. vinifera varieties are grown in limited amounts in other states because they are difficult to grow in the climatic extremes in Midwestern and Eastern areas.

United States Production and Utilization

The total production of grapes in the United States was 5,576,100 tons in 1980 (Table 2). California accounted for 92 percent of the total U.S. production. New York's grape production was three percent of the national total and Washington accounted for 2.6 percent. In California the raisin varieties accounted for about 53 percent of California's total grape production [20]. Wine varieties were about 40 percent and table grape varieties about seven percent of the total grape production. In California wine varieties were used almost 100 percent for crush products. Raisin varieties were used for making wine, brandy, raisins, and for fresh consumption. Table grape varieties were used for crush products and fresh consumption.

In New York, Concord grapes represented approximately 70 percent of the total grape production. Concord grapes accounted for about 90 percent of Washington's production [20]. The average grower price, listed in Table 2 column 3, varied from $167 per ton in Pennsylvania to $531 per ton in Oregon. The prices represented averages of all grapes. Prices for premium wine grapes, table grapes, and raisin grapes vary considerably. This explains the relatively high grape price for Oregon where only high quality *V. vinifera* varieties are planted. The value of the total grape production in the U.S. amounted to over $1.3 billion.

The utilization of grapes in the United States for the year 1979 is summarized in Table 3. About 54 percent of the grapes were used for wine, 29 percent were dried for raisins, 10.5 percent were consumed fresh as table grapes, six percent were crushed for juice, and about

TABLE 2. UNITED STATES GRAPES: PRODUCTION, QUANTITY CRUSHED, AVERAGE GROWER PRICES AND FARM VALUE, BY STATES 1980

State	Total Production (tons)	Quantity Crushed (tons)[a/b/]	Aver. Grower Price ($ per ton)	Value of T. Production (1000 $)[c/]
California	5,105,000	2,891,000	238.00	1,215,585
New York	175,000	171,000	217.00	37,975
Washington	145,100	144,700	178.00	25,828
Pennsylvania	56,000	54,000	167.00	9,352
Michigan	49,500	47,800	250.00	12,375
Arizona	12,400		170.00	14,508
Ohio	12,000	11,700	173.00	2,076
Arkansas	6,600	6,560	170.00	1,122
North Carolina	5,800	4,400	276.00	1,518
Georgia & South Carolina	4,500	2,550	388.00	1,746
Missouri	4,200	4,100	254.00	1,067
Oregon	1,415	1,415	531.00	751
Other States	471,100	446,810	229.00	107,567
U.S. Total	5,576,100	3,337,810	237.00	1,323,152

a/ Crushed for all purposes

b/ Substandard raisins delivered to wineries and distilleries not incl.

c/ Value of production losses not included

Sources: California Crop and Livestock Reporting Service and Crop Reporting Board, U.S. Department of Agriculutre.

Oregon State University Extension Service, County Agent Estimates.

TABLE 3. UNITED STATES GRAPES: PRODUCTION AND UTILIZATION

Utilized Production	Fresh Use	Canned	Dried	Crushed for Wine	Crushed for Juice
Tons					
4,988,700	542,100	60,000	1,380,900	2,713,000	310,600
Percentage					
100	10.5	1.2	27.68	54.39	6.23

Source: Agricultural Statistics 1980, USDA.

Oregon's History

Oregon's history of wine growing is almost as old as the state itself. Wine growing began with the settlers coming to the territory over the Oregon Trail in the middle of the last centruy [1]. Some of the settlers brought vine cuttings and began growing grapes in the Willamette Valley south of Portland. Farmers in Ashland grew vinifera table grapes and shipped Flame Tokay to markets. This was before the Tokay industry developed at Lodi in California.

The 1980 Census of Agriculture listed wine production in Oregon of 2,603 gallons (Table 4). In 1880, when the special national Census of wine growing was taken, Jackson county produced 15,000 gallons of wine. In the 1899 Census 536,139 grape vines of bearing age were listed which yielded 2,694.55 tons of grapes. During the first two decades of this century the number of grape vines decreased to 381,302 in 1909 and 361,484 in 1919. The value of production increased from $98,776 in 1909 to $170,558 in 1919.

Complete statistics for grape and wine production in Oregon were not available. The earlier Censuses listed only quantities of wine produced. In contrast, the later Censuses listed only the production figures of wine grape production.

TABLE 4. OREGON GRAPE AND WINE INDUSTRY: PRODUCTION, NUMBER OF VINES, VALUE OF PRODUCTION 1860 - 1978

Year	Acres	# Of Vines	Bearing	Non-bearing	Production Tons	Value Of Production (Dollars)	Gallons Produced
1860							2,603
1870							1,751
1880							15,000[a/]
1890							
1899			537,139		2,694		
1909		468,598	381,302		1,603	98,776	
1919		397,054	361,484	35,570	1,421	170,558	
1924		648,514					
1929		599,579	517,892	81,687	2,668	111,663	
1934		599,943	528,700	71,243	1,904	49,517	
1939		438,497	398,157	40,340	1,606	57,788	
1944		350,657			1,384	127,921	
1949		286,619	223,041	63,578	899	57,993	
1954		173,589	164,961	8,628	303	24,515	
1959		112,742	102,022	10,720	616	49,359	
1964		89,052	78,590	10,462	519	80,000	
1969	89	39,885	32,574	7,311	289	66,000	
1974	432	225,252	56,406	168,846	1,190	457,000	
1978	1,305	918,662	464,511	454,151	1,413	522,000	

a/ Only Jackson county was listed

Source: U.S. Census of Agriculture

Grapes were grown from the vinifera and labrusca varieties. The V. vinifera grapes were limited to Jackson, Josephine Counties, and the Columbia Basin. Labrusca grapes were grown in the Umpqua, Rogue River, Willamette Valleys, the Columbia Basin, and as far northeast as Umatilla County [1]. Around the turn of the century Professor F. T. Bioletti suggested that several Oregon locations seemed climatically suited for Vitis vinifera varieties. But Oregon agricultural authorities were not impressed with the idea of developing the state wine industry.

The wine industry was prospering around 1900 and won honors [1]. A wine from Ernst Reuter, a German settler near Forest Grove, won a silver medal at the 1904 St. Louis Exhibition.

The Oregon wine industry experienced a decrease in production after 1900 to 1920. In anticipation of Prohibition most wine producers expected disaster. There were dozens of old farmer wineries in Oregon when Prohibition began in 1920 but the dry law did not put them completely out of business. In fact the grape production went up from 1,421 tons in 1919 to 2,668 tons in 1929. (Table 4) The wine production instead shifted to "basements and bathrooms".

The first license after the Repeal of Prohibition was granted to Louis Herbolt in 1933. Due to Mr. Herbolt's efforts in the post Prohibition era the number of wineries increased to 28 in 1938 and the total production in that year exceeded one million gallons. [44] However after 1938 the number of bonded wineries and total production of wine declined progressively. A major reason for the decline of Oregon's wine industry was the strong competition from California. The decline began just one year after the California Legislature passed

their Marketing Act. The California Marketing Act of 1937 enabled the passage of marketing orders for wine to stabilize prices. Through promotional and other activities of the California Wine Advisory Borad, California intended to become the nation's number one wine supplier. They succeeded in that respect [21]. Oregon grape and wine production declined until the 1960's.

In the 1960's the whole national pattern of grape growing was reversed. In 1965 Dr. Konstantin Frank introduced his New York State Johannisberg Riesling and Chardonnay wines. This was considered a sensation by the wine industry because this meant that California no longer was the only state that could grow the true vinifera grapes of Europe, although vinifera grapes had been grown for much of this century in Washington, Oregon, Arizona, Idaho, and Utah [1].

In the 1960's a change in consumer taste towards table wines was noticed. The demand for dessert wines declined. Better grapes were required, new vineyards were needed. California's surplus raisin and table grapes and the East's leftover Concord were no longer desirable [1] The rapid expansion of the market for table wines in the 1960's created a pressing demand for the planting of more wine grapes. The better products of the new premium quality varieties along with education on the value of wine in the diet lead to a renewed interest in wines.

It was at that time that the wine industry in Oregon was reborn [1]. The pioneers of the new industry came mainly from California. These pioneers had to do much experimentation while exploring grape growing and wine making in the northwest climate. They showed that

several grape varieties were better suited to Oregon than to other locations in the United States including California.

In 1968 The Economic Development Division of the Oregon State Department of Commerce published a report on potential for development of the wine industry [44]. The report was optimistic about the future of the wine industry but urged that research in viticulture and enology was needed to aid the developing industry.

At that time Oregon State University started to plant grape vines of different varieties at the Research Centers in Medford, Aurora, and Corvallis. Together with several commercial growers, the Department of Horticulture tested 27 vinifera and several rootstock varieties. In 1976 the Northwest Regional Commission authorized a Tri-state Grape Research Project with test plots in Oregon, Washington, and Idaho. The research is conducted through three state institutions: Oregon State University, Washington State University, and University of Idaho. The objectives of the project are: [39]:

(1) to seek solutions to specific developmental problems of an industry that is new to the Pacific Northwest: a wine and wine grape industry based upon selected European vinifera varieties.

(2) To explore the varieties and methods best suited to the unique growing conditions of the region.

(3) To develop techniques that are applicable to vineyards and small wineries in the Pacific Northwest.

Oregon's Wine Grape Production and Location

County Extension agents' estimates of wine grape production are tabulated annually (Table 5). In 1980, a state total of 1,305 acres were harvested which yielded 3,940 tons of grapes. Total acreage of non-bearing wine grapes were not available. An acreage survey was planned by the OSU Extension Information Service for fall 1980.

The greatest concentration of wine grape growing in Oregon was in the Willamette Valley. The Willamette Valley is also the most agriculturally diversified in the state. Because the valley floor often experienced frosts, most vineyards lay along the hillsides. Washington and Yamhill Counties accounted for most of the grape production in 1980.

The average price growers received was $531 per ton. The highest price was received in Washington County, the lowest in Morrow County. The grapes in Morrow County were mainly Concords. Those grapes were used for juice production.

Yield per Acre

Yields per acre vary considerably according to variety, soil, and climate conditions. Comparision of yields per acre was difficult for several reasons. There were hardly any data about acreage and production available prior to 1975. In that year the first survey of the Oregon Wine Growers Council was conducted. The U.S. Census listed only number of vines of bearing and non bearing age. Various spacing practices existed and were varying over time within regions. Using California figures must be done with caution because different varieties

TABLE 5. OREGON WINE GRAPE PRODUCTION: ACREAGE, YIELD PER ACRE, PRODUCTION, PRICE RECEIVED PER TON AND VALUE OF PRODUCTION, BY COUNTY IN 1980

County	Harvested Acres	Yield (tons) (per acre)	Production (tons)	Av. Grower Price ($ per t.)	Value of Production (1,000 $)
Benton	25	4	100	460	46
Clackamas	25	4	100	300	30
Lane	30	3	90	644	58
Linn	25	4	100	460	46
Marion	35	2.9	100	600	60
Multnomah	5	3	15	333	5
Washington	200	2	400	675	270
Yamhill	700	3	2,100	600	1,260
Douglas	130	3.5	455	325	148
Jackson	60	2.5	150	500	75
Josephine	45	2.4	110	500	55
Morrow[a/]	20	10	200	140	28
Wasco	5	3	20	500	10
Total	1,305	3	3,940	531	2,092

a/ Grapes were used for juice production

Source: Oregon State University Economic Information Service, County Agents Estimates

besides V. vinifera varieties were included in those figures. Some of those varieties are heavy quantity producers but exhibit inferior quality compared to vinifera varieties. To establish some idea about average yields in California and Oregon, data from the two states were compared in Figure 1. The Yield per acre in California varied between 4.52 and 6.96 tons per acre over the last ten years [59]. The following yield ranges for different varieties in Oregon were obtained through interviews with Oregon wine grape growers and Prof. Lombard.[a/]

Variety	Low Yield (tons/acre)	High Yield (tons/acre)
Pinot noir	1.5	6
Chardonnay	1	5
Gewuertztraminer	1.5	3
Riesling (White)	2	5
Cabernet Sauvignon	2	5
Gamay Beaujolais	2	4

Production Potential

The identification of potential areas for wine grape production in Oregon was problematic. Information on this subject was obtained through analysing the estimates of the State Water Resources Board [51]. In this study the acreage of each soil series found in a region was estimated. To find the potential acreage for grape production the following parameters were used according to the classification of the study. (1) The soil series should be deep or moderately well drained.

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a/ Department of Horticulture, OSU.

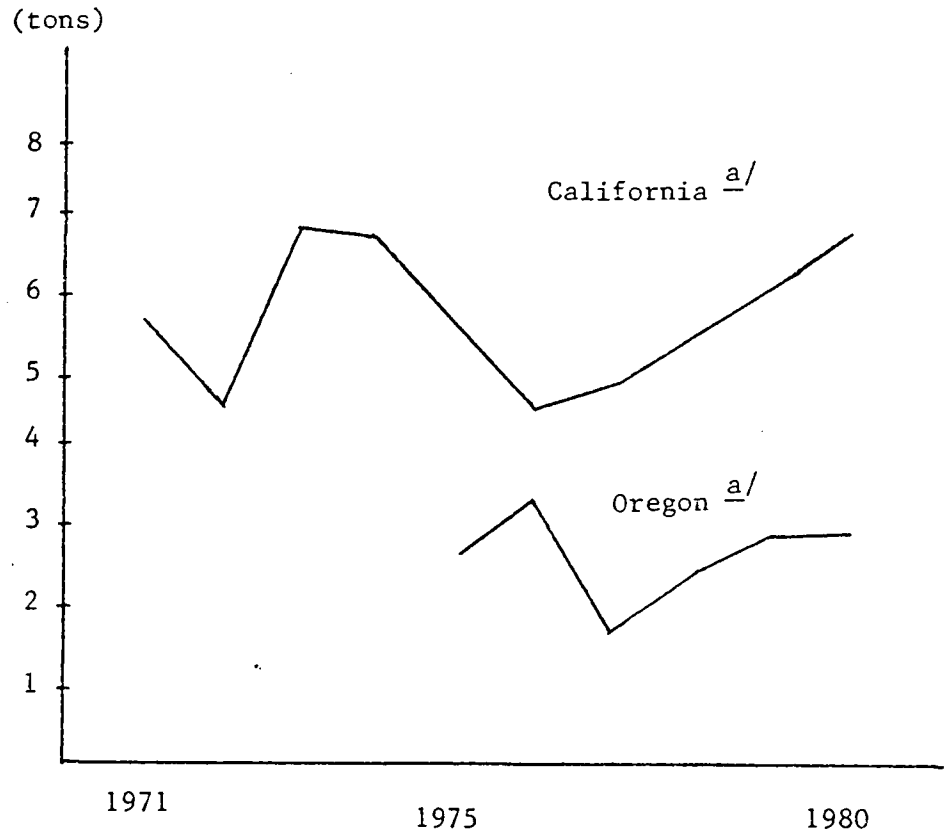


Figure 1. California and Oregon average yield per acre 1971 - 1980.

Source: Wines & Vines Annual Statistical Survey, 1981

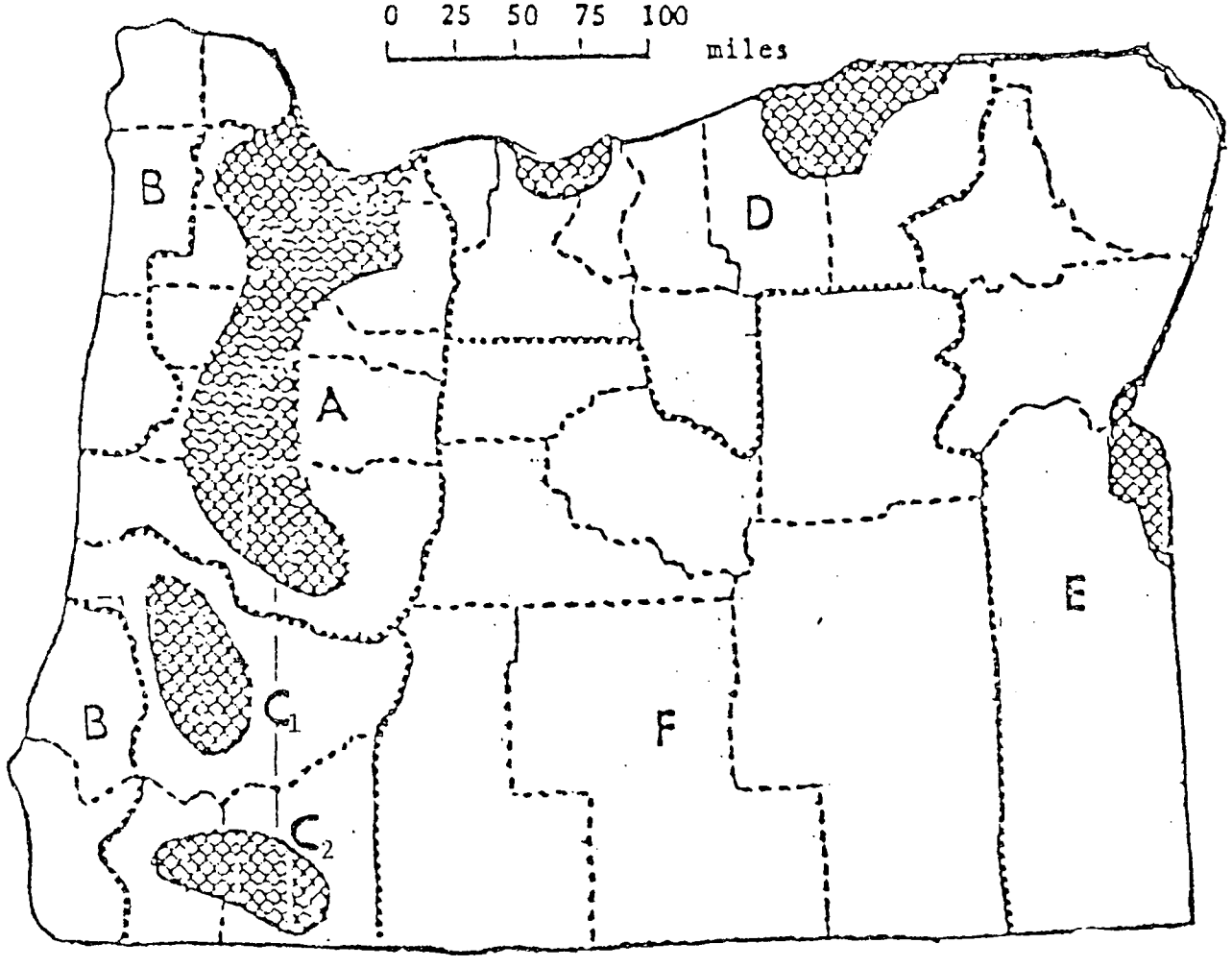
a/ Yield reflects average of all varieties

(2) Rainfall should not exceed 40 inches. (3) Slopes should be between three and 20 percent upgrade. (4) Elevation should not be higher than 1000 feet.

Using these parameters the estimated acreage for the Willamette Valley was 178,000 acres, and for the Umpqua region 37,800 acres. This was a multiple of the area of grapes actually planted. The number of acres of bearing grape vines was 1,305 in 1980.

One would expect that grape vines could not be planted on all of this area. The survey did not give any information about exposition of the slopes, the micro climate, and other important factors like market conditions. But all these factors are substantial for successful wine grape growing.

Even if only a small percentage of the 215,000 acres estimated were actually feasible for grape planting, it can be concluded that there is no physical limitation through acreage to future wine grape production in Oregon. The potential wine grape growing areas in Oregon are shown in Figure 2.



Legend

Principal Agricultural Regions

A. Western Oregon
Willamette Valley

B. Pacific Coast Area

C. Southern Oregon
1 Umpqua River V.
2 Rogue River V.

D. Columbia Basin

E. Snake River Basin

F. South Central Oregon

Potential Grape Growing Areas

Figure 2. Potential Wine Grape Growing Areas in Oregon

Source: Prof. R. Garren, Department of Horticulture, OSU, Corvallis.

Climate and Soils

Climate Requirements

Like any other cultivated plant the grape vine has certain environmental requirements (climate and soil). High quality yields are only possible if the wine grape grower knows these requirements and takes them into consideration in cultivation practices to prevent stress situations (malnutrition, diseases etc.). The growth factors for the grape vine are light, air, water, heat, and nutrients [55]. The plant is able to yield high quality only if these factors are in optimal relationships.

The climate influences the rates of change in the constituents of the fruit during development and the composition at maturity. For a dry table wine of quality, a moderately cool weather in which ripening proceeds slowly is favorable [60]. The cool weather brings a high degree of acidity, a low pH, and a good color. The change of warm days and cool nights results in mature fruit, optimum development of the aroma, and flavoring constituents. This is therefore the precursor of the bouquet and flavoring substances in the wine.

In warm climates the aromatic qualities loose delicacy and richness, and the other constituents are less well balanced. Therefore the resulting table wines cannot compete with the best wines of cooler regions. Wines of cooler regions bring such qualities with the bouquet and freshness that are characteristic of premium wines. Hot regions are better suited for dessert and sherry wines, where the high ratio of sugar to acid and the ill effect of the heat on aroma and flavor is less than in the case of table wines [60].

For the best development the V. vinifera grapes require long, warm to hot, dry summers, and cool winters. Vinifera varieties are not suited to humid summers, owing to their susceptibility to fungus diseases and insect pests that flourish under humid conditions. Neither will vinifera vines withstand intense winter cold.

The climate factor of predominant importance for the wine grape is temperature [55,60]. Other factors like rainfall, fog, humidity, duration of sunshine, and length of the vegetation period are also important. The most important temperature criterion is the heat summation. Heat summation means the sum of the monthly temperature degrees above 50°F for the period concerned (usually from April through October).

A minimum of about 1600 is required for successful grape growing. To compare climates in terms of plant response to temperature and day length the Thornthwaite potential evapotranspiration index (PET) is sometimes used. Thornthwaite's PET index (measured from April through October) varies from around 23 on the Rhine (Germany) to well over 27 in warmer areas. The grape vine also requires a vegetation period of 150 to 180 frost free days. The degree of cold that grape vines will withstand differs according to the variety, the maturity of the wood, and the weather pattern preceeding the freeze. All V. vinifera vines will withstand temperatures down to 10°F, or even 0°F for short periods, if they are fully dormant. But grape vines that are not well matured may be killed by less severe temperatures. The major threat in northern grape growing regions are frosts, especially when the plant has already started the vegetation cycle. Shoots and flower

clusters may be killed by temperatures below 28°F in spring. The minimum annual of precipitation the grape vine requires is between 16 - 24 inches. Precipitation of more than 30 - 40 inches may cause problems with fungus diseases.

Oregon's Climate

Oregon lies between 42° and 46° north latitude which is the same position as the major wine producing areas in France around Montpellier (43°) and the Bourgogne (46°). For comparison the famous quality wine producing areas like the Champagne and Alsace in France, and the Mosel-le and Rhine Valleys in Germany lie even further north close to 50° north latitude. This is about the northern limit of grape production.

The climate in Oregon is under the moderating influence of the Pacific Ocean. Minimum winter temperatures in Oregon vary from above zero to as far as -50°F (Mt. Hood). East of the Cascades the 20 year minimum winter temperature is -25°F and colder. Such temperatures preclude V. vinifera grape growing in those areas except in parts of the Columbia Basin and parts of the Grande Ronde Valley [4]. In western Oregon the 20 year minimum winter temperature is above -10°F.

The heat indices range from 1,800 - 3,400 degree days. Heat summation indices show over 3,000 degree days around The Dalles, Umatil-la, and Huntington (see Appendix Figures 14). In western Oregon the Willamette, Umpqua, and Rogue Valleys show indices between 1,800 and 2,700 degree days. The highest evapotranspiration indices occur along the Columbia and Snake Rivers near Arlington and Huntington. The PET indices for the Willamette, Umpqua, and Rogue Valleys are adequate for grape gorwing. The length of the growing season varies from zero to

300 days in Oregon. West of the Cascades the length of the growing season varies from 150 to 200 days in the Rogue, Umpqua, and Willamette Valleys. Along the Columbia River and in the Huntington - Ontario area the length is 150 days or longer.

Evaluating these climatological factors is important for successful grape growing. The optimal areas for grape growing are found west of the Cascades. Oregon east of the Cascades suffers from severe winters except the areas aroung The Dalles and in Umatilla County. Within a climatologic region there can be local areas which result from different topographical features which have a strong effect on the climate on a particular site.

Rainfall is usually sufficient for wine grape growing in Oregon except some areas in southern and eastern Oregon where irrigation is necessary. Also it is sometimes required to water young plants during the first summer when they are planted.

Winkler distinguished five climatological regions for California according to the heat summation. [60] Region I has less than 2,500 degree days, II less than 3,000, III less than 3,500, IV less than 4,000, and region V with more than 4,000 degree days. The grape growing areas in Oregon lie in Regions I and II according to this classification. For Region I Winkler recommends early maturing, premium quality, dry table wine varieties. Heavy bearing varieties should not be planted, since their production can not compete with that of the warmer districts. This region contains restricted areas with fertile soils where hillside slopes and valley areas are available. Region II is an area of great importance according to Winkler. The valleys can produce

most of the premium quality and good standard white and red table wines.

Soils

Soil Requirements

The vinifera vines grow on soils of different composition and geological origin. Types and geological origin of the soil material determine the distinctness of the tasts within the variability of a variety [55].

The most important soil characteristics which influence the growth of the grape vines in various ways are texture, stratification, depth, soil color, potassium content, humus content, nutrients, and soil reaction (pH - level) [55]. These characteristics determine the possibility of sending out roots and the degree to which soil warmth, water, air, and nutrients are availbale. The V. vinifera vine does not tolerate wet, extreme acid or salted soils.

V. vinifera varieties are deep rooted plants which penetrate the soil up to 15 feet or more, except where root penetration is obstructed by hard pan imprevious clay substratum, toxic concentration of salts, or a free water table.

The micro climate of a site is strongly influenced by the exposure to the sun. The angle of incidence determines the amount of heat which the site will obtain through solar radiation. Experiments show that a slope exposed to the south receives almost twice as much radiated heat than a comparable slope exposed to the north. [55] On south and west exposed sloped the daily temperature maximum coincides with the most

intensive radiation in the afternoon, Southwest and west slopes reach higher day temperature maxima. These slopes are more favorable than southeast and east slopes. Slopes from 30 to 35 percent can be cultivated with a tractor. Slopes above 35 percent have to be worked with special equipment.

Oregon's Soils

The choice sites in Oregon are gentle slopes with southern exposure, located a few hundred feet above the valley floor [17]. A slope helps to avoid natural frost pockets because cold air will move down the slopes into the valley or depressions. Through the movement, the air draws down warm air as it flows. Air temperatures on the slopes will be a few degrees higher than the lowest areas, particularly low areas without air drainage outlets. Any barriers that impede the downflow of cold air may increase the chance of local freeze in the vicinity of the barrier.

Generally the soil series found within the climatically suitable areas have the capability of providing for effective root zones from 40 to 60 inches. These soil series have sufficient clay and organic matter content to provide a waterholding capacity from 9 to 12 inches. This amount is adequate for vinifera grape growing.

When selecting a site for a vineyard the topography, soil depth, texture, and composition of the soil has to be considered. It is also important to examine the soil for the presence of specific grape vine pests and diseases.

The major pest of wine grape production all over the world is an aphid called phylloxera. Vitis vinifera varieties are not resistent

against phylloxera. The aphid does exist in Oregon [17]. It is therefore necessary to examine the sites for planting carefully, especially when remnants of old grape vines are known to have existed before on that site. No direct method of control is fully effective so far [60]. The remedy is to use rootstocks that resist the aphid. Most rootstocks used are crossbreedings of the American species, the varieties Vitis berlandieri and Vitis riparia. Vitis vinifera varieties grafted on those rootstocks which are well adapted to both the variety and the soil produce very satisfactorily.

In Oregon nematodes can be present on sites from which were removed oak or old stone fruit trees. When nematodes or oak fungi are present the soil has to be fumigated prior to planting with carbondisulfide or methylbromide [60]. Other problems such as perennial weeds, pests, and rodents may need to be combatted too.

Cultural Practices

Varieties

About 8,000 varieties of grapes have been named and described [60]. Approximately 20 percent of them may be growing somewhere in vineyards, gardens, and experiment stations. Certainly not more than 60 - 70 varieties can be considered important for grape production in the United States. This includes varieties of Vitis vinifera, American species, French -, and American hybrids. In 1979, 1,600 acres of grape vines were planted with vinifera varieties, and about 100 acres were planted with Concords in Oregon.

Riesling, Chardonnay, Gewuerztraminer, Sylvaner, Semillon, and Sauvignon blanc were the most important white wine varieties in Oregon in 1979. Of minor importance were Chenin blanc, Pinot blanc, Pinot gris, Muscat, Muscat-Ottonel, and Mueller-Thurgau. The most important red wine varieties were Cabernet Sauvignon, Pinot noir, Merlot, and Zinfandel. The varieties Grenache and Gamay were also grown in small quantities [39].

In choosing a particular variety it is necessary to consider climatic, soil, and market conditions. The grape vine can be planted on its own roots or grafted on rootstocks. Hybrids of American species are the most common rootstocks in the present. Each of the rootstock varieties has certain characteristics like cold resistance, resistance against phylloxera, suitability for wet or deep soils, and other attributes. Breeding with these varieties lead to combinations of desirable characteristics. By using rootstocks the V. vinifera varieties can be better adapted to the micro climate of a particular site.

Clonal Selection

Within a variety genetic changes in the growing points of buds can develop into new mutants. These mutants can be selected and screened. Those of potential commercial value are designated as clones and further propagated. Clonal selection has been conducted successfully in Germany for decades and resulted in improvements in yield and quality. This systematic selection is useful in helping to improve the viticultural and economically valuable characteristics. The establishment of a similar selection program in Oregon would undoubtedly help to find the best plants for each soil and micro climate and thus improving yields and quality.

Trellis System

Grape vines can not be satisfactorily grown without some form of support. A wide variety of supports have been used. The most practical forms may be classified into four groups: stakes, vertical trellis, wide top trellis, and arbors [60]. In the first case the grape vine is tied to a stake. The canes and shoots are attached to the stake. The vertical trellis is the system found here in Oregon. The plants are trained into a trellis along a row. The trellis consists of wires tightened between posts to support the vines. The wide top trellis is found in Italy and is called pergola. The trellis system is constructed vertically and horizontally like a roof. Arbors are found all over the world. The plants are trained individually. The vines are supported by posts and crossbars which give the shape of a tree. The individuality of the wine growers is so great that a lot of variations and transitions can be found [60].

In choosing a certain training system, the following criterion must be considered: operation possibilities, structure of sites, desired quality, desired yield, soil, micro-, and macro climatic conditions. Related with the decision about the training system is the selection of the spacing of the plants. By combining these criterions site formula can be cites [2]:

Spacing, training, pruning = f(site, profitability, and varieties)

All independent and dependent variables are interrelated. For example, certain varieties need to be densely planted and heavily pruned. Others have to be trained long and thus need a wider trellis and spacing. A wider spacing, however, requires less hand labor and therefore influences the profitability. Fertility of the soil is an other variable influencing yield. Fertile sites enable closer spacing and reduce the need for fertilizer applications.

Modern wine grape growing must provide a balanced composition of shoots, leaves, and clusters which stimulates grape quality. Common spacing of the plants in Oregon varies from 8 - 12 feet rows and 6 - 12 feet between vines. This results in 450 to 1350 plants per acre respectively.

Pruning

The grape vine is a liana plant which climbs around trees naturally to reach the sun light. An annual cut back of the new shoots on the vine is necessary for successful cultivation. The purpose of pruning is: (1) to help stabilize and maintain the vine in a form that will save labor and facilitate vineyard preparations, (2) to distribute the bearing wood over the vine, among the vines, and over the years in

accordance with the capacity of the spurs and vines, (3) to lessen or eliminate thinning in the control of the plant, (4) to increase light for fruit bud formation.

The following factors have to be considered when pruning the grape vine; spacing, training system, variety (fertility), growth power, and desired quality. Pruning tests conducted in Germany lead to a rule of thumb that with spacing of 8' x 8' (64 squarefeet) the canes[a/] should be cut back to 38 - 64 buds, with 6' x 12' (80 squarefeet) to 48 - 80 buds. Overcropping can result in grapes which are lower in sugar, pigments, and other constituents and are therefore lower in quality. After the pruning the canes are usually tied to the trellis system.

With almost all different kinds of training practices the growth of the grape vine has to be controlled. Because of the strong cut back the vine has a vigorous growth. The growth control is done through summer training which includes removing of suckers, summer pruning, removing of mature leaves, and topping [55]. Summer training leads to a growth concentration and growth regulation, a control of the yield, and better exposition to the sun light. Undersirable shoots have to be removed. An upright growth of the shoots helps to avoid wind damage and makes pest control easier. Summer training is usually done by hand except topping and requires some experience. The intensity of the works depends on the condition of the grape vines.

Fertilizer Requirements

The grape vine can adapt itself to a wide range of soil fertility

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a/ last year's shoots

[55]. The vine is less exacting than many other horticultural crops in the quantity level of soil nutrients required. Instances of deficiency of fertilizer elements are rare. The amount of nutrients removed from the vineyard through the harvest of one ton of grapes are: 3.9 - 5 lb N, 1.3 - 1.7 lb P, 7.4 - 8.8 lb K_2O, 1.1 - 1.3 lb CaO, and 0.4 - 0.5 lb MgO. By considering the amount of nutrients taken away through the grapes together with soil tests the wine grower can make a nutrients balance sheet to calculate the amount of fertilizer needed each year. The leaves and the prunings, constituting about 90 percent or more of the annual growth, are usually returned to the soil. Thus, the instances of deficiencies are rare. Nitrogen, potassium, phosphorous, magnesium, and boron are the elements sometimes needed in Oregon vineyards.

Pests

Various kinds of insects and mites attack grapes. There are about fifty insects and other pests that attack grape vines and its fruits. Those with the potential of doing great damage are the grape leaf hopper, grape leaf roller, Pacific mite, Willamette mite, nematodes, phylloxera, grape mealy bug bettle, grasshoppers, hoplia beetle, and sphinx moth [60]. There are no serious insect or mite problems in most vineyards in Oregon. However, this pest picutre might change drastically once grape vine acreage is increased.

Diseases

Grapes are susceptible to a number of diseases which can be caused by fungi, parasites, viri, nematodes, and bacterias. The most common

disease problems in Oregon vineyards are caused by powdery mildew, botrytis, and gray mold. The fungicides used are based on organic or inorganic active agents. The oldest and the most used material against powdery mildew is sulfur which can be sprayed or dusted. Some material contain several active agents to attack different fungi in one operation. The most effective and most reasonable control practice against diseases is prevention. Spraying materials are applied several times in regular intervals to protect the grape vine from any attack.

Weed control

Weeds can be controlled through cultivation of the soil, application of chemicals, or a combination of both. The general purposes of cultivation are also: to prepare the soil as a seed bed for cover crops, to incorporate cover crops, manures, and fertilizer into the soil, to help control certain pests, and to promote water infiltration where other vineyard operation have compacted or puddled the surface. Useful machines in cultivating between the rows of vines are plows, disks, cultivators, harrows of various kinds, and rototillers. The choice of tools is governed by the nature of the soil, the power available for pulling, the distances between rows, the manner of pruning brush disposal, and the preference of the operator.

Herbicides are applied as a sterilant or a contact weed killer. Those that are sterilants are: Triflon, Simazine, and Casoron. Others, like Round-up, and Paraquat, are applied when the plants are already green for weed killing. The danger of using herbicides lies in the development of one-sided weed populations if the same herbicide is used all the time. Damage may also occur in the new vineyards when the

application is not done carefully and some of the spraying material drifts onto the young grape vines. A common practice is to apply herbicides along the rows under the vines and to use some mechanical cultivation between the rows.

Improper use of herbicides can cause serious injuries to grape vines. Injuries can occur on the buds, leaves, shoots, and berries. Damages through herbicides can also occur from production of other crops. The chemical 2,4-D is applied extensively for weed control in wheat fields. Damage from 2,4-D occurs when wind drifts some material into nearby vineyards. Currently 2,4-D injuries are a big problem in Washington state's grape production. Damages have also occurred in Oregon.

Harvesting

Before harvesting the grapes, their maturity has to be determined accurately. The better the variety, the more important is its proper maturity. The physiological maturity is reached when the sugar storing process stops. This is at a sugar concentration of about 250 grams per liter. During the ripening process the acid content in the grapes is also reduced. Malic-acid is decomposed usually to a greater extent than the tartaric-acid. In "bad" wine years the malic-acid dominates the tartaric-acid, resulting in an unripe taste in the wine [56].

The significant criteria for determining the maturity of wine grapes are: sugar, acid, pH, and the Brix-acid ratio of the freshly pressed juice. Brix or Balling is the measure of the level of soluble solids in the grape. About 90 - 95 percent of the soluble solids in ripe grapes are fermentible sugars. Brix or Balling hydrometers

are calibrated indicating grams of sucrose for 100 grams of liquid. The criterion most commonly applied for determining when to harvest is the sugar content (amount of soluble solids).

The harvesting is usually done by hand in Oregon, although numerous devices for mechanization have been developed. Mechanical harvesting of wine grapes was introduced in California and a number of other grape growing regions. Hand harvesting in Oregon is still prefered because a selection of the grape material is necessary when high quality wines are to be produced. Most of the vineyards are also too small to make a mechanical grape harvest economically feasible.

CHAPTER III

WINE GRAPE AND WINE PRODUCTION COSTS AND RETURNS

Much of farm decision making is concerned with comparing costs and returns of different alternatives. An understanding of the basic cost relationships is necessary to effective decision making. To aid the decision making process, this chapter investigates the costs associated with producing wine grapes and wine in Oregon. The objectives of this chapter are to determine: (1) the costs of producing a ton of grapes; (2) activities contributing to these costs; (3) capital requirements for producing and establishing a vineyard; (4) capital investment in wine production; and (5) costs to produce wine out of grapes.

Problems of Measuring Production Costs

There are a number of problems with occur in analyzing costs of production [32]. (1) There is a discrepancy in the accountant's and the economists' view of cost. The economist considers cost in terms of the value of the alternatives or other opportunities which have to be foregone in order to achieve a particular task [48]. The accountant, however, defines the cost of something as the total money expenditure or outlays necessary to achieve the task. (2) It is difficult to determine the cost to be assigned for the services of an acre of land. Possibilities include the use of a cash rental rate, or current market price times current interest rate. Both possibilities do not necessarily reflect the opportunity cost of land for a particular farmer. (3)

Allocation of joint costs and total farm overhead is difficult. Possibilities are to allocate these proportionally to the value of the product or the quantities of inputs used. (4) It is difficult to price operator and family labor. One way of dealing with this problem is to use prevailing farm wage rates or to use skilled trade labor rates. The other way is to calculate the profit in terms of returns to management. In this case the individual operator/manager chooses the appropriate return. (5) The next problem is how to price services for one years use of durable inputs such as farm machinery, equipment, and buildings. One year's cost is referred to as depreciation, but this charge can be based on acquisition cost, present market price or expected replacement cost. The most common practice is to use a depreciation charge to account for the length of life. (6) The aggregation of production costs causes problems because there is a great variability in unit costs from farm to farm. The variation results from different farm sizes, different soil and climate conditions, regional differences in prices paid by farmers, and differences in the relative importance of the enterprise on the farm.

These weaknesses and the fact that production costs do not take into account product demand conditions lead to the conclusion that cost of production should not be used as the only criteria for policy decisions such as pricing. Despite these problems, cost studies are useful in farm planning. The purpose of cost studies is to generate information on cost patterns, which is necessary to aid the decision making process.

Peculiarities of Grape Production Costs

Perennial crops differ from annual cultures through high investments which last for a long time period [45]. The factors of production, soil, labor, and capital are fixed for that period. In most cases the farm organization is also fixed. After the planting of the vines and construction of the trellis system, the wine grape grower is restricted in the choice of production operations by the trellis system. Once the vineyard is established, improved machinery cannot always be applied and the wine grape grower has the choice of either a premature reconstruction of the vineyard or a continuation of the production with relatively higher costs. The length of the production period of a vineyear is influenced by improvements in vine cultivation, by new breeds or selections with improved quality and quantity, as well as by changes in consumer behavior. Consumer behavior ultimately determines the demand for a certain wine type and consequently the variety of grapes grown.

Cost studies for wine production are usually divided into: (1) costs of establishing a vineyard; (2) production costs for the first three years separately; (3) production costs of the mature vineyard. Establishment costs occur over the first three years because not all installations are made at once. The costs of establishing a vineyard are to be charged over the useful life of the vineyard because the vineyard as a durable asset contributes to a production over several production cycles. The problem occurring in this regard is that the useful life of a vineyard cannot be determined in advance. It has to be assumed. The economic background of this problem lies in the age of the vineyard which is reflected in a slackening of the qualitative

and quantitative production and therefore in the revenues. Decreasing revenues can also be caused by low demand for a certain type or variety, change in wine taste, or overproduction. On the cost side the relative and absolute costs can increase when a vineyard does not satisfy the conditions for the use of modern production techniques.

The major components of the establishment costs are: investment in land, plants, trellis system, land preparation, amelioration, irrigation system (if necessary), and the cultural cost during the first years during which capital inflow occurs. Production costs of the mature vineyard can be divided into fixed and variable costs. Fixed costs are costs which do not vary with output. Fixed costs in grape production are interest or rental rate paid for the land, interest on machinery investment, depreciation, insurance, taxes, and housing for the machinery. Variable costs in grape production, which vary directly with the rate of output, are labor cost for pruning, summer training, harvesting, fertilizer, spraying material, herbicides, tying materials, costs for fuel, and lubrication of machines.

Establishment and Cultural Costs for a 20 Acre Vineyard

The establishment and cultural costs of a representative 20 acre vineyard in Oregon are summarized in Table 6. Because costs and production practices do not vary considerably among different varieties, no particular variety was chosen. The costs would be the same for any V. vinifera variety planted in Oregon. It was assumed for this study that the entire 20 acres were planted at the same time and at the same site. In order to make a consistent estimate of the cost for the trellis system a quadratic shaped vineyard was assumed (Appendix Figure 19). The number of end posts, line posts, and anchors can vary considerably with the shape of the site. The trellis system was established gradually over the first three years. Stakes, end posts, and anchors were purchased during the first year (Table 6). Line posts were bought in the second year. The trellis system was completed during the third year with the installation of the wires. The cost of the trellis system amounted to $1,158 per acre. The trellis system consisted of line posts every fourth plant, three main and two movable catch wires, end posts, and anchors at either side (Appendix Figure 20). The plants were purchased for $ .60 each. It was assumed that 10 percent of the plants had to be replaced during the second year. A land cost of $2,000 per acre was assumed. Prior to planting the soil had to be plowed. This was done on a custom work basis.

This cost study does not reflect an average production cost per acre. Rather it reflected one set of production practices. The production practices were developed from information obtained from interviews with 10 commercial grape growers in Oregon. The production

TABLE 6. ESTABLISHMENT AND CULTURAL COST FOR A 20 ACRE VINEYARD

	Amount per acre	Cost per unit (dollars)	First year	Second year	Third year	Fourth year
Establishment Costs						
Land Preparation (custom)		50	50			
Plants	650	0.60	390			
Replants	65	0.60		39		
Trellis						
Stakes	650	0.60	390			
Line posts	160	2.50		400		
End posts	4.5	6.50	30			
Anchors	4.5	0.60	3			
Anchor wire		0.25	1			
Wire #11	11,657 ft	0.019			221	
#13	7,772	0.014			113	
Staples, Miscellaneous			50	50	50	50
Total Established Costs:			914	489	385	50
Cultural Costs:						
Spraying mat.				6	9	33
Herbicides				22	22	40
Fertilizer			20			19
Labor pruning, summer tr.	20 hours	4.00	80	80	80	360
harvesting	$60/ton					120
Variable Machinery Costs			145	145	145	145
Total Variable Costs:			245	253	256	767
Fixed Costs:						
Machinery fixed cost			182	182	182	182
Management charge			120	120	120	120
Taxes (land)			6	6	6	6
Interest ($2,000/acre, 12%)			240	240	240	240
Total Fixed Costs:			548	548	548	548
Total Fixed and Variable Costs			1,697	1,280	1,179	1,305
Receipts for first harvest						-1,100
Accumulated investment cost at end of second year (i=14%)				3,214		
Accumulated investment cost at the end of third year					4,844	
Accumulated investment cost at the end of fourth year						5,728

practices, machinery, and equipment varied somewhat. Some grape growers were producing other crops and thus already had machinery. Other grape growers started with used machines.

The second cost category is cultural costs incurred during the first four years (Table 6). It was assumed that weed control was done twice with herbicides and five times against fungus diseases with sulfur and twice the Botran and Captan. Fertilizer was applied during the first, fourth, and the following years. An adequate amount of nitrogen, phosphorus, and potassium was used.

Labor had to be hired during the first three years for planting, establishment of the trellis, and summer training. For the mature vineyard hired labor was needed for pruning, summer training, and harvesting. Grape harvesting was done by hand and amounted to $60 per ton. The transportation costs were included as part of the costs of machinery. It was further assumed that the operator and family were also working in the vineyard for some operations.

The machinery equipment was assumed to be new and purchased in 1981. The calculation of the variable and fixed costs are summarized in Appendix Table 24. The total variable costs amounted to $240, $253, $256, and $767 for the four establishment years, respectively. Fixed costs which occurred during the first four years are summarized at the bottom of Table 6. The calculation of the fixed machinery cost was shown in Appendix Table 24. The fixed machinery costs which included depreciation, interest, insurance, and a charge for housing, amounted to $182 per acre. The next fixed cost item listed was a management charge of $120 per acre. This was about five percent of the gross receipts.

The management charge was included as a compensation for the operator's management effort. Property taxes for land were $6 per acre. An interest cost of $240 was included for the initial land investment of $2,000 per acre. Total fixed costs amounted to $538 in the first year per acre. Total establishment and cultural costs were $1,697 for the first year. Total costs for the second year were $1,280 for the third year $1,179 and 1,305 for the fourth year. In the fourth year the first grapes would be harvested. The yield selected was two tons per acre which was sold at $550 per ton.

The total costs accruing during the first four years were compounded at 14 percent interest to the end of the fourth year. This number represented the total accumulated investment cost at the end of the fouth year. It amounted to $5,728 per acre. This amount had to be amortized over the expected life time of the vineyard.

Production Costs for the Mature Vineyard

The production costs for the mature vineyard are summarized in Table 7. The costs were calculated at varying land investment prices to indicate how sensitive the total costs were to land investment cost. The operations and cost items listed in Table 7 were the same as in the last column on Table 6, the costs of the fourth year. Total variable costs amounted to $646 in all three cases. All fixed cost items were the same in the three cases except for the amortization of the accumulated establishment cost and the investment cost for the land investment. The total costs were calculated in terms of total preharvest costs. These costs did not vary with different yield levels. The

TABLE 7. PRODUCTION COST OF THE MATURE VINEYARD WITH VARYING LAND PRICES

	Cost of Land $1,000 per acre		Cost of Land $2,000 per acre		Cost of Land $4,000 per acre	
Variable Costs:		% of tot. cost		% of tot. cost		$ of tot. cost
Fertilizer, Spraying mat, Herbicides, Misc.	141	8	141	7	141	6
Labor pruning, Summer training	360	20	360	18	360	15
Variable Machinery Cost	145	8	145	7	145	6
Total Var. Costs	646	36	646	32	646	27
Fixed Costs:						
Fixed Machinery C.	182	10	182	9	182	8
Taxes	6		6		6	
Management Charge	120	7	120	6	120	5
Interest on Land (12% interest)	120	7	240	13	480	21
Amortized Establishment Cost (14% interest)	684[a/]	40	767[b/]	40	933[c/]	39
Total Fixed Costs	1,112	64	1,315	68	1,721	73
Total Pre-Harvest Cost	1,758	100	1,961	100	2,367	100

a/ Accumulated investment cost $5,740 at the end of fourth year, amortized over 21 years.

b/ Accumulated investment cost $5,728 at the end of the fourth year

c/ Accumulated investment cost $7,056 at the end of the fourth year.

total preharvest costs ranged from $1,258, 1,961 to 2,367 for the different cases.

Besides the actual cost figures the percentage figures of total preharvest costs are also included in Table 7. The biggest part of the costs were fixed costs ranging from 64 - 74 percent. The annuity for the accumulated investment alone accounted for 39 - 40 percent of the costs. Among the variable costs the labor cost was the biggest item with a range from 15 - 20 percent of total costs. Material and variable costs were relatively small parts with 6 - 8 percent of total preharvest costs.

Breakeven Prices

The breakeven prices for different yield and price levels were calculated and summarized (Table 8). The breakeven price is that price at which the receipts cover total costs. Harvest cost of $60 per ton were included in calculating the total costs for Table 8. The higher the yield the lower the price received has to be for the grape grower to break even. The prices at which variable costs would be covered were also summarized (Table 9). These were the minimum prices required for the farmer to stay in business at least in the short run. In the long run total variable and fixed costs would need to be recovered.

Internal Rates of Return

The internal rates of return (IRR) on a 20 acre vineyard at varying yield and price levels were calculated on a before-tax basis. Yearly budgets were used for the calculation of the IRR. The internal rate

TABLE 8. BREAKEVEN PRICES

Yield per acre	Case 1		Case 2		Case 3	
	Total Cost	Breakeven Price	Total Cost	Breakeven Price	Total Cost	Breakeven Price
2	1,782	891	1,995	998	2,440	1,220
3	1,842	614	2,055	685	2,500	833
4	1,902	476	2,155	529	2,560	640
5	1,962	392	2,175	435	2,620	524
6	2,022	337	2,235	373	2,680	447

a/ Case 1 = land price at $1,000 per acre.

b/ Case 2 = land price at $2,000 per acre.

c/ Case 3 = land price at $4,000 per acre.

TABLE 9. BREAKEVEN PRICES (VARIABLE COST)

Yield per acre	Variable Cost	Breakeven Price
2	767	384
3	827	276
4	887	222
5	947	189
6	1,007	168

of return is the discount rate at which the net present value of all cash flows equal zero. The formula is [7]:

$$INV = \frac{A_1}{(1+r)} + \frac{A_2}{(1+r)^2} + \ldots + \frac{A_n}{(1+r)^n}$$

where: INV = initial investment

$A_1, A_2, \ldots A_n$ = cash flow in years $1,2,\ldots n$

r = rate or return that will equal the income stream to the capital outlay required by the investment

n = expected economic life of the project

The IRR method implicitly assumes that net cash flows from an investment are reinvested to earn the same rate as the IRR. The acceptibility of an investment depends upon the comparision of the IRR with the investor's (decision maker's) required rate or return.

The positive internal rates of return for the 20 acre vineyard were identified (Table 10). The price to be received per ton ranged from $300 to $750 in $50 increments. The yields varied from two to six tons per acre in one ton increments. The IRRs were calculated for three different land prices. Case I, $1,000 per acre, case II, $2,000 per acre, and case III $4,000 per acre.

The analysis pointed out the importance of vineyard productivity. At a grape price of $300 per ton the yielding vineyard made a positive internal rate of return in cases I and II. The low yielding vineyard began to make a positive rate of $700 in case I. For cases II and III no positive IRR was obtained at a yield of two tons per acre. In case II the first positive IRR was obtained at three tons and a price of $550 per ton. In case III yield per acre and price had to be three

TABLE 10. INTERNAL RATE OF RETURN ON A 20 ACRE VINEYARD WITH VARYING LAND PRICES[a/]

Yield (tons) per acre	Dollars per Ton										Land Price per acre
	300	350	400	450	500	550	600	650	700	750	
2		negative IRRs							0.43	3.83	Case 1
3					1.91	6.28	9.66	12.51	15.02	17.29	$1,000
4			3.22	8.39	12.33	15.65	18.56	21.18	23.59	22.82	
5		5.77	10.20	15.49	19.10	22.99	25.17	27.81	30.26	32.56	
6	5.51	11.97	16.85	20.93	24.50	27.71	30.64	33.35	35.87	38.24	
3						1.67	5.37	8.85	11.52	13.89	Case 2
4				3.03	8.65	12.18	15.19	17.89	20.30	22.54	$2,000
5		1.02	7.45	12.02	14.66	18.99	21.54	24.53	26.97	29.25	
6	0.69	8.26	13.43	17.61	21.22	24.43	27.34	30.03	32.53	34.87	
3								0.49	4.81	7.59	Case 3
4					1.07	5.61	9.08	11.99	14.52	16.83	$4,000
5				5.41	9.69	13.16	16.16	18.84	21.32	24.66	
6		0.51	7.08	11.71	15.49	18.77	21.70	24.37	26.84	29.14	

a/ Calculated on a before tax basis

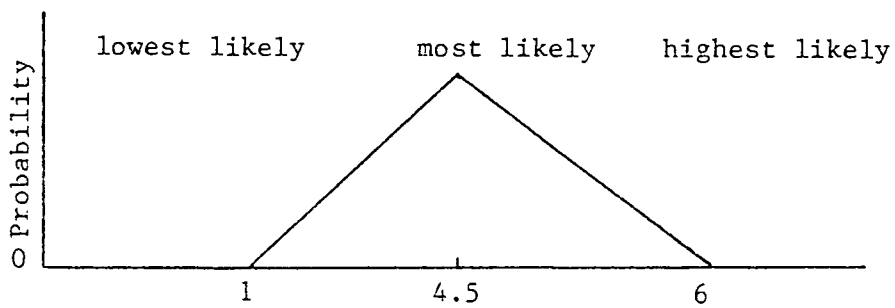
tons and $650 respectively for the first positive IRR. A high yield would make the wine grape grower less sensitive to low prices. With high yields the grape grower might still earn an appropriate rate of return at modest price levels.

Risk and Competitive Position of Wine Grape Production in Oregon

The risk involved in producing wine grapes in Oregon was assessed. There are different sources of risk in agriculture [31]. It includes financial hazard of crop production.

There are numerous methods of incorporating risk considerations into crop selection decisions. A simple indication of the riskiness associated with producing a crop is the breakeven probability. The breakeven probability indicates the probability that a crop will meet or exceed the level of costs. This simple measurement may be used to provide information about the riskiness of growing grapes in Oregon and to compare grapes with other crops.

In order to calculate the breakeven probability, the probabilities of yields and prices must be subjectively quantified. This can be done by using the triangular probability distribution in a relatively simple way [31]. To quantify the triangular probability distribution only three points are needed; a lowest likely, most likely, and a highest likely level.



The sum of all probabilities or the area under the traingle must equal one. The triangular probability distribution need not be equilateral. The distribution can be skewed to either side. The lowest

likely level is assigned 0.0 probability with a linearly increasing amount of probability assigned to each level between the lowest likely and the most likely level. The probability peaks at the most likely level and linearly decreases for each level going to 0.0 at the highest level.

The risk analysis model was programmed on a HP 41C programmable calculator [9]. The probability (Pr) of each price (P) and yield (Y) combination that exceeded total cost (nonharvest and harvest cost) was summed to give the breakeven probability (Pr(BE)).

$$Pr(BE) = \sum_{i=1}^{20} \sum_{j=1}^{20} Pr(P_i)\, Pr(P_j) \quad \text{for all } P_i Y_j > \text{total cost}$$

Prices and yields of a particular crop were assumed to be independent of one another. The model broke the range between the highest and lowest likely points into 20 equal intervals. The value indicated for each level was the midpoint of the interval.

For the calculation of the breakeven probability of wine grape production the cost data derived earlier was used. The costs were divided into non-harvest and harvest cost. Prices and yield levels were obtained from interviews with grape growers (Table 11). For wine grapes the lowest likely yield (LLY) ranged from 1 - 2.5 tons per acre. The most likely yield (MLY) was 4 and 4.5 tons. The highest likely yield (HLY) was specified as 5 - 6 tons per acre. For the price level the lowest likely price (LLP) was $450 per ton. The most likely price (MLP) ranged from $550 - $650 per ton and the highest likely price (HLP) ranged from $750 - $800 per ton. The breakeven probability was then calculated for several yield and price combinations. For the

TABLE 11. PRICE AND YIELD LEVELS, BREAKEVEN PROBABILITIES FOR SELECTED CROPS

	Grapes		Filberts	Cherries	Black Raspberries	Strawberries
Lowest Likely Price (dollars)	450 - 550		860	400	500 - 800	400 - 506
Most Likely Price	550 - 650		1,000	500 - 550	1,000 - 1,180	576 - 676
Highest Likely Price	700 - 800		1,200	600	1,680	818
Lowest Likely Yield (tons)	1 - 2.5		0.6 - 0.75	0 - 1.5	0.5 - 0.9	1.5 - 2.5
Most Likely Yield	4 - 4.5		1	2.5 - 3.0	0.8 - 1.5	3.2 - 3.5
Highest Likely Yield	5 - 6		1.5	3.5 - 6.0	1 - 2	6.1
Non-harvest Cost	1,766	1,977	805.84	872.09	1,584	1,088
Harvest Cost	60	60	159.06	185.6	139.2	374
Breakeven Probability (%)	58.9 - 80.7	43.1 - 68.3	66.2 - 78.2	23.5 - 59.6	5.6 - 27.6	25.7 - 52.0

wine grapes different non-harvest costs were used which reflected two different land investment cost. In the first case (with $1,000 land investment) the breakeven probability ranged from 58.9 to 80.7 percent. In the other case (with $2,000 land investment) a breakeven probability range of 43.1 to 66.2 percent was obtained.

The breakeven probability of wine grape production was compared to the breakeven probability of filberts, black raspberries, cherries, and strawberries, to compare the degree of riskiness of grapes to these crops (Table 11). Enterprise data sheets from 1979 were adjusted to account for the increase in prices. The price and yield levels for the different crops were obtained from three county agents. The costs, prices and yields as well as the breakeven probabilities were summarized (Table 11). The highest breakeven probability was obtained for filberts with a range of 66.2 to 78.2 percent. The ranges for cherries (23.5 - 59.6 percent), black raspberries (5.6 - 27.6 percent), and strawberries (25.7 - 52.0 percent) were lower than the range for wine grapes. A much wider range of the breakeven probability of these crops was apparent relative to wine grapes and filberts.

Based on these results it was concluded that wine grape production is not much riskier than growing filberts in Oregon. It is much riskier to grow cherries, black raspberries, and strawberries than wine grapes.

Wine Production

The White Wine Process

The process of producing white wine can be illustrated in simple steps. (Figure 3) The illustration includes the major steps in the process. Deviations from this illustration occur due to individual experiences and preferences of the wine makers.

After the grapes are crushed the grape juice, called must, remains about 2-5 hours on the grape skins. The stems are removed during the crush. During the waiting time mucus constituents in the must are decomposed through enzymes in the grape. This leads to a better pressing output, to a higher juice output, and to a higher development of the typical flavor of the grapes. The must is pressed usually in horizontal presses which are either mechanical or hydraulic, continuous or discontinuous. The must is than precleaned either through automatic separators or through letting the must sediment. The muddy particles (dust, soil, mesoderm) settle down at the bottom of the tank. Studies conducted in Germany have shown that precleaning leads to clearer wines [56].

Chaptalization

Chaptalization (named after J.A. Chaptal) is the increase of the alcohol content of the later wine through adding sugar to the juice prior to the fermentation. Chaptalization is a common practice in most wine producing countries in the world. Chaptalization is sometimes necessary in bad wine years when the natural sugar content is not high enough to produce wines with sufficient alcohol content.

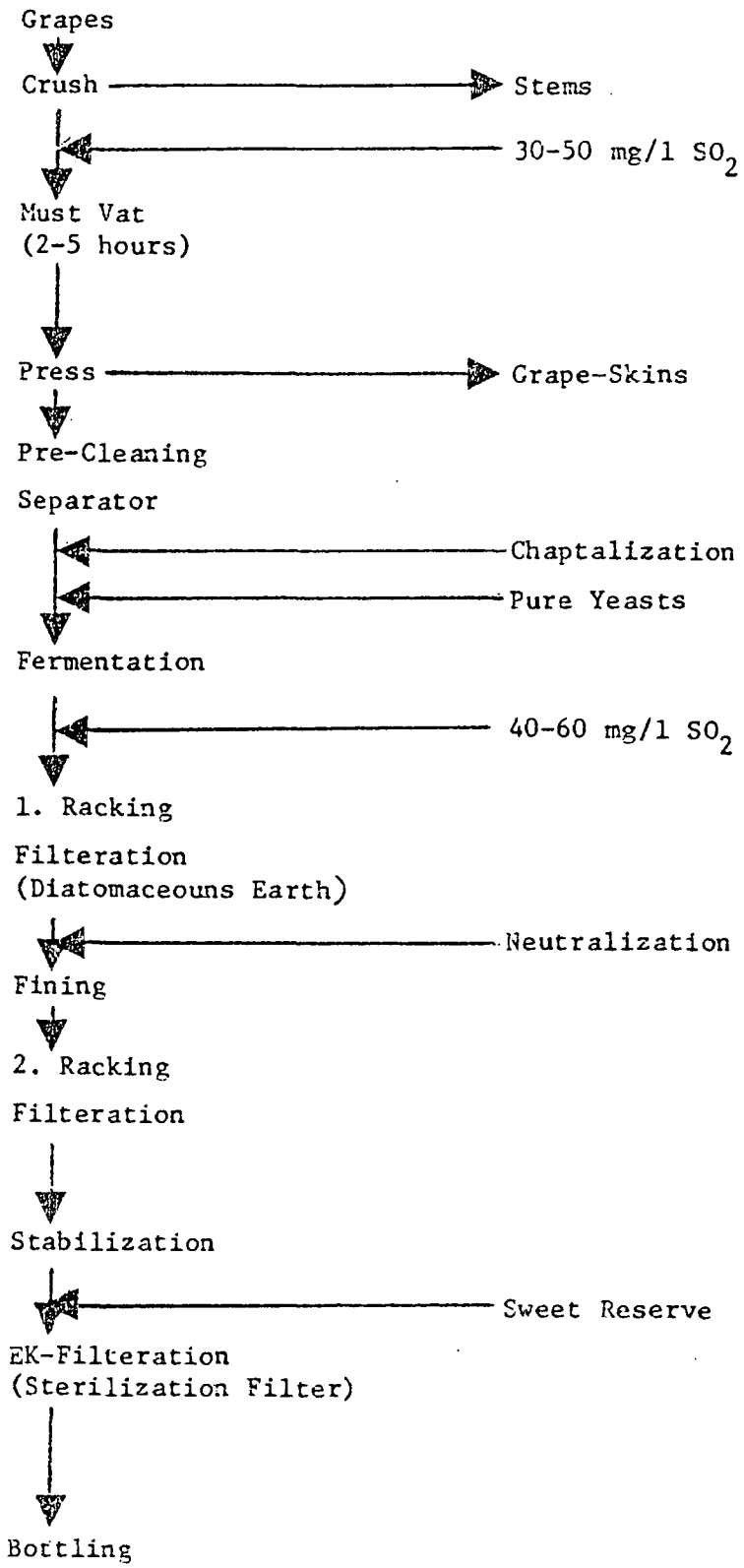


Figure 3. Illustration of the Production of White Wine

The method of adding pure cane or beet sugar was developed in France in the eighteenth century. After the fermentation it is not possible to distinguish whether the alcohol content originated from natural or added sugar. To prevent abuse of this method, all countries imposed more or less strict laws and regulations concerning the use of sugar. For Oregon the Oregon Liquor Control Commission imposed certain regulations concerning chaptalization.

Fermentation

The alcoholic fermentation is the conversion of the sugars glucose and fructose to alcohol and carbon dioxide. Besides these main products of the fermentation some 300 by-products are produced. These by-products of the fermentation and the extract constituents of the wine form the overall taste and odor.

The fermentation is a biochemical process induced by yeasts. Every must contains naturally enough yeasts which start fermenting if the temperature is not too low. Unfortunately there exist also yeasts and bacteria which are harmful to the wine. Therefore the fermentation has to be supervised by the wine maker and corrected if necessary. One practice is to use pure yeasts to stimulate the desired wine fermentation. Pure yeasts are cultivated cultures which are known to induce the desired fermentation. The fermentation takes 5-8 days within a temperature of 71-77°F (22-25°C).

Sulfur

Sulfur is one of the oldest chemicals used in the wine making process. It is applied all over the world. Sulfur dioxide aides the

clarification of the wine, gives protection against oxidation, and suppresses bacteria growth. Through suppressing the acetic and lacto bacterias a biological stabilization is gained. During fermentation some acetaldehyde is formed which has a negative influence on taste and odor. Through the addition of sulfur dioxide the acetaldehyde is bound.

Racking

Racking is the transfer of wine from one container to another to help the clarification of the wine. After fermentation nearly ceases the yeast and suspended particles of skins and pulp settle rapidly and form a sediment called lees. When fermentation has reached this stage the new wine is racked from the lees to aid the clearing and to avoid extraction of undesirable flavors from the old or dead yeasts.

Fining

In fining the small particles of suspended material are induced to coalesce and form larger particles which settle out by gravity. The commonly used fining agents are gelatin, egg whites, casein, and calcium or sodium bentonite. These agents cause flocculation and settling.

Sweet Reserve

Sweet reserve is unfermented grape juice which can be added to the wine prior to the bottling to improve tasts and harmony of the wine. To prevent a new fermentation this procedure has to be done very carefully such that no infection can occur. Before the wine is

bottled it has to be filtered with a sterilization filter to prevent any blurring of the wine.

Stabilization

Settling, racking, and fining can be viewed as stabilization operations used to promote and to age and clarify the wine before marketing. Stabilization is sometimes refered to as the specific operation to stabilize against post-bottling deposition of potassium bitartrate. Although potassium bitartrate has no negative influence on the taste of the wine, it is not desired because some consumers may misinterpret this settlement in the bottle. Potassium bitartrate concentration can be reduced through either chilling or iron exchange treatment of the wine.

The Red Wine Process

The red wine process is different from the white wine process (Figure 4). One difference is that red wines are fermented before they are pressed and removed from the skins. The reason is that color pigments and the tannin which are desired in red wines are in the skins and in the seeds respectively. Through the fermentation the color pigments are extracted from the skins. To accelerate the color extraction the must is sometimes heated to 86°F (30°C). The color pigment of the red wine is called oenin and is an anthocyan.

After the juice has remained long enough on the skins, which is usually 5 - 10 days, malo-lactic bacteria are inoculated. This malo-lactic fermentation is sometimes encouraged in cooler climates to reduce the acid levels in wine. Unlike the primary fermentation

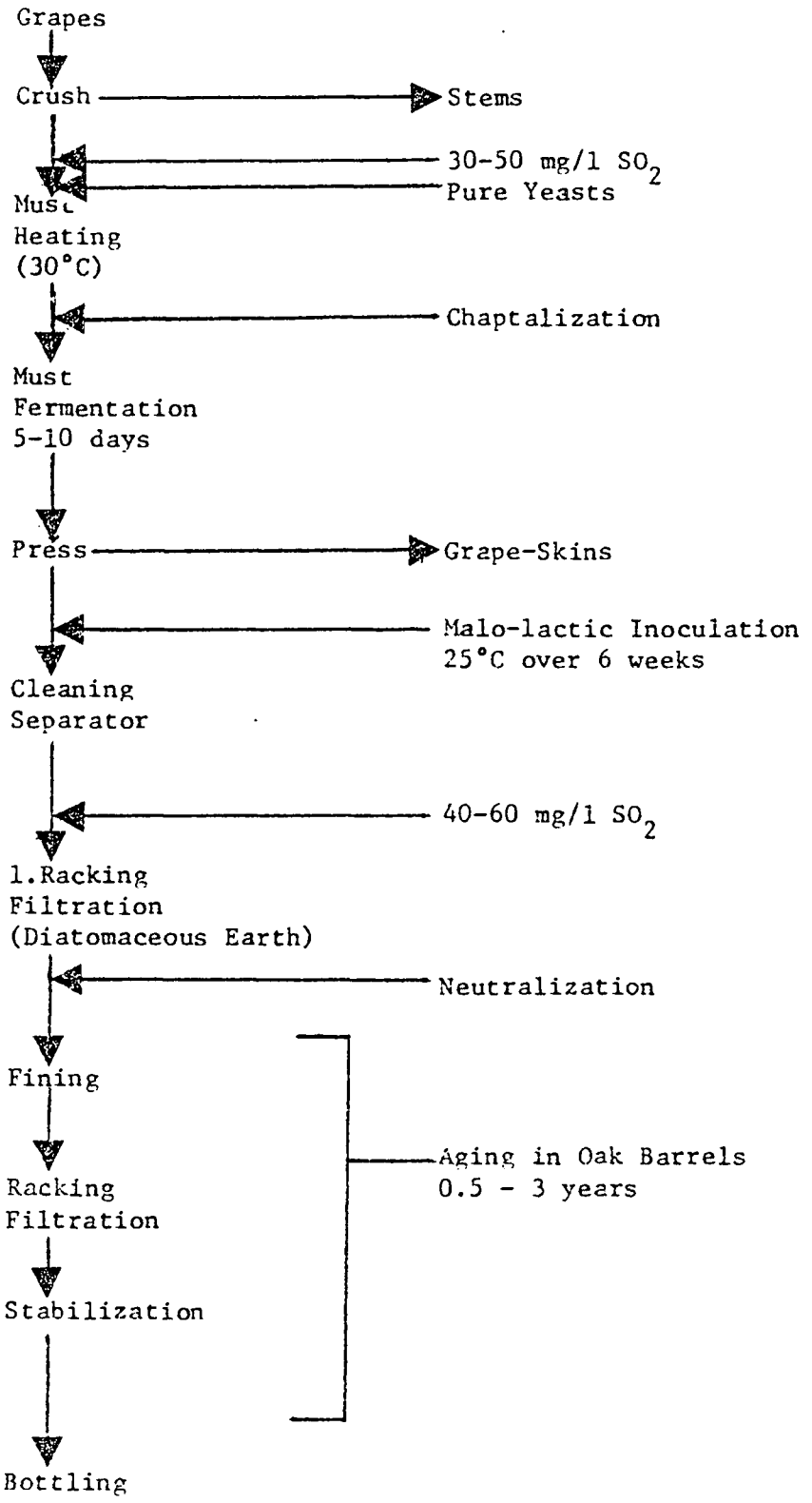


Figure 4. Illustration of the Production of Red Wine

which is accomplished by yeasts the second is a bacterial fermentation. During this process bacteria convert malic acid to lactic acid and carbon dioxide thus reducing the total acid content of wine by one half. The malo-lactic fermentation clouds the wine and the wine has therefore to be clarified using gelatine or other protein rich compound. After the first racking the young new wine is usually transferred to wooden tanks or barrels for aging.

Aging

Aging is a complex process of oxidation, reduction, and estrification that results in the formation of a desirable bouquet and the loss of the raw flavor of the new wine. During aging a slight evaporation occurs and the wood is allowed to impart its own flavor to the wine. The length of time that wine ages depends upon the character and nature of the wine, the type and age of the wood, and the style desired by the wine maker. Like the white wine, the red wine has to be racked and filtered several times, fined and stabilized.

Rosé Wines

Rose wines are basically produced in the same process as white wines. The basic difference is that red wine grapes are used and processed like white wine grapes. Although the major part of the color pigments are in the skin of the grape, there are also some color pigments in the mesoderm of the grape which give rosé wines the distinct color.

Winery and Wine Production Costs

Peculiarities of Wine Production Costs

Wine production is a capital intensive business. A small winery that produces 10,000 gallons annually required a capital investment of $266,500 (Table 12). Before planning a winery the potential winery operator must know his goal in complete detail [32]. A business plan must be set up which includes the varieties and types, the approximate volume of wine at a defined level of quality, and the market to be served. Will principal markets be local, regional, out-of-state, or international? The business plan should also include the price levels consistent with quality and volume of the expected wine.

The first decision to be made when starting the winery is the location of the firm. The cost of production of the wine can increase rapidly if the grapes for the crush have to be hauled over a long distance. The distance of the winery to the market influences the final wine cost. The accessibility of the winery to tourists is important if the operator plans to sell part of the wine through the tasting room.

Construction costs of wineries vary considerably according to the design of plant and visitor - sales facilities, as well as land price. The construction costs for the building can vary between $15 and $70 per square foot. These costs do not include the land. To estimate the needed building size about one-half square foot of building is required per gallon annual production.

The next big cost item besides building is the equipment. In

TABLE 12. INVESTMENT COST FOR A 10,000, 25,000, AND 50,000 GALLON WINERY

	Annual Production 10,000 gallons		Annual Production 25,000 gallons		Annual Production 50,000 gallons	
		(Dollars)		(Dollars)		(Dollars)
Land ($ 2,000 per acre)	2 acres	4,000	3 acres	6,000	4 acres	8,000
Building						
Squarefeet	6,000		8,000		12,000	
Price per squarefoot ($)	30		25		20	
Total building cost		180,000		200,000		240,000
Cooperage						
Stainless steel tanks						
5,000 gal for $ 10,000			4 units	40,000	9 units	90,000
2,500 " " $ 6,000	3 units	18,000	2 "	12,000	3 "	18,000
1,250 " " $ 4,000	2 "	8,000	2 "	8,000	2 "	8,000
French oak barrels						
60 gal for $ 300 ea	50 "	15,000	200 "	60,000	400 "	120,000
Total cooperage		41,000		120,000		236,000
Processing equipment						
Unloading facilities (including crusher/stemmer)		5,000		20,000		20,000
Press	1 x 10ht	9,000	1 x 15 ht	12,000	2 x 15ht	24,000
Refrigeration		1,000		5,000		5,000
Filter (plate and frame)		8,000		8,000		8,000
" (pressure leaf)		5,000		5,000		5,000
Pumps		1,000		2,000		3,000
Hose, fittings		2,000		5,000		7,000
Forklift				10,000		10,000
Laboratory		5,000		5,000		5,000
Bottling line						
Filler		500		3,500		25,000
Corker		200		4,200		
Labeler		2,000		17,000		17,000
Rinser		500		3,500		4,000
Fill optimet		3,100		3,300		10,000
Miscellaneous		2,000		5,000		10,000
Total processing equipment		41,500		111,000		158,000
Total investment		266,500		437,000		642,000

Source: Equipment choices, prices, and labor organization. Bill Nelson, Winery Systems & Enology Consultant, Eugene OR.

Costs reflect 1981 prices

general the price of a piece of equipment is not directly related to the wine quality but it has an important effect on the efficiency of the operation. Small wineries which cannot afford expensive equipment do not necessarily produce lower quality wine. Neither do larger wineries produce better wines because of the more expensive equipment.

A major part of the winery equipment is the cooperage. The choices between wood barrels and stainless steel tanks depends upon the composition of red and white wines being produced. Wood barrels are chosen only if the wine is aged in wood, as is the current practice in Oregon with most red and some white wines. For the calculation of the size of the storage and processing equipment the following conversions are usually applied [40]. For one ton of grapes crushed about 160 gallons of storing cooperage is needed. For fermenting space red wine requires about 250 gallons per ton, while white wine needs about 220 gallons per ton. A larger number than the actual volume of the wine is necessary for filtering, racking, etc. A winery is considered filled to capacity when the gallons of wine in storage equal two-thirds to three-fourths of its total gallons of cooperage. In selecting the cooperage the proper size of the tanks has to be considered, depending on the amount and number of different wines to be produced.

The processing equipment of a winery consists of: press, crusher stemmer, pumps, filters, bottling line, laboratory, hoses, and fittings. The choice of the appropriate equipment for a particular winery depends on the organization, labor situation, and money available. A

large choice of equipment is available at various degrees of automation.

Investment and Production Costs of a 10,000, 25,000, and 50,000 Gallon Winery

In the following part investment and production costs for the three different sizes of wineries in Oregon were calculated. Size was expressed in terms of annual production. The three sizes: 10,000, 25,000 and 50,000 gallons were representative for most wineries established in Oregon. Building, equipment and labor organization appropriate for the particular size was chosen with the help of a winery consultant. As in the grape production cost study the following study does not represent average costs for producing wine in Oregon. The costs are representative of those occurring for the three different winery sizes. The major investment cost items were building, cooperage, and processing equipment (Table 12). The total investment costs amounted to $266,500 for the small, $437,000 for the medium, and $642,000 for the large winery. The operating costs consist of labor, bottling supply, and chemicals (Table 13). It was assumed that the small winery employed a winemaker half time. The medium and the large winery hired a winemaker full time. For crush and bottling operations additional workers were hired. Labor hours were charged $7.20 including social security and other benefits. Because no strict distinction between the winemaker's, operator's, and hired labor's work could be drawn, an extra managemen charge was included. The management charge took into account the operator's and winemaker's managing and

TABLE 13. OPERATING COSTS FOR THREE DIFFERENT WINERIES

	Annual Production 10,000 gallons		Annual Production 25,000 gallons		Annual Production 50,000 gallons	
Labor Cost						
Crush	720 h	5,184	1,080 h	7,776	1,440 h	10,368
Filtering, racking Prebottling	240 h	1,728	300 h	2,160	440 h	2,880
Bottling (incl. set up)		7,500		13,250		16,000
Management charge		7,200		14,400		21,600
Total Labor Cost		21,612		37,586		50,848
Bottling Supplies						
Corks per case	$1.50		$1.20		$1.10	
Bottles	$3.00		$2.40		$2.15	
Labels	$ .50		$ .30		$ .25	
Capsules	$ .36		$ .36		$ .36	
Cost per case	$5.36		$4.26		$3.86	
Total Bottling Supply		23,300		44,500		80,500
Chemicals, Filter, etc.		500		1,000		2,000
Cost for Storing Red Wine		5,200		13,000		26,000
Total Operating Cost		50,612		96,086		159,384

supervising work. The total labor cost amounted to $21,612 for the small, $37,586 for the medium, and $50,848 for the large winery.

The costs for bottling supplies were declining from the small to the large winery due to rebates when larger volumes of supplies were purchased. In the operating cost a charge for storing the red wine was included. It was assumed that 15 minutes per week and per barrel had to be spent. The cost amounted to $.52 per gallon of wine produced. The total operating cost amounted to $50,612 for the small, $96,086 for the medium, and $159,384 for the large winery.

In Table 14 the interest cost, property tax, and depreciation charge was listed. It was assumed that half of the longe term investment was equity. The other half was borrowed for 25 years at an interest rate of 12 percent. Capital for the purchase of equipment and wood barrels was borrowed for eight years at 14 percent interest. For the calculation of the cost of capital the cost of debt and the cost of equity had to be included. This was done by weighting half of the average long term investment with the interest rate (12 percent). The other half of the investment was weighted with the opportunity cost of equity capital which was assumed to be 14 percent. The total capital cost amounted to $25,400, $53,372, and $82,314 for the three different wineries respectively. The property tax was calculated at a rate of two percent of the assessed value of building, land, and machinery. For the calculation of the depreciation, certain life times and resale values were assumed. The straight line depreciation was applied.

The various costs were summarized on a per gallon basis in Table

TABLE 14. INTEREST COST, TAXES, AND DEPRECIATION CHARGES FOR THREE DIFFERENT WINERIES

	Annual Production 10,000 gallons	Annual Production 25,000 gallons	Annual Production 50,000 gallons
Interest Cost			
Long term loan for building,[a/] land, steel tanks	13,221	16,510	22,205
Intermediate loan for equipment, wood barrels	12,179	36,862	59,928
Total Interest Cost	25,400	53,819	82,314
Property Tax			
Land, building	3,900	5,021	6,853
machinery	552	1,921	2,751
Total tax	4,452	6,942	9,604
Depreciation			
Building (30 years)	6,000	6,667	8,000
Steel tanks (15 years, 10% resale)	1,560	3,600	6,960
Equipment (10 years, 10% resale)	2,943	9,342	13,320
Oak barrels (5 years, $20 resale)	2,800	11,200	22,400
Total Depreciation	13,303	30,809	50,680
Total	43,155	84,187	142,598

a/ Based on 13% weighted average cost of capital times average investment. Weighted average cost of capital includes cost for equity capital at 14% and interest on debt capital at 12%.

TABLE 15. COST SUMMARY: FIXED COSTS, VARIABLE COSTS, AND PERCENTAGES OF FINAL PER GALLON COST

	Annual Production 10,000 gallons	Annual Production 25,000 gallons	Annual Production 50,000 gallons
Fixed Cost (per gallon)			
Interest	2.54	2.13	1.65
Depreciation	1.33	1.23	1.01
Property Tax	.44	.27	.19
Management charge	.72	.57	.43
Total Fixed Cost	5.03	4.20	3.28
Variable Cost (per gallon)			
Grapes ($55 per ton)	3.66	3.66	3.66
Labor	1.10	.61	.33
Cost for red wine	.52	.52	.52
Bottling supply, filter, etc.	2.38	1.82	1.65
Total Variable Cost	7.66	6.61	6.16
Total Fixed and Variable Costs	12.69	10.81	9.44
Percentages of Final Per Gallon Cost			
Interest	20	20	17.5
Depreciation	10.5	11	10.7
Tax	3.5	2	2
Bottling Supply	18.5	17	17.4
Labor	18.5	16	13.6
Grapes	29	34	38.8
	100.0	100.0	100.0

15 also includes the percentage figures of the costs in terms of total cost. Besides declining unit costs with increasing firm size there were differences in the composition of the cost. In this Table it was assumed that the grapes were purchased for $550 per ton. This is equivalent to $3.66 per gallon of wine. The total production cost of wine amounted to $12.69, for the small, $10.81 for the medium, and $9.44 per gallon for the large winery. The grapes are the biggest cost item with increasing shares in all three wineries. The composition of the percentage figures of total production cost with changing grape price was shown in Figure 5 for all three different winery sizes. The price of grapes is indicated on the vertical axis ranging from $450 to $850 per ton. The numbers on the left vertical axis represent the percentages of the different cost items of total costs at a grape price of $450 per ton. The right vertical axis indicates the percentages at a grape price of $850 per ton. For the small winery the percentage of grape cost of total costs increases from 24.9 to 38.6 percent if the grape price increases from $450 to $850 per ton. For the large winery the percentage increases from 35.8 to 51.5 percent. Figure 5 shows the importance of the grape price to the winery.

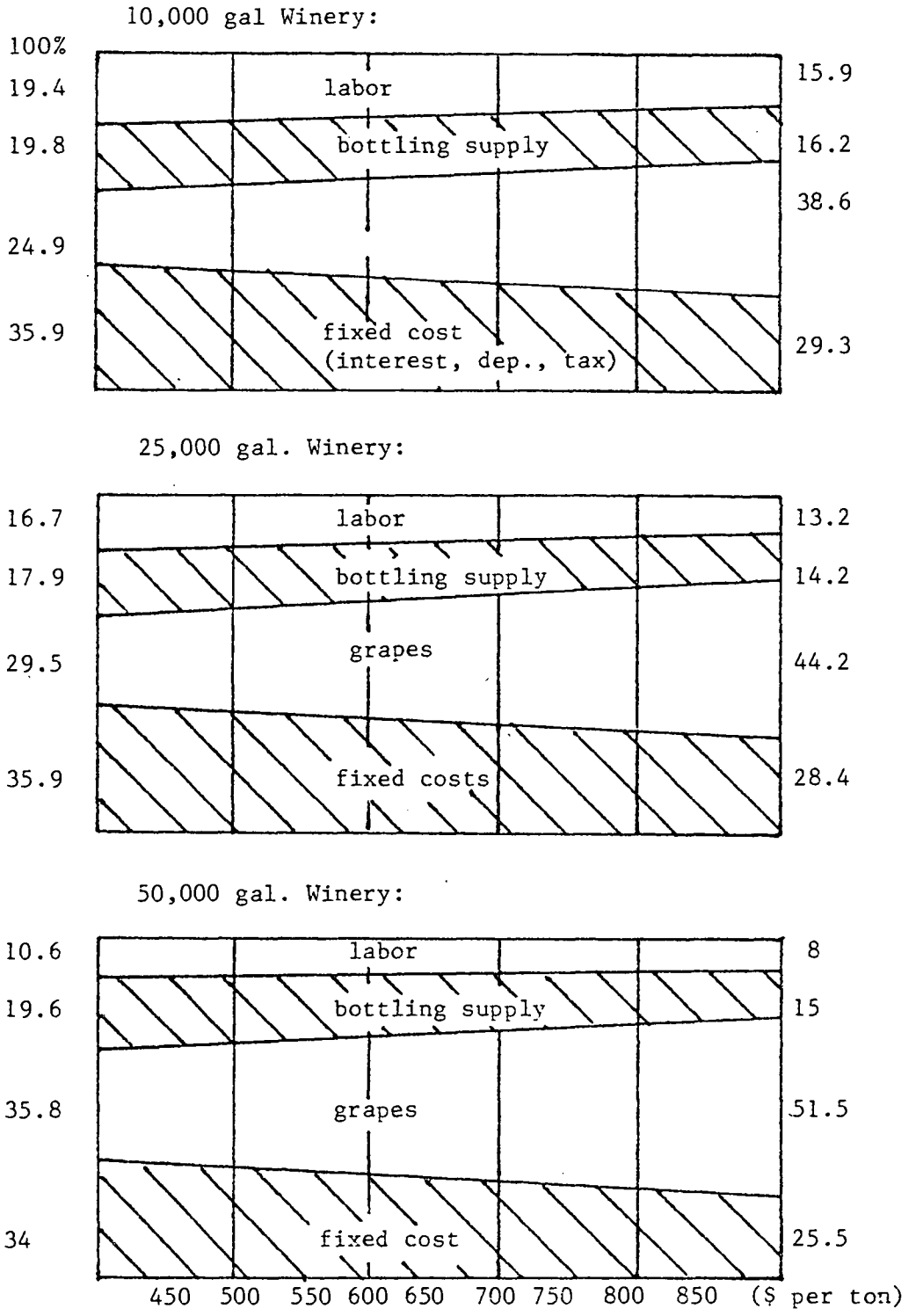


Figure 5. Composition of Wine Production Cost with Changing Grape Price

CHAPTER IV

THE WINE GRAPE AND WINE MARKET

Theoretical Framework

To give helpful directions for marketing strategies for the Oregon wine industry, the market where the Oregon wine industry operates has to be examined first. The Oregon wine market comprises the market within Oregon itself and other states to which Oregon wine is exported. Since the wine market in Oregon is dominated by wine imports from other states and foreign countries, the analysis in this chapter has to go beyond the Oregon wine market.

A market is defined as a closely interrelated group of sellers and buyers. A market includes all sellers in the individual industry and all buyers to whom they sell [5]. Marketing means working with markets, which in turn means to actualize potential exchanges for the purpose of satisfying human needs and wants. Marketing involves the flow of products from the producer to the consumer, the flow of money from the consumer to the producer, and the flow of information and services in either direction. Marketing includes all the economic activities related to the flow of products, money, and information between the point of initial production and the point of final consumption.

In a modern society the organization of markets is strikingly diverse. Few if any of the markets show characteristics of the extreme states: perfect competition and monopoly, for which economic theory provides information. Under perfect competition each seller

is so small that the selling price is taken as given and the seller will adjust output independently to the level which is most profitable. The industry output will be extended and price reduced to the point where the marginal cost of supplying is equal to the selling price. If firms expand output without increasing the unit costs, or if there is unimpeded and easy entry for additional sellers, long term output will be expanded and prices reduced to the point where every firm is producing at minimal unit cost. There are no excess profits [5].

A monopoly is characterized through a single seller having complete control of the market price through quantity variation. The monopolist can choose the most profitable price relative to the cost. A monopolist will produce less and charge more than a seller in a competitive market. The models of perfect competition and monopoly lead to logical and positive conclusions [5].

The organization of most markets falls somewhere in between these extreme states. Economists classify one type of organization as oligopoly. Oligopolies are characterized through few large sellers. Various oligopoly models have been developed over the past 150 years, but none of them has permitted very definitive predictions about the differences in market performance.

Oligopsony is characterized by a few buyers which purchase a significant share of the market supply. The buyers have some control over the price not the sellers. There might be some general tendency for large buyers to collectively depress price somewhat below the atomistic level while restricing purchases [5].

In the wine grape and wine markets the actions of a few influences the market and therefore violating the basic concept of the perfectly competitive and monopolistic states. The wine grape and wine markets can be best described in an oligopolistic - oligopsonistic framework.

Market Structure

The organization or structure of an industry has a strong influence on the performance of the industry [5]. The market structure constrains and directs enterprise activities and their results. In trying to discover cause and effect relations in market structure - conduct-performance, economic theory helps develop predictions concerning these relationships.

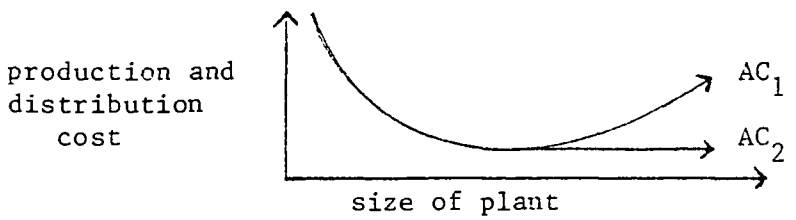
In an oligopolistic industry there will be some sales promotion costs which raise the total cost and probably the price of supplying goods. The level of selling cost in oligopoly may be less or greater than with perfect competition, depending on whether or not oligopolies are collusive in determining the amount of their selling outlays. In oligopoly any number of patterns of product quality, variety, and product change over time may emerge. The division of the market among sellers will be influenced by product differentiation. Various patterns of price differences among competing sellers are possible though not inevitable. These predictions are qualitative and rather indefinite [5].

To describe the extent of the oligopolistic competition in the wine market some organizational characteristics need to be determined. The market structure refers to the organizational characteristics of the market and is mainly classified according to: seller and buyer concentration, product differentiation, and barriers to entry. Other elements sometimes cited are: height of fixed costs, and growth rate of market demand.

Seller concentration refers to the number and size distribution

of sellers in the market [5]. The question which arises in this context is how high does seller concentration need to be, before mutually recognized interdependence of sellers emerges. In qualitative terms oligopolistic interdependence exists if each of two or more sellers have a large enough market share that a small proportional increase in volume of sales for one will result in a noticable proportional decrease in the sales of the other sellers. An answer in quantitative terms is not easy to find. It is possible to make some statements about the presence or absence of oligopoly only with respect to comparative extremes of high and low concentration [5]. According to Bain two classifications exist. First, industries in which the largest four sellers supply more than half an industry output is "monopolistic" or better, having monopolistic tendencies loosely attributed to oligopolies. Industries in which the largest four sellers supply less than half of the industry output are competitive. The second classification identifies as oligopolistic all industries in which the largest eight sellers together supply one-third or more of an industry [5].

The seller concentration is closely related with efficiency in production. There is a tendency of firms to seek efficient sizes. The effect of the size of a firm on its efficiency results from economics of size. As the plant becomes larger up to some point the firm operating it is able to obtain lower costs per unit of output.



Unit costs do not generally become indefinitely lower as the plant becomes indefinitely larger. Possible diseconomies of very large size through the wieldness of management and administration can be apparent in very large organizations. Therefore the average cost (AC_2) will probably increase after a certain point. The difficulty is to determine the optimal plant size.

According to Bain an oligopolistic industry structure may emerge almost automatically as a result of competition if there are important economies of size. This concentration movement is also favored when product differentiation exists [5]. This advantage helps some sellers to dominate over others within the industry.

With an oligopolistic structure some firms may find it profitable to operate at non-optimal sizes because efficiency is only one of the factors influencing the profitability of the firm. Market shares in an oligopolistic industries may not be equal. It is possible in the course of the evolution of the market structure that some of the firms will and some of them will not secure sufficient market shares to support operations at optimal size. Some of the greatest wineries in the world are exactly the same size today that they were 100 years ago. Therefore some of the firms may be undersized from the standpoint of efficiency but their business may still be profitable.

Given that there are firms of sub-optimal size, the firms might merge with each other or with larger firms to support plants of optimal size. But there are some important reasons why firms may not merge. First, mergers may be discouraged or prohibited by law. In markets with considerable product differentiation some relatively

small or undersized firms may find it most profitable to remain that way because they have a distinctive market position through catering to customers who prefer their special brands.

In general oligopolistic industries will not automatically move to rationalize their structures so that every firm is within the range of optimal size. Bain concludes that the degree of seller concentration found in oligopolistic industries should on average or most probably be consistent with the production of the bulk of industry output by firms of reasonable size. The disadvantage of large size production of wine can occur through the loss of valuable product identify or a production of the specially identified product in excess of the demand for it at attractive prices. The regular growth of most markets is a corrective force which tends to permit undersized firms to grow to efficient size with the market [5].

Theory of Oligopoly

In an oligopolistic market situation, firms adjust their prices according to the market conditions or in response to changes introduced by rivals. There is no general model explaining oligopolist price setting. One model which may serve as an explanation for certain aspects of oligopoly behavior, is the dominant firm price leadership model [50].

Dominant firm price leadership prevails when there is one or a few dominant firms and many small firms. The small firms are treated as perfect competitors. For a given market demand, the demand for the dominant firms is the difference between the market demand and the supply of the small firms in the industry. The model is illustrated in Figure 6. The demand curve for the dominant firms is constructed in

the following way. At price P_1 the market demand is equal to the supply of the small firms. The quantity demanded for the dominant firms is zero. At price P_2 the quantity supplied by the samll firms is $\overline{P_2B}$. The dominant firms supply $\overline{BA}$. $\overline{BA}$ is equal to $\overline{P_2G}$. The demand curve for the dominant firms is constructued in similar way for each price. In Figure 6, MR is the marginal revenue curve for the dominant firms corresponding to the demand curve $\overline{P_1d}$. MC is the sum of the marginal cost curves. The dominant firms maximize profits if they mark up $\overline{EF}$ on their marginal cost and set price at P*. At this price the small firms will supply quantity Q_s; the dominant firms Q_0.

Theory of Heterogenous Commodities

Most textbooks on economic theory do not provide explanations about heterogeneous commodities. A theoretical explanation of the demand for heterogeneous commodities can be obtained through the work of Prof. J.A. Edwards in his unpublished manuscript "A Study in the Theory of Value: Heterogeneous Commodities." (1969) [12].

A product is defined as consisting of all units of output produced by a given firm. A commodity is to be defined as a particular aggregate of products. A homogeneous commodity is defined as the set of all products for which the consumer has linear indifference curves with slope equal to -1.0 between each pair of products in the set. If the slopes of the indifference curves between each pair of products are not equal to -1.0, then the commodity is heterogeneous. The following graph represents one level of utility (V_0^A) in terms of the total quantity of the commodity A, and an index number (α). The index number reflects the subjective measure of quality of the individual

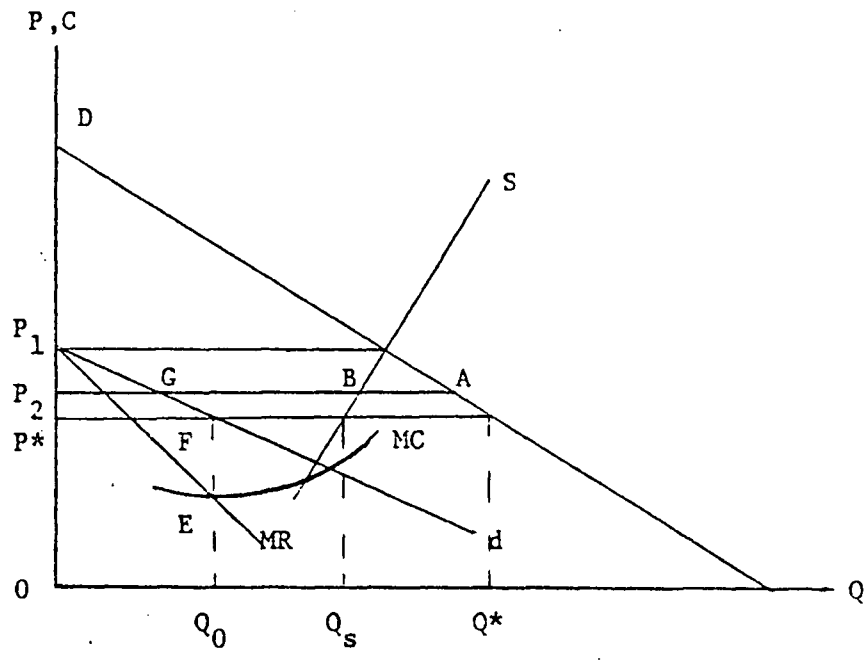
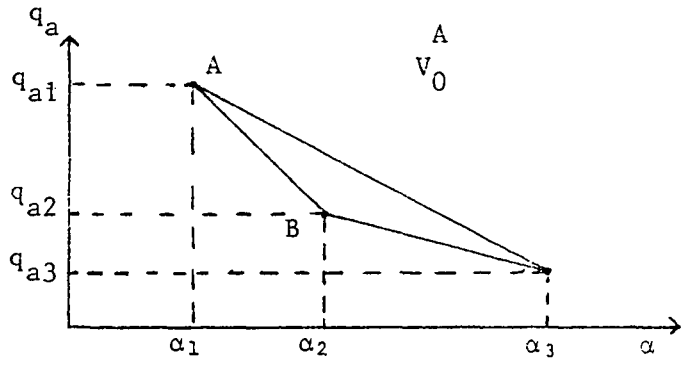


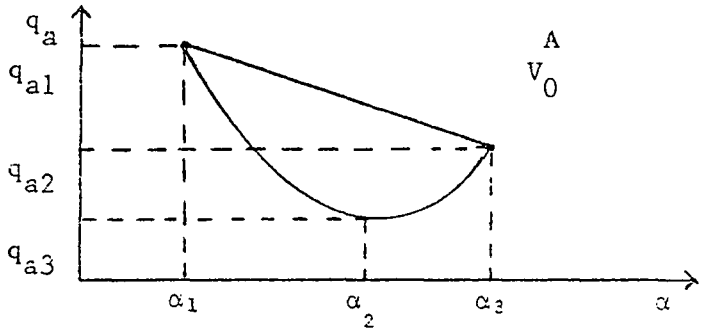
Figure 6. Dominant Firm Price Leadership Model

consumer. The commodity consists of three products.



The line $\overline{AB}$ in (q_a,α) space represents the combinations of the products q_{a1} and q_{a2} that yield the utility level V^A as the indifference curve between them. If wine is taken as commodity, q_{a1} might be a generic brand with the lowest quality index and q_{a2} might be a selection of an outstanding vintage.

If it is assumed that the consumer is capable of imagining an infinite number of products over some range from which he might choose, the lower boundary of the indifference area takes on a smooth shape.



The consumer will have a "preferred product" for a given level of utility V_0^A. At this point the marginal rate of product substitution is equal to zero. The marginal rate of product substitution indicates the rate at which the consumer is willing to exchange the form (product) of his commodity consumption for the level (quantity)

of commodity consumption. Points to the left of α_2 have a negative marginal rate of product substitution. This indicates that the consumer prefers products with higher indices to those with lower product indices. The curve reflects that the consumer ranked the products comprising commodity A according to his preferences. The consumer's perception of the quality of the products comprising a commodity can be summarized by the statement:

$$\frac{\partial F^A}{\partial \alpha} \gtrless 0 \text{ as } \alpha \lessgtr \alpha_2$$

If $\alpha = 0$, then the commodity is homogeneous.

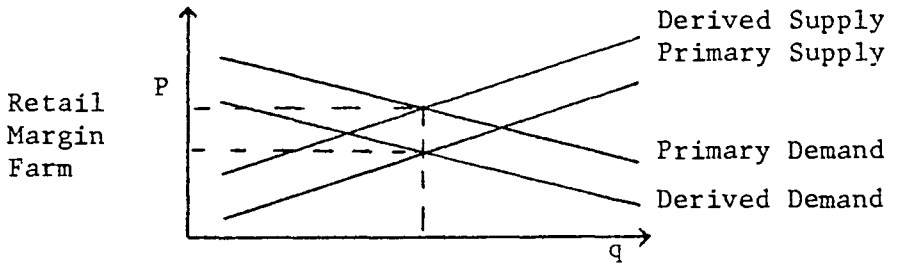
The assumptions concerning consumer behavior: complete ordering, transitivity, nonsatiation, absence of lexiographic ordering, and absence of externalities are assumed to be met.

The individual consumer is seeking to maximize his utility in consumption of commodities given prices and income. The optimal quantity and product chosen by the consumer will depend upon the exogeneously given price function and the income of the consumer.

Derived Demand for Wine Grapes

Wine grapes are exclusively used for wine production, therefore the relationship between price and quantity of wine grapes demanded is determined by the demand for the final product wine. The difference between the price received by the wine grower and the price the consumer paid for wine is the marketing margin [53]. The marketing margin includes processing, advertising, and retailing costs.

Assuming that the marketing margin remains constant, the relation between primary and derived demand and supply can be shown:



The retail price is established at the point where primary demand and derived supply curves intersect. The farm level price is based on derived demand and primary supply. The difference between the two prices is the marketing margin.

Provided knowledge of marketing margin and of the elasticity of either retail or farm level, it is possible to estimate the elasticity at another level [53]. Usually the marketing margin (M) is likely to be a combination of a constant amount (c) and a constant percentage (1) of the retail price (Pr). The relation is: $M = c + aPr$.

Thus the relationship between the elasticity of derived demand (E_d) and the elasticity of retail demand (E_r) is:

$$E_d = E_r \quad 1 - \frac{c}{(1-a)\ P_r}$$

The Wine Grape Market

Structure

According to K. Moulton the market for wine grapes can be regarded as oligopsonistic. This argument can be supported by looking at the U.S. Census of Agriculture in 1978. The Census listed 10,349 farmers producing grapes in California. These growers attempted to sell to a relatively few important buyers. In 1978 there were 183 firms in California operating 307 bonded wineries. The leading buyers are Gallo in California and Taylor in New York. The grower prices vary according to supply and demand conditions, quality, variety and availability of alternate uses.

An analysis of the grape market is difficult because of the extreme diversity of the wine grape market and the changing environment for price making. New York and California have enacted legislation to encourage early and independent price determination.

Wine grapes are usually purchased on yearly supply contracts with minimum price guaranties [29]. A new statute in California requires that wine grape prices be finalized by January 10 after the crush. In the past wine grape prices have averaged higher in other states than in California (see Table 2).

The Oregon wine grape market comprises only grapes from vinifera varieties which are exclusively used for wine production. In 1980, 1,415.67 tons were crushed in Oregon, where 31.8 tons originated from California, and 267.105 tons from Washington [39]. The 1978 Census listed 856 farms reporting grape production in Oregon. This number included also farmers who produce some house wine or table grapes.

Currently there are 36 bonded wineries in Oregon. Of these wineries, 22 have their own vineyards. Some wineries provide all grapes themselves. As a consequence only a small number of wineries act as major buyers in the wine grape market. The Oregon wine grape market can be viewed as oligopsonistic.

The grapes are usually sold in yearly contracts in Oregon. A typical contract includes the conditions of delivery, quality, base price, sanitary condition of the grapes, dates of payments, and warranties. Grapes are paid according to their weight and sugar content. This method is applied all over the world. The sugar content is the major indicator for quality and is measured in degree Brix. A certain base level is required for each variety, i.e. 21° Brix for Chardonnay, or 22° for Pinot noir. The agreement between the winery and the wine grape producer includes also bonuses for higher than base degrees and penalties for lower degrees.

Price Determination

Prices are determined in two different ways in Oregon. Some wineries base their wine grape price on current prices of grapes of comparable varieties in Washington and California. The price in Washington is usually about 60 - 90 percent of the price in the Northcoast area in California. The other method is to use a rule of thumb, the expected future bottle price of the particular wine is about one percent of the wine grape price per ton, i.e. if the expected bottle price per fifth is $6.50, the price for a ton of grapes is $650. Both pricing methods are not totally satisfactory to grape producers and grape buyers, because they do not reflect the particular market

conditions of wine grapes in Oregon. A closer cooperation of wine grape growers and wineries should be sought, because the grape price is very important for both sides. This is especially important since the Oregon wine industry and the wine market are growing. A moderate pricing policy would help to increase the market share.

The Wine Market Structure in the U.S. and Oregon

Seller Concentration

The U.S. wine industry can be regarded as highly concentrated. The degree of concentration was measured in terms of sales and in terms of storage capacity. In terms of sales the four largest wineries (Gallo, United Vintners, Frazia-Morgan, David Almaden) accounted for 54.1 percent [59]. The eight largest sellers accounted for 64.5 percent, the ten largest for 66.7 percent of the purchases reported. By looking at the storage capacity the largest four wineries had 48 percent, the largest eight had 64 percent and the largest 12 had 73 percent of the total storage capacity of wine in the United States in 1980 [59].

The leading enterprise in the wine business was Gallo one of the biggest family enterprises in the U.S. in 1980. The estimated case shipment was 45,000,000 with a sales volume of $520,000,000 [59]. The influence of Gallo on the wine industry was not limited to the determination of the grape and wine prices, it also affected the human capital in the wine industry. In 1978, six directors of leading wineries and three enologists had previously worked for Gallo. Shea estimated that approximately half of the wine production of California was controlled by and through former "scholars" of Gallo [49].

The non-varietal table wine market can be said to be dominated by Gallo, Franzia, and United Vintners. The leading wineries in the premium wine market were Almaden, Paul Masson, Inglenook, Christian Brothers and Sebastiani [29]. With the exception of Sebastiani the leading premium wineries are controlled by multinational enterprises.

Heublein, where the wine business accounted only for 17 percent of the overall sales, controlled Inglenook and United Vintners. Seagrams Company, the biggest distiller group in the world, controls Christian Brothers and Paul Masson. Almaden is a subsidiary of National Distillers. Another big company which invested in the wine industry is Coca Cola. The Coca Cola Co. which owned the Wine Spectrum ranked number four in sales volume in the U.S. in 1980. The Wine Group which belonged to the Coca Cola Bottling Co. of New York, ranked number five. The reason for the high concentration in the wine industry was probably due to economies of size in the distribution of wine which are more important than on the production level. The big companies were already established in the beverage market and have already a certain market power and experience with product promotion policies.

In Oregon the seller concentration reflects the national picture. According to the Oregon Liquor Control Commission (O.L.C.C.) the four biggest suppliers of wine, Gallo, United Vintners, Almaden, and Sebastiani, accounted for 64 percent of the market. The largest eight supplied 76 percent, the largest 20 accounted for 85 percent of the total sales in 1980. The largest Oregon winery, Honeywood, ranked number 18 in the O.L.C.C. statement. Numbers 22- 24 were Tualatin, Oak Knoll, and Sokol-Blosser. The 1980 statement of the O.L.C.C. listed 111 wineries from California which accounted for 88 percent of the sales, 17 foreign countries which accounted for six percent, and 31 Oregon wineries supplying three percent of the wine to the Oregon market. Wine sales in Oregon were 8,233,107.87 gallons in

1980 [35].

Buyer Concentration

Buyer concentration in the economic sense refers also to the number and size distribution of buyers [5]. In the American economy departures from perfect competition are less common on the buying sides of the markets than on the selling sides. A significant degree of buyer concentration is apparent in the wine grape market. In the wine market the final consumers are all relatively small. Each of the consumers purchases so little that he or she cannot influence the price at which he or she buys. The consumer reacts therefore as a price taker. However, on the wholesale and retail level oligopsonistic tendencies can occur. Large stores, especially if they operate on a national basis, will have some influence on the price at which they buy.

By looking at the buyer concentration in the geographic sense, huge differences between states, and between rural and metropolitan areas were apparent. The percentages of domestic, imported, and total wine consumed in the top 20 metropolitan areas in the U.S. were summarized (Table 16). The top 20 metropolitan areas consumed 44.7 percent of all wines produced in the U.S., 54.9 percent of all imported wine, and 46.9 percent of all wine in the United States in 1980.

It was further apparent that more domestic wine relative to imported wine was consumed on the West Coast. The reverse was true for the East. New York itself accounted for 14.4 percent of the consumption of imported wines.

The per capita consumption of wine differed very much among the

states in 1980 (Table 17). The states with the highest per capita consumption were: District Columbia, Nevada, California, and New Hampshire. Oregon ranked seventh in 1980. All states on the Pacific coast were above the national average of 2.11 gallons per capita. The states with the lowest consumption were: Arkansas, Mississippi, Kentucky, and West Virginia.

Market Penetration

Market penetration can be viewed as a different type of buyer concentration. In his study, Folwell estimated the percentage of households in each region making at least one purchase during a 12 month period [16]. He concluded that the sale of wine in the U.S. is typified by low market penetration. The Pacific region had the highest market penetration with 52.6 percent of the households purchasing wine. The whole U.S. had an average of 38.8 percent. Relatively few households bought most of the wine in the United States. Ten percent of the households made 54.4 percent of all wine purchases. Twenty percent of the households accounted for 66 percent of all wine purchases (Figure 7).

Product Differentiation

Wine is a highly differentiated product. In 1974 the universal product code had over 45,000 entries for wine products [16].

Product differentiation refers to the extent to which buyers differentiate, distinguish, or have specific preferences among the competing outputs of the various sellers established in the industry [5]. According to Bain, one condition must be present to give product

TABLE 16. WINE SALES OF U.S. PRODUCED AND IMPORTED WINES IN THE TOP 20 METROPOLITAN AREAS IN 1980

Metropolitan Area	Percentage of Total Wines		
	U.S. Produced	Imported	Total
Los Angeles - Long Beach	10	5.3	9
San Francisco - Oakland	4	2.7	3.9
Seattle - Everett	1.7	0.5	1.4
Anaheim-Santa Ana-Garden G.	1.6	0.7	1.4
San Diego	1.4	0.7	1.2
Riverside - San Bernardino	1.3	0.4	1.1
San Jose	1.3	0.5	1.1
Total West Coast	21.3	10.8	19.1
Dallas - Fort Worth	1.4	1.2	1.4
Houston	1.2	1.1	1.2
Denver - Boulder	1.2	0.6	1.1
Total	3.8	2.9	3.7
New York	4	14.4	6.4
Chicago	3	5.2	3.5
Boston-Lowell-Brockton-Lawrence-Haverhill	2	3.8	2.5
Detroit	2	2.8	2.3
Philadelphia	2	3.7	2.3
Washington D.C.	2	2.1	1.7
Nassau-Suffolk	1	3.6	1.6
Newark N.J.	1	3.1	1.5
Baltimore	1.3	0.7	1.2
Cleveland	0.9	1.8	1.1
Total East	19.6	41.2	24.1
Total Top 20 Metro. Areas	44.7	54.9	46.9

Source: The Wine Marketing Handbook 1981.

TABLE 17. PER CAPITA CONSUMPTION IN THE U.S. BY STATES, 1960, 1970, 1980[a/]

State	1960	1970	1980[2]	Percent Change from 1970[2]	1980 Rank
	Gallons				
AL	.22	.41	.98	139.1	42
AK	.77	1.55	2.93	89.0	11
AZ	1.12	1.40	2.18	55.7	17
AR	.45	.62	.69	11.3	48
CA	2.09	2.93	4.41	50.5	3
CO	.78	1.41	2.94	108.5	9
CT	1.31	1.56	2.71	73.7	15
DE	1.17	.96	1.81	88.5	23
DC	2.84	3.94	6.49	64.7	1
FL	.89	1.39	2.33	67.6	16
GA	.25	.62	1.19	91.9	36
HI	.76	1.12	2.78	148.2	14
ID	.29	.44	1.78	304.5	24
IL	.85	1.24	2.08	67.7	19
IN	.41	.54	1.05	94.4	41
IA	.15	.28	.80	185.7	44
KS	.28	.43	.70	62.8	47
KY	.25	.38	.61	60.5	50
LA	1.25	1.26	1.54	22.2	29
ME	.36	.44	1.76	300.0	25
MD	.98	1.14	2.03	78.1	20
MA	1.10	1.39	2.86	105.8	13
MI	.66	1.07	1.70	58.9	26
MN	.46	.71	1.57	121.1	27
MS	—	.36	.61	69.4	49
MO	.69	.90	1.26	40.0	34
MT	.43	.60	2.13	255.0	18
NB	.41	.61	1.18	93.4	37
NV	1.90	3.01	5.01	66.4	2
NH	.54	1.43	3.73	160.8	4
NJ	1.39	1.76	2.94	67.0	10
NM	1.25	1.56	1.95	25.0	21
NY	1.45	1.86	2.88	54.8	12
NC	.33	.72	1.25	73.6	35
ND	.37	.48	1.05	118.8	40
OH	.65	.85	1.31	54.1	33
OK	.37	.68	.97	42.6	43
OR	1.00	1.83	3.10	69.4	7
PA	.82	.90	1.42	57.8	31
RI	1.22	1.78	3.37	89.3	5
SC	—	.69	1.08	56.5	39
SD	.45	.60	1.11	85.0	38
TN	.25	.30	.74	146.7	46
TX	.54	.78	1.32	69.2	32
UT	.44	.52	.79	51.9	45
VT	.99	1.74	2.95	69.5	8
VA	.62	.94	1.56	66.0	28
WA	.89	1.80	3.17	76.1	6
WV	.39	.41	.56	36.6	51
WI	.66	.98	1.89	92.9	22
WY	.45	.71	1.43	101.4	30
US Total	.91	1.31	2.11	61.1	

1/Based on resident population as of July 1, except for 1980 which is April 1. Excludes U.S. civilian and military services personnel abroad.
2/ Preliminary
Sources: State and tax agencies; BATF; Bureau of the Census.

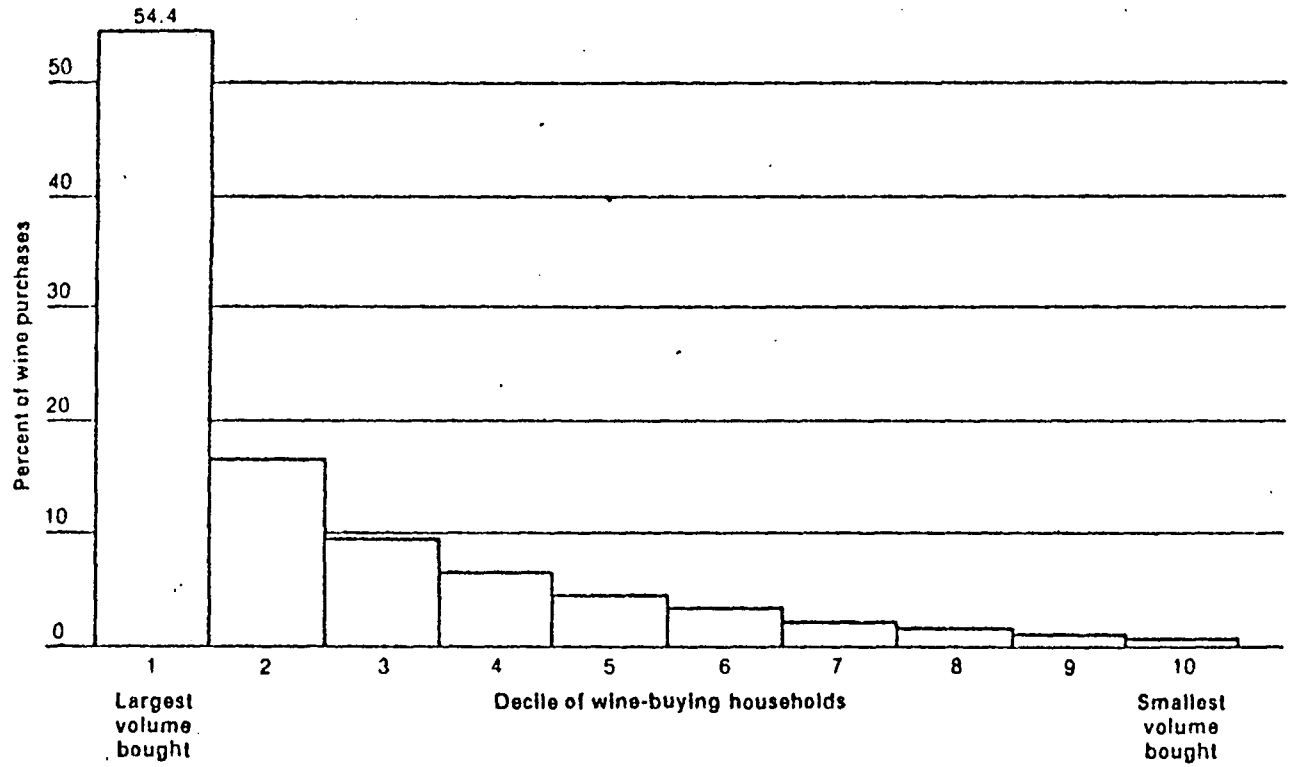


Figure 7. Concentration of wine purchases, February 1975 to January 1976

Source: [16].

differentiation its full meaning. Different groups of buyers rank various competing outputs differently on their scales of preferences. The strength of preferences and willingness to pay a premium price varies from buyer to buyer. These circumstances lead to some specific and generally unequal division of the market among competing sellers. A division occurring with equal or unequal prices for their products is also possible.

Sources of product differentiation are [5]: (1) Differences in quality or design, different buyers may rank the competing products differently. (2) Some buyers are ignorant of essential characteristics and qualities of the goods they purchase. They may rely on seller or product reputation. (3) Preferences through persuasive sales promotion activities of sellers cause product differentiation. Advertising is aimed at creating product differences through generally phrased praises of the attributes of the product, or through penetrating into the potential buyer's mind an awareness of the product through endless repetition. Product differentiation may be based on nonrational or emotional attitudes. (4) Differentiation may be caused through differences in the location of sellers of the same sort of good, or through (5) so called gift goods. Those are products which are frequently bought on special occasions as gifts with the motive of gaining the admiration or gratitude of others.

Wine can be differentiated through:

- Regional origin
- Variety
- Color (white, red, rosé)

- Price class
- Domestic or imported
- Wine class (according to the O.L.C.C. 845-10-280)
    - Wine or grape wine
    - Sparkling wine (including champagne)
    - Carbonated wine
    - Fruit and berry wine

        (according to the U.S. Treasury)
    - Table wine
    - Dessert wine
    - Vermouth
    - Other special natural
    - Sparkling wine
- Table wine, non-varietal (generic) wine, varietal (premium) wine
- Quality characteristic
- Brands

Wine Quality

Among wine distinctions the quality is the most difficult to address. The definition of wine quality is very difficult. The price is often used as a measure of quality[a/]. Generally it costs more to produce high quality wine because of lower yield per acre and higher production costs. But frequently, distribution costs or taxes are such that differences on the production level are not

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a/ This phenomenon is referred to as the Veblen effect.

transmitted on the consumer level.

Also, if there is a certain coincidence in the price and quality scale among experts, it has to be noted that the consumer preferences are not homogeneous and do not necessairly correspond to the preferences of the experts.

An important aspect regarding quality judgement is that there is a great difference in the sensorial perception among individuals. Approximately 25 percent of the people are color blind to a certain extent. Some people are physiologically very sensitive to acid, some are not. The health, age, and regular consumption of certain products (like tobacco) have also a strong influence on the individual sensorial perception. The taste of wine depends on color, aroma, and temperature. Sometimes the presence of a certain environment, or vocabulary which is used to express or compare the different elements of the taste influence the quality perception of the individual.

There is an important difference between the United States and European wine growing countries. Their governments and the Commission of the European Community imposed several relative quality standards (AOC, VDQS, QbA)[a/] and absolute quality standards like alcohol content. The quality differences in the U.S. are more expressed through wineries with their particular brands rather than through an appellation of origin or alcohol content.

To illustrate the notion of quality we can distinguish between two different aspects. There is an absolute distinction where a

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a/ Apéllation d'Origine Controlée; Vin de Qualité Supérieure; Qualitaetswein bestimmten Anbaugebietes

certain minimum quality requirement exists which the wine has to exceed to be purchased by the consumer. The other aspect is a relative distinction. A certain wine is qualitatively superior compared to others which are nevertheless consumable.

Product differentation has a very important influence on pricing and on product promotion policies and vice versa. Each seller is faced with a market in which some buyers either prefer the product or rank it high in their preference schedule [5]. The study of Folwell showed that there is some degree of brand preference for all types of wine. However the panel of households did not show strong brand preferences for all wines produced by one winery [16]. Each company served some unique segment of the wine market.

The degree of independence in pricing by individual sellers in product differentiated markets does not necessarily result in their selling at a variety of different prices. The individual firm has more latitude in its price decision. Product and service differences serve to desensitize the buyer to existing price differentials [5].

Barriers to Entry

Barriers to entry to the wine business appear through regulations and through the wine production itself. The Oregon Liquor Control commission regulation prevents entry or participation of certain licensees in more than one level of market activity. Selling wine at both wholesale and retail level is prohibited except in the case of a person holding a farmer's winery license. The regulation although restrictive to persons already in the wine trade, prevents vertical integration of wholesales and retailer, which would make it more

difficult for new retailers to enter the market.

A license is necessary to operate at any level in the marketing channel. Before the license is granted, enforcement officers check into financial background of the perspective licensee or the nature of the source of backers.

Barriers to entry to the wine business occur through the different regulations in various states. Taxes and mark-up pricing in some states can be viewed as barriers.

Barriers to entry inherent to wine production are the high investment costs in both the wine grape and wine production. In addition economies of scale exist on the production and especially on the distribution level. To serve the national market a winery must have a certain amount of wine of the same quality.

For a small winery barriers to entry through high investment cost might not be that important and the expansion beyond a certain small size may be more difficult than entry especially if consumer's preferences are marked. The smaller firm, being less handicapped in its demand, supply, and cost conditions in the local market, may find it extremely difficult to expand into the regional or national market.

Barriers to entry appear also through product differentiation. Already established wineries have a certain advantage through already known brands.

To enter wine grape and wine production successfully a certain technical knowhow is necessary which also limits entering the business.

Market Regulation

The environment in which the U.S. wine industry operates is unique. Wine is exempt from the commerce clause of the U.S. Constitution [21]. The Twentyfirst Amendment (Repeal of Prohibition) authorized each state to regulate the sale, distribution, and taxation of wines manufactured in the state or imported for consumption. The industry operates therefore in two worlds. There is the dynamic world of market growth and potential and there is the restrictive world of state laws and regulations which differ very much within the United States.

Wine is sold under a number of laws; 40 states have local options for prohibition, 13 states sell wines in state owned wholesale or retail stores. Twelve states have state monopoly for table wine distributions at wholesale and retail distribution [58]. Some states, Arkansas, Georgia, Florida, New Mexico, and Michigan imposed higher taxes for out-of-state wines.

The Liquor Control Act as set out in Chapter 471 in the Oregon Revised Chapter is the legal basis for the regulation in Oregon. The responsible authority in Oregon is the Oregon Liquor Control Commission (OLCC) located in Portland. The purpose of the Liquor Control Act is outlined in Chapter 471,040: The Liquor Control Act shall be liberally constructed so as: (1a) To prevent the recurrence of abuses associated with saloons or resorts for the consumption of alcoholic beverages.

(b) To eliminate the evils of unlicensed and unlawful manufacture, selling, and disposing of such beverages and to promote temperance in the use and consumption of alcoholic beverages.

(c) To protect safety, welfare, health, peace, and morals of the people in the state.

> (2) Consistent with subsection (1) of this section, it is the policy of this state to encourage the development of all Oregon industry.

The regulations of the O.L.C.C. contain: (1) Only persons of 21 years of age are qualified to purchase alcoholic beverages. (2) The wine trade in the state is facilitated by the issuance of different licenses. Each type of license carries different types of privileges. (3) Section 845-10-280 contains regulations about standards of identity of wines. The different wine types are defined. This section also regulated the appellation of origin and cellar treatment. (4) Section 845-10-290 regulates the labeling of wine produced or bottled in Oregon. (5) Another section regulates sanitation and cleanliness for the production, bottling, or otherwise handling of wine. (6) The commission sets a minimum price for the retail level. No wine can be sold at prices lower than those set for the designated container size. Currently the minimum prices are 59¢ per fifth and $2 per gallon. A list of prices must be filed with the commission before the 20th of a month to take effect the following month. (7) Advertising through the medias must be submitted to and approved by the commission prior to use. The commission considers the "public interest" in sanctioning advertising material.

Taxation

Different taxes are imposed on wine in Oregon. The O.L.C.C. imposes a tax on grapes or grape products of $10 per ton. The state wine tax on table wine (with less than 14 percent alcohol by volume) is $.65 per gallon in 1981. The federal tax on table wine is $.17 per

gallon. The state taxes vary from $.01 per gallon in California to $1.51 per gallon in West Virginia. Nine states impose a markup up to 95 percent [18].

Product Promotion

Price competition is very seldom observed in oligopolistic markets [5]. The central feature in oligopolistic markets with product differentiation is non-price competition. The most important methods of non-price competition are advertising and creating product loyalties (quality differentials) among products. Advertising or more generally product promotion policies include [23]:

Advertising: any paid form of nonpersonal presentation and promotion of ideas, goods, or services by an identified sponsor.

Personal selling: oral presentation in a conversation for the purpose of making sales.

Publicity: nonpersonal stimulation of demand for a product, service, or business unit.

Sales promotion: those marketing activities, other than personal selling, advertising, and publicity, that stimulate consumer purchasing and dealer effectiveness.

Sales promotion policies are essentially multidimensional and more complex than price policy. Sales promotion includes [23]:

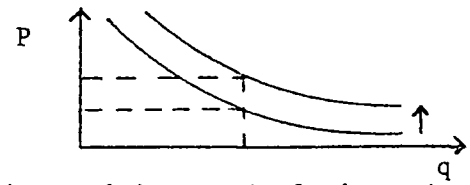
Design of promotional campaign

Choice of advertising media

Determination on how much to spend

Policy decision to alter the product quality over a wide range

Through advertising the seller wants to increase consumer's perference for a product. The seller wants a new and higher demand curve level [48].



Advertising is used increasingly by major wineries. The index of advertising expenditures for wine has increased five times since 1967 [29]. According to K. Moulton, the advertising expenditures expanded from 10¢ per gallon in 1972 to 16¢ per gallon in 1975 [29]. Budgets for imported wines were considerably higher. In 1980 wine advertisers invested $134 million in media promotion. This was 2.2 percent of the total consumer expenditures on wine of $5.939 billion. The beer industry spent $419.2 million on advertising in 1980 which was 1.6 percent of the total consumer expenditures on beer of $26 billion [18].

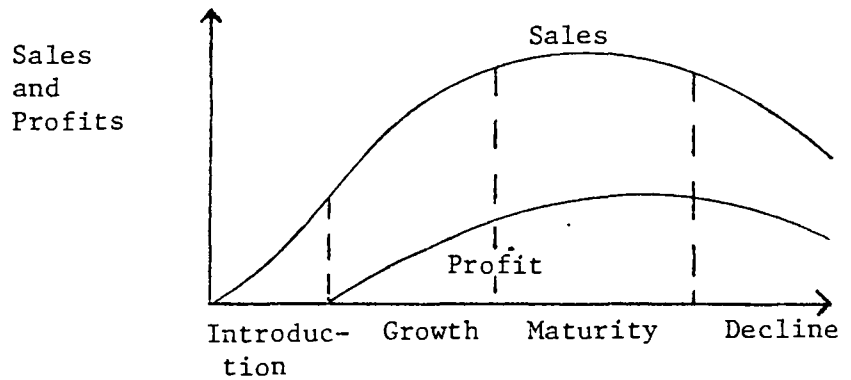
Broadcasting, television and radio combined, was the media where the most wine advertising money was spent in 1980. The advertising expenditures on broadcast accounted for 83.6 percent of all advertising money. Magazines accounted for 12.3 percent and newspapers for 4.1 percent in 1980 [18].

Only large wine companies can fully exploit the advantages of large scale promotion. The use of such exceptionally effective media like nationally distributed magazines, television, and radio requires that a firm distributes its product on a nationwide, or at least regionwide, basis to make it available to all buyers in all localities covered by the media. This in turn requires that the firm has a large enough quantity to serve the market.

Product Life-Cycle and Marketing Strategies

To evaluate the trends and development of future wine comsumption it is important to determine in which stage of the life-cycle the product is [23]. The concept of product life cycle attempts to recognize distinct stages in the sales history of the product. Corresponding to these stages are distinct opportunities and problems with respect to marketing strategies and profit potential.

Product Life Cycle



Introduction is the period of slow growth as the product is introduced to the market. Profits are almost nonexistent because of heavy expenses for product introduction. Growth is the period of rapid market acceptance and substantial profit improvement. Maturity is the time with a slowdown in sales growth because the product has achieved acceptance by most of the potential buyers. Profit is starting to decline because of increasing market outlays to sustain product position. Decline is the period when sales decline heavily and profits erode rapidly. The designation of the points where these stages begin is somewhat arbitrary. Not all products pass through this idealized S-shaped curve. The life cycle curve is supported by the theory of the diffusion and adoption of innovations.

A new product has to overcome resistance of existing purchasing patterns. Awareness, interest, trial, and purchase have to be stimulated. If the product is satisfying, larger number of buyers appear, this in turn attracts the entry of new competitors increasing the market awareness and also exerting a downward pressure on price. Eventually the rate of growth decreases and approaches zero.

The market projections of K. Moulton, R. Folwell, Gavin-Jobson, and the Bank of America suggest that the wine as a whole is somewhere in the growth and maturity stages (Figure 8). This will continue until about 1990. However this overall phenomenon can be specified in different wine types. The table wines which might be considered the "engine" of the wine boom are still in the growth stage where as statistics suggest, that dessert wines are already in the declining stage.

The Oregon wine might be classified somewhere in the introduction and growth stages. Some wines are already well established in the market whereas others are still concerned with market awareness.

P. Kotler suggests the following marketing strategies for the different stages [23]. During the introductory stage there are likely to be only a few firms selling the new product. Firms direct their selling effort towards those buyers who are the most likely to buy. They are usually familiar with similar products. A high level of promotion is necessary to (1) inform potential consumers, (2) induce trial of the product, and (3) secure distribution in retail outlets. The management can set a high or a low level for each marketing variable such as price, promtion, distribution and product quality. In

the growth stage the sales will start climbing if the new product satisfies the market. In this stage new competitors enter the market which leads to a scramble for available distribution outlets. During this stage the firm tries to susbtain market segments and distribution channels. The firm shifts some promotion from building product awareness to improve product conviction and purchase, and to decide when the time is right to lower the price to attract the next group of price sensitive buyers into the market. The firm in the growth stage faces a trade-off between high market share and high short-run profit. The firm forgoes maximum profit in the short-run by spending money on product improvement, promotion, and distribution. The maturity stage is characterized through a slowing down of the rate of sales growth and stabilizing profits. This stage lasts normally much longer than the previous stages. The manager should not be content with simply defending the product's current position. The three basic strategies in this stage are; market modification, product modification, and marketing-mix modification. Market modification means looking for opportunities to find new buyers. This can be done through stimulating increased usage among present customers. Through quality improvement as a means of product modification, the manager can try to break out of stagnant sales. As a final source of mature product strategy the possibility of stimulating sales through altering one or more elements of the marketing mix. This can be achieved through price cuts, gifts, contests, etc. When the product reaches the declining stage only little can be done to halt the deterioration of sales and profits. The firm can then decide on strategies

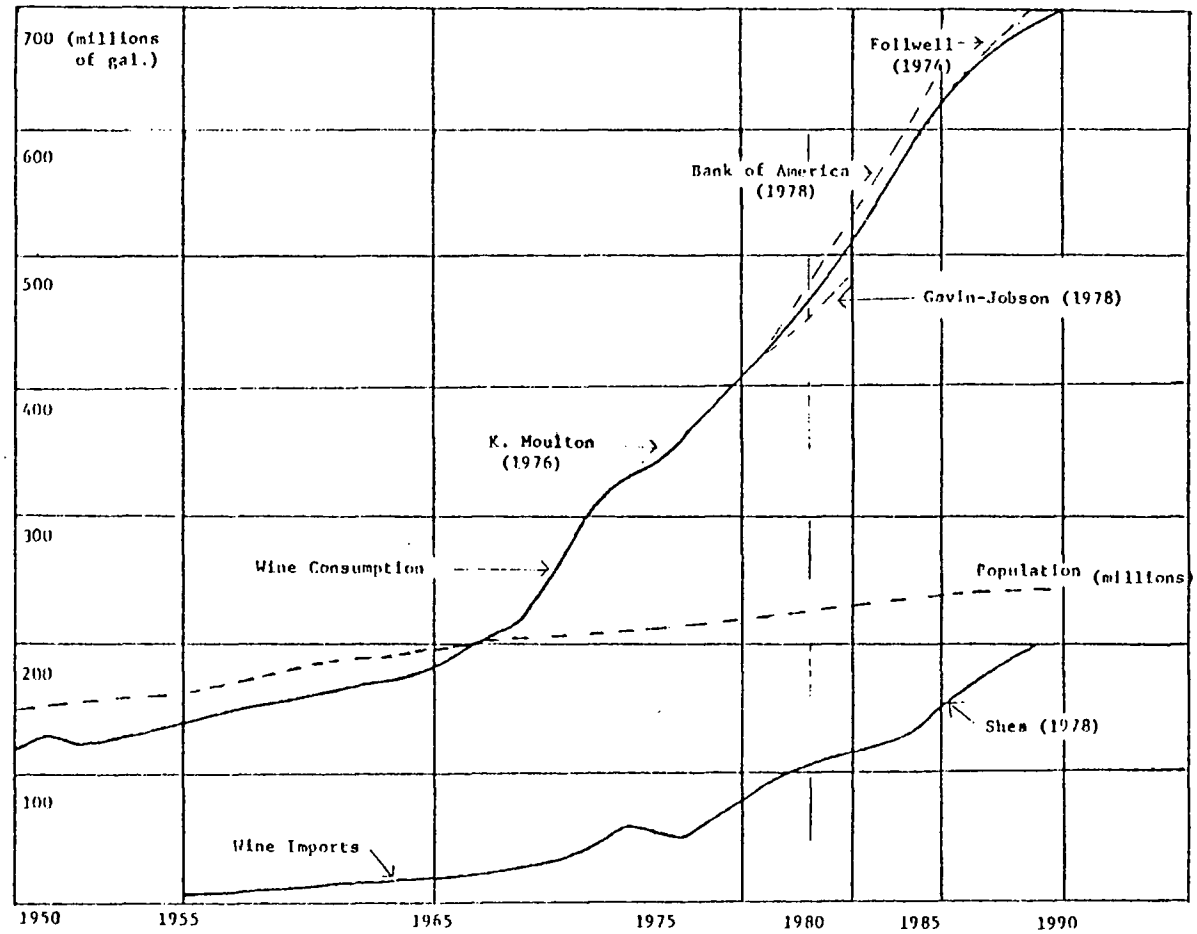


Figure 8. Evolution of Population, Consumption, and Imports of Wine from 1950 to 1977 and Projections Until 1990.

including: (1) continue as is, (2) concentrate only on profitable segments, or, (3) reap the largest profit possible in the shortest amount of time and then phase out the product.

Related with product differentiation and product promotion is market segmentation. Market segmentation is defined as the process of identifying groups of buyers with different buying desires or requirements [23]. Market segmentation is the subdivision of a market into distinct subsets of customers where any subset may conceivably be selected as a market target to be reached with a distinct marketing mix. Marketers divide markets into segments based on geographic, demographic, or psychographic variables. The variables of geographic segmentation: states, regions, metropolitan, and rural areas were described under the section buyer concentration. The variables of demographic segmentation: age, income religion, etc. will be addressed in one of the following sections. The third category of segmentation variables is the psychographic. This refers to the individual and such aspects as his or her life style, personality, buying motives, and product knowledge and use.

The seller may segment the market in many different ways. The goal is to determine the most decisive mode of segmentation - that is, the differences among buyers that may be the most consequential in choosing among them or marketing among them [23].

Firms can target their marketing strategies toward the existance of market segments. Examples in the wine market are the wine companies Monarch and Morgan David which produce "kosher" wine especially for the jewish population. Another example are the various companies

which sell Lambrusco wines. These wines are also called "Italian Coca-Cola". These wines are especially for younger people.

Imports

In 1980, 102.507 million gallons or 21.4 percent of wine entering distribution channels in the Unites States were imported from foreign countries [59]. This was a 11.2 percent increase in volume from 1979. Until 1979 the wine imports were in a gradual steady uptrend. In 1980 as in the years before Italy was the largest importer to the U.S. supplying 58 percent of all imported wine. Other major importers were France with 13 percent, Germany with 11.6 percent, Spain with 7.3 percent, and Portugal with 5.7 percent of the imported wines. Other countries supplied less than one percent [59]. In Oregon only 6.3 percent of the wine consumed was imported in 1980.

The strong increase in imports in 1980 was mainly due to fluctuations in the exchange rates. The dollar appreciated considerably against the French franc and the German mark during 1980, which favored the exports in those countries, as their products get relatively cheaper in the U.S.. The appreciation of the dollar continued through the first half of 1981.

Shea estimated that wine imports will total between 95 million and 221.9 million gallons with an average of 158.5 million gallons in 1985 [49][a/]. Table wines will comprise about 90 percent of the imports. Shea estimated that Italy will maintain its position as the largest wine exporter in the world and to the U.S. Italy's market share will decline slightly because it is expected that carbonated wines will be less demanded in the future [29,49]. The low value of

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a/ For projection see Figure 7.

the Italian lira relative to the dollar will aid the competitive position of the Italian wine.

Spain's market share will increase because of the large resources in wine this country has. Experts estimate that Spain could easily double its exports in a relatively short time. Current yields per acre are only about one third compared to German yields. The yields could be improved with viticultural means in Spain.

Germany has almost reached its production capacity limit. There are only about 40,000 - 50,000 acres left to increase the production surface, due to climatic conditions. Also the per capita consumption is expected to increase slightly. Consequently, the German market share is expected to decline from 16 percent currently to about 10 percent in 1985 [49]. In the years 1978 - 1980 the German wine exports to the U.S. increased although the competitive position of the German wine was worsened by a strong devaluation of the dollar relative to the mark.

The wine imports to the U.S. are also favored through the fact that the import market is highly competitive among the top ten importers.

The decline in German imports of wine in the future may be of great interest for the Oregon wine industry. Given that Oregon wine resembles the closest to German wine among the imports, Oregon might capture parts of the market which cannot be served by German import wines.

Distribution Channels

The most common channel of distribution of wine is from the producer or importer to the wholesale distributor who sells to a retailer [29,49]. Figure 9 gives an overview of the possible ways the product can flow from the producer to the consumer. In certain states the wine wholesaling and/or retailing function is undertaken by a state agency. Certain wine organizations may act as national importers or marketing organizations. Their domestic brands are normally without the volume to support a full marketing organization. They have sufficient resources to support heavy promotional programs and extensive distribution networks to assure product availability (i.e. Fromm and Sichel, Schieffelin).

Large wine making companies carry out their own sales program in the same way as the national importing and marketing companies. Most of the major wine companies have local representatives in principal market areas. They can be classified like importers. They have no distribution networks, they carry no inventory, and they do not contribute to advertising. They are more active in sale of imported wine and in selling bulk wine.

Retail distribution is through liquor stores, speciality shops, food stores, drug stores, and various on-sale premises. Large retail organizaitons buy wine directly from both domestic and foreign producers or from national sales organization. On-premises sales are important to small wineries.

Wineries in Oregon sell about 10 - 20 percent of their wine directly out of their tasting room. Although this is combined with

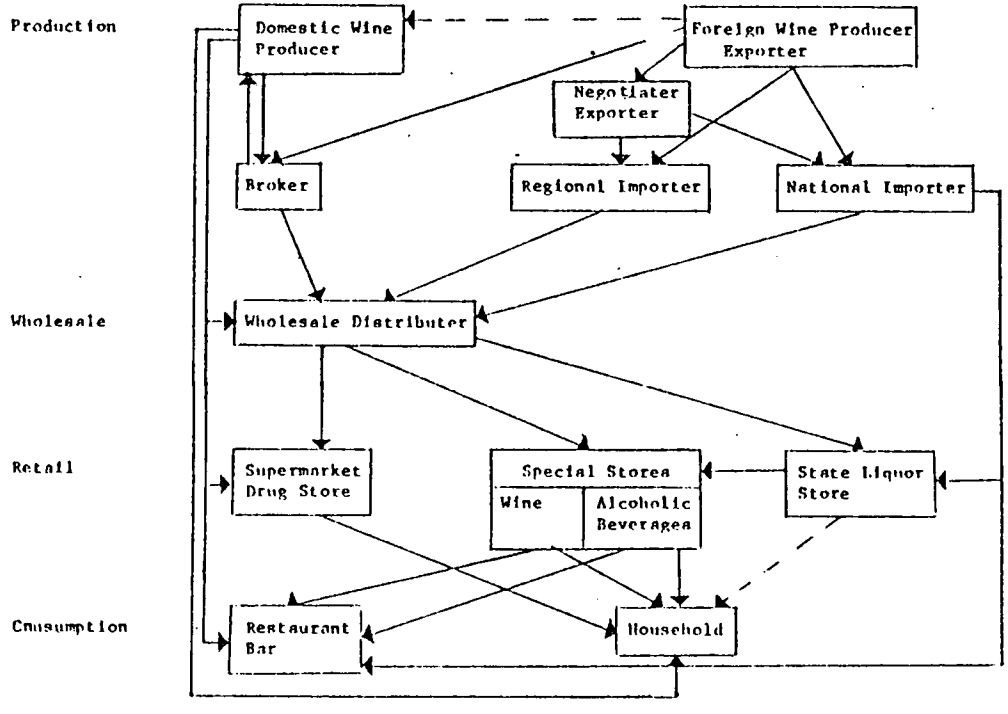

Figure 9. Distribution Channels of Domestic and Imported Wine in the United States

higher costs for tasting room and wine for the tasting itself, this can be regarded as a very important and effective means of product promotion.

For Oregon the O.L.C.C. currently issues 140 wholesale, 1,690 on-sale, 2,431 off-sale, 1,779 combination of on-sale and off-sale licenses.

The way wine is distributed has a strong influence on the final retail price. Wholesaler takes a 25 - 35 percent markup, retailers take an additional 40 - 50 percent markup.

A small winery has basically two approaches to sell wine: a direct and a general distribution approach. By the direct approach the winery has control over its price but the winery has to do all the promotion and marketing work itself. The general approach permits sale of only one or a few persons in a large market. This can lower the marketing and transportation cost but the winery has to take the price which it is offered. The value of middlemen largely boils down to their superior efficiency in the performance of basic marketing tasks and functions. Marketing intermediaries, through their experience, specialization, contacts, and scale, offer the producer more than he can usually achieve on his own [23].

The Wine Consumer

Measurement of Demand Response

The relationships between the quantity of a good which a consumer wants to buy and all the quantitative factors which determine this demand can be expressed with a demand function [48]. Quantitative factors influencing demand are: the price of the good, the price of substitutes, income, etc. The demand relationships are important to understand the forces that determine the demand for a product.

The elasticity is a measure of consumption response [11]. Relevant time-series and/or cross-sectional data can be analyzed to isolate the impact of price changes or income changes on consumption. The price elasticity of demand (e_{ii}) indicates the percentage change in quantity demanded resulting from a percentage change in price of the good. The income elasticity (η) refers to the degree or responsiveness of the demand for a good to changes in income of consumers. The cross-price elasticity (e_{ij}) refers to the degree of responsiveness of the demand of one good to changes in the price of another good. Whether the demand is elastic ($e_{ii}>1$) or inelasitc ($e_{ii}<1$) is an important consideration. If the demand is elastic with respect to price, a change in price of one percent of the good will result in a change of more than one percent in the quantity demanded of that good.

One of the first demand estimates of wine was done by Labys [24]. He compared price and income elasticities for wine consumption for nine countries by using time-series data from 1954 - 1971. The problems Labys encountered by calculating the elasticities based on time-

series were: (1) Changes in taste in wine consumption occurred frequently. (2) Changes in relative prices, relative income, price levels, and other variables caused elastics to vary over time. (3) Wine price series of reasonable quality and quantity were difficult to obtain. (5) Changes in wine prices had been infrequent, although that was less true since the period beginning 1965. The consumption variables represented aggregate wine quantities rather than quantities of a particular wine grade and type (Table 18). The price elasticities were inelastic for most Eurpoean countries. The income elasticities were inelastic for most European countries except for the Netherlands. According to Labys study, the demand is elastic with respect to price for domestic and imported wine in the United States. The income elasticity was inversely related to the consumption level, as it was for other foods and beverages.

New understanding about income and price elasticities of wine consumption without the problems encountered by Labys were provided through the study of Folwell and Baritelle [16]. They used cross-sectional data created through their household survey panel to estimate the demand for different wine types in different regions in the U.S.. In this study the quantity of a particular wine type demanded by a household in a region per month, was a function of total quantity purchased per adult member of the household, deflated price paid per ounce, deflated weighted average price paid by all households, deflated income per adult member, for all regions during a month. The demand functions were estimated in double logarithmic functional form, so that the coefficients were in terms of elasticities.

TABLE 18. WINE ELASTICITY AND CONSUMPTION LEVELS FOR SELECTED NATIONS (1954-1971)

Country	Price Elasticity	Income Elasticity	Per Capita Consumption (gal)a/
France	-0.062	-0.148	24.42
Italy	-1.003	0.276	23.62
Portugal	-0.678	0.054	22.62
Spain	-0.336	0.143	18.4
Germany	-0.379	0.508	6.42
United States			
Domestic	-0.440	3.345	2.01
Import	-1.654	3.343	
Belgium	-1.142	1.811	
Netherlands	-	2.018	
Australia	-1.0 - 13.2	1.0 - 2.0	

Source: W.C. Labys. a/ The Wine Marketing Handbook 1981.

TABLE 19. ESTIMATED DEMAND FUNCTIONS FOR THE PACIFIC REGION

Wine Type	Intercept	Price Cents/oz	Per Capita Income $1,000	Cross-elasticity
White varietal	3.382	--0.648	0.338	
Pink "	3.320	-0.947	0.566	Non-varietal red table w. 1.048
Red "	2.519	-0.808	0.498	
Red non-varietal	3.332	-0.833	0.510	
White "	3.411	-0.790	0.433	
Pink "	2.489	-0.288	0.372	

Source: Folwell

The estimated demand functions for the Pacific region were shown in Table 19. The price elasticity of demand for wine was less than one in Labys' and Folwell's studies, except for imported wine. A comparison of the elasticities for imported wine was not possible because Folwell focused only on domestic wine. The price elasticities were used to make inferences about total industry revenue as price changed. Since the demand was inelastic with respect to price, all other factors remaining constant, an increase in the price of the wine would lead to an increase in total revenues for the wine industry as a whole.

The results concerning the income elasticities differed greatly between Labys' and Folwell's studies. This was probably due to the different natures of the studies, cross-section vs. time-series analysis. According to Labys' study wine could almost be considered a "necessity" in the Mediterranean countries where the income elasticities were very low. The consumption in those countries remained about the same irrespective of income levels. Domestic and imported wine was elastic with respect to income in the U.S. in Labys' study. Folwell found statistically significant coefficients for five regions in the U.S. The elasticities were all between zero and one and were therefore inelastic. The quantity demanded was not very responsive to change in income.

Consumption

The consumption of beverages in the U.S. increased on the average by two percent every year between 1960 and 1978. The per capita consumption of beverages was 128 gallons in 1978. In the future the increase will be 2.5 percent annually according to the magazine IMPACT.

Soft drinks accounted for the largest part of beverages consumed with 36 gallons per capita in 1978 (Table 20). Beer was the second largest beverage with 23 gallons consumed. Wine and spirits were the smallest items. The projection of the per capita consumption for 1990 shows a decrease in consumption for coffee and milk. The other beverages are expected to increase.

The expenses for beverages are shown in Table 21. Most dollars per capita were spent on beer, spirits and soft drinks in 1975. The amount spent on wine was higher than that on coffee, tea and cacao, and fruit juice. It can be seen in Tables 20 and 21 that the structure changed over time. More than half of the beverage budget was spent on alcoholic beverages in 1975.

The total consumption of wine increased from about 120 million gallons in 1950 to 478 million gallons in 1980 (Figure 8, page 110, [59]). The total consumption is expected to increase to about 700 million gallons in 1990. Figure 8 shows development of all wine consumed. There were differences in the development of the differnt wine types. Between the years 1961 and 1975 per capita consumption of table wine almost tripled. The per capita consumption of all wine rose from 0.86 to 2.11 gallons in 1980 (Figure 10). In Figures 10, 11,

TABLE 20. CONSUMPTION OF BEVERAGES IN THE U.S. (GALLONS PER CAPITA)

	Coffee	Soft Drinks	Milk	Beer	Tea	Fruit Juice	Spirits	Wine	Total
1960	35.7	12.3	37.9	15.1	5.6	2.7	1.3	0.9	111.5
1965	34.0	16.5	35.0	16.0	6.2	2.4	1.5	1.0	112.6
1970	32.5	23.1	31.0	18.7	6.9	3.3	1.8	1.3	118.6
1975	27.9	31.7	28.4	21.8	7.6	3.8	2.0	1.7	124.9
1978[1]	24.0	36.0	25.0	23.0	12.0	4.0	2.0	2.0	128.0
1990[2]	16.7	50.1	17.5	27.6	16.5	5.0	2.6	4.3	140.3

Source: Diréction des Produits Agro-Alimentaire du C.F.C.E.

[1]Estimation

[2]Projection

TABLE 21. EXPENSES FOR BEVERAGES IN THE U.S. ($ PER CAPITA)

	Coffee	Soft Drinks	Milk	Beer	Tea & Cocoa	Fruit Juice	Spirits	Wine	Total
1955	12	8	29	31	2	4	24	6	116
1965	10	19	31	35	2	6	34	7	144
1975	14	59	48	69	4	13	58	19	284

Source: National Food Situation, June 1977, ERS, USDA.

the development of the per capita consumption of beer, wine, and distilled spirits was drawn. Beer represented the largest volume of consumption of alcoholic beverages with a per capita consumption of 24.3 gallons. The consumption in Oregon was 24.1 gallons in 1980. Only two percent of the consumed beer was imported [18]. The beer industry experienced a strong growth over the last 15 years. The market was expanding especially with new light beers which were in strong demand particularly among women. The consumption of distilled spirits was increasing very slowly over the last 20 years. The per capita consumption was 2.04 gallons in the whole U.S. and 1.84 gallons in Oregon in 1980. Whiskey and other spirits were regarded as the principal categories of distilled spirits. The market of other spirits was slightly increasing whereas the market for whiskey was declining It could be concluded that wine competed directly with those liquors [49]. More and more people started realizing the values of wine consumption. According to Le Monde (Dec, 5, 1973), it was known that wine in low concentration had bactericide and nutritous qualities. But these values were only effective by the consumption of less than one liter in 24 hours by a healthy person with a balanced diet and who was not addicted.

Geographic regions within the U.S. exhibited various consumption patterns. These differences resulted from regional, social, and institutional factors. Most wine was consumed in the Pacific states. Alabama, Kentucky, Mississippi, and Tennessee comprised the smallest regional market.

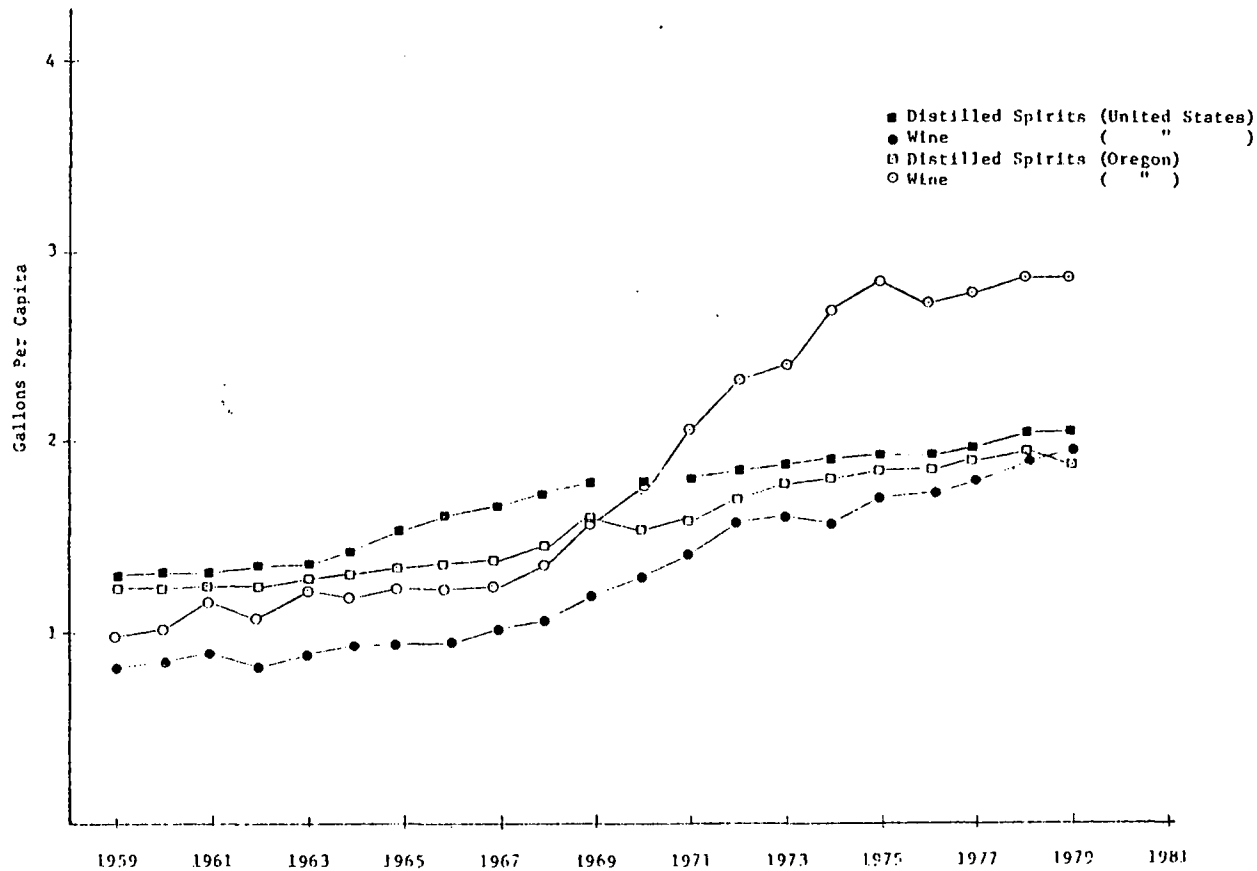

Figure 10. Per Capita Consumption of Wine and Distilled Spirits In The U.S. and Oregon, 1959 - 1980

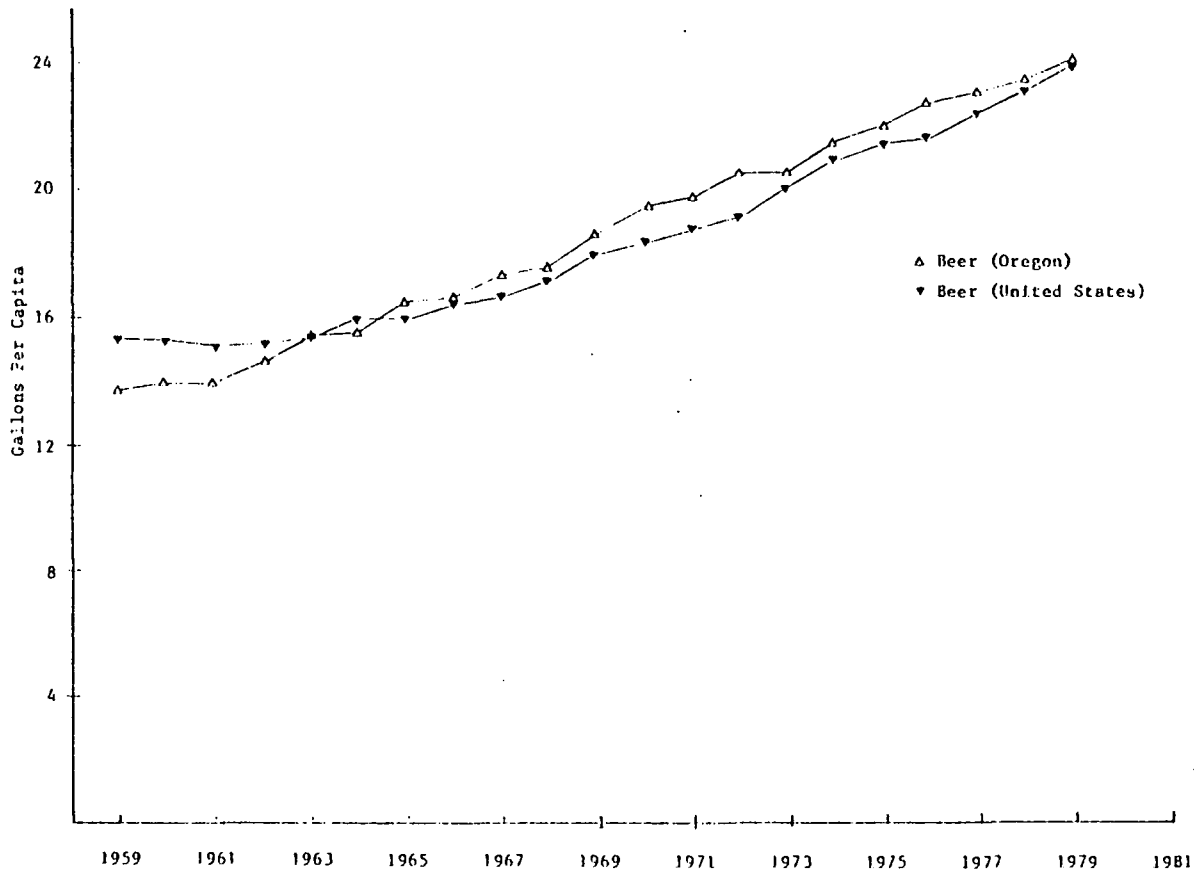

Figure 11. Per Capita Consumption of Beer in the U.S. and Oregon, 1959 - 1980

Demographics of the Wine Purchaser and Consumer

Major work in this area was done by R. Folwell in his study about the U.S. wine market [16]. His study was based on a survey panel of about 7,000 households, who reported their monthly wine purchases over 11 months in 1975. Other studies about demographics had been conducted by R. C. Reitzenstein on consumer and retailer perception of table wine and wine store attributes [46]. The study was conducted in a medium sized Southeastern city. Time and Newsweek magazines also conducted surveys in the early 1970's. The Wine Marketing Handbook listed several surveys about demographics of wine consumers of various magazines. But those studies are based on very few observations, the validity of their conclusions must be questioned.

Age of purchaser: The study of Folwell reported that 28 percent of the table wine was purchased by people between 25 and 34 years old. The age group of 34 - 65 years bought 60 percent (see Figure 12). The consumer study of Reitzenstein lead to similar results; 23 percent of the wine consumers were in the 25 - 34 year age bracket, 58 percent were in the 34 - 65 year range. This compared directly with the results of the study by Time, with 22 percent and 59 percent respectively.

Sex of purchaser: According to Folwell's study, females accounted for 60 percent of all wine purchases. This was consistent with the supermarket as the major place of purchase. The distribution for the Pacific region is shown in Figure 13. In the Pacific region, the female purchaser was by far the most important (Figure 13).

Income of purchaser: The household panel was also examined for their

income. The incidence of purchases increased as income increased for all age groups. The highest incidence of purchase was in the under 35 years age group whose incomes were over $20,000. The study of Newsweek (1972) indicated 40 percent of the consumers earned less than $10,000, 37 percent between 10,000 and 20,000 and 23 percent earned more than 25,000 dollars a year. The results of Reitzenstein's study were 44; 45, and 11 percent for those income groups.

Education of purchaser: The Newsweek study showed that 47 percent of wine users, in the U.S. have a high school education or less, 53 percent had at least some college eduction. Reitzenstein's results were: 45 percent had less than high school and 55 percent of the wine users had at least some college education. Folwell's results have to be used carefully because households with less than high school education were underrepresented in his study. The education of the first decile which accounted for 54 percent of all wine purchases had at least some college education.

Place of purchase: The place of wine purchase differed by wine type within various regions. The results for the Pacific region are listed in Figure 14. The supermarket accounted for the most part of the wine purchases.

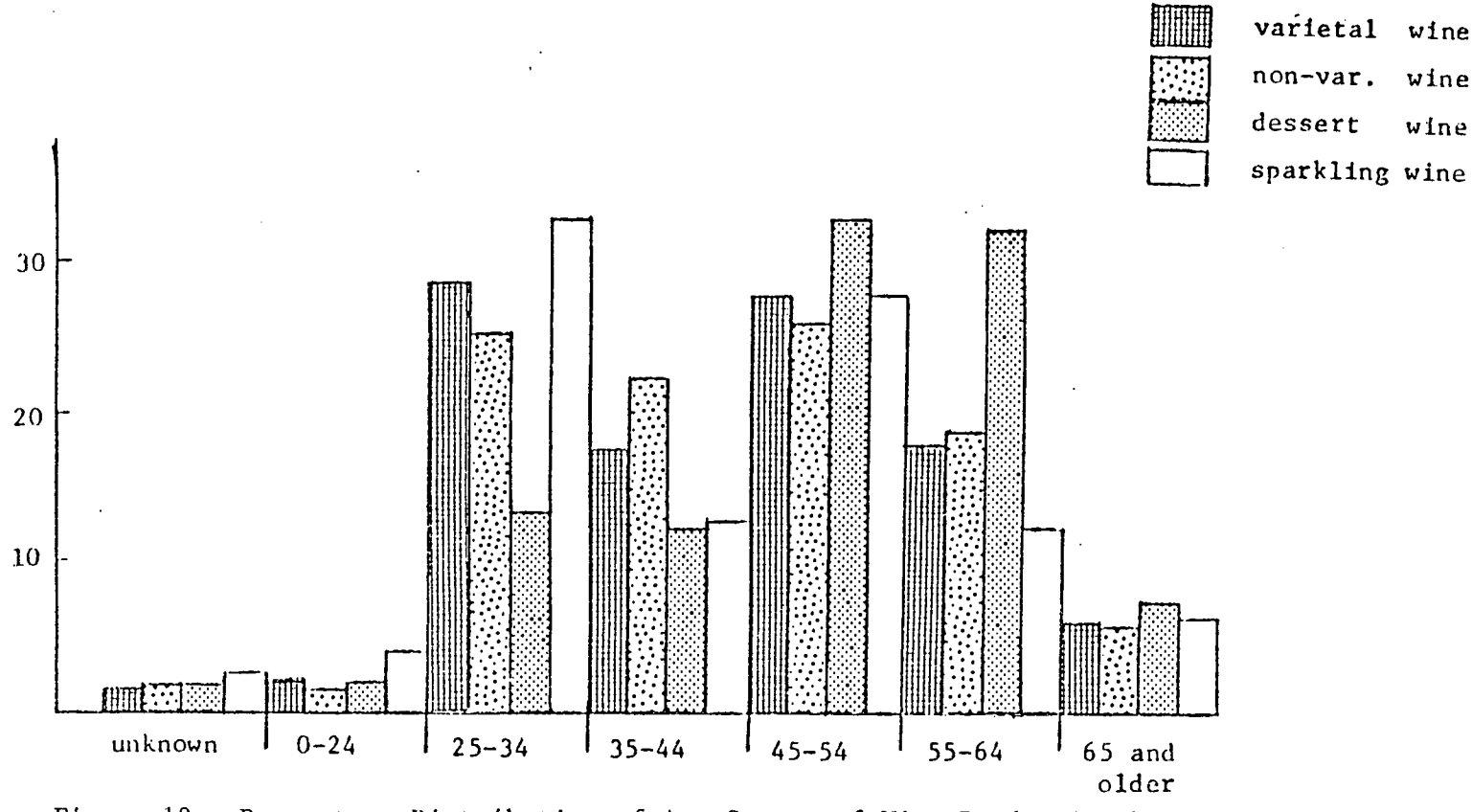

Figure 12. Percentage Distribution of Age Groups of Wine Production by Different Wine Types

Source: [16].

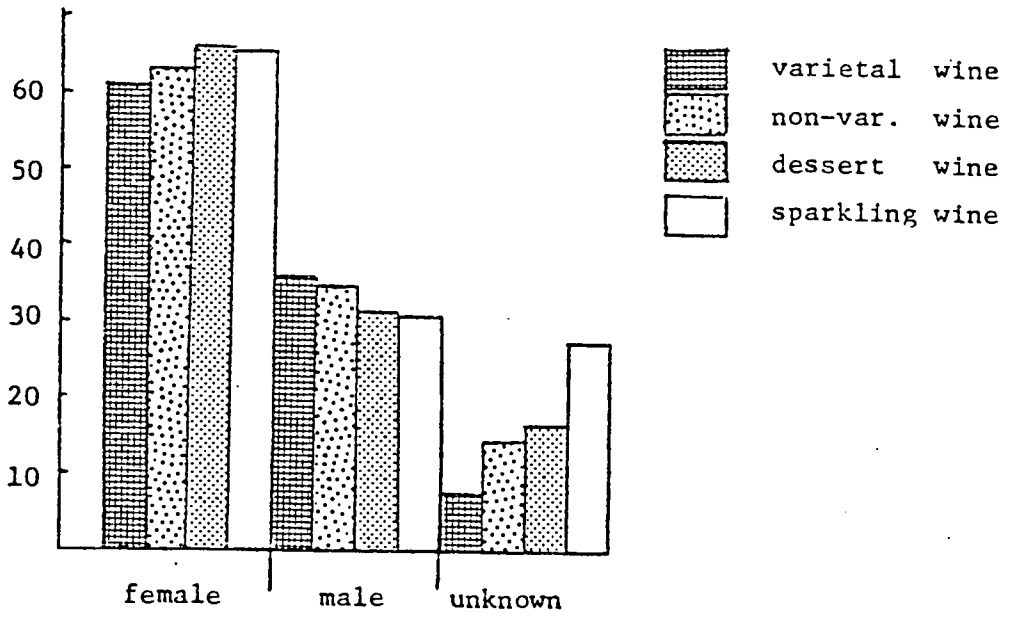

Figure 13. Sex of Wine Purchaser in the Pacific Region

Source: [16].

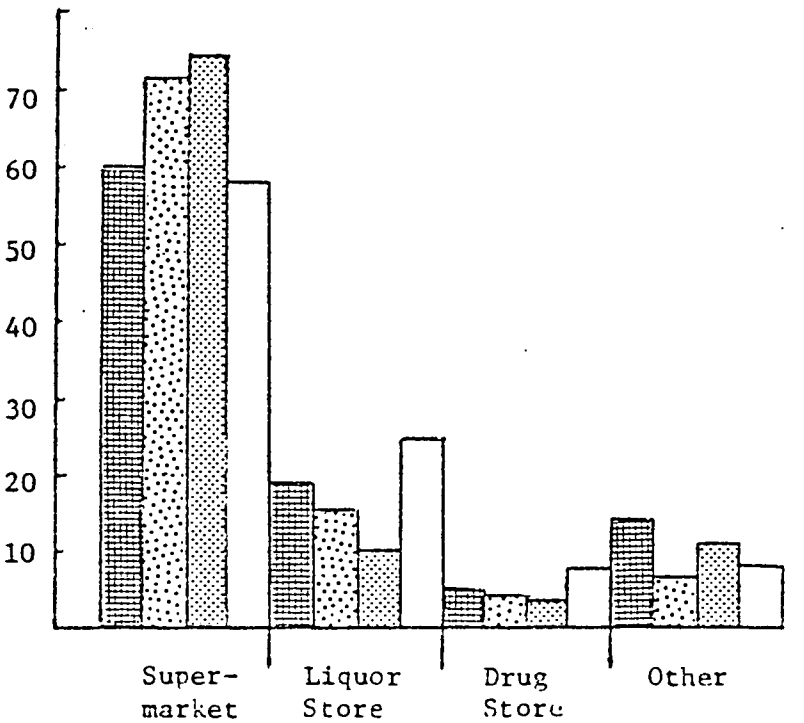

Figure 14. Place of Wine Purchases in the Pacific Region

Source: [16].

Market Trends

In 1980 wine sales increased for the 17th consecutive year in the U.S. [18]. Wine consumption surpassed that of distilled spirits for the first time. As can be seen from Table 22, table wine was the most important wine type. Table wine increased its market share from 74.3 to 76.3 percent. The market shares for dessert and Vermouth wines were declining. Table 22 showed the general trend observed during the last years which was more table wines, less dessert wines, and sparkling and vermouth wines almost stable.

According to the Time magazine there will be a steady increase in the 25 - 44 age bracket which were the significant ages for wine consumption. Total adult population will be 19 million more than in 1979 [18]. In 1989 the largest population segment will be concentrated in the 25 - 34 age group, embracing 41.2 million people an increase of 6.2 million in the ten year period.

The beverage alcohol marketing will be influenced by special and supplemental markets. The women, Black, and Hispanic markets are expected to increase. The Black population represents a substantial market for wines. Black population is relatively young. More and more Black owned businesses are reaching higher income levels. A well educated Black middle class is emerging that will have a definite influence on the wine and spirits market. Black and women market are markets with tremendous potential for wine [18].

Table 23 summarized the percentages of table wine consumed in different price classes. It can be seen that most table wine consumed was in the low and lower middle classes according to the classification

TABLE 22. PERCENTAGE OF TOTAL WINE SALES, BY TYPES

Type	1979	1980
Table	74.3	76.3
U.S. Produced	53.7	54.5
Imported	20.6	21.8
Dessert	16.9	14.9
U.S. Produced	16.1	14.2
Imported	0.8	0.7
Champagne & Sparkling	6.6	6.7
U.S. Produced	5.4	5.5
Imported	1.2	1.2
Vermouth	2.2	2.1
U.S. Produced	1.4	1.4
Imported	0.8	0.7
Total Wine	100.0	100.0
U.S. Produced	76.6	75.6
Imported	23.4	24.4

Source: The Wine Marketing Handbook 1981.

TABEL 23. THE MARKET FOR TABLE WINES BY PRICE CLASSES (IN PERCENTAGES)

Class	Price Ranges (Equivalent 750ml Prices)[a/]	1979	1980
Low	Under $2.00	50.1	49.0
Lower Middle	$2.01 - $2.75	26.9	27.3
Middle	$2.76 - $4.25	13.3	13.7
Upper Middle	$4.26 - $5.75	6.4	6.6
High	Over $5.75	3.3	3.4
Total		100.0	100.0

a/ 750 ml is about one fifth of a gallon

Source: The Wine Marketing Handbook estimates

of The Wine Marketing Handbook. Two thirds of the wine sold was sold for less than $2.75 per 750 milliliter. Higher priced wines comprised only a small market share. From Table 23 it could be concluded that the opportunity ahead for the wine business lies in volume rather than in price.

According to The Wine Marketing Handbook, the evolving market can be improved only through promoting of a greater frequency rate of wine consumption among those of the 25 - 44 age bracket. The wine promotion should stress "less drinking per occasion but more drinking occasions" [18]. Wine consumption is still concentrated too heavily in top state and metropolitan areas. The wine industry must, in addition to cultivating a higher frequency rate in the prime wine markets, promote greater wine usage in areas which are not yet wine conscious.

Market Projection for Oregon Wine

Market projections for Oregon wine are very difficult at this time. It is not possible to foresee how successful the Oregon wine industy is in increasing the demand for Oregon wine through promotion. Only about ten percent of the table wines are sold at a price over $4.26 per 750 ml in the U.S. (Table 23). Most of the Oregon wine is sold in the higher price classes. The Oregon wine marketers are therefore aiming at a small part of the table wine market. To increase the wine sales, the Oregon wine industry could try to approach a wider range of wine consumers at a lower price class. Another alternative would be to work on promotional efforts to improve the product loyalty because the competition is higher in the upper price classes.

Folwell projected a per capita consumption of 4.88 gallons for all wine, and 3.737 gallons for U.S. produced table wine in Oregon by 1990 (15]. By using these numbers together with the projected population in Oregon the total quantity of wine demanded in Oregon will be 13.653 million gallons (compared to 8.2 million in 1980). The amount of Oregon wine demanded is depending on the expected market share:

Expected Market Share (percent)	Gallons of Wine	Grapes needed for Crush*	Acres needed for production**
(1980)			
3	409,590	2,730.60	682.65
5	682,650	4,551.00	1,137.50
10	1,356,300	9,102.00	2,275.50
15	2,047,950	13,653.00	3,413.25

* assumed, one ton of grapes = 150 gal. of wine.
** assumed a yield of four tons per acre

Exports to other states are not included in the estimate.

CHAPTER V

SUMMARY AND RECOMMENDATIONS

Although wine grapes have been grown in Oregon since the first settlers came to the area, the wine industry did not expand significantly until the last 10 - 15 years. The growth of the Oregon wine industry is attributed to the demand for Vitis vinifera wines. There are many areas in Oregon suitable for the production of high quality wines. These areas, mainly located west of the Cascades, will enable the industry to expand well beyond its present size. Yields of Vitis vinifera grapes in Oregon are lower than in other states. Viticultural research is needed to improve yields through better adaption of Vitis vinifera varieties to the particular climate in Oregon.

The production of wine grapes and wine is complex in nature requiring knowledge, high investment costs, and special equipment. Planting decisions have to be made in cooperation with winemakers and wine marketers. The high investment costs of grape and wine production must be amoritized over a long range. The amount of labor involved in grape and wine production increases as production is expanded. Conversely, unit costs in wine production decrease with increasing winery size. Analysis showed that risk involved in wine grape production is lower than with some other crops currently grown in Oregon, such as strawberries, cherries, and black raspberries. Grape yields of 3-5 tons per acre are necessary to give a satisfying return on investment. The grape price is the single most important cost components

for the winery, regardless of size. The larger the winery, the higher the cost of grapes relative to other costs.

The wine grape market in the U.S. and Oregon is showing oligopsonistic tendencies. Few wineries purchase most of the wine grapes, usually based on yearly contracts. Few large firms supply the major part of the wine. This results in a highly concentrated national wine market, primarily on the West and East coast with California as the major producer.

Wine is a heterogeneous commodity leading to a high degree of product differentiation. This in turn leads to the importance of nonprice competition in the form of product promotion. Marketing of wine is influenced by imports from foreign countries and the restrictions through market regulations. Exemption of wine from the commerce clause leads to very differing state laws and regulations which hampers the wine industry.

The Oregon wine industry, which constitutes a rather small part of the Oregon and national wine market, is still in the introductory stage of the product life-cycle. A high level of product promotion is necessary to get market awareness and to attract buyers.

Wine consumption in the U.S. increased over the last decade and is expected to increase in the future as the adult population in the U.S. increases and new market segments are approached. Consumer uncertainty about wine underlines the need for product promotion and education.

Cooperative as an Alternative Business Form

An agricultural cooperative is a buisness organization usually incorporated, owned and controlled by member agricultural producers, which operates to the mutual benefit of its members (or stockholders). The cooperative operates on a cost basis after allowing for the expenses of the operation and maintenance and any other authorized deductions for expansion and necessary reserves [54]. A cooperative can be broadly defined as a democratic association of persons organized to furnish themselves an economic service under the plan that: (1) eliminates entrepreneur profit at the corporate level and (2) provided for substantial equality in ownership and control.

Operating on a cooperative basis usually means operating "at cost". A cooperative profit is eliminated through apportioning of all savings to patrons and/or owners.

The legal basis for forming of cooperatives was provided through the Capper Volstead Act in 1922, which authorized the association of agriculturalists to join together to provide an economic service on a cooperative basis. Three requirements were set forth by the act:

(1) No member is allowed more than one vote because of the amount of stock or membership capital he may own in the association.

(2) No dividends on stock or membership capital shall be in excess of eight percent per year.

(3) The association shall not deal in the products of non-members to an amount greater in value than the products handled for members.

The philosophy of cooperatives is based on four principles: (1) democratic control (one man, one vote); (2) open membership; (3) limited returns on invested capital; (4) distribution of returns on the basis of patronage.

Literature about cooperatives is dominated by socio-reformistic, historical, and descriptive interpretations. Only a few studies address the theoretical aspects. Basic work was done by Helmberger [20] and Phillips [43]. One reason firms find it economic to operate a plant jointly, rather than carrying out the same production process individually is a decreasing long-run average cost curve over a considerable range. By pooling of their activities and functions through a common plant, they are able to increase their economic efficiency by approaching closer optimum size for this operation.

The optimum stability of the cooperative is obtained, as long as it is economical and the anticipated conflict of interest among the participating entrepreneurs is minimized. This can be achieved through bylaws and articles.

The participation in the joint activities in itself tends to reduce the anticipated variabilities of the profits of each of the firms over time. The opportunity to pool uncertainties within the group of participating entrepreneurs is another source of increased stability of profits over time. The participation in the joint plant often reduces capital rationing. Participating firms usually are able to obtain credit as a group for joint activity.

One form of vertical integration is a cooperative. In Oregon a cooperative might be considered for the following reasons:

The nature of the wine grape and wine production suggests some degree of vertical integration. Wine grapes are exclusively produced for wine production. An optimal quality of the final wine can only be obtained through a close cooperation of wine grape producer and the wine maker. Both wine grape and wine production require special expertise and training. One operator can not easily manage both processes, the operator has to concentrate on either one. Through a cooperative of sufficient size specialists for wine making and marketing can be employed. The wine grower can therefore concentrate on grape production but he is still linked to the whole production process. The wine grower has some control over the final product. The high investment cost for a winery can be shared through the cooperation of several wine grape growers. A winery of sufficient size can be constructed to fully exploit the economies in production, distribution, and advertising. Wine grape producers and wine maker can coordinate amount and composition of the varieties grown and thus create the optimal marketing mix. A cooperative offers the opportunity to share risk which can occur in various ways in grape and wine production.

Commodity Commission for Effective Promotion

To exploit the potential of the Oregon wine and wine grape industry, promotional efforts will be necessary in future years to increase the demand for Oregon wine. As seen before, the current wine consumption is concentrated in metropolitan areas and the market penetration is very low. Few households buy most of the wine. The future potential of the wine market lies therefore in developing rural areas which are not yet wine consciousness, in promoting a greater wine usage, and in increasing the number of households purchasing wine.

Articles from Reitzenstein [46] and The Wine Marketing Handbook [18] stress the fact that the U.S. consumer is still in a learning process. The wine marketers should help the consumer in this educational process.

The Oregon wine industry should consequently, like the entire U.S. wine industry, try to educate people about wine and bring more people to wine. At this time it might also be easier for the Oregon wine industry to increase the market share by developing new markets rather than to try to capture someone's market share. It is important for the Oregon wine industry to establish and to improve its product loyalty which is the essence for successful marketing in a product differentiated market. The Oregon wine industry should try to set quality standards which help to create such a product differentiated market. The Oregon wine industry should try to set quality standards which help to create such a product loyalty and at the same time to inform the wine consumer about these standards. For

example, there is no uniformity of the use of the expresssions "dry wine" or "selection". Setting certain standards does not result in "equalizing"all wines produced in Oregon. It is an important means to specify a range of quality which serves several objectives:

(1) Quality standards improve product loyalty and thus product differentiation.

(2) Quality standards are helpful for the consumer by "demythologizing" wine and thus creating an appreciation of wine for people who so far thought they could not understand the wine culture

(3) It assists retailers of Oregon wine to obtain a better overview of the product mix.

(4) Quality standards are helpful if some wineries attempt joint marketing programs.

One example where the lack of quality standards causes confusion are different quality levels of Riesling wine. Riesling wine can vary from a light dry wine to a heavy dessert type wine. But wine marketers and wine consumers cannot distinguish these different wines without tasting prior to buying. The wine consumer should be informed through the label which should contain information about the range of quality to be expected. This is also an important point if the winery sells the wine through marketing channels. France and Germany established quality standards for all wines sold within the European community. These explicite standards greatly facilitate the marketing.

For effective promtion of Oregon wine, it is necessary for the industry to have a strong organization which combines the interests

of wine grape growers and wineries. Currently there exist two organizations in the Oregon wine industry: the Oregon Table Wine Research Advisory Board (OTWRAB) and the Oregon Winegrowers Association (OWA). The OTWRAB was established in 1977 for the purpose of promoting and encouraging enological and viticultural research. The OWTRAB is not a commodity commission but the board members have the same responsibilities as commissioners. The OWTRAB is financed through a fee of $10 assessed per ton of grapes crushed.

The OWA is the voice of the industry and was formed in 1978 from the existing Winegrower's Council of Oregon and Oregon Council of Winegrowers. Members of the OWA meet in a regular basis to exchange ideas and experiences. The OWA is financed through a membership due of $30 for an industry member and $15 for an associate member. The OWA promotes the wine industry through information booths at festivals and fairs, brochures, and displays, as far as their limited budget allows. The OWA has no one working full time for it. All efforts are made by members on a volunteer basis.

Several members of the wine industry have expressed interest in forming a commodity commission for wine to improve promotional efforts.

Commodity commissions are organizations for the purpose of raising money from all producers of a commodity to perform stated things for the welfare of those producers [36]. There are currently commodity commissions for 20 different commodities organized in Oregon. The legal basis and the procedures are outlines in Chapter 576 of the Oregon Revised Statutes. A commission is created if two thirds of the producers vote for the creation of the commodity commission (ORS 576.125).

These producers have to supply more than one third of the total quantity of the commodity produced. The authority of a commodity commission in general is listed in Section 305 of Chapter 576. Among the points mentioned are: (1) To conduct scientific research to discover and develop the commercial value of the commodity and products thereof....(14) Enter into contracts for advertising the commodity and to develop raw markets through such advertising.

One example of a successful commodity commission is the Washington Apple Commission located in Wenatchee. This commission was founded in 1937. The Apple Commission is the advertising, promotional, and the publicity arm of the Washington apple industry [57]. The activities of the Commission are concentrated into: (1) Consumer advertising, (2) Field staff merchandisers, (3) Merchandising tools, including point-of-sale materials, (4) General and food-page publicity on behalf of the Washington apple industry, and (5) A home economics program for secondary schools throughout the United States.

The Apple Commission operates with a nine person office staff and a field staff of 14, located in all major markets throughout the nation. Part of the task of the field staff is to tie national advertising efforts with that of the local retailers so that the retailers know that they are being helped to sell more of the product [57].

The Apple Commission is supported by apple growers on the basis of a self imposed per box assessment of 7.5 cents.

One of the major accomplishments of the Washington apple industry is that the industry has paid strict attention to standardization and grading. The industry adapted its own standards which are more refined

than federal grades. Product standardization and business faith between buyers and sellers are important because the buyer never sees the product before it is delivered.

The Oregon wine industry will not be able to raise as much money from its members as the Washington Apple Commission to support such a promotional program at the present time. However, the example of the Apple Commission shows how effective quality consciousness and product promotion is.

Establishing a commodity commission for Oregon wine would have several advantages:

(1) The commodity commission would form one uniform voice of wine grape growers and wineries. The efforts of the OTWRAB and OWA would be combined and coordinated.

(2) Quality standards could be established and controlled through the commodity commission.

(3) A commodity commission can establish joint promotion programs with other commodity commissions.

(4) A commodity commission would take advantage of the already established administrative mechanism.

Future Research Areas

More research has to be conducted in the wine grape and wine production and in the wine grape and wine market. The following points became apparent through the conduct of this study:

(1) The need for viticultural and enological research is indicated and research programs are established by the Department of Horticulture and Food Science (OSU).

(2) Wine was identified as a heterogeneous commodity. All the tools which were applied in economic studies to analyze the wine grape and wine market were based on the assumptions of a homogeneous commodity which sometimes leads to erraneous results. Research has to be conducted which accounts for the heterogeneous character of the wine.

(3) Demand studies for Oregon wine on a state, regional, and national level are needed. Those demand studies have to include the wine consumption in restaurants.

(4) The relation of wine to other beverages like beer, spirits, and soft drinks is indicated in many studies, but not taken into account in the analyses. More research is needed to identify degrees of substitutability among those beverages and switching patterns by the consumer.

(5) Subjective and objective quality standards need to be established which are helpful for effective promotion and for the wine consumer.

(6) Consumer studies conducted by various magazines are based on very few observations. The validity of their results has to be questioned. More refined studies based on a scientific analysis are needed.

(7) The impact of a cooperative on the wine industry especially the influence on the grape price determination has to be examined.

(8) Cost studies of vineyards with various sizes are needed.

(9) The economic feasibility of mechanical harvesting needs to be examined.

(10) The viticultural, enological and economic components of the quality - quantity relationship of wine grapes needs to be examined. Wine growers and wineries have different objective functions, but, nevertheless, they pursue a common overall goal.

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APPENDIX

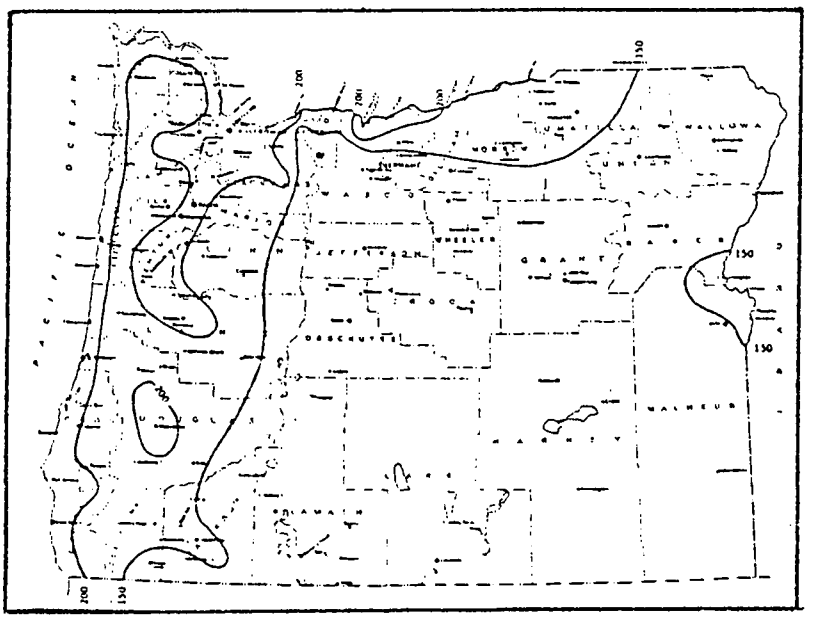


Figure 15. Average Length of Growing Season (Days between 32°F)

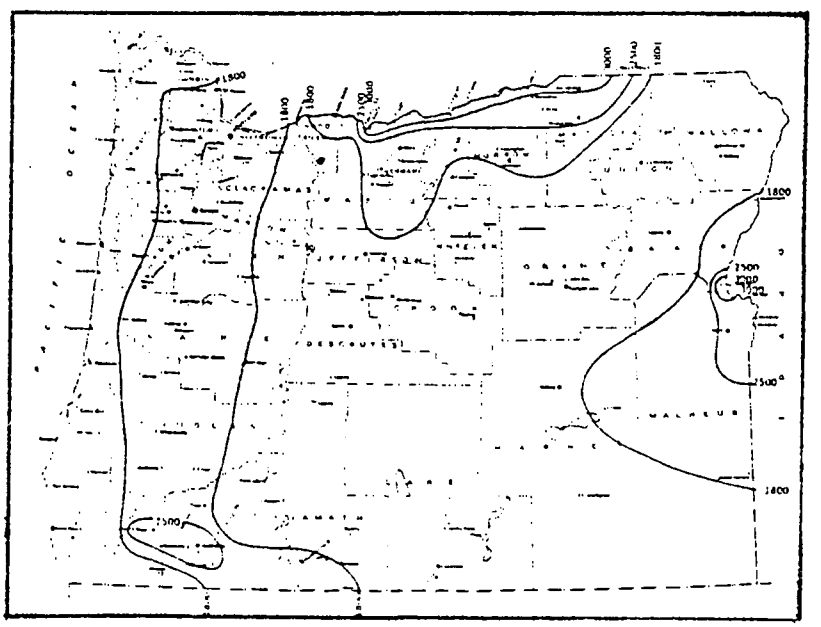


Figure 16. Average April-October Degree Days (Winkler's Heating Units, Base 50°F)

Source: Aney [4].

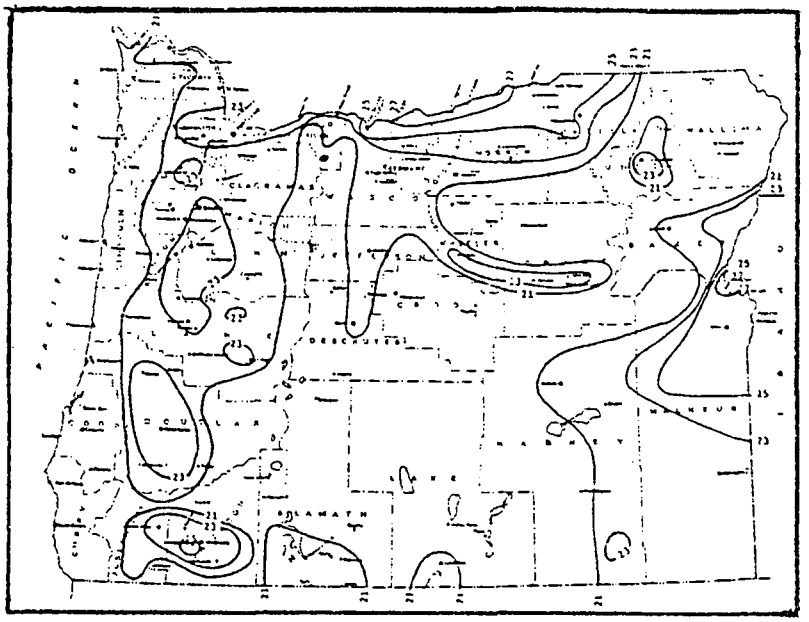


Figure 17. Average April-October Potential Evapotranspiration (Thornthwaite's Index, Inches)

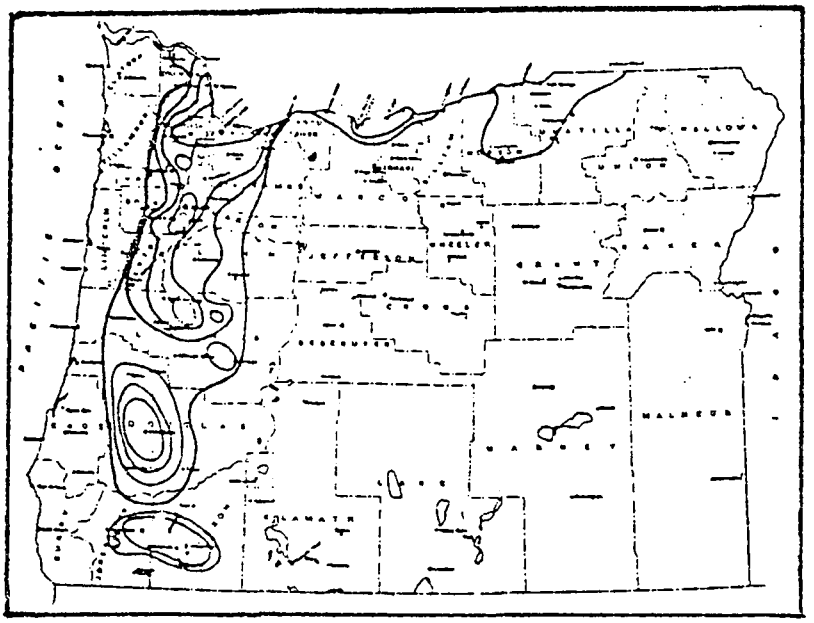
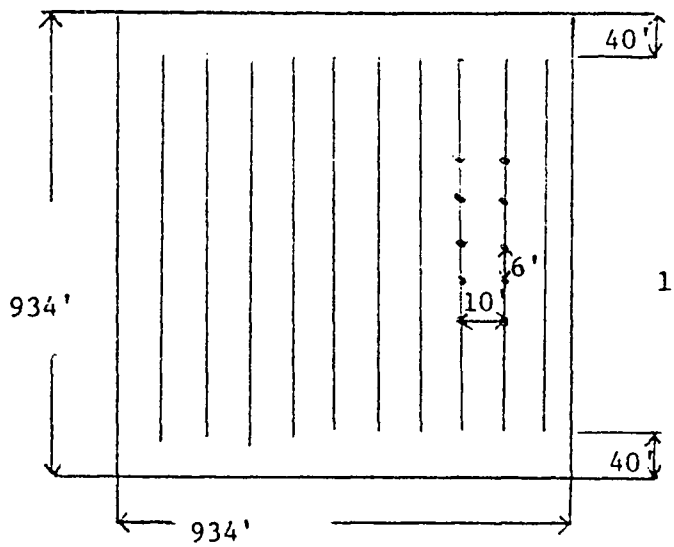


Figure 18. Areas suitable for Wine Grape Growing in Oregon (Based on Minimum Winter Temperatures, Length of Growing Season, and Summer Heat)

Source: Aney [4].



Spacing 6' x 10'
(60 squarefeet per plant)

91 rows (4.5 per acre)

143 plants per row

13,013 plants (650 per acre)

Figure 19. Layout of the 20 Acre Vineyard

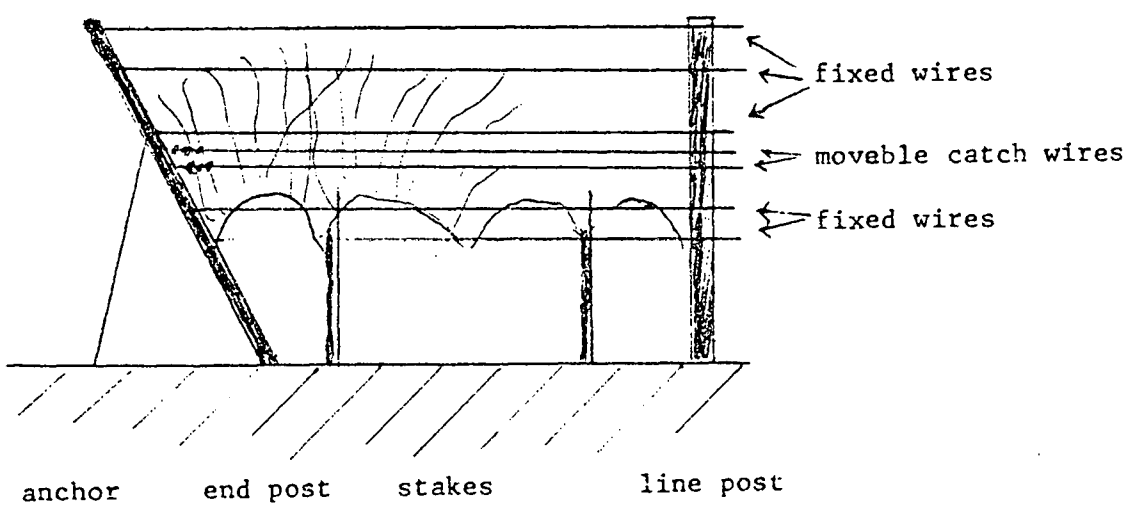


Figure 20. Illustration of the Trellis System

TABLE 1. MACHINERY COSTS

Equipment	Purchase Price	Life (years)	RFV * (percent)	Depreciation	Interest, Housing (percent)	Insurance (amount)	Annual Repair Cost
Tractor (40 hp)	11,400	10	29.5	803	15.2	1121.98	130
Pickup (0.75 ton)	9,000	10	17.7	765	20.4	1080.48	545
Disc	960	15	9.6	87	14.6	77	
Rototiller	2,700	10	17.7	222	14.6	232	
Fertilizer spreader	500	10	17.7	41	14.6	43	236
Trailer	400	15	9.6	33	14.6	32	
Sprayer	3,000	10	17.7	298	14.6	258	

Variable cost per hour (fuel, lubrication)

Tractor	4.62
Pickup	8.39

* Remaining on-farm value

Source: The cost of Owning and Operating Farm Machinery in Washington, EM 4035 W.S.U. 1980