

**ECONOMIC LINKAGES IN THE ECONOMY OF  
HUMBOLDT COUNTY**



# Economic Linkages in the Economy of Humboldt County

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# **ECONOMIC LINKAGES IN THE ECONOMY OF HUMBOLDT COUNTY**

## **EXECUTIVE SUMMARY**

### **Introduction**

The future level of economic activity and stability in Humboldt County remains uncertain because of unknown external factors. External factors such as proposed increases in federal grazing fees, changes in federal land management policies, or a lower world gold price are three of which that could have future economic impacts on the county economy. Understanding how these external factors would impact the Humboldt County economy requires knowledge of socioeconomic trends, economic base, and economic linkages in the county. Additional knowledge pertaining to the use of economic linkages to estimate impacts on economic activity, employment, and income are also helpful. This information is provided in this report.

### **Major Findings**

- Humboldt County's average annual population growth rate is less than the state of Nevada but considerably higher than the nation. The instability of average annual population growth for Humboldt County is one of the lowest in the state indicating a rather stable growth in population when compared to other Nevada counties.
- Per capita personal income in 1990 for Humboldt County was \$17,194 which was approximately 10% less than the state's \$19,049 and approximately 8% less than the national average \$18,696.
- Approximately 80% of Humboldt County's total income was received from net industry earnings while approximately 20% was in the form of dividends, interest and rents and transfer payments.
- Total personal income in Humboldt County realized an average annual growth rate of 8.78% ranking Humboldt County tenth among Nevada's seventeen counties.
- Approximately 80% of the land in Humboldt County is federally owned with the Bureau of Land Management managing approximately 87% of total federally owned land.
- In 1990, Humboldt County's median age of population is 30.6 years which is younger than the state's median age of 33.3 years.
- Humboldt County's level of poverty is lower than most counties in the state of Nevada.
- Using location quotient procedures, Humboldt County's major export sectors are the agricultural and mining industries.

- Using shift-share analysis, the mining industry was a major contributor to employment growth in Humboldt County. Given nationally the mining industry lost employment from 1980 to 1990, the increase in mining industry employment for Humboldt County signifies the competitive advantage Humboldt County experienced for this sector.
- If the Livestock Sector in Humboldt County experienced a ten percent increase in export sales, total economic activity in the county would increase by \$2,921 thousand while employment and household income would increase by 41 jobs and \$547 thousand, respectively.
- The Livestock Sector experienced the largest distributional impacts. Approximately 55.5% of total economic activity was created by the Livestock Sector's ten percent increase in export sales. Income and employment from the Livestock Sector contributed approximately 50.3% and 44.2%, respectively.
- Other sectors in Humboldt County are also impacted by increased export sales by the Livestock Sector. The Trade Sector had over 4% of total economic activity created by expanding export sales while personal income and employment for the Trade Sector was 11.3% and 11.6%, respectively, of county totals.
- If the Gold Mining Sector in Humboldt County experienced a ten percent increase in export sales total economic activity in the county would increase by \$22.6 million. Included in this total economic activity is approximately \$5.3 million of income and 240 jobs.
- The Gold Mining Sector experienced the largest distributional impacts. Approximately 56.3% of total economic activity was created by the Gold Mining Sector's ten percent increase in export sales. Income and employment from the Gold Mining Sector contributes approximately 74.6% and 31.0%, respectively.
- Other sectors in Humboldt County are also impacted by increased export sales by the Gold Mining Sector. The Trade Sector had over 2% of total economic activity created by expanding export sales while income and employment for the Trade Sector accounted for 4.9% and 8.7%, respectively.
- Approximately 75% of total income is created through the Gold Mining Sector while only 31% of total jobs were created through the Gold Mining Sector from its ten percent increase in export sales. This indicates that larger levels of employment are created through supporting sectors, however employment is compensated at lower salary and wage rates. Average annual wages in the mining industry for Humboldt County in 1990 was approximately \$33,000 while other major sectors in Humboldt County in 1990 realized average annual salaries ranging from \$11,000 to \$23,000.

## **Interpretation and Implications**

Humboldt County like many counties in Nevada experienced population and economic growth during the 1980's. Growth during the 1980's was greater than the national average but was below the state of Nevada. However the population and economic growth in Humboldt County has experienced more stability than many of Nevada's rural counties.

The economy of Humboldt County is dependent upon the activity of its mining and agricultural industries. These sectors provide the majority of export growth in the county and have significant local economic linkages. Changes in federal land management policies which may impact the level of economic activity in the agricultural and mining sector will have significant impacts throughout the economy.

## **Introduction**

During the 1980's, the Northern Nevada county of Humboldt experienced both economic and population growth. Total county real personal income increased by 41 percent and population in the county grew from 9,700 to 13,100. However even with these increases, external factors may influence the future level of economic activity and stability in Humboldt . External factors such as proposed increases in grazing fees, changes in federal land management policies for the ranching and mining industries, and lower world gold prices potentially could reduce levels of economic activity in the ranching and mining sectors which would have consequences for the entire economy of Humboldt County.

In order to derive these county-wide impacts, interindustry or input-output analysis is used. Interindustry analysis derives the economic interrelationships between economic sectors in a rural economy. From these estimated interrelationships, impacts to the regional economy given a selected economic sector's change in economic activity (such as range livestock) can be estimated.

Therefore for the study, the primary objective is to derive the economic interrelationships of economic sectors in Humboldt County. Specific objectives are:

- 1) To review some basic concepts of community economics;
- 2) To investigate overall socioeconomic trends in Humboldt County;
- 3) To develop an interindustry model for Humboldt County;
- 4) To determine the economic linkages among sectors in Humboldt County; and
- 5) To estimate impacts to Humboldt County economy from changes in export sales by the local Livestock Sector and Gold Mining Sector.

## **Some Basic Concepts of Community Economics**

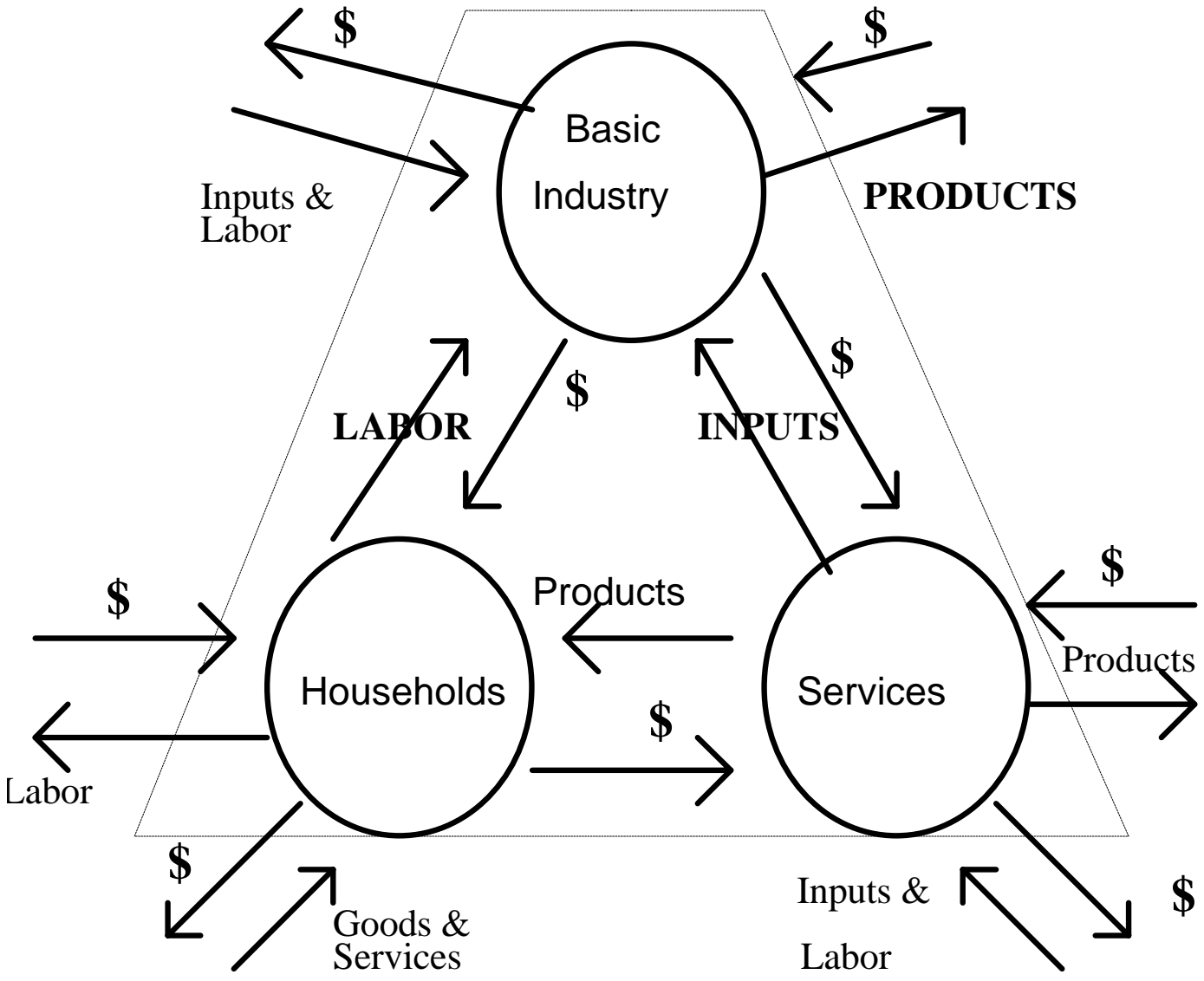
Perhaps one way to view a local economy is to imagine the community's economy as portrayed in figure 1 with money and goods and services flowing within and outside the community. Figure 1 represents a number of key concepts. One, the community is intimately linked with the rest of the world through inflow and outflow of income, inputs, finished products, and labor. Second, the community uses resources and labor to produce the output it sells. These resources or inputs and labor can be purchased locally or elsewhere. Third, the size of the local economy is determined essentially by the inflow of outside income, the lack of income leakage, and the volume of resources and labor used to produce the community's output.

Important components of all economic systems are industries which produce goods and services primarily for sale outside the economy. These industries are usually involved in agriculture, mining, manufacturing, or casino gaming and are called basic industries. Economic systems have two other major structural elements: service firms and households. The major flow of goods, services, and dollars among these sectors of any economy are depicted in figure 1.

Basic industries purchase labor from households, reimbursing them with dollars. Many of the inputs used by basic industries are purchased from local service firms. Local service firms also provide goods and services to households (consumers). Of course, each of these three sectors purchase products, inputs, and labor from outside the community borders. Local transactions determine the relationships that exist among the various types of firms in an economy.

The total impact of any basic industry on an economy consists of direct, indirect, and induced impacts. Direct impacts are the activities or changes in production level of the impacted industry. Indirect impacts occur in the local business sector as a result of providing inputs to the impacted industry. For example, the increased output of local firms providing inputs for a local mining operation represent the indirect impacts of a basic industry. Induced impacts consist of the economic activity caused by household consumption in a local economy from the direct and indirect effects.

The relationships discussed above indicate how basic industries serve as the foundation of an economy and how households and service firms are necessary to make the economy function. Service industries account for a substantial part of the output of most economies, but, as shown in figure 1, much of service industries' output goes to support local basic industries and households. Mathematical techniques, such as input-output analysis, can be used to measure the relationships between basic industries, households, and services.



**Figure 1. Overview of Community Economic System**

## **Socioeconomic Trends in Humboldt County**

Before discussing the economic linkages of Humboldt County, the socioeconomic trends within Humboldt County need to be identified to determine how past trends in the county may impact the future. Trends in population, per capita income, and the export sectors of Humboldt County will be examined.

### **Population Trends**

Humboldt County is located in the northern part of the state of Nevada. It is bordered by the state of Oregon to the north, Elko and Lander Counties to the east, Pershing County to the south, and Washoe County to the west (Figure 1). The county is sparsely populated with a large number of the county's population living in Winnemucca, the county seat. Population in Humboldt County in 1990 was estimated to be 13,100 which ranks Humboldt County as the ninth most populous county in the state of Nevada (Bureau of Business and Economic Research, 1992).

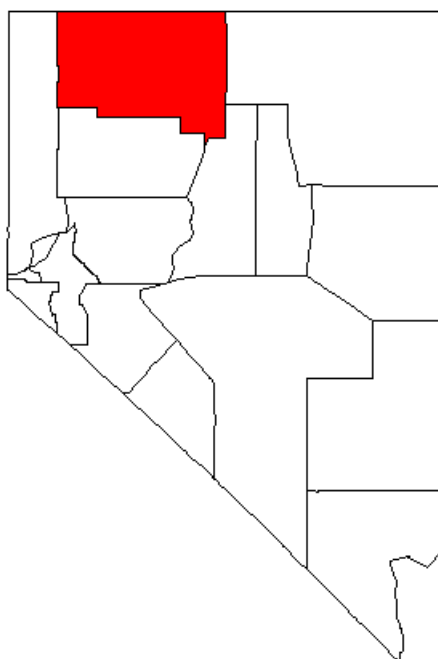


Figure 2. The State of Nevada

From Table 1, Humboldt County ranks eleventh out of seventeen Nevada counties with an average annual growth rate in population of 3.33 percent. Humboldt County's average annual growth rate is less than the state of Nevada but considerably higher than the nation. Interestingly the instability index for population growth for Humboldt County indicates a rather stable county in population growth ranking the county twelfth among Nevada's seventeen counties.

**Table 1. County Patterns of Population Growth. Average Annual Percentage Growth and Instability Index 1969 - 1990**

County	Average Annual % Change	County Rank <sup>1</sup>	Instability Index	County Rank <sup>2</sup>
Douglas	6.56	1	0.56	14
Storey	6.11	2	0.89	10
Nye	5.40	3	1.36	7
Clark	4.97	4	0.28	17
Carson City	4.48	5	0.74	13
Lyon	4.42	6	0.55	15
Elko	4.17	7	1.01	9
Esmeralda	4.02	8	2.62	3
Lander	4.01	9	1.55	6
Washoe	3.49	10	0.31	16
Humboldt	3.33	11	0.86	12
Churchill	2.53	12	0.87	11
Eureka	2.46	13	2.58	4
Pershing	2.36	14	1.34	8
Lincoln	2.00	15	1.93	5
White Pine	-0.193	16	17.60	1
Mineral	-0.343	17	6.97	2
Nevada	4.41		0.25	
U.S.	1.00		0.12	

Note: Compiled by University of Nevada, Reno Department of Agricultural Economics, from Bureau of Census and Bureau of Business and Economic Research data.

<sup>1</sup>County rank for average annual percentage growth from highest to lowest

<sup>2</sup>County rank for instability index from highest to lowest

## Personal Income Trends

In 1990 (the latest year for which comprehensive data are available), Humboldt County residents received almost \$225 million in personal income, or approximately \$17,200 for every man, woman, and child in the county (U.S. Department of Commerce, 1992). About one-fifth of this amount was in the form of "unearned income" -- 12% (approximately \$28 million in total) came from dividends, interest payments and rents, while another 10% (approximately \$22 million) came from transfer payments such as social security, food stamps, unemployment payments and veteran's benefits. However, the lions share of Humboldt County's income came from people working. Approximately \$190 million was earned in the county in the form of wages, salaries and income of proprietors in Humboldt County, as shown in Table 2.

**Table 2. Income of Humboldt County**

	-----(\$1,000)-----	
Total Earnings in Humboldt County		193,181
Wages and Salaries	150,341	
Other Labor Income	16,611	
Proprietors' Income	26,229	
Farm	11,808	
Non-Farm	14,421	
Less Personal Social Security Contributions		8,854
Plus Residence/Commuting Adjustment		-8,684
Net Earnings of Humboldt County Residents		175,643
Dividends, Interest, and Rent		27,527
Transfer Payment		21,525
Total Personal Income, Humboldt County Residents		224,695
Farm		15,813
Non-Farm		208,882
Population (thousands)		13.1
Per Capita Personal Income (dollars)		17,194

Source: U.S. Department of Commerce. "Regional Economic Information System". Bureau of Economic Analysis, Washington D.C., April 1992.

This amount must be adjusted, since some people who earn income in Humboldt County are not county residents; they commute into the county to work and take their paycheck back home. On the other hand, Humboldt County residents may work outside the county and bring income back to the county. On net, just over \$8 million more is earned in Humboldt County and leaves the county than is brought in from outside. This isn't unusual for counties in Nevada, where most Nevada counties provide jobs on net for those who live outside the area. If income of Humboldt County **residents** are to be measured, commuting across county lines must be estimated.

In order to better measure income available to Humboldt County residents before income taxes (a concept called personal income by economists), approximately \$9 million of personal contributions to social insurance programs such as social security, Medicare, unemployment, etc. paid by residents of Humboldt county must be subtracted. Subtracting personal insurance contributions and resident adjustments leaves net earnings of Humboldt County residents of over \$175 million, or approximately 78 percent of total personal income.

Table 3 gives the percentage breakdown of Humboldt County's income by source, and presents similar data for the state of Nevada and the nation. From table 3, Humboldt County's breakdown differs from the state of Nevada and U.S. Dividend, interest, and rents account for smaller percentage of total Humboldt County income as likewise with transfer payments. Net Earnings by Residents for Humboldt County is approximately 78% of total personal income as opposed to approximately 71% and 68% for the state of Nevada and U.S., respectively.

The last line of Table 3 shows that Humboldt County's per capita income is lower than those of the state or nation.

**Table 3. Sources of 1990 Income: Humboldt County, State of Nevada, and U.S.**

Total Earnings	Humboldt	Nevada	U.S.
	-----%-----		
Wages and Salaries	66.9	65.3	58.3
Other Labor Income	7.4	4.6	5.5
Proprietors' Income	11.7	6.1	8.6
Farm	5.3	0.4	1.1
Non-Farm	6.4	5.7	7.6
Less Personal Social Insurance Contributions	3.9	3.9	4.8
Plus Residence/Commuting Adjustments	-3.9	-1.6	0.0
Net Earnings of Residents	78.2	70.7	67.6
Dividend, Interest, and Rents	12.3	16.3	17.4
Transfer Payments	9.6	13.0	15.0
Total Personal Income	100.00	100.00	100.00
Farm	7.0	0.5	1.3
Non-Farm	93.0	99.5	98.7
Population (thousands)	13.1	1,223.9	249,466.2
Per Capita Personal Income (dollars)	\$17,194	\$19,049	\$18,696

Source: U.S. Department of Commerce "Regional Economic Information System". Bureau of Economic Analysis, Washington, D.C., April 1992.

At \$17,194, Humboldt County's 1990 income per capita was approximately 10% less than the state's \$19,049, and approximately 8% less than the national average of \$18,696.

Total personal income for Humboldt County had an average annual growth rate of 8.78 percent which ranks Humboldt County tenth among Nevada's seventeen counties (Table 2). The average annual growth rate in total personal income for Humboldt County was lower than that for the state of Nevada but higher than the national average. However Humboldt County experienced one of the lowest indexes for instability in annual change in total personal income ranking the county next to the lowest county in instability. The low instability index signifies that Humboldt County is a rather stable local economy when compared to other Nevada county economies.

**Table 4: County Patterns of Real Total Personal Income Growth: Average Annual Percentage Growth and Instability Index, 1970 - 1989**

County	Average Annual % Growth	County Rank	Instability Index	County Rank
Douglas	17.18	1	0.168	9
Storey	15.96	2	0.184	4
Carson City	13.98	3	0.171	8
Esmeralda	12.05	4	0.164	12
Clark	11.22	5	0.183	5
Lander	11.01	6	0.132	17
Lyon	10.60	7	0.185	3
Washoe	9.27	8	0.182	6
Nye	9.19	9	0.185	2
Humboldt	8.78	10	0.137	16
Churchill	8.64	11	0.180	7
Elko	7.49	12	0.166	11
Lincoln	6.21	13	0.145	15
Eureka	6.04	14	0.167	10
Pershing	3.98	15	0.155	14
White Pine	1.57	16	0.162	13
Mineral	1.35	17	0.189	1
Nevada	10.36		0.170	
U.S.	3.92		0.164	

Note: Real Incomes Determined Using the Implicit Price Deflator for Personal Consumption Expenditures

## **Land Ownership**

In terms of land area, Humboldt County ranks fourth largest in the state with 9,704 square miles or 6,210,560 acres. Approximately eighty percent of the land in Humboldt County is federally owned with the Bureau of Land Management managing approximately eighty-seven percent of total federally owned land in Humboldt County (Table 5).

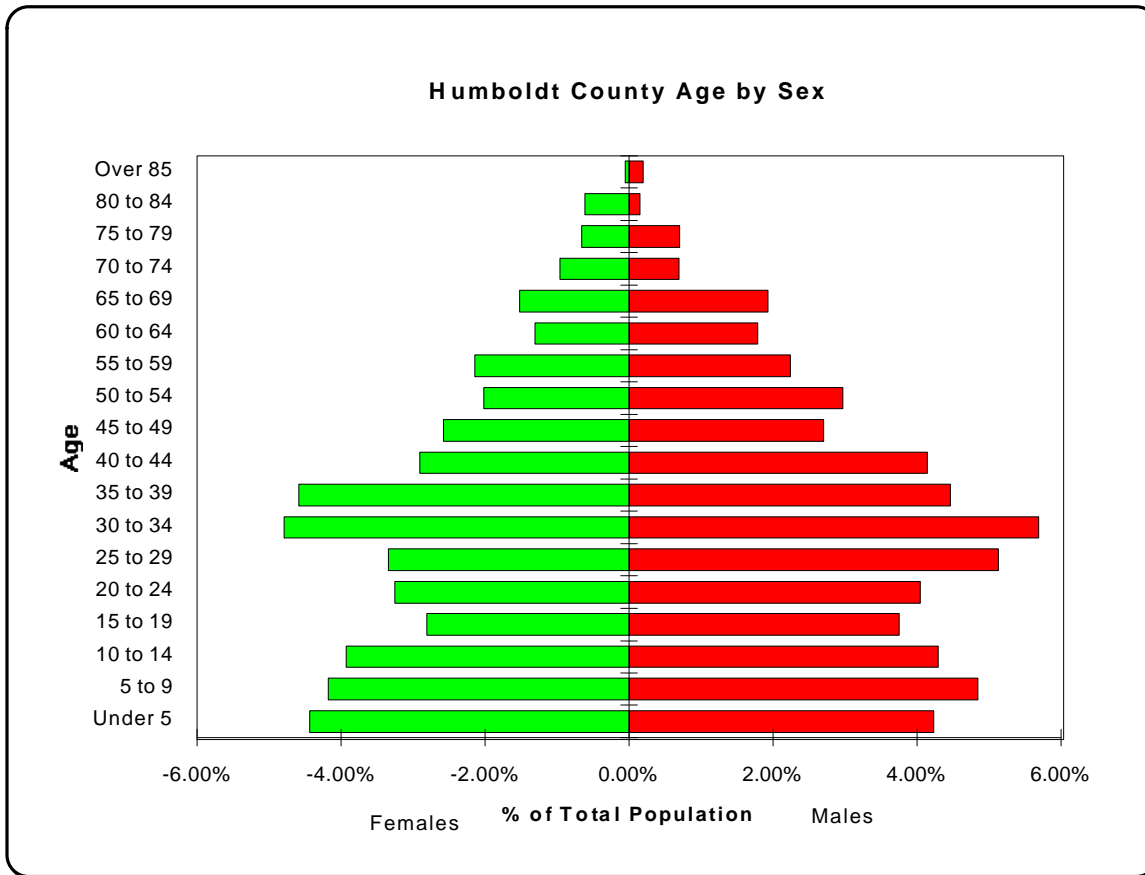
**Table 5. Federally-Owned Land, Humboldt County**

<u>Federal Agency</u>	<u>Acres</u>	<u>Share</u>
		%
Bureau of Land Management	4,321,854	86.10
Forest Service	268,493	5.41
Fish and Wildlife	371,423	7.49
TOTAL	4,961,770	100.00

## **Demographics**

Demographic characteristics of an area refer to the age and sex composition of its residents. Demographic composition changes slowly over time as new residents are added through birth and immigration, and as previous residents are lost through death and outmigration. The demographic composition of an area is important because it determines the makeup of the labor force, the demands for private goods and services and public services, and the ratio of dependents to employed residents. The demographic composition of an area is usually pictured as a pyramid with the number or percent of males on one side and females on the other, and with the youngest age groups at the bottom and oldest at the top.

**Figure 3. Demographic Pyramid, Humboldt County, 1990**

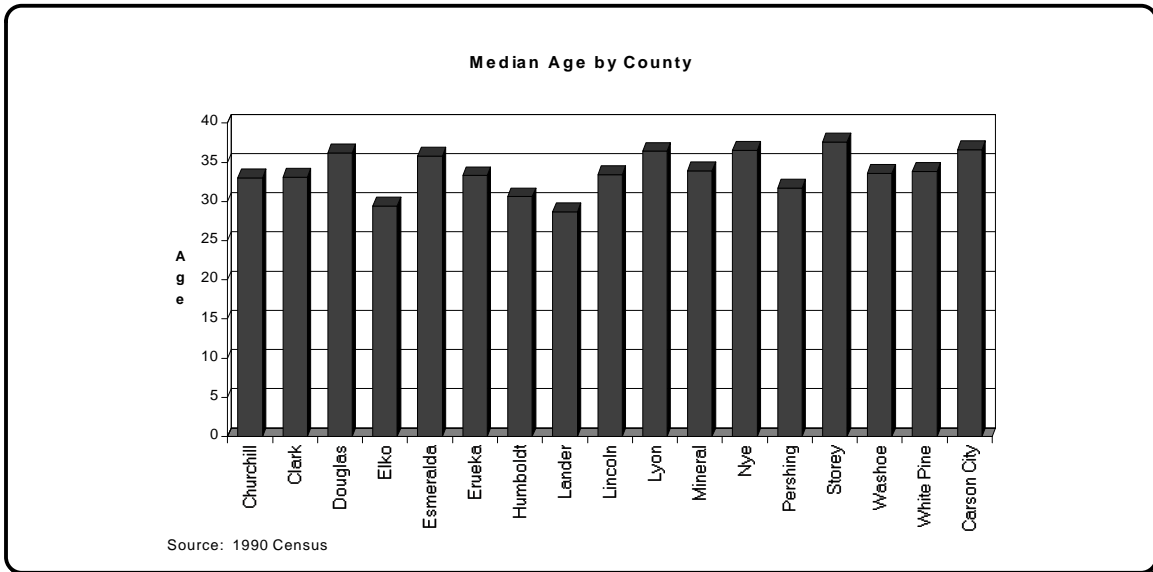


Source: 1990 Census

Figure 3 shows the demographic pyramid for Humboldt County in 1990. The bulge in the middle shows that immigration has been largest for the 25 to 39 year age group and/or outmigration has been heaviest in the 15-24 year age group. The immigration phenomena can be explained by the increased level of economic activity by the mining sector. The mining industry provides employment and high wage opportunities which attracts people to Humboldt County. As for the 15 to 24 year age group, the outmigration of this age group can be attributed to young adults leaving the county for entry level employment opportunities or higher education

Another aspect of demographics for Humboldt County is the median age of population. In Figure 4, the median age for Humboldt County is 30.6 years which is younger than the state's median age of 33.3 years. Humboldt County's median age is similar to the Nevada counties of Elko, Lander and Pershing.

**Figure 4: Median Age by County, 1990**

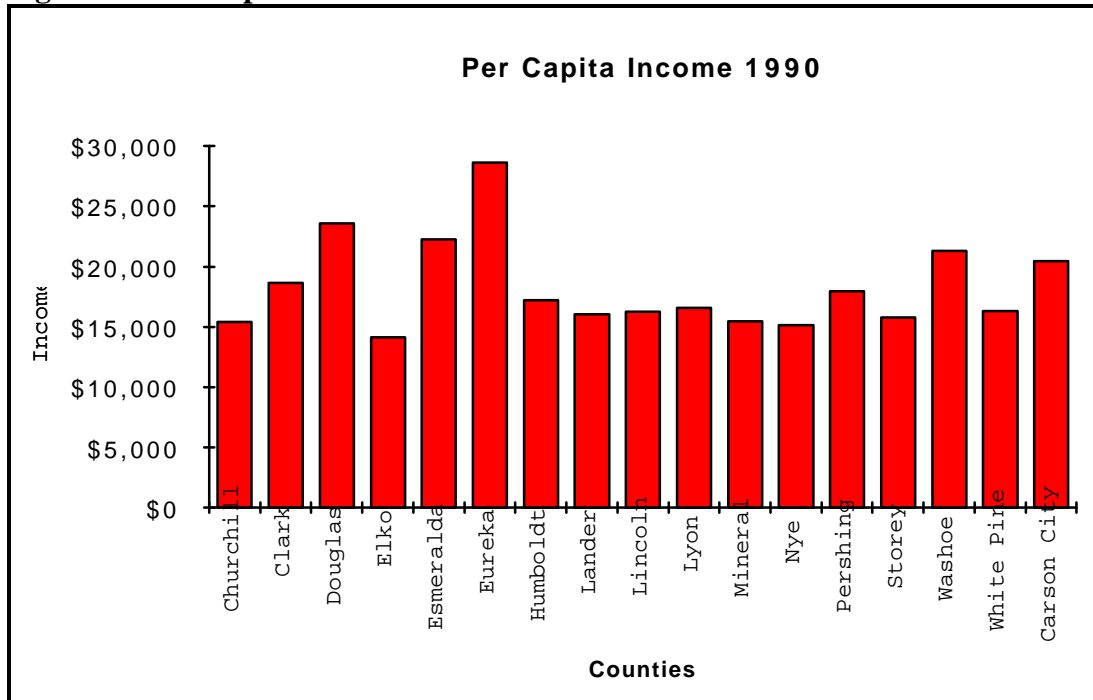


The demographic characteristics of Humboldt County differ from many rural counties in the nation. Often rural counties have substantially higher median age values because the young people with the best education and health, and the most marketable skills and abilities, leave the rural area to realize their potential. With them go some of the area's future leaders, innovators, and entrepreneur, of this generation and probably future generations. Taxes collected in the county, to invest in their education, are now earning dividends for people and economies in other counties and states. Humboldt County, however, has reversed this national tide and has retained many of its young residents. Because of the expansion of mining opportunities and higher wages, an in-migration of younger people to Humboldt County has occurred which has lowered the county's median age. However if the local mining industry decreases its economic activity because of lower world wide gold prices or governmental regulations, Humboldt County most assuredly would realize an out-migration of it's younger populace as experienced in numerous rural counties in the nation.

## Income

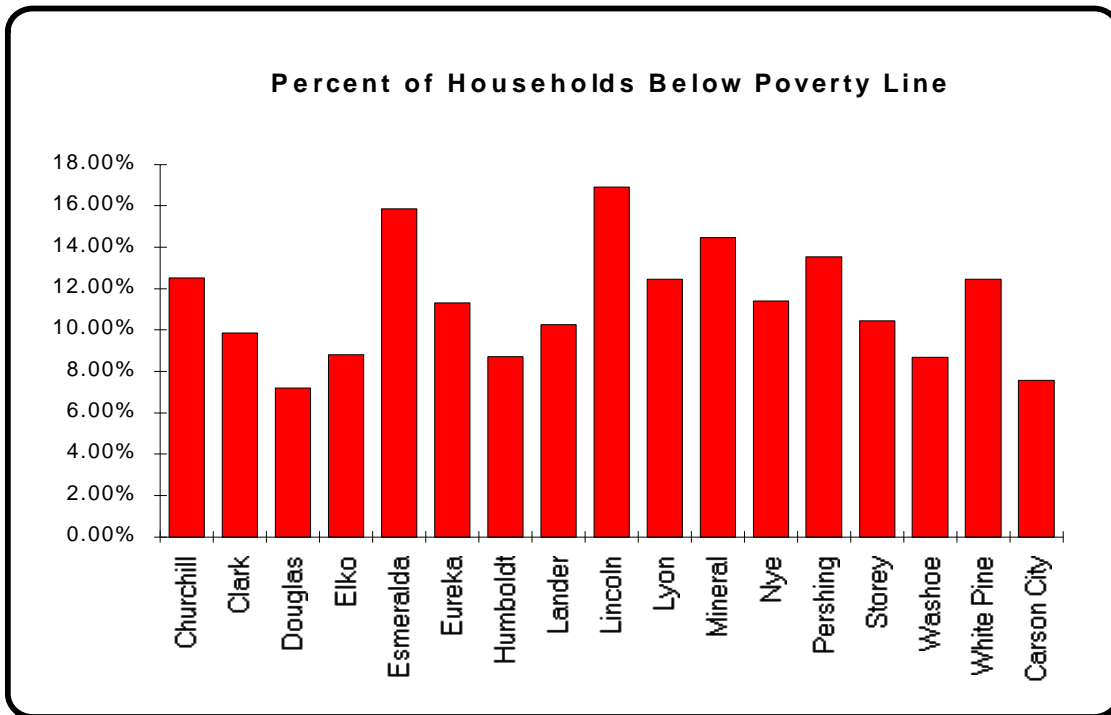
Economic quality of life is difficult to measure because of differences in cost of living and non-monetary income between locations. However, per capita income is still an important basis for comparing economic quality of life, especially among geographically similar areas. On this basis, the economic quality of life in Humboldt County lags behind that of many Nevada counties. In Figure 5, the per capita income of each county is shown, in comparison with Humboldt County, Clark, Douglas, Esmeralda, Eureka, Pershing, Washoe, and Carson City counties had higher per capita incomes.

**Figure 5: Per Capita Income All Counties Source: REIS**



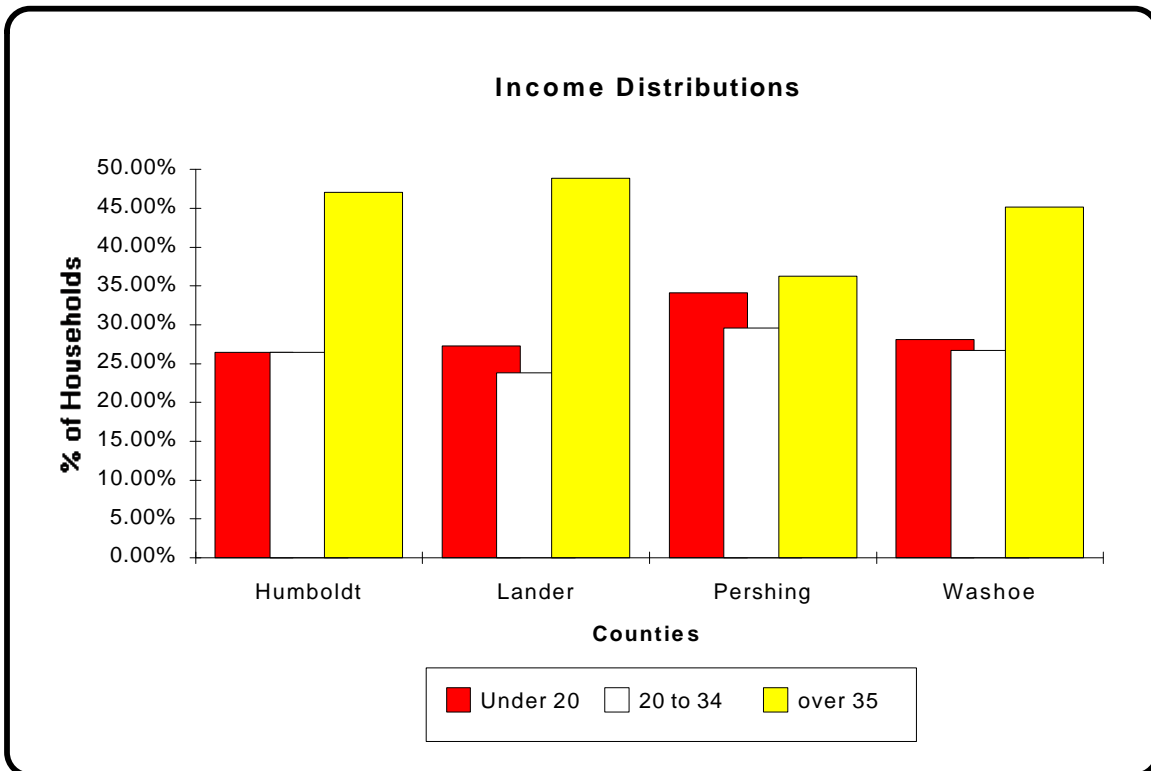
Another useful measure of economic quality of life is the percent of households below the poverty line. From Figure 6, Humboldt County has shown a level of poverty that is lower than many of Nevada's other counties.

Figure 6: Percent of Households Below Poverty Line, All Counties



Source: U.S. Census

Figure 7: Income Distribution of Neighboring Counties



Source: U.S. Census

From Figure 7, most families in Humboldt County earn over \$35,000 per year. The proportion of households in Humboldt County with incomes below \$20,000 is about equal to the proportion of households with incomes between \$20,000 and \$34,000 a year.

### **The Economic Base of Humboldt County**

The economic base of a county refers to the relative size of its industries. A county is said to have a diversified economic base if several industries are relatively large. Conversely, if one or a few industries dominate a local economy, the economy is said to have a concentrated economic base.

To determine the degree of concentration of Humboldt County industries, location quotients for individual economic sectors are calculated. Location quotients indicate the economic importance of each regional industry relative to the same industry at the national level. Location quotients usually use employment as an indicator of an industry's size and importance. The primary focus of location quotients is the identification of industries which are either more important or less important locally than nationally. The broader the economic base (that is, the higher location quotients), the more stable the economy of the community. On the other hand, very low location quotients represent industries that are largely underdeveloped and may offer an opportunity for future development.

An industry's location quotient is the ration of the industry's share of employment in the region to the industry's share of employment in the nation. It is calculated as follows:

$$LQ_i = (e_i/E) / (n_i/N)$$

where:

i = any economic sector

$LQ_i$  = Location quotient for economic sector i

$e_i$  = County employment in economic sector i

E = Total county employment

$n_i$  = National employment in economic sector i

N = Total national employment

The interpretation of location quotients are as follows:

1. Every industry's output can be divided into two uses: export and local consumption (use).
2. The amount consumed (used) by any community is proportionate to the amount consumed locally.
3. If the location quotient for an economic sector is less than one, goods and services must be imported to satisfy local demands.
4. If the location quotient for an economic sector is equal to one, then the economy is approximately fulfilling the requirements of the local household and firms.
5. Finally, if the location quotient is greater than one, for that particular economic sector, the community is producing more than it consumes and is capable of exporting excess goods for the purposes of bringing income into the community.

Location quotients shown in Table 6 were derived from employment levels in each economic sector at county and national levels from the U.S. Department of Commerce, REIS Regional Economic Information System for 1990.

**Table 6. Sectoral Location Quotients for Humboldt County, 1990**

Sector	Location Quotient
Agricultural	3.29
Agriculture Services, Forestry, and Fisheries	1.91
Mining	29.36
Construction	1.57
Manufacturing	0.10
Transportation and Public Utilities	0.99
Wholesale Trade	0.44
Retail Trade	0.95
Finance, Insurance, and Real Estate	0.32
Services	0.83
Federal Government, Civilian	0.82
Federal Government, Military	0.23
State and Local Government	0.99

Given the interpretation of location quotients, economic sectors in Humboldt County can be classified as export sectors (that is, they market much of their output outside the county in which they are located) or import industries (that is, a large portion of the demand for goods and services is satisfied by producers outside the county).

The location quotient analysis for Humboldt County's economic base indicates that the county is highly dependent on Mining, Agriculture, Agricultural Services, and Construction Sectors. Location quotient values are as high as 29.36 for the Mining Sector to 1.57 for the Construction Sector.

From Table 6, Humboldt County imports much of its wholesale trade and manufactured goods. The location quotient analysis also shows that retail trade and transportation and public utilities are import industries, however, their values are close to 1.0. This would indicate that little is being imported by these two sectors.

The location quotient analysis can be used to target new industries or businesses for the county and to develop economic strategies for the future. One strategy, for example, might be to encourage the location of input suppliers for the agricultural, mining, and construction industries. Another strategy would be to investigate the expansion of economic sectors such as manufacturing, wholesale trade, and retail trade which currently do not meet local demand.

### **The Changing Economic Base of Humboldt County**

The location quotient results indicate the nature of the area's economy for a specific time period. Of additional interest is the change occurring in the county's economic base. To measure the changes, shift-share analysis is performed.

Shift-share analysis, like location quotients, is a measure of a county's economic condition relative to other communities and to the nation as a whole. The data used in this analysis are the same as that used for the location quotient analysis. For this study, the shift in economic base was studied from 1980 to 1990.

The purpose of shift-share analysis is to determine the county's competitiveness and changing employment patterns in the industrial market place. Shift-share analysis assumes that there are three components to changes in employment: national component, industrial mix component, and competitive share component.

### **National Growth Component**

The sum of employment in all industries in all communities makes up national employment. One would expect that if a community's economy was maintaining its relative competitiveness, changes in the level of national employment would be reflected in proportionately equal changes in the local employment. The calculation of the national growth component, therefore, measures how much of the local employment change is due to the national growth trend. The calculation is as follows:

$$\text{National Growth Component} = (\text{rate of change in } N * e_i)$$

where:

$e_i$  = local employment in economic sector  $i$  in 1980

$$\text{rate of change in nation} = (N_{1990} - N_{1980}) / N_{1980}$$

### **Industrial Mix Component**

On a national level, each industry grows or declines at some rate, at least partially independent of the rate of growth in the national economy. A local economy's performance will depend, then, on its mix of industries; that is, on whether its economic base is concentrated in faster or slower growing industries. The industrial mix calculation indicates the expected growth in local industries if they grow at the same rate as their national counterparts. The expected local share of the particular industry is determined using the following equation:

$$\text{Industrial Mix Component} = (\text{rate of change in } n_i - \text{rate of change } N) * e_i$$

$i$  = any economic sector

$n_i$  = national employment in economic sector  $i$

$N$  = total national employment

$e_i$  = county employment in economic sector  $i$

$$\text{rate of change in } n_i = \frac{(n_{i1990} - n_{i1980})}{n_{i1980}}$$

$$\text{rate of change in } N = \frac{(N_{1990} - N_{1980})}{N_{1980}}$$

### **Competitive Share Component**

A local industry's employment grows or declines for a number of reasons, including changes in the national employment level, changes in employment by the same industry at the national level, and changes in local conditions. After the first two components have been calculated, the residual change, if any, is attributed to changes in the competitiveness of the local industry. The competitive share component measures this latter factor in employment change.

The competitive share component is measured as follows:

$$\text{Competitive Share} = (\text{rate of change in } e_i - \text{rate of change in } n_j) * e_i$$

where:

$e_i$  = county employment in economic sector  $i$

$$\text{rate of change in } e_i = \frac{e_{i1990} - e_{i1980}}{e_{i1980}}$$

$$\text{rate of change in } n_j = \frac{n_{j1990} - n_{j1980}}{n_{j1980}}$$

### **Results of Shift-Share-Analysis**

A local industry's employment grows or declines for a number of reasons, including changes in the national employment level, changes in employment by the same industry at the national level, and changes in local conditions. After the national component and industrial mix component have been calculated, the residual change, if any, is attributed to changes in the competitiveness of the local industry. Table 7 shows the results of the shift-share analysis for Humboldt County.

**Table 7. Shift-Share Analysis, Humboldt County, 1980-1990**

Sector	National Component	Industrial Mix	Competitive Share	Total
Agriculture	134	-247	81	-32
Ag. Services, Forestry & Fisheries	20	28	5	53
Mining	40	-81	1390	1349
Construction	210	57	-578	-311
Manufacturing	42	-51	-71	-80
Transportation & Public Utilities	79	-21	-51	7
Wholesale Trade	39	-12	-57	-29
Retail Trade	252	60	-225	87
Finance, Insurance, & Real Estate	40	23	-64	-1
Services	219	314	232	765
Fed Gov., Civilian	35	-23	-21	-9
Fed.Gov., Military	6	-4	2	5
State & Local Gov.	130	-47	176	259
Total	1246	-4	819	2063

At the present, the shift-share analysis shows that the mining and service sectors provide the majority of economic growth in the county. Of interest, the Humboldt County mining industry is a major contributor of county economic growth. Nationally the mining industry lost employment, however, the competitive advantage of the mining industry in Humboldt County provided for the overall employment growth in this sector.

In the trade sectors, most growth was due to the national growth and competitive share was negative. This is most unexpected in the trade sectors, where most demand is dependent on broad economic conditions.

The Agricultural Sector had an overall a loss in employment, however the Agricultural Sector in Humboldt County realized positive competitive share which reduced sectoral employment decline. A major factor of sectoral employment loss for the Agricultural Sector was the loss in Agricultural Sector employment nationally.

Overall Humboldt County realized employment growth of 2063 between 1980 and 1990. Overall national employment growth impacted Humboldt County, in addition the overall positive

competitive share for Humboldt County contributed to Humboldt County's employment growth. Analyzing both results of the location quotient and shift-share analysis, Humboldt County is highly dependent on the agricultural, mining, and service sectors. By diversifying the economic base of Humboldt County, a more stable economy could be achieved. However in pursuing the goal of economic diversification, the goal of economic growth must also be addressed.

### **Interindustry Analysis**

Within a regional economy, there are numerous economic sectors performing different tasks. All sectors are dependent on each other to some degree. A change in activities will directly or indirectly affect the response or level of production of the other regional sectors. The amount of economic activity among economic sectors shows the degree of interrelationships between sectors. That is, an increase in production by the regional livestock sector would directly increase purchases of alfalfa hay. With increased alfalfa hay purchases, farm workers will have greater incomes which would increase their purchases from the trade sector. The trade sector would experience increased economic activity because of its indirect relationship with the livestock and alfalfa hay sectors. These interdependencies among regional economic sectors can be estimated through interindustry or input-output analysis.

### **Transaction Table**

An interindustry study is based on the transactions of the sectors in an economy, i.e. purchases of inputs and sales of outputs (Figure 8). A transaction table shows the monetary flows of goods and services through the regional economy. Transactions can be delineated into four major classifications. One classification (Quadrant I) is the processing section which produces goods and services. Processing sectors in Quadrant I produce and buy products and/or services from other processing sectors to be used in their production process. Goods and services used in the processing section are intermediate goods which are used in the production of goods and services which are ultimately sold to final consumers.

Another classification (Quadrant II ) includes sales to final demand of goods and services. The Final Demand Section includes net inventory change, exports, government purchases, capital formation and purchases by households. The third classification (Quadrant III) is the Final Payment Section. The Final Payments Section includes the non-processing supply sectors such as imports, depreciation, and households. Quadrant IV (fourth classification) represents direct inputs of final demand which are not produced by industries in the processing sector.

Output Input	Sector 1.....j.....n	Final Demand	
l . . . i . . . n	$X_{ij}$	Quadrant I (Processing Section)	$X_i$
Final Payments		Quadrant II (Final Demand Section)	
	Quadrant III (Final Payments Section)	Quadrant IV (Final Demand- Final Payments Section)	
$X_j$			
Total Gross Input			

Figure 8. A Classification of Transactions

Transactions include costs and revenues concerning an economic sector. First, reading down the column of the transactions table, the inputs (cost) required by a specific sector from other specific sectors to produce its output can be seen. Second, reading across the row of the transactions table, the distribution of sales by a specific sector to other sectors can be seen.

From Figure 8, a total of  $n$  industries are listed across the top and left hand side of Quadrant I. For a given industry  $i$ , reading across the row gives the sales of that sector to all other sectors in the regional economy. For example, the values in cell where row  $i$  intersects with column  $j$  ( $x_{ij}$ ) represents the sales of sector  $i$  to sector  $j$ . The sales of sector  $i$  to  $j$  are also the purchases of sector  $j$  from sector  $i$ .

### **Direct Requirements**

The logic of interindustry analysis is to establish the structural relationships among the processing sectors of the model. These relationships can be seen throughout the direct requirements table. A direct requirements coefficient is computed from the processing section (Quadrant I) of the transaction table by dividing the value in a column cell by total output of the column. This can be expressed as:

$$a_{ij} = x_{ij}/X_j \quad i, j = 1, 2, \dots, n$$

where  $a_{ij}$  is the purchase by sector  $j$  from sector  $i$  to produce one dollar of output by sector  $j$ ,  $x_{ij}$  is the dollar value of transactions between sector  $i$  and sector  $j$ , and  $X_j$  is the value of total output for sector  $j$ .

The  $a_{ij}$  is a direct requirement coefficient which shows how much a given sector purchases from another sector within the same regional economy in order to produce one dollar's worth of output. Direct requirement coefficients are only calculated for the processing sectors.

The column sum of the direct coefficients of a given sector show the direct effects of changes in the volume of output of a given sector upon other sectors of the economy. The direct effect or "first round" effects show how much a given sector has to increase its purchases of output from other processing sectors when there is an increase in demand for the output of the given sector.

### **Final Demand Interindustry Coefficients**

Due to the direct effect of additional output for a given industry, other processing sectors must supply additional inputs. To supply these additional outputs, the directly effected sectors must increase their output levels which means increased purchases from their input supply sectors. This expansion of output by sectors directly and indirectly related to the principal sector which increased its output to meet final demand sales is referred to as final demand interindustry coefficient. The column sum of final demand interindustry coefficients derives the final demand multiplier for a given economic sector. The final demand multiplier estimates the increase in regional economic activity required for a particular economic sector to increase sales to final demand by one dollar.

Final demand multipliers are calculated for both "open" and "closed" input-output models. An "open" model does not contain a non-processing sector in the processing section of the transaction table. The final demand multiplier of an "open" model derives both direct and indirect effects of a one dollar increase in sales to final demand for a given sector. Indirect effects being those increases in levels of output for the regional economy to meet the output levels of the directly related industries.

A "closed" input-output model contains at least one non-processing sector in the processing section of the transactions model. Usually the Household Sector is incorporated into the processing section of the transactions table to produce a closed mode. The final demand multiplier from a "closed" model derives direct, indirect, and induced effects from a one dollar increase in sales to final demand for a given sector. Induced effects are the effects of new incomes to households upon the individual sectors of the economy from increased sales to final demand by a given sector.

### **Output Interindustry Coefficients**

Final demand interindustry coefficients derive the effects to the regional economy from sales to final demand for a given sector. In order to meet these final demand sales, the given sector must increase production by purchases from itself. This intrasectoral purchasing increases

output response greater than one. In order to estimate economic effects from total production rather than from deliveries outside the processing sectors, output interindustry coefficients are required.

Output interindustry coefficients are derived by dividing each column entry in the final demand interindustry coefficient matrix by the given sector's intrasectoral interindustry coefficient. This will derive intrasectoral coefficients equal to one. The other entries in the final demand interindustry coefficients matrix are adjusted similarly to refer to production rather than external end product deliveries by dividing all entries in each row by the entry at the intersection with the corresponding column or the intrasectoral coefficient.

Direct and indirect output multiplier coefficients are derived from an "open" model. Indirect effects being the increased purchases in the regional economy created by the purchases of the directly effect sectors from a given sector's increase in production. Direct, indirect, and induced output interindustry coefficients are derived from a "closed" model. Induced effects being the increase in regional economic activity from increase in household incomes created by production increases for a given sector.

### **Employment Effects**

As shown in the previous section, input-output analysis is used to determine the effects on the regional economy from changes in a given sector's level of output or sales to final demand. Input-output analysis also can be used to derive the effects on regional employment from changes in a given sector's sales to final demand or output level. Studies by Elrod and Laferney (1972) and Osborn et al. (1973) have derived procedures to determine regional employment impacts from input-output models.

To determine employment effects, it is first required that the direct labor effects for each of the  $n$  processing sectors be derived, or:

$$L_j = E_j / X_j \quad j = 1, 2, \dots, n$$

where,  $L_j$  is the number of employees required per dollar of output by sector  $j$ ,  $E_j$  is the number of workers employed by sector  $j$ , and  $X_j$  is the dollar value of production by sector  $j$ .

From the direct employment requirements vector for each processing sector in the region, direct and indirect labor requirements from a one dollar sales to final demand by a given sector can be derived by premultiplying the direct labor coefficients matrix by the "open" final demand interindustry coefficient matrix. Indirect labor effects are the number of workers employed elsewhere in the regional economy to produce the direct and indirect inputs used by each sector.

Premultiplying the direct labor requirements matrix by the "closed" interindustry coefficients matrix derives the direct, indirect, and induced employment effects in the region from a given sector's change in sales to final demand interindustry coefficients matrix. Direct and indirect employment effects and direct, indirect, and induced employment effects from changes in a given sector's level of output can be derived from the "open" or "closed" output interindustry coefficients matrix.

### **Household Income Effects**

The effects on regional household incomes from changes in sectoral sales to final demand and levels of output can be derived through interindustry analysis. If households are exogenous to the model, that is an "open" model, the derivation of direct and indirect household income effects requires the determination of a direct household income vector. The direct household income vector is the division of the Household Sector row value for each processing sector. Direct and indirect household income effects from changes in sales to final demand by a given sector are derived by multiplying the direct household income requirements by the "open" final demand interindustry coefficient matrix. The indirect income effects are those increases in regional income created by increased production activities from those sectors indirectly related to the direct resources supply sectors.

When the Household Sector is made endogenous to the processing section or what is referred to as a "closed" model, direct, indirect, and induced household income effects are derived. Induced income effects are the changes in regional incomes created by the additional purchases of regional households created by the change in a given sector's sale to final demand. Direct, indirect, and induced household income effects can be read directly off the "closed" final

demand interindustry coefficients matrix. The coefficients are the values from the household row in the interindustry coefficients matrix for each given processing sector. Using the output interindustry coefficients matrix, the effects on household income from changes in a given sector's level of production can be derived.

### **Economic Linkages in Humboldt County**

An input-output model for Humboldt County was derived using the microcomputer IMPLAN model and supplemented by primary data at the local level. The Micro IMPLAN model was developed by the U.S. Forest Service to estimate sectoral and regional impacts of alternative forest management scenarios (Alward et al., 1989). The update and further development of the Micro IMPLAN has been conducted by the University of Minnesota (1991).

County input-output or interindustry models can be developed from either primary or secondary data. County interindustry models derived through primary data sources are time consuming and very costly. Secondary data procedures use publicly available data sources to estimate county level interindustry models from the national model. IMPLAN uses regional purchase coefficients to estimate regional or county level input-output models. Numerous studies have examined differences between primary and secondary data input-output models (Round, 1983; Schahher and Chu, 1969; Stevens et al., 1983). Studies have shown differences between these models when compared to primary models, semi-survey models provide the best model (Miller and Blair, 1985).

The input-output model developed for Humboldt County is a semi-survey model. An IMPLAN model for Humboldt County was first developed. The IMPLAN model was modified through a survey of Humboldt County's commercial sector and production data for the agricultural and mining industries. In addition employment data used by IMPLAN was verified using employment data supplied by the Nevada Employment Security Department. For this analysis, the Local Government Sector and the Household Sector were closed to the processing section. A listing of the economic sectors used in the analysis are shown in Appendix A and a listing of data sources used for this semi-survey model are shown in Appendix B.

## **Transactions Table**

Table 8 shows the transactions table for Humboldt County based on 1987 data. A transactions table shows the dollar flow of goods and services throughout the county economy. Total sectoral output of the processing sectors in Humboldt County indicate the relative importance of the various sectors in terms of volume of dollar activity. Total output varies for the processing sectors from \$1.5 million for the Wheat Sector to \$127.2 million for the Gold Mining Sector. The Household Sector which will be "closed" for this analysis has the largest sectoral output of \$154.5 million.

Row values of a given economic sector show the distribution of sales by that sector. For example, the Trade Sector (Row 15) sold roughly \$600 million of output to the Livestock Sector (Column 1). Intra-industry (intrasectoral) transactions occur when firms sell to other firms in the same sector. The Trade Sector (Row 15) sold \$49 million of output to other firms in the Trade Sector (Column 15). The Trade Sector, also, (Row 15) had sales to the Household Sector of \$13.4 million, or 56 percent of total sales by the Trade Sector.

Table 8 shows that a large portion of the output in Humboldt County was sold to buyers outside the region. For example, the Gold Mining Sector (Row 9) sells \$127 million (99.9 percent of total output) of its output to buyers outside the region. Other sectors also have large exports sales such as the Livestock Sector with \$12.6 million or 77.3 percent of total output, and the Alfalfa Hay Sector with export sales of \$14.2 million or 99.9 percent of total sector output.

Purchases of specific inputs by a give processing sector can be analyzed by moving down the column entries of a give sector (Table 8). For example, the Livestock Sector (Column 1) purchases \$2.3 million of inputs from the Other Hay Sector (Row 3) and \$84 thousand of utility services from the Utility Sector (Row 14).

Firms in the region purchase some of their inputs from sellers outside the region. The dollar amount of imports by each sector is included in the Imports Sector (Row 24). The Livestock Sector (Column 1) purchases \$4.9 million of inputs from sellers outside Humboldt County or 30.4 percent of total sectoral inputs. Other sectors can be analyzed in much the same fashion from the transactions table which give the dollar flows in the regional economy.

Table 8. Transactions Table for Humboldt County, 1987

Sectors	1 Livestock	2 Alfalfa Hay	3 Other Hay	4 Alfalfa Seed	5 Wheat
	-----(\$1,000)-----				
1 Livestock	3,617	0	0	0	0
2 Alfalfa Hay	0	0	0	0	0
3 Other Hay	2,309	0	0	0	0
4 Alfalfa Seed	0	63	0	0	0
5 Wheat	0	0	0	0	48
6 Barley	149	0	0	0	0
7 Vegetables	0	0	0	0	0
8 Ag. Services	141	590	12	228	174
9 Gold Mining	0	0	0	0	0
10 Other Mining	0	0	0	0	1
11 Construction	150	0	0	0	11
12 Manufacturing	141	0	17	0	8
13 Trans/Comm	155	0	16	0	8
14 Utilities	84	307	30	42	44
15 Trade	607	785	130	67	78
16 Eat/Drnk/Lodg	0	0	0	0	0
17 F.I.R.E.	233	310	56	42	38
18 Services	49	412	11	13	20
19 Hot/Gam/Rec	0	0	0	0	0
20 Health	0	0	0	0	0
21 Local Gov't	366	542	151	76	55
22 Households	2,772	5,778	955	576	310
23 Other F.P.	591	1,016	159	119	123
24 Imports	4,954	4,400	990	585	644
Total Input	16,318	14,203	2,527	1,748	1,562

Table 8. Transactions Table for Humboldt County, 1987 (Continued)

Sectors	6 Barley	7 Vegetables	8 Ag. Services	9 Gold Mining	10 Other Mining
	-----(\$1,000)-----				
1 Livestock	0	0	0	0	0
2 Alfalfa Hay	0	0	0	0	0
3 Other Hay	0	0	0	0	0
4 Alfalfa Seed	0	0	0	0	0
5 Wheat	0	0	0	0	0
6 Barley	24	0	0	0	0
7 Vegetables	0	113	0	0	0
8 Ag. Services	10	92	2	15	0
9 Gold Mining	0	0	3	0	0
10 Other Mining	5	8	1	71	5
11 Construction	21	76	16	648	23
12 Manufacturing	28	61	19	1,302	1
13 Trans/Comm	17	89	20	1,652	3
14 Utilities	21	131	15	7,159	30
15 Trade	212	429	22	245	8
16 Eat/Drnk/Lodg	0	0	0	508	0
17 F.I.R.E.	67	151	12	2,464	4
18 Services	12	33	15	2,285	4
19 Hot/Game/Rec	0	0	0	716	0
20 Health	0	0	0	0	0
21 Local Gov't	42	253	36	2,139	10
22 Households	965	3,326	683	39,717	129
23 Other F.P.	348	1,402	352	21,190	130
24 Imports	1,363	2,268	417	47,119	150
Total Input	3,135	8,432	1,613	127,230	497

Table 8. Transactions Table for Humboldt County, 1987 (continued)

Sectors	11 Construction	12 Manufacturing	13 Trans/Comm	14 Utilities	15 Trade
	-----(\$1,000)-----				
1 Livestock	0	5	0	0	0
2 Alfalfa Hay	0	0	0	0	0
3 Other Hay	0	0	0	0	0
4 Alfalfa Seed	0	0	0	0	0
5 Wheat	0	0	0	0	0
6 Barley	0	0	0	0	0
7 Vegetables	0	1	0	0	0
8 Ag. Services	46	0	0	1	1
9 Gold Mining	0	8	0	0	0
10 Other Mining	3	88	0	15	0
11 Construction	10,853	47	276	1,582	164
12 Manufacturing	1,039	114	49	118	113
13 Trans/Comm	680	107	528	564	458
14 Utilities	328	120	63	4,106	546
15 Trade	3,448	69	54	25	49
16 Eat/Drnk/Lodg	0	0	136	48	185
17 F.I.R.E.	560	23	82	104	457
18 Services	765	45	213	104	431
19 Hot/Gam/Rec	0	0	19	35	110
20 Health	0	0	0	0	0
21 Local Gov't	566	32	59	243	137
22 Households	19,911	1,311	5,119	4,918	11,725
23 Other F.P.	7,671	562	3,418	12,304	5,821
24 Imports	23,135	2,381	2,749	15,041	3,640
Total Input	69,005	4,913	12,765	39,208	23,837

Table 8. Transactions Table for Humboldt County, 1987 (continued)

Sectors	16	17	18	19	20
	Eat/Drnk/Lodg	F.I.R.E.	Services	Hot/Gam/Rec	Health
	-----(\$1,000)-----				
1 Livestock	0	0	0	0	0
2 Alfalfa Hay	0	0	0	0	0
3 Other Hay	0	0	0	0	0
4 Alfalfa Seed	0	0	0	0	0
5 Wheat	0	0	0	0	0
6 Barley	0	0	2	0	0
7 Vegetables	0	0	2	3	0
8 Ag. Services	0	19	0	24	0
9 Gold Mining	0	0	0	0	0
10 Other Mining	0	0	0	0	1
11 Construction	39	384	220	792	28
12 Manufacturing	38	14	41	95	16
13 Trans/Comm	52	71	210	441	33
14 Utilities	275	87	215	1,111	39
15 Trade	372	15	77	39	45
16 Eat/Drnk/Lodg	0	58	188	221	0
17 F.I.R.E.	76	336	145	559	52
18 Services	51	79	269	541	45
19 Hot/Gam/Rec	0	45	98	70	0
20 Health	0	1	5	0	30
21 Local Gov't	43	69	61	229	17
22 Households	2,286	1,522	4,581	4,796	1,123
23 Other F.P.	871	6,892	2,642	3,809	221
24 Imports	2,747	1,379	2,797	5,482	746
Total Input	6,850	10,971	11,553	18,212	2,396

Table 8. Transactions Table for Humboldt County, 1987 (continued)

Sectors	21 Local Gov't	22 Households	23 Other F.D.	24 Exports	25 Row Total
	-----(\$1,000)-----				
1 Livestock	0	10	67	12,619	16,322
2 Alfalfa Hay	0	9	10	14,184	14,211
3 Other Hay	0	7	3	208	2,539
4 Alfalfa Seed	0	0	0	1,685	1,764
5 Wheat	0	0	100	1,414	1,582
6 Barley	0	0	43	2,917	3,159
7 Vegetables	0	158	10	8,145	8,460
8 Ag. Services	0	3	0	255	1,645
9 Gold Mining	0	0	0	127,219	127,266
10 Other Mining	0	1	102	196	537
11 Construction	1,700	566	43,245	8,164	69,049
12 Manufacturing	40	787	129	743	4,961
13 Trans/Comm	160	3,343	1,525	2,633	12,817
14 Utilities	422	3,033	3,085	17,915	39,264
15 Trade	476	13,408	191	2,986	23,897
16 Eat/Drnk/Lodg	0	4,692	32	782	6,914
17 F.I.R.E.	181	4,245	0	774	11,039
18 Services	233	5,415	59	449	11,625
19 Hot/Gam/Rec	0	10,831	268	6,020	18,288
20 Health	11	2,322	3	24	2,476
21 Local Gov't	4,020	3,995	245	7,571	21,041
22 Households	8,514	157	26,418	6,919	154,599
23 Other F.P.	900	27,803	0	0	N.A.
24 Imports	4,300	73,726	0	0	N.A.
Total Input	20,957	154,511	N.A.	N.A.	N.A.

## **Direct Requirements**

The dollar values of all inputs used by a sector to produce one dollar of output are called direct requirements. Direct requirements by a sector have been referred to as a "production recipe" to produce a dollar of output. That is, the direct requirements by a sector to produce one dollar of output is the required purchases of inputs from each selling sector.

Direct requirements (Table 9) are determined by dividing each purchase transaction for a given sector by its total output. Direct requirements provide estimates of the dollar value of inputs that are required to produce one dollar of output by the producing sector. For example, to produce one dollar of output, the Livestock Sector (Column 1) purchases \$0.14 from the Other Hay Sector (Row 3), \$0.04 from the Trade Sector (Row 15) and \$0.01 from the Finance, Insurance, and Real Estate Sector (Row 17).

The total of the direct requirements for a sector is \$1. That is, to produce one dollar of output, all of the payments for the resources used in production are equal to one dollar since profits are considered as part of total inputs. For the Livestock Sector (Column 1), input requirements from local economic sectors is \$0.70 while \$0.30 are imported to produce one dollar of output.

## **Final Demand Interindustry Coefficients**

The direct requirements provide estimates of the direct response of the processing sector in Humboldt County economy to expansion of output by a given sector by one dollar. The processing sectors that respond to the direct requirement of a given sector will expand their output by purchasing inputs from other processing sectors. The direct effects plus the resulting indirect effects from increased sales to final demand are called final demand coefficients from an "open" model. For this study the Local Government Sector and the Household Sector were included as processing sectors to derive direct, indirect, and induced effects.

Table 9. Direct Requirements Table for Humboldt County 1987.

Sectors	1 Livestock	2 Alfalfa Hay	3 Other Hay	4 Alfalfa Seed	5 Wheat
1 Livestock	0.221657	0.000000	0.000000	0.000000	0.000000
2 Alfalfa Hay	0.000000	0.000000	0.000000	0.000000	0.000000
3 Other Hay	0.141500	0.000000	0.000000	0.000000	0.000000
4 Alfalfa Seed	0.000000	0.004436	0.000000	0.000000	0.000000
5 Wheat	0.000000	0.000000	0.000000	0.000000	0.030730
6 Barley	0.009131	0.000000	0.000000	0.000000	0.000000
7 Vegetables	0.000000	0.000000	0.000000	0.000000	0.000000
8 Ag. Services	0.008641	0.041541	0.004749	0.130435	0.111396
9 Gold Mining	0.000000	0.000000	0.000000	0.000000	0.000000
10 Other Mining	0.000000	0.000000	0.000000	0.000000	0.000640
11 Construction	0.009192	0.000000	0.000000	0.000000	0.007042
12 Manufacturing	0.008641	0.000000	0.006727	0.000000	0.005122
13 Trans/Comm	0.009499	0.000000	0.006332	0.000000	0.005122
14 Utilities	0.005148	0.021615	0.011872	0.024027	0.028169
15 Trade	0.037198	0.055270	0.051444	0.038330	0.049936
16 Eat/Drnk/Lodg	0.000000	0.000000	0.000000	0.000000	0.000000
17 F.I.R.E.	0.014279	0.021826	0.022161	0.024027	0.024328
18 Services	0.003003	0.029008	0.004353	0.007437	0.012804
19 Hot/Gam/Rec	0.000000	0.000000	0.000000	0.000000	0.000000
20 Health	0.000000	0.000000	0.000000	0.000000	0.000000
21 Local Gov't	0.022429	0.038161	0.059755	0.043478	0.035211
22 Households	0.169874	0.406815	0.377918	0.329519	0.198464
23 Other F.P.	0.036218	0.071534	0.062920	0.068078	0.078745
24 Imports	0.303591	0.309794	0.391769	0.334668	0.412292
Totals	1.000000	1.000000	1.000000	1.000000	1.000000

Table 9. Direct Requirements Table for Humboldt County, 1987. (Continued)

Sectors	6 Barley	7 Vegetables	8 Ag. Services	9 Gold Mining	10 Other Mining
1 Livestock	0.000000	0.000000	0.000000	0.000000	0.000000
2 Alfalfa Hay	0.000000	0.000000	0.000000	0.000000	0.000000
3 Other Hay	0.000000	0.000000	0.000000	0.000000	0.000000
4 Alfalfa Seed	0.000000	0.000000	0.000000	0.000000	0.000000
5 Wheat	0.000000	0.000000	0.000000	0.000000	0.000000
6 Barley	0.007656	0.000000	0.000000	0.000000	0.000000
7 Vegetables	0.000000	0.013401	0.000000	0.000000	0.000000
8 Ag. Services	0.003190	0.010911	0.001240	0.000118	0.000000
9 Gold Mining	0.000000	0.000000	0.001860	0.000000	0.000000
10 Other Mining	0.001595	0.000949	0.000620	0.000558	0.010060
11 Construction	0.006699	0.009013	0.009919	0.005093	0.046278
12 Manufacturing	0.008931	0.007234	0.011779	0.010233	0.002012
13 Trans/Comm	0.005423	0.010555	0.012399	0.012984	0.006036
14 Utilities	0.006699	0.015536	0.009299	0.056268	0.060362
15 Trade	0.067624	0.050878	0.013639	0.001926	0.016097
16 Eat/Drnk/Lodg	0.000000	0.000000	0.000000	0.003993	0.000000
17 F.I.R.E.	0.021372	0.017908	0.007440	0.019367	0.008048
18 Services	0.003828	0.003914	0.009299	0.017960	0.008048
19 Hot/Gam/Rec	0.000000	0.000000	0.000000	0.005628	0.000000
20 Health	0.000000	0.000000	0.000000	0.000000	0.000000
21 Local Gov't	0.013397	0.030005	0.022319	0.016812	0.020121
22 Households	0.307815	0.394450	0.423435	0.312167	0.259557
23 Other F.P.	0.111005	0.166271	0.218227	0.166549	0.261569
24 Imports	0.434769	0.268975	0.258524	0.370345	0.301811
Totals	1.000000	1.000000	1.000000	1.000000	1.000000

Table 9. Direct Requirements Table for Humboldt County, 1987 (Continued)

Sectors	11 Construction	12 Manufacturing	13 Trans/Comm	14 Utilities	15 Trade
1 Livestock	0.000000	0.001018	0.000000	0.000000	0.000000
2 Alfalfa Hay	0.000000	0.000000	0.000000	0.000000	0.000000
3 Other Hay	0.000000	0.000000	0.000000	0.000000	0.000000
4 Alfalfa Seed	0.000000	0.000000	0.000000	0.000000	0.000000
5 Wheat	0.000000	0.000000	0.000000	0.000000	0.000000
6 Barley	0.000000	0.000000	0.000000	0.000000	0.000000
7 Vegetables	0.000000	0.000204	0.000000	0.000000	0.000000
8 Ag. Services	0.000667	0.000000	0.000000	0.000026	0.000042
9 Gold Mining	0.000000	0.001628	0.000000	0.000000	0.000000
10 Other Mining	0.000043	0.017912	0.000000	0.000383	0.000000
11 Construction	0.157278	0.009566	0.021622	0.040349	0.006880
12 Manufacturing	0.015057	0.023204	0.003839	0.003010	0.004741
13 Trans/Comm	0.009854	0.021779	0.041363	0.014385	0.019214
14 Utilities	0.004753	0.024425	0.004935	0.104724	0.022906
15 Trade	0.049967	0.014044	0.004230	0.000638	0.002056
16 Eat/Drnk/Lodg	0.000000	0.000000	0.010654	0.001224	0.007761
17 F.I.R.E.	0.008115	0.004681	0.006424	0.002653	0.019172
18 Services	0.011086	0.009159	0.016686	0.002653	0.018081
19 Hot/Gam/Rec	0.000000	0.000000	0.001488	0.000893	0.004615
20 Health	0.000000	0.000000	0.000000	0.000000	0.000000
21 Local Gov't	0.008202	0.006513	0.004622	0.006198	0.005747
22 Households	0.288544	0.266843	0.401018	0.125434	0.491882
23 Other F.P.	0.111166	0.114390	0.267763	0.313814	0.244200
24 Imports	0.335266	0.484633	0.215354	0.383621	0.152704
Totals	1.000000	1.000000	1.000000	1.000000	1.000000

Table 9. Direct Requirements Table for Humboldt County, 1987 (Continued).

Sectors	16 Eat/Drnk/Lodg	17 F.I.R.E.	18 Services	19 Hot/Gam/Rec	20 Health
1 Livestock	0.000000	0.000000	0.000000	0.000000	0.000000
2 Alfalfa Hay	0.000000	0.000000	0.000000	0.000000	0.000000
3 Other Hay	0.000000	0.000000	0.000000	0.000000	0.000000
4 Alfalfa Seed	0.000000	0.000000	0.000000	0.000000	0.000000
5 Wheat	0.000000	0.000000	0.000000	0.000000	0.000000
6 Barley	0.000000	0.000000	0.000173	0.000000	0.000000
7 Vegetables	0.000000	0.000000	0.000173	0.000165	0.000000
8 Ag. Services	0.000000	0.001732	0.000000	0.001318	0.000000
9 Gold Mining	0.000000	0.000000	0.000000	0.000000	0.000000
10 Other Mining	0.000000	0.000000	0.000000	0.000000	0.000417
11 Construction	0.005693	0.035001	0.019043	0.043488	0.011686
12 Manufacturing	0.005547	0.001276	0.003549	0.005216	0.006678
13 Trans/Comm	0.007591	0.006472	0.018177	0.024215	0.013773
14 Utilities	0.040146	0.007930	0.018610	0.061004	0.016277
15 Trade	0.054307	0.001367	0.006665	0.002141	0.018781
16 Eat/Drnk/Lodg	0.000000	0.005287	0.016273	0.012135	0.000000
17 F.I.R.E.	0.011095	0.030626	0.012551	0.030694	0.021703
18 Services	0.007445	0.007201	0.023284	0.029706	0.018781
19 Hot/Gam/Rec	0.000000	0.004102	0.008483	0.003844	0.000000
20 Health	0.000000	0.000091	0.000433	0.000000	0.012521
21 Local Gov't	0.006277	0.006289	0.005280	0.012574	0.007095
22 Households	0.333723	0.138729	0.396520	0.263343	0.468698
23 Other F.P.	0.127153	0.628202	0.228685	0.209148	0.092237
24 Imports	0.401022	0.125695	0.242102	0.301010	0.311352
Totals	1.000000	1.000000	1.000000	1.000000	1.000000

Table 9. Direct Requirements Table for Humboldt County, 1987. (Continued)

Sectors	21 Local Gov't	22 Households
1 Livestock	0.000000	0.000065
2 Alfalfa Hay	0.000000	0.000058
3 Other Hay	0.000000	0.000045
4 Alfalfa Seed	0.000000	0.000000
5 Wheat	0.000000	0.000000
6 Barley	0.000000	0.000000
7 Vegetables	0.000000	0.001023
8 Ag. Services	0.000000	0.000019
9 Gold Mining	0.000000	0.000000
10 Other Mining	0.000000	0.000006
11 Construction	0.081118	0.003663
12 Manufacturing	0.001909	0.005093
13 Trans/Comm	0.007635	0.021636
14 Utilities	0.020136	0.019630
15 Trade	0.022713	0.086777
16 Eat/Drnk/Lodg	0.000000	0.030367
17 F.I.R.E.	0.008637	0.027474
18 Services	0.011118	0.035046
19 Hot/Gam/Rec	0.000000	0.070099
20 Health	0.000525	0.015028
21 Local Gov't	0.191821	0.025856
22 Households	0.406260	0.001016
23 Other F.P.	0.042945	0.179942
24 Imports	0.205182	0.477157
Totals	1.000000	1.000000

From Table 10, the interdependencies or linkages between and among economic sectors in Humboldt County are derived. For example when the Livestock Sector in Humboldt County increases sales to final demand; i.e., expansion of export sales, the Livestock Sector requires an estimated increase in output from the Trade sector (Sector 15) of \$0.1006. Direct requirements by the Livestock Sector (Table 9) from the Trade Sector to increased output by one dollar is \$0.0372. The indirect and induced effects on the Trade Sector to support an increase of one dollar in sales to final demand by the Livestock Sector is \$0.0634 (\$0.1006 less \$0.0372). In other words, \$0.0634 of business activity was required from the Trade Sector to supply all processing sectors' trade services in response to the direct requirements of the Livestock Sector to produce one dollar of additional output for final demand.

Table 10. Total Requirements Table from Changes in Final Demand, Humboldt County, 1987

Sectors	1 Livestock	2 Alfalfa Hay	3 Other Hay	4 Alfalfa Seed	5 Wheat
1 Livestock	1.284839	0.000056	0.000059	0.000051	0.000046
2 Alfalfa Hay	0.000025	1.000034	0.000031	0.000030	0.000022
3 Other Hay	0.181825	0.000034	1.000032	0.000031	0.000024
4 Alfalfa Seed	0.000000	0.004436	0.000000	1.000000	0.000000
5 Wheat	0.000000	0.000000	0.000000	0.000000	1.031704
6 Barley	0.011827	0.000010	0.000006	0.000006	0.000006
7 Vegetables	0.000463	0.000622	0.000563	0.000553	0.000410
8 Ag. Services	0.012169	0.042345	0.004917	0.130761	0.115216
9 Gold Mining	0.000050	0.000088	0.000028	0.000253	0.000231
10 Other Mining	0.000350	0.000152	0.000232	0.000217	0.000954
11 Construction	0.029738	0.019210	0.019338	0.019646	0.025686
12 Manufacturing	0.016864	0.005424	0.011424	0.005953	0.010445
13 Trans/Comm	0.029378	0.020275	0.024491	0.019083	0.021052
14 Utilities	0.028242	0.047838	0.034807	0.048667	0.050113
15 Trade	0.100598	0.111403	0.102604	0.089977	0.090756
16 Eat/Drnk/Lodg	0.015310	0.020503	0.018355	0.018018	0.013729
17 F.I.R.E.	0.040572	0.045267	0.043250	0.045498	0.042161
18 Services	0.025678	0.056602	0.029106	0.032620	0.033051
19 Hot/Gam/Rec	0.031434	0.042252	0.038252	0.037633	0.027924
20 Health	0.006649	0.008932	0.008130	0.007992	0.005885
21 Local Gov't	0.066222	0.070430	0.093817	0.076853	0.063074
22 Households	0.433612	0.582562	0.529816	0.521216	0.383281
Totals	2.315844	2.078476	1.959256	2.055058	1.915770

Table 10. Total Requirements Table from Change in Final Demand, Humboldt County, 1987 (Continued)

Sectors	6 Barley	7 Vegetables	8 Ag. Services	9 Gold Mining	10 Other Mining
1 Livestock	0.000053	0.000061	0.000067	0.000053	0.000039
2 Alfalfa Hay	0.000025	0.000032	0.000032	0.000024	0.000022
3 Other Hay	0.000027	0.000033	0.000034	0.000026	0.000022
4 Alfalfa Seed	0.000000	0.000000	0.000000	0.000000	0.000000
5 Wheat	0.000000	0.000000	0.000000	0.000000	0.000000
6 Barley	1.007719	0.000006	0.000006	0.000007	0.000005
7 Vegetables	0.000460	1.014164	0.000578	0.000449	0.000397
8 Ag. Services	0.003361	0.011236	1.001380	0.000260	0.000139
9 Gold Mining	0.000027	0.000041	0.001889	1.000024	0.000010
10 Other Mining	0.001878	0.001225	0.000947	0.000857	1.010314
11 Construction	0.019979	0.027229	0.025899	0.020866	0.069011
12 Manufacturing	0.013014	0.012304	0.016478	0.014141	0.006150
13 Trans/Comm	0.020572	0.029422	0.030084	0.027950	0.019794
14 Utilities	0.025085	0.039030	0.030550	0.079133	0.082501
15 Trade	0.109233	0.103900	0.065160	0.042099	0.054430
16 Eat/Drnk/Lodg	0.015197	0.018911	0.018501	0.018642	0.012933
17 F.I.R.E.	0.039032	0.039504	0.027469	0.035630	0.022833
18 Services	0.024154	0.029191	0.033518	0.037284	0.025780
19 Hot/Gam/Rec	0.031327	0.039396	0.038941	0.035847	0.026928
20 Health	0.006607	0.008357	0.008295	0.006403	0.005714
21 Local Gov't	0.033208	0.058382	0.047613	0.036902	0.039913
22 Households	0.432025	0.546035	0.542252	0.418157	0.373161
Totals	1.782982	1.978458	1.889694	1.774756	1.750096

Table 10. Total Requirements Table from Changes in Final Demand, Humboldt County,

Sectors	11 Construction	12 Manufacturing	13 Trans/Comm	14 Utilities	15 Trade
1 Livestock	0.000068	0.001373	0.000055	0.000025	0.000064
2 Alfalfa Hay	0.000027	0.000021	0.000030	0.000012	0.000036
3 Other Hay	0.000031	0.000211	0.000031	0.000013	0.000037
4 Alfalfa Seed	0.000000	0.000000	0.000000	0.000000	0.000000
5 Wheat	0.000000	0.000000	0.000000	0.000000	0.000000
6 Barley	0.000007	0.000017	0.000008	0.000002	0.000009
7 Vegetables	0.000498	0.000601	0.000557	0.000216	0.000657
8 Ag. Services	0.000914	0.000114	0.000143	0.000115	0.000220
9 Gold Mining	0.000038	0.001673	0.000014	0.000010	0.000016
10 Other Mining	0.000470	0.018607	0.000172	0.000547	0.000206
11 Construction	1.198423	0.022743	0.037945	0.058864	0.023287
12 Manufacturing	0.022144	1.027022	0.008480	0.005879	0.009801
13 Trans/Comm	0.027946	0.035304	1.059478	0.023593	0.039349
14 Utilities	0.024803	0.042734	0.024896	1.124856	0.048081
15 Trade	0.102997	0.049655	0.054690	0.022490	1.060135
16 Eat/Drnk/Lodg	0.016377	0.012812	0.028881	0.008400	0.028989
17 F.I.R.E.	0.027766	0.018761	0.025851	0.010914	0.042047
18 Services	0.034799	0.026294	0.040487	0.012729	0.045462
19 Hot/Gam/Rec	0.033690	0.026455	0.039082	0.015537	0.048969
20 Health	0.007114	0.005610	0.007986	0.003094	0.009425
21 Local Gov't	0.029527	0.022588	0.025213	0.016568	0.029914
22 Households	0.465232	0.366972	0.522559	0.202308	0.616686
Total	1.992870	1.679567	1.876559	1.506171	2.003389

Table 10. Total Requirements Table from Changes in Final Demand, Humboldt County, 1987 (Continued)

Sectors	16 Eat/Drnk/Lodg	17 F.I.R.E.	18 Services	19 Hot/Gam/Rec	20 Health
1 Livestock	0.000050	0.000022	0.000054	0.000045	0.000066
2 Alfalfa Hay	0.000026	0.000012	0.000030	0.000023	0.000035
3 Other Hay	0.000027	0.000012	0.000031	0.000024	0.000037
4 Alfalfa Seed	0.000000	0.000000	0.000000	0.000000	0.000000
5 Wheat	0.000000	0.000000	0.000000	0.000000	0.000000
6 Barley	0.000005	0.000003	0.000183	0.000009	0.000009
7 Vegetables	0.000478	0.000218	0.000731	0.000591	0.000643
8 Ag. Services	0.000127	0.001868	0.000165	0.001508	0.000179
9 Gold Mining	0.000016	0.000010	0.000014	0.000019	0.000020
10 Other Mining	0.000205	0.000080	0.000174	0.000218	0.000667
11 Construction	0.019296	0.048552	0.035958	0.066922	0.028669
12 Manufacturing	0.009578	0.003700	0.008210	0.009737	0.011842
13 Trans/Comm	0.023330	0.014018	0.035874	0.039816	0.033677
14 Utilities	0.062134	0.017349	0.040946	0.084397	0.040406
15 Trade	0.096634	0.022974	0.057044	0.042844	0.075786
16 Eat/Drnk/Lodg	1.015731	0.012532	0.034402	0.026380	0.020816
17 F.I.R.E.	0.028595	1.039579	0.032376	0.047169	0.044605
18 Services	0.028161	0.017197	1.047091	0.049111	0.045983
19 Hot/Gam/Rec	0.032532	0.018887	0.045924	1.032479	0.043438
20 Health	0.006870	0.003208	0.008374	0.006028	1.021896
21 Local Gov't	0.024847	0.016094	0.026152	0.031603	0.031225
22 Households	0.449581	0.203454	0.518980	0.393279	0.602899
Total	1.798225	1.419769	1.892714	1.832202	2.002896

Table 10. Total Requirements Table from Changes in Final Demand Humboldt County, 1987 (Continued)

Sectors	21 Local Gov't	22 Households
1 Livestock	0.000068	0.000108
2 Alfalfa Hay	0.000039	0.000068
3 Other Hay	0.000040	0.000068
4 Alfalfa Seed	0.000000	0.000000
5 Wheat	0.000000	0.000000
6 Barley	0.000008	0.000009
7 Vegetables	0.000713	0.001232
8 Ag. Services	0.000245	0.000239
9 Gold Mining	0.000016	0.000014
10 Other Mining	0.000207	0.000182
11 Construction	0.134071	0.020325
12 Manufacturing	0.009468	0.008270
13 Trans/Comm	0.032162	0.033631
14 Utilities	0.052516	0.038866
15 Trade	0.096030	0.106674
16 Eat/Drnk/Lodg	0.023018	0.038644
17 F.I.R.E.	0.036315	0.040189
18 Services	0.044647	0.048731
19 Hot/Gam/Rec	0.048253	0.083182
20 Health	0.010899	0.017786
21 Local Gov't	1.263153	0.041263
22 Households	0.670509	1.165602
Totals	2.422376	1.645084

### **Multipliers: Final Demand, Employment, and Household Income**

The total of interindustry (direct, indirect, and induced) effects per one dollar change in sales to final demand for all 22 sectors are shown in Table 11 (column 1). This is called final demand multiplier. The final demand multiplier for the Livestock Sector (Sector 1) is 2.3158. The multiplier indicates if sales by the Livestock Sector to final demand increase by one dollar, total Humboldt County economy would increase by \$2.3158. Using the final demand coefficient matrix in Table 10, the individual sectoral impacts can be derived from changes in sales to final demand. Final demand multipliers values range from 1.4198 for the Finance, Insurance, and Real Estate Sector to 2.4224 for the Local Government Sector. The large multiplier for the Local Government Sector is indicative of this sector's purchases of local products. As for sectors with lower multipliers, these results may indicate local economic development initiatives to strengthen economic linkages of these sectors with others in the local economy.

**Table 11. Multipliers for Final Demand, Employment, and Household Income for Humboldt County, 1987.**

Sector	-----Multipliers-----		
	Final Demand	Employment	Household Income
Livestock	2.3158	2.9086	2.5526
Alfalfa Hay	2.0785	3.0343	1.4320
Other Hay	1.9593	2.6001	1.4019
Alfalfa Seed	2.0551	3.4735	1.5817
Wheat	1.9158	3.1745	1.9312
Barley	1.7830	2.2899	1.4035
Vegetables	1.9785	2.5765	1.3843
Ag. Services	1.8897	1.1777	1.2806
Gold Mining	1.7748	3.2132	1.3395
Other Mining	1.7501	3.0086	1.4377
Construction	1.9929	3.0595	1.6123
Manufacturing	1.6796	1.8588	1.3752
Transportation and Communication	1.8766	2.2604	1.3031
Utilities	1.5062	2.2164	1.6129
Trade	2.0034	1.4255	1.2537
Eating, Drinking, & Lodging	1.7982	1.5547	1.3472
Finance, Insurance, and Real Estate	1.4198	1.4495	1.4666
Services	1.8927	1.2663	1.3088
Hotel, Gaming and Recreation	1.8322	1.4007	1.4934
Health	1.0029	1.3001	1.2863
Local Government	2.4224	1.8434	1.6504

Also from Table 11 area employment and household income multipliers. Employment multipliers indicate the numbers of jobs increased in Humboldt County when a given sector increases employment by one employee. Therefore for the Livestock Sector, the employment multiplier is 2.9086. This means when the Livestock Sector increases employment by one employee, total employment in Humboldt County increases by 2.9086 employees. Employment multipliers range from 1.1777 for the Agricultural Services Sector to 3.4736 for the Alfalfa Seed Sector.

Household income multipliers indicate the amount that household income in Humboldt County increases when a given sector increases income by \$1. For example, household income in Humboldt County will increase by \$2.5526 when the Livestock Sector increases household income by \$1.00. Household income multipliers range from 1.2537 for the Trade Sector to 2.5526 for the Livestock Sector.

## **IMPACT ANALYSIS**

What will be the economic impact of a proposed project or development? What will be the total regional impact on income and employment resulting from the establishment of a new plant? What type of industry, if established, will create the most economic activity? These are questions which are difficult to answer, but leaders in business and government require such information for purposes of evaluating how various projects and program will effect the economic activity in a region.

Community leaders are asking for information on the different abilities of various industries to generate new jobs. Decision makers need to know how the available resources in a region can best be used for further development and economic growth.

These are similar types of questions constantly facing Nevada businessmen and government leaders. Before expanding their facilities, businessmen attempt to evaluate the demand for increased production of goods and services. Others in the region are interested in the impact that new or expanded industries will have on businesses. Those who finance a new plant in an area want to know the impact the new facility will have on the economic activity of Humboldt County.

Information is also needed to measure declines in economic activity as well as increases. For example, what will be the effect on the economy if a plant or department of defense base were to close its doors? What will be the total regional impact on income and employment resulting from lower levels of production activities by the agricultural or mining sector from changes in public land management policies? Employment and income would directly decline by the size of the employed labor force or payroll or payroll of the closed plant or effected industry. Other businesses in the region however would also feel the effects as lesser amounts of their goods and

services would be demanded. Input-output analysis can be used to estimate the regional impacts of increased or decreased economic activity in a regional economy. (Additional key items to be considered when a county anticipates economic change are shown in Appendix C).

Input-Output analysis is a technique which derives the economic linkages between and among local economic sectors for household income, employment, and industry output. For this technique, a model of the local economic sectors is developed showing the relationship between input and output of various sectors. The model numerically derives the linkages between various economic sectors. The model solution shows impacts on local economic activity, employment and/or income from a given sector's change in sales or level of production. From these impact estimates, the community gains an understanding of potential overall impacts to a local economy from alternative economic development and governmental policies. A Humboldt County input-output model was developed with twenty-three economic sectors. The model can be used to estimate the economic linkages within Humboldt County and to derive impacts to the Humboldt County economy from various policies. From the solution of the model, input-output multipliers that calculate sectoral linkages can also be derived.

The following examples illustrate how the input-output analysis is used in estimating economic impacts. Analyzed are scenarios involving increases in export sales of livestock commodities and mined gold metals from Humboldt County. Economic impacts are estimated for economic activity, employment, and household income.

Suppose that exports of commodities from the livestock sector and gold metals sector from the mining sector were to increase by ten percent above their 1987 level. These increased levels of export; for example, maybe a consequence of a local economic development efforts. This would mean that export sales would increase by \$1,262,900 from the Livestock Sector and likewise from the Gold Mining Sector would increase by \$12,721,900. Shown in Table 12 are the estimated overall Humboldt County impacts on economic activity, employment, and household income.

**Table 12. Economic Impacts from a Ten Percent Increase in Export Sales by the Livestock Sector and Gold Mining Sector, Humboldt County.**

Impacts From Export Growth	Economic Activity (\$1,000)	Employment (Jobs)	Household Income (\$1,000)
Livestock Sector	1,922	43	547
Gold Metals Sector	22,578	242	5,320
Total	24,500	285	5,867

Humboldt County is estimated to realize an increase in economic activity of \$1,922,000 with corresponding increases in employment and household income of 43 jobs and \$547,000 from a ten percent increase in export sales by the Livestock Sector. Likewise the county is estimated to realize from a ten percent increase in export sales by the Gold Mining Sector an increase in economic activity of \$22,578,000 with corresponding increases in employment and household income of 242 jobs and \$5,320,000, respectively. Humboldt County is estimated to realize an increase in economic activity of \$25,500,000, an increase in household income of \$5,867,000 from a ten percent increase in export sales by both the Livestock Sector and the Gold Mining Sector.

### **Livestock Sector Impacts**

Input-output models not only estimate overall impacts to a regional economy from changes in economic activity for a specific economic sector, interindustry analysis also derives sectoral impacts. The distributional impacts provide information as to linkages between basic economic sector and non-basic sectors in a local economy. Table 13 presents the economic impact of a ten percent increase in export sales by the Livestock Sector in Humboldt County. The estimated ten percent increase in export sales by the Livestock Sector was estimate to be a little over \$1.2 million. This \$1.2 million created an additional \$1.7 million in economic activity through indirect and induced effects resulting in over \$2.9 million of total economic activity in Humboldt County. Included in the total economic activity was approximately \$547 thousand of personal income and 43 jobs.

**Table 13. Sectoral Impacts from a Ten Percent Increase in Export Sales by the Livestock Sector, Humboldt County.**

Sector	Direct	Indirect and	Total	Employment	Income
	Impact	Induced	Impact	Total	Impact
	(\$1,000)	(\$1,000)	(Jobs)	(Jobs)	(\$1,000)
Livestock	1,263	358	1621	19	275
Alfalfa Hay	0	0	0	0	0
Other Hay	0	229	229	3	87
Alfalfa Seed	0	0	0	0	0
Wheat	0	0	0	0	0
Barley	0	15	15	0	5
Vegetables	0	1	1	0	0
Ag. Services	0	15	15	1	7
Gold Mining	0	0	0	0	0
Other Mining	0	0	0	0	0
Construction	0	38	38	0	11
Manufacturing	0	21	21	0	6
Transportation & Communication	0	37	37	0	15
Utilities	0	36	36	0	4
Trade	0	127	127	5	62
Eating, Drinking, and Lodging	0	19	19	0	6
Finance, Insurance, and Real Estate	0	51	51	1	7
Services	0	32	32	2	13
Hotel, Gaming, and Recreation	0	40	40	1	10
Health	0	8	8	1	4
Local Government	0	84	84	3	34
Households	0	547	547	5	1
<b>TOTAL</b>	<b>1,263</b>	<b>1658</b>	<b>2,921</b>	<b>41</b>	<b>\$547</b>

**Livestock Distributional Impacts**

Table 14 summarizes the distribution of total economic impacts from the Livestock Sector across major sectors in the Humboldt County economy. As expected the Livestock Sector represents a significant portion of total economic activity, personal income, and employment associated with the ten percent increase in export sales by the Livestock Sector. From Table 14, the Livestock Sector represents approximately 55.5% of total economic activity created by the

Livestock Sector's ten percent increase in export sales. Personal income and employment from the Livestock Sector contribute approximately 50.3% and 44.2%, respectively.

When the Livestock Sector expands output to meet expanding export demand, other sectors in the Humboldt County economy will be impacted. For example, the Trade Sector has over 4% of total economic activity created by expanding export sales by the Livestock Sector while personal income and employment from the Trade Sector account for 11.3% and 11.6%, respectively, of total activity.

**Table 14. Major Sector Contributions From a Ten Percent Increase in Export Sales by the Livestock Sector, Humboldt County.**

Sector	Percent of Economic Activity	Percent of Employment	Percent of Household Income
Livestock	55.5	44.2	50.3
Other Hay	7.8	7.0	15.9
Trade	4.4	11.6	11.3
Hotel, Gaming and Recreation	1.4	2.3	1.8
Other Services	1.1	4.7	2.4
Local Government	2.9	7.0	6.2
Households	18.7	11.6	0.0
Other Sectors	8.3	11.6	12.1
<b>TOTAL</b>	<b>100</b>	<b>100</b>	<b>100</b>

Table 14 indicates that the Livestock Sector provides substantial amounts of relatively good paying jobs. A little over 50% of total household income is created through Livestock Sector export sales which goes directly to employees in the Livestock Sector that provide only 44.2% of total jobs. Even though the majority of the employment impacts are created through supporting sectors in the economy, this employment is compensated at lower salaries and wage rates.

### **Gold Mining Sector Impacts**

Table 15 presents the sectoral economic impacts of a ten percent increase in export sales by the gold Mining Sector in Humboldt County. The estimated ten percent increase in export sales by the Gold Mining Sector was estimated to be a little over \$12.7 million . This \$12.7 million created an additional \$9.9 million in economic activity through indirect and induced effects resulting in \$22.6 million of total economic activity in Humboldt County. Included in total economic activity was approximately \$5.3 million of personal income and 242 jobs.

**Table 15. Sectoral Impacts From a Ten Percent Increase in Export Sales by the Gold Mining Sector, Humboldt County.**

Sector	Direct Impact (\$1,000)	Indirect and Induced Impact (\$1,000)	Total Impact (\$1,000)	Employment Total (\$1,000)	Income Impact (\$1,000)
Livestock	0	1	1	0	0
Alfalfa Hay	0	0	0	0	0
Other Hay	0	0	0	0	0
Alfalfa Seed	0	0	0	0	0
Wheat	0	0	0	0	0
Barley	0	0	0	0	0
Vegetables	0	6	6	0	2
Ag. Services	0	3	3	0	1
Gold Mining	\$12,722	0	12,722	75	3,971
Other Mining	0	11	11	0	3
Construction	0	265	265	2	77
Manufacturing	0	180	180	2	48
Transportation & Communication	0	356	356	4	143
Utilities	0	1,007	1,007	6	126
Trade	0	536	536	21	263
Eating, Drinking, and Lodging	0	237	237	6	79
Finance, Insurance, and Real Estate	0	453	453	7	63
Services	0	474	474	28	188
Hotel, Gaming, and Recreation	0	456	456	16	120
Health	0	81	81	5	38
Local Government	0	469	469	15	191
Households	0	5,320	5,320	53	5
<b>TOTAL</b>	<b>\$12,722.</b>	<b>9,855</b>	<b>22,577</b>	<b>240</b>	<b>5,318</b>

Table 16 summarizes the distribution of total economic impacts from the increase in export sales by the Gold Mining Sector across major sectors in the Humboldt County economy. As expected the Gold Mining Sector represents a significant portion of total economic activity, personal income, and employment associated with the ten percent increase in Gold Mining Sector's export sales. From Table 16, the gold Mining Sector represents approximately 56.3% of total

economic activity generated by its ten percent increase in export sales. Personal income and employment from the Gold Mining Sector contribute approximately 74.6% and 31.0%, respectively.

**Table 16. Major Sector Contributions From a Ten Percent Increase in Export Sales by the Gold Mining Sector, Humboldt County.**

Sector	Percent of Economic Activity	Percent of Employment	Percent of Household Income
Gold Mining	56.3	31.0	74.6
Trade	2.4	8.7	4.9
Hotel, Gaming, and Recreation	2.0	6.6	2.3
Other Services	2.1	11.6	3.5
Local Government	2.1	6.2	3.6
Household	23.6	21.9	0.0
Other Sectors	11.5	14.0	11.1
TOTAL	100.0	100.0	100.0

However, in order for the Gold Mining Sector to meet expanding export demand, this sector is dependent upon other major sectors in the Humboldt County economy. For example, the Trade Sector has over 2% of the total economic activity created by expanding export sales by the Gold Mining Sector while personal income and employment from the Trade Sector account for 4.9% and 8.7%, respectively, of total activity.

Table 16 indicates that the gold Mining Sector provides substantial amounts of relatively high paying jobs. Approximately 75% of total household income is created through the Gold Mining Sector export sales which goes directly to employees in the Gold Mining Sector that provide only 31% of total jobs. Even though larger levels of employment are created through supporting sectors in the economy, this employment is compensated at lower salaries and wage rates. In 1990, average annual wages for the mining industry in Humboldt County was approximately \$33,000. Other major sectors had average annual-wages ranging from approximately \$11,000 to \$23,000.

## Summary

During the 1980's Humboldt County experienced both economic and population growth. Total county real personal income increased by 41 percent and population grew from 9,700 to 13,100. Given the past increase in the local economy but future uncertainties as to mineral prices and public lands management policies, interest in estimating the economic linkage between economic sectors in Humboldt County is of interest.

The major export economic sectors in Humboldt County are the mining and agricultural sectors. The mining sector, from shift-share analysis provide the major impetus for employment growth in Humboldt County from 1980 to 1990. This is of interest because nationally the mining sector was losing employment during this ten year period while the mining sector in Humboldt County realized rapid employment expansion during the period. The agricultural sector from the location quotients procedures is the second ranking export sector to the mining sector and from the shift-share analysis the local agricultural industry has a positive competitive advantage.

An interindustry model for Humboldt County was developed to show the interdependencies among county economic sectors. With these interrelationships derived, regional output, employment, and income effects were estimated for changes in economic sectoral sales to final demand and for changes in sectoral levels of production.

Employment and household income multipliers are estimated for each sector of the Humboldt County economy. The individual sectoral multipliers are presented in this report. Both public and private sector decision makers can readily use these multipliers to estimate the economy wide employment impacts of changes in sectoral final demand sales or changes in production caused by changes in the product market export sales, natural resource supplies, or governmental policies.

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**APPENDIX A:  
LISTING OF ECONOMIC  
SECTORS**

Table A.1. Sectors and Sector Definitions for the Humboldt County Interindustry Model.

SECTOR	TYPE OF ACTIVITIES
1. Livestock	Ranches engaged in production and sale of cattle, horses, sheep or other livestock
2. Alfalfa Hay	Farm enterprises that mainly produce alfalfa hay.
3. Other Hay	Farm enterprises that mainly produce other types of hay.
4. Alfalfa Seed	Farm enterprises that mainly produce alfalfa seed crop.
5. Wheat	Farm enterprises that mainly produce wheat crop.
6. Barley	Farm enterprises that mainly produce barley crop.
7. Vegetables	Farm enterprises that mainly produce vegetable crops.
8. Agricultural Services	Businesses primarily engaged in agricultural services.
9. Gold Mining	The extraction and processing of gold minerals.
10. Other Mining	The extraction and processing of metal and non-metal minerals not classified under gold mining.
11. Construction	Businesses engaged in any type of heavy or general building construction including new construction, additions, alterations, and repairs.
12. Manufacturing	Businesses engaged in the machining and mechanical assembly or chemical transformation of materials or substances.
13. Transportation and Communications	Businesses furnishing local or long distance trucking, the associated warehousing services, and air and road transporting firms serving the area. Also businesses furnishing telephone, radio, and television services.
14. Utilities	Gas and electric power companies.
15. Trade	All wholesale and retail businesses not elsewhere classified.
16. Eating, Drinking, and Lodging	Restaurants, bars, motels, and hotels.
17. Finance, Insurance and Real Estate	Finance, insurance, and real estate firms.
18. Services	Repair services, social services, professional services, and other services not elsewhere classified.
19. Hotel, Gaming, and Recreation	Gaming establishments, including restaurants, bars, and lodging accommodations which are part of the establishments. Also includes recreation and amusement enterprises.
20. Health	Physicians, dentists, clinics, and hospitals.
21. Local Government	City and county government including special districts.
22. Household (row) Household (column)	Labor payments, transfer payments, interests and dividends. Expenditures by individuals and families for personal (non-business)uses.
23. Import (row) Export (column)	All purchases of goods and services from outside Humboldt County. Goods and services provided to places outside the Humboldt County.
24. Other Final Payments (row) Other Final Demand (column)	State and federal taxes, depreciation, retained earnings and savings. State and federal government consumption, inventory change, and new capital investments.

**APPENDIX B:  
SOURCES OF DATA FOR HUMBOLDT COUNTY  
INPUT-OUTPUT MODEL**

## Sources

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**APPENDIX C:  
PRIVATE SECTOR, LOCAL GOVERNMENT, AND NON-MARKET  
IMPACTS FROM ECONOMIC CHANGES**

Table C.1. Impacts of Economic Change on the Private Sector - Important Consideration

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1. How many workers will be hired by the new business activity? What is the dollar value of the anticipated payroll? What will be the value of production or sales from the new business activity?
  2. What is the "multiplier" effect and how can it be appraised in a community?
  3. When will the new workers be hired? When will the payroll be generated? And when will the new purchases and sales be made in the local economy?
  4. Is the new economy activity associated with construction or operation of the business?
  5. Will the new economic activity stimulate construction in related businesses, housing, and service and trade sectors of the economy?
  6. Do the changes in employment, income, and sales represent net or gross additions to the community's economic base?
  7. How does the new economic activity compliment the local economic situation?
  8. What will be the incidence of the impacts? More specifically which people and businesses are likely to benefit, and which people and businesses are likely to bear the costs of the economic development.

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Source: Gordon, John. "Considering Economic Change in the Community's Private Sector", in How Extension Can Help Communities Conduct Impact Analysis, University of Wisconsin Extension, 1982.

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Table C. 2. Impacts of Economic Change on the Local Government Sector-Important Considerations.

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1. Within what governmental jurisdictions will new families live?
2. How many in-migrant families are expected, and what is their anticipated income level?
3. How many school-age children are expected?
4. Do the public services and schools have excess capacity, or would expansions be required to maintain the quality of service at predevelopment levels?
5. Are there migration fees to cover additional public service costs?
6. Will state and federal aid increase as population grows?
7. When will the project be completed?
8. Does the expenditure estimation procedure used include only the additional costs associated with the new growth?
9. Will new revenues be divided among more than one governmental unit, such as city, county, and school district? If so, how much additional revenue will each receive?
10. When will the public Expenditures for the project begin and when will the community begin receiving project-generated revenues? How will these change over time?
11. Will projected demands for service require a change in tax rates or a change in the level of service?
12. Who benefits and who loses from the development?
13. Will tax abatements or other publicly supported inducements be used to encourage this growth?
14. Is the project capital-or labor-intensive?
15. What is the probability that the firm will remain in the area and operate successfully over a five, 10, or 20 year period?
16. What are the income and employment multiplier effects of the new industry?
17. How will this development and associated population growth affect state aid to education and local property tax revenues in your state?

Source: Morse, George and George McDowell, "Estimating the Impacts of Growth on Local Governments", in How Extension Can Help Communities Conduct Impact Analysis, University of Wisconsin-Extension, 1982.

Table C.3. Nonmarket Impacts of Economic Change-Important Considerations

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- I. Distribution: Who Will Be Affected?
    - A. Will effects vary among geographic sectors of the community?
    - B. What income groups will be affected and in what ways?
    - C. Will all or just certain economic sectors of the community have to make adjustments?
    - D. Will the impacts vary over time?
  
  - II. Employment-Related Impacts.
    - A. Will the new jobs be satisfying to workers?
    - B. Effects on commuting time and distance. How far must local residents travel to their new jobs?
    - C. Will the jobs be permanent or will they be highly sensitive to managerial decision and economic trends?
    - D. Will the workers perceive the new jobs as an improvement over previous conditions?
  
  - III. Population-Related Impacts.
    - A. Demographic.
      - 1. How much in-migration will occur?
      - 2. Will the newcomers and their families match or be different from the prevalent age and family structure of the community?
      - 3. What value changes might occur?
      - 4. Can the newcomers easily be integrated into the community social structure or will adjustments be needed?
    - B. Housing.
      - 1. How will the value of housing change?
      - 2. How will the quality of housing change?
      - 3. What changes in housing ownership will occur?
      - 4. What type of new housing will be needed?
  
  - IV. Community Ecology.
    - A. How will communication networks be affected?
    - B. How will religious organizations be affected?
    - C. How will participation in community affairs be affected?
    - D. What different internal-external linkages will appear?
    - E. Will satisfaction with the community change?
  
  - V. Political and Local Government.
    - A. Political
      - 1. What leadership changes will occur?
      - 2. Will voter participation change?
    - B. How will public recreation facilities and use be altered?
    - C. Will physical safety of workers and residents change?
    - D. What short-and long-term health effect could occur?
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Source: Shaffer, Ron. "Nonmarket Impacts From Economic Development", in How Extension Can Help Communities Conduct Impact Analysis, University of Wisconsin-Extension, 1982.99

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