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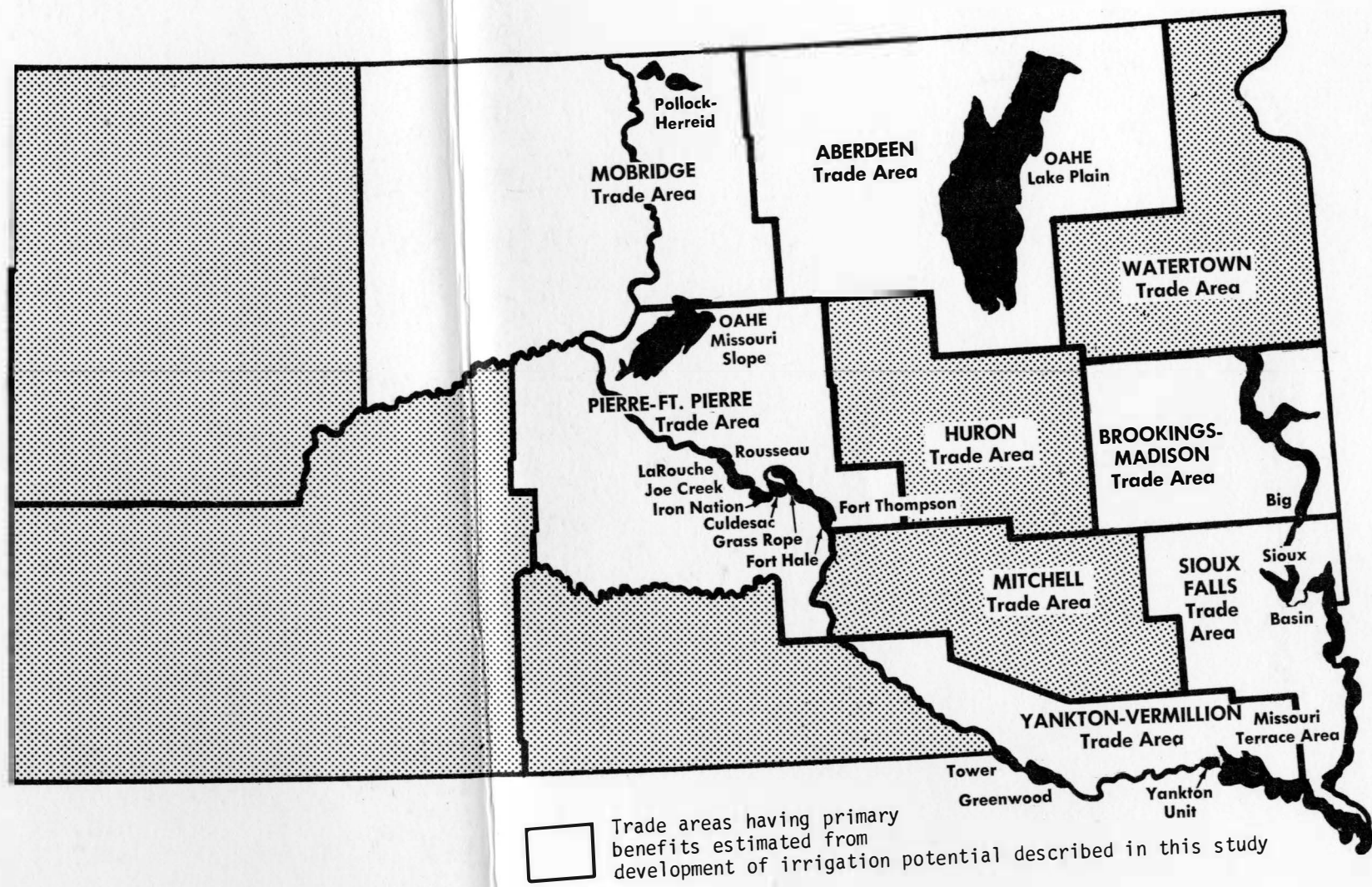
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Impact of Irrigation Development on Income and Trade

Eastern and Central South Dakota

*Location of
irrigable lands,
by trade area,
reported feasible
development using surface
water supplies in
Eastern and
Central South Dakota.
(Figure 1).*



**Economics Department
Agricultural Experiment Station
South Dakota State University
and the Water Resources Institute**

Impact of Irrigation Development on Income and Trade Eastern and Central South Dakota

by
THORMOD CHRISTENSEN
and
ARTHUR J. MATSON

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**Economics Department
Agricultural Experiment Station
South Dakota State University, Brookings
and the South Dakota Water Resources Institute**

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Impact of Irrigation Development on Income and Trade Eastern and Central South Dakota

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Potential Gains in Income and Trade from Irrigation Development in Eastern South Dakota

Irrigation in South Dakota would have effects on communities of the state in addition to the direct effects on individual farms. One result of the development of feasible irrigation potential appears to be higher total incomes in an area. Development may also serve to expand sales volume of business firms and to improve the well-being of consumers.

If farmers adopt profitable irrigation practices, they receive primary benefits from economically feasible development. Additional off-farm benefits are induced by increased farm purchases of equipment, materials and services. These are some of the secondary benefits to a regional economy. Others arise from the change in spending that comes with higher incomes. Among the most likely to prosper from increased expenditures are firms in retail trade and services.

This investigation has been concerned with impacts from the adoption of irrigation on farm expendi-

tures, area personal incomes, and the volume of retail and service trade. Other effects were not estimated in this analysis. They include, however, benefits for the processing and handling industries stemming from increased farm production. Also any effects from development of irrigation potential other than that investigated by the feasibility studies cited in this report were not considered in the measure of impacts on an area economy. The study has sought to estimate a significant share, but not all, of the impacts on communities in regions having potential for irrigation which, it is assumed, could be developed according to proposed plans.

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Sectors of the Area Economy

The industries in a community can be grouped into sectors according to the type of market for their goods and services. Sales made outside a geographic region are considered exports. Employment in these industries is "basic" to the local economy. Industries which serve the local market are "non-basic." Total employment and incomes rise and fall with the basic industries.

The export or basic industries depend on outside markets rather than on the residents of the area because the local market is so small it does not affect the total market. The community, though, receives income from export sales outside the area and the investment expenditures made locally by the basic economic sector.

Local consumption expenditures, on the other hand, are related to income originating in other sectors. The level of income largely determines the amount a family spends on consumer goods. The higher income, the higher the spending. Some of the goods and services are purchased locally. The rest of the income is spent outside the community, is saved, or is paid in non-local taxes.

Procedures presented here have accumulated the changes in farm expenditures reported from an assumed level of development of irrigation potential. The effects on area personal income were estimated together with the changes in local spending resulting in impacts on receipts for retail trade and service industries in the area.

Irrigation Potential

in Eastern South Dakota

Development of about 650,000 acres for irrigation would be profitable to farmers in eastern and central South Dakota who adopt irrigation practices, according to previous investigations considered here which have assumed sources of water to be from surface supplies. Acreages are distributed among four projects in table 1.

Table 1. Irrigable acreages by project

Project	Acres
Oahe Unit	495,000
South Dakota Pumping Division	51,580
Big Sioux Basin	59,080
Missouri Terrace	45,000
Total	650,660

Two areas authorized by the Flood Control Act of 1944 are the Oahe Unit and the South Dakota Pumping Division of the Missouri River Basin Project. The Missouri Terrace Area in extreme southeastern South Dakota and the Big Sioux Basin have also been investigated. Irrigable acreages from each project are distributed by county according to appendix tables A-1 to A-4.

The *Oahe Unit* comprises 495,000 acres suitable for irrigation. It includes two sub-areas: the *Lake Plain* in four counties which include the cities of Aberdeen and Redfield; and the *Missouri Slope*, in two counties between the trade centers of Pierre and Mobridge.

Eleven units of the *South Dakota Pumping Division* along both sides of the Missouri River include 51,580

irrigable acres in three regions across the central part of the state.

Irrigation potential in the *Big Sioux Basin* and the *Missouri Terrace Area* has been described.¹ The acreage determined to be feasible for development from stream sources is not certain. A total of 59,080 acres is assumed in five Sioux Basin counties. The Missouri Terrace Area between Yankton and Sioux City has an estimated 45,000 irrigable acres located in three counties.

The reports on the feasibility of irrigation for the above resource areas are summarized in appendix tables A-5 to A-12. The items of income and expenditure for each area are presented with the changes associated with irrigation.

Several assumptions were necessary in the attempt to arrive at numerical values that are comparable and additive, yet realistic for the area they represent. The costs assumed are for development by federal standards from surface water supplies. The Pollock-Herreid Unit is assumed to use sprinkler irrigation; the others, flood systems. The acreage of soils designated as irrigable land was taken to be near 40% of the identified arable lands in the Big Sioux Basin and about 70% in the Missouri Terrace Area.

The irrigable acres from the reports on the four projects are distributed by county in table 2. Brown County has 37% and Spink County 25% of the 650,660-acre total, reflecting the magnitude of the Oahe Project.

Counties are grouped in table 3 into trade areas bearing names of cities within the areas which repre-

Table 2. Irrigable acreages by county

County	Acres
Brookings	31,220
Brown	243,000
Buffalo	7,480
Campbell	15,000
Charles Mix	6,910
Clay	17,800
Day	3,000
Hughes	12,079
Lincoln	4,200
Lyman	7,217
Marshall	34,000
Minnehaha	6,720
Moody	10,150
Potter	2,500
Spink	165,000
Stanley	1,789
Sully	47,500
Yankton	11,805
Union	<u>23,290</u>
Total	650,660

Table 3. Counties with irrigable acres reported by trade area

Trade Area	Counties
Sioux Falls	Lincoln, Minnehaha, Union
Brookings-Madison	Brookings, Moody
Aberdeen	Brown, Day, Marshall, Spink
Yankton-Vermillion	Charles Mix, Clay, Yankton
Pierre-Ft. Pierre	Buffalo, Hughes, Lyman, Stanley, Sully
Mobridge	Campbell, Potter

¹For further reference, see: U. S. Department of the Interior, Bureau of Reclamation, Missouri-Oahe Projects Office. Report on Big Sioux and Missouri Terrace Area, Huron, South Dakota, January 1968.

sent shopping centers. Each area includes additional counties, but the 19 listed are those having irrigable land from table 2.

The irrigable acreages from the counties are added by trade area in table 4. The Aberdeen area includes the Lake Plain sub-unit of the Oahe Unit, so comprises 68% of the total. The grouping of counties by trade area is necessarily arbitrary, and does not coincide strictly with reality. Counties are not wholly or predominantly within a definite trade area, but data available by county totals cannot readily be organized according to area lines which would divide counties.

Table 4. Irrigable acreages by trade area

Trade Area	Acres
Sioux Falls	34,210
Brookings-Madison ..	41,370
Aberdeen	445,000
Yankton-Vermillion ..	36,515
Pierre-Ft. Pierre	76,065
Mobridge	17,500
Total	650,660

Trade area outlines from a past study were accepted in this report. For convenience, trade areas were designated by the names of major cities within their boundaries. The impacts described from analysis of data would accrue to an entire respective trade area and not entirely to the city by which the area is named. No analysis of the concentration of business activity within a trade area was conducted in this study.

Trade Areas in South Dakota

People who make purchases in a trade center are said to live in the

trade area of that center. Trade areas are difficult to outline because residents patronize several trade centers depending on the kinds of businesses and services available.

Antonides delineated major trade areas of South Dakota by county groupings.² Trade is not actually divided by county lines, but county groupings permit use of available data. Each trade area provides its inhabitants with a relatively complete set of functions and has a growing center of economic activity and social services. The trade areas of South Dakota are shown in figure 1 (see front cover).

Effects of Irrigation on Business

Trends have been toward larger retail and service enterprises in areas having steady economic growth. Rural areas have experienced population decline and changes in the age structure of people who remain after substitution of farm mechanization for labor. In some communities this results in business volume decline and reduction in number of firms. These changes have come when the ability to provide goods and services of high quality at reasonable prices, along with reasonable wages and profits, is thought to require increasing volume of business per establishment in retail trade and service industries.

Water resource development may stimulate economic activity

²Robert J. Antonides, Some Guidelines for Organizing Economic Development Efforts in South Dakota Along Trade Area Lines, Extension Circular 651, Cooperative Extension Service, South Dakota State University, Brookings, 1966.

and cause increase in the number of farm and business firms in an area. Greater sales per existing retail firm, without change in the number of establishments, however, would reduce the social cost that otherwise might be experienced with decline in business activity. Opportunities may appear which would retain or attract young people.

Irrigation has already been profitable for some farmers. Additional acreage could be placed under irrigation. The effects, not only on farm income, but on total area personal income have been estimated by trade areas where irrigation potential exists. Further effects on the volume of business and the number of firms in retail trade and service industries have also been accounted for in the procedure. The impacts on employment and consumers in a trade community can also be evaluated.

Estimating Irrigation Benefits for the State and Local Areas

Some areas largely dependent on agriculture could benefit from adoption of profitable farm irrigation practices. Farms would be made more productive. In addition to having a larger farm trade, the non-farm businesses could benefit from increased area personal incomes,³ and consumers could receive advantages from living in areas served by prosperous and growing business establishments.

This study had the two objectives: (1) to estimate the impacts on area personal incomes resulting from the increased farm expenditures associated with the adoption of irrigation practices, and (2) to estimate the impacts on retail and

service trade resulting from increased area personal incomes.

The procedures followed were: (1) to add together the changes in farm accounts reported in irrigation feasibility reports by trade areas of South Dakota, (2) to calculate changes in the total area personal income that would result from feasible irrigation development, and, (3) to calculate the effects on retail and service trade estimated to result from the gain in area personal incomes.

As part of the procedures, it was necessary to establish the relationships that have existed (1) between business receipts and incomes of persons working in those businesses, and (2) between personal incomes and expenditures made with retail and service establishments in the state and local areas. Statistical analysis was used to get the values of these relationships.

The items of farm expenditure from farm budgets were classified as receipts for retail trade and service trade. Appendix table B-1 illustrates the kinds of business in the major retail groups. Appendix table B-2 lists major groups of selected service trade by kind of business. For instance, building materials dealers are in retail business and repair services are classified under service trade. The effects of consumer expenditures made from increased area personal incomes would also accrue to retail and service trade according to the same groupings of businesses.

³Personal income represents receipts of families and individuals from which they pay certain taxes, as the federal income tax, and then are free to spend over a range of choices.

Sources of data are reports from the Bureau of Reclamation, the Bureau of the Census, the Office of Business Economics, and the Internal Revenue Service. Personnel from state and federal agencies and from South Dakota State University and also officials in business and banking supplied detailed information.

Economic Justification of Development Programs

The values of the increase in output of goods and services which result directly from the expenditures for resource development are *primary benefits*. An example is the rise in farm income resulting from investment in an irrigation project. Other benefits which can be expressed in monetary terms are *secondary benefits*. Examples are the added incomes of handlers and processors stemming from larger volume or a different composition of output.

The secondary benefits estimated in this study were the income changes induced by the changes in expenditures made by farmers as they would adjust to practices associated with the adoption of a feasible level of irrigation. Additions to incomes for area residents would result in more trade for retail stores and service establishments. The procedures in this study estimated the effects on retail trade and service business in six designated trade areas in eastern and central South Dakota.

The economic circumstances in an area or a state are considerations in calculating the difference in conditions with and without water resource development.

Further benefits are the savings from reduced production and marketing costs and the improved efficiencies resulting from reduced costs to retail and service firms.

Retail Trade and Selected Services⁴

Trends have been toward larger establishments in retail trade and service industries in the state as well as the nation and the West North Central Region.⁵

Retail Trade

Average sales per retail establishment in South Dakota were more than six times larger in 1963 than in 1939, in dollars unadjusted for price changes. Business volume rose from \$17,228 to \$114,345 as seen in appendix table B-3. The state has had slightly less gain than the region and the nation and has generally had lower average sales as the index numbers in appendix table B-4 reveal.

Trade areas with the largest total sales generally have the largest sales per establishment. The number of establishments for trade areas in eastern and central South Dakota appear in appendix table B-5.⁶

⁴The major groups of retail trade by kind of business are listed in appendix table B-1, and B-2 for selected service trade.

⁵The West North Central Region by census grouping included states of Iowa, Kansas, Minnesota, Missouri, Nebraska, North and South Dakota.

⁶Statistics from the 1944 Census of Business are not presented in this report because the relationship between personal income and receipts of retail and service firms was disrupted by the shortage of goods and services during World War II.

Retail volume per outlet is associated with monetary returns to people working in retail trade. Employees in South Dakota retailing in 1963 earned 4% less than did retailing employees in the seven-state region and about 9% less than those in the United States, as presented in appendix table B-6. Payments to proprietors are not included. Persons in family-operated retail businesses dependent on agriculture may not have shared in the growth of national consumer expenditures to the same extent as employees because of investments held in the business. If it is assumed that retail firms doing a large volume of business have an advantage in offering quality goods at competitive prices, consumers in South Dakota may not have enjoyed all the benefits from large scale retail operations.

Retail trade for the years 1958 and 1963 in South Dakota are compared in table 5. Sales increased 13.4%, unadjusted for price changes. The rise in sales per establishment reflected larger total sales and the decline in the number of establishments. The number of persons employed dropped by more than 1,100. The drop in the number of proprietors was not offset by the gain in paid employees. The impact of irrigation development could be expected to affect the trend in these measures.

Selected Service Trade

The growth in average receipts for establishments in services is traced in appendix table B-7. Whereas the change from 1939 to 1963 was from \$3,799 to \$21,371 in the state, index numbers in appendix table B-8 suggest that the aver-

Table 5. Comparison between years 1958 and 1963 regarding retail trade in South Dakota.

	1958	1963
Sales (\$1,000)		
Total, all establishments	771,832	875,543
Establishments with payroll	717,996	841,985
Percent change in total sales since last census	13.7	13.4
Establishments		
Total	8,758	7,657
With payroll	6,116	6,007
Sales per establishment (\$)		
Total all establishments	88,129	114,345
Establishments with payroll	117,396	140,167
Persons employed	37,228	36,060
Active proprietors, unincorporated businesses	8,842	6,949
Paid employee, work week ending Nov. 15	28,386	29,111
Sales per Employed persons	20,733	24,280
Payroll paid employees (\$1,000)	68,234	87,685
Percent change since last census	12.0	28.5
Rank of state by percent change in retail sales from last census (48 states in 1958, 50 in 1963, plus District of Columbia)....	36	47

(Source: 1958 and 1963 Census of Business. Retail Trade Statistics.)

age size of establishment has been consistently less than in the region and has been about half that of the U. S. average.

The number of establishments in service industries from 1939 to 1963 for certain areas appear in appendix table B-9. The average annual salary for employees in the service trades in 1963 lagged more than for retailing (appendix table B-10). One possible explanation for the relatively unfavorable return to South Dakota service employees is the number of unemployed or underemployed persons in those services. Another explanation is that the state has more than its share of lower paying skills or that the level of skill is below the level elsewhere; so that in comparison, em-

ployees are neither underemployed nor underpaid. Employees in other areas may also possess greater bargaining power as means to attract trained persons and to command higher wage rates.

The measures regarding selected services in South Dakota for 1958 and 1963 are compared in table 6. The receipts rose in total, but the numbers of proprietors and paid employees fell. The record for the service occupations, especially, is of concern for policy decisions in vocational education.

The purpose of the next section of this report is to estimate the impacts of proposed resource development on personal incomes and consumer welfare of people in the affected trade areas.

Table 6. Comparison between years 1958 and 1963 regarding selected services in South Dakota.

	1958	1963
Receipts (\$1,000)		
Total, all establishments	67,454	85,934
Establishments with payroll	50,830	73,172
Percent change in total receipts since last census	37.2	27.4
Establishments		
Total	4,272	4,021
With payroll	1,760	2,025
Receipts per establishment (\$)		
Total, all establishments	15,790	21,371
Establishments with payroll	28,881	36,134
Persons employed	11,159	10,565
Active proprietors, unincorporated businesses	4,490	4,017
Paid employees, work week ending Nov. 15	6,669	6,548
Receipts per employed person	6,045	8,134
Payroll, paid employees (\$1,000)	14,525	18,126
Percent change since last census	48.2	24.8
Rank of state by percent change in service trade receipts from last census (48 states in 1958, 50 in 1963, plus District of Columbia)	21	41

(Source: 1958 and 1963 Census of Business. Selected Services Statistics.)

Business Receipts Related to Personal Income⁷

The estimation of area impacts from irrigation development depends on the calculated relationships of personal income and business receipts for each classification of industry. Historically, the personal income originating in each industry has been derived from the volume of business going to that industry.

Personal income originating from a selected industry may be estimated from business receipts of that industry. Changes in personal income may be predicted from assumed changes in business receipts.

Retail trade volume can be said to generate income for persons working in retail trade. Other relationships between personal income and business receipts were found for the selected service trades, the wholesale trade, banking, and local governments. The values of these relationships were used in the analysis.⁸

The estimates of the trend lines for the five industries appear in figures 2 through 6 from data presented in appendix tables B-11 through B-15. Figure 2 indicates that as retail sales have risen by \$1.00, the personal income of people working in retail trade has risen by approximately 19 cents. Personal income in service trades would rise by about 22 cents with a gain of \$1.00 in receipts. Personal income of wholesalers is seen to rise just over 6 cents for a dollar of additional sales. Income to banks in South Dakota is estimated to go up by nearly 21

cents for each additional dollar of interest paid to banks. Local governments appear to have paid out nearly \$1.03 in payroll when their revenues increased by \$1.00. These estimates are not averages. They represent marginal or additional changes in income associated with a change in revenue for each industry grouping.

Personal Income Related to Retail Trade and Service Receipts

Families and individuals spend money with local businesses somewhat in accordance with the personal incomes they receive. In addition to making greater expenditures, persons with larger incomes may change their pattern of spending. The trend in the relation of personal income and retail sales in South Dakota is shown in figure 7 and for service receipts in figure 8. Data are in appendix tables B-16 and B-17.

⁷Data on business receipts for retail trade, wholesale trade and the selected service trades in South Dakota in this report came from *Census of Business*. Personal income data came from the *Survey of Current Business*. Annual editions of *Business Tax* provided data for the banking industry.

Annual taxes paid to local governments are published in annual issues of *Classified County Expenditures* by the South Dakota Division of Taxation. Annual payrolls of local governments are from the *Statistical Abstract of the United States*. Local representatives of insurance companies provided estimates regarding impacts on income for the local insurance industry from changes in the amount of premiums collected.

The relationship between two variables is expressed by using a simple linear regression. For further explanation see Michael J. Brennan, *Preface to Econometrics*, Southwestern Publishing Company, Cincinnati, Ohio, 1960.

⁸The values for retail trade, banking and local government were statistically significant at the 1% level, for wholesale trade at 5%, and for selected services 30%. These were the only estimates available.

Personal Income, in Millions 1957-1959 Dollars

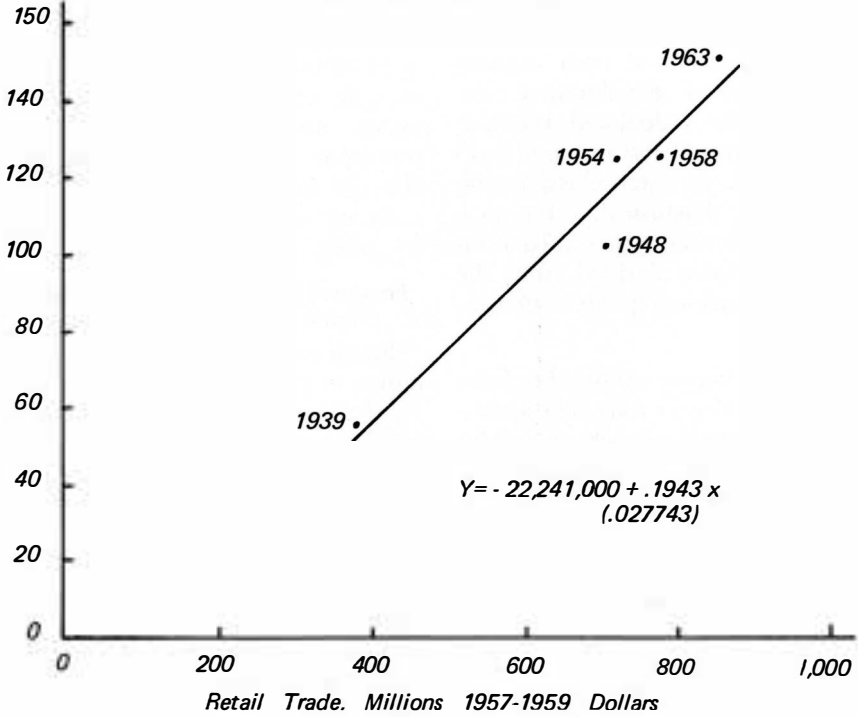
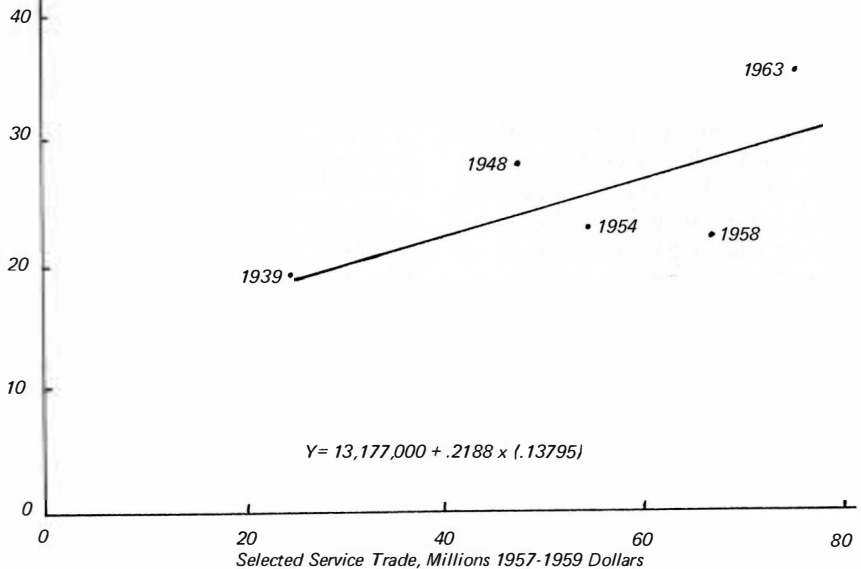


Figure 2. Personal income with retail trade as industrial origin and sales volume of retail trade, South Dakota. (Data from Table B-11, Appendix B.)

Figure 3. Personal income with selected service trade as industrial origin and volume of business receipts of selected service trade, South Dakota. (Data from Table B-12 in Appendix B.)

Personal Income, Millions 1957-1959 Dollars



Personal Income, Millions 1957-1959 Dollars

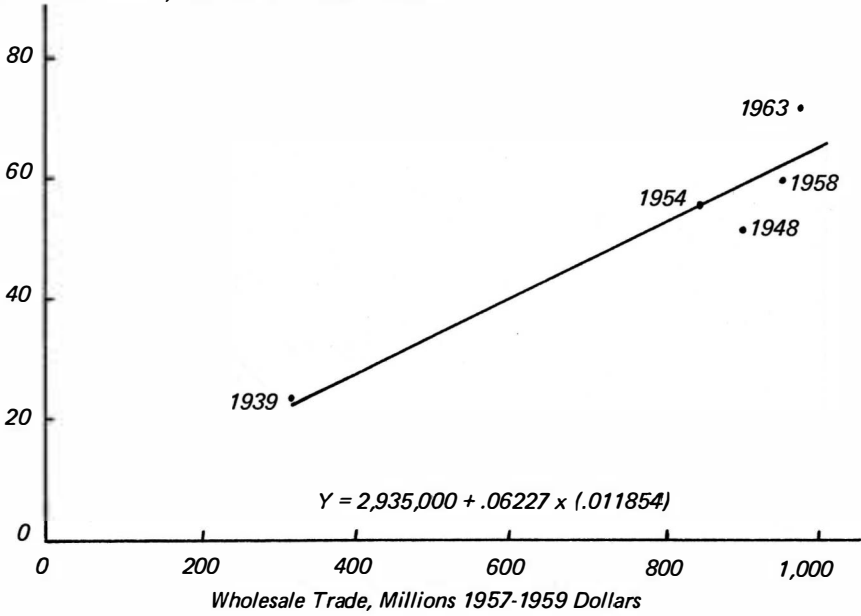
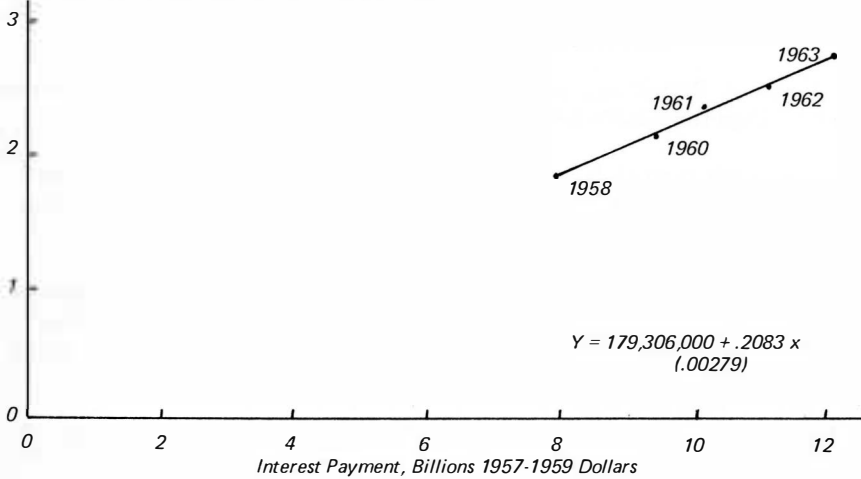


Figure 4. Personal income with wholesale trade as industrial origin and sales ume of retail trade, South Dakota. (Data from Table B-11, Appendix B.)

Figure 5. Compensation of officers plus distributed profit and interest payment received by banks. Samples of bank corporations in United States. (Data from Table B-14 in Appendix B.)

Compensation + Profit, Billions 1957-1959 Dollars



Payroll, Millions 1957-1959 Dollars

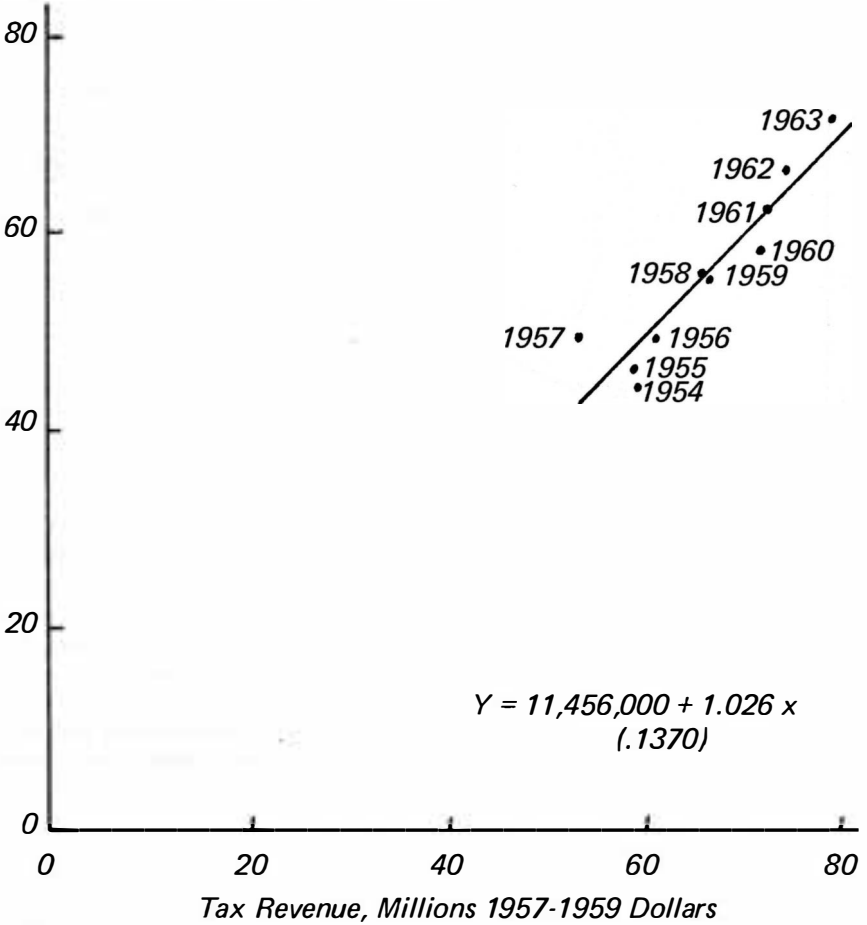


Figure 6. Payroll and property tax revenue of local government in South Dakota. (Data from Table B-15 in Appendix B.)

As personal income has risen by \$1.00 in South Dakota, the addition to retail sales in the state has been 53½ cents and to service industries, 7 cents.⁹ Thus, the stimulus from new expenditures from irrigation investment and operation in the basic farm sector was estimated to result in greater net farm income and also additional off-farm person-

al incomes. This increased consumer buying power has been calculated to result in greater business for the retail trades and service industries. These two industry groupings account for about one third of the off-farm employment in South Dakota.

⁹The relationship of personal income and retail trade was statistically significant at the 1% level and for service trades at 5%.

Retail Trade, Millions 1957-1959 Dollars

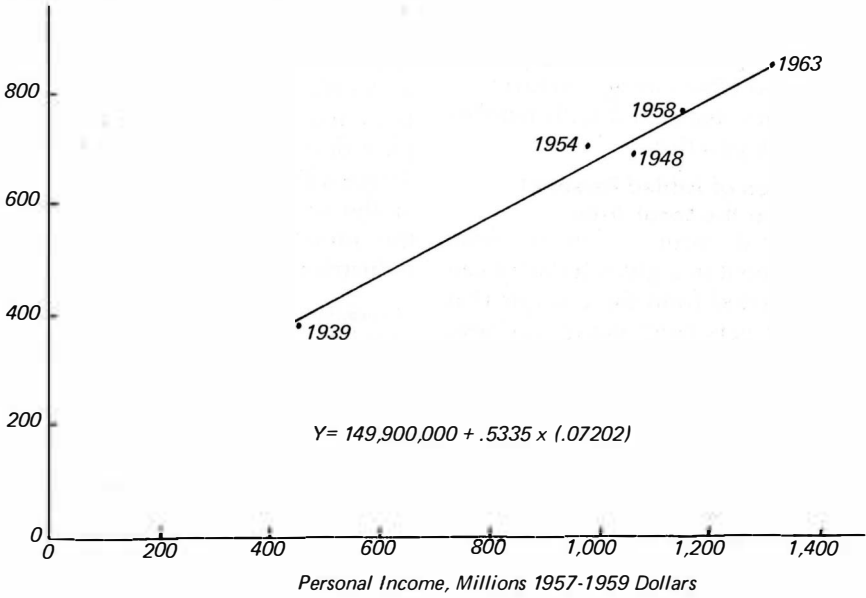
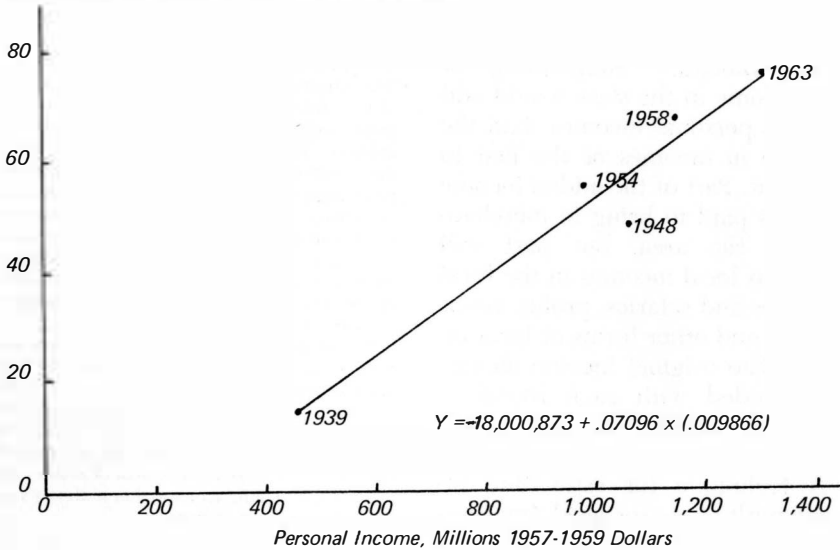


Figure 7. Total personal income and sales volume of retail trade, South Dakota. (Data from Table B-16 in Appendix B.)

Figure 8. Total personal income and receipts volume of selected service trade, South Dakota. (Data from Table B-17 in Appendix B.)

Selected Service Trade, Millions 1957-1959 Dollars



Benefits to Local Business from Irrigation Development

Boosts to area personal income and retail and service receipts are generated from changes in farm expenditures associated with feasible irrigation practices.¹⁰

Estimation of Added Personal Income in the Local Area

Personal income derived from employment in a given industry can be estimated from the receipts that industry gets from doing business, including business with farmers. If farm expenditures rise and are received by area business firms, the personal incomes of people working in those enterprises are expected to rise also. If the additions to net farm incomes and off-farm incomes resulting from irrigation are combined as gains to area personal incomes, then the impacts from spending from higher incomes on area retail and service industries can be estimated.

A multiplier applied to the initial increase in personal income is used to calculate the final increase in personal income. A study by Rapp estimated a multiplier of 2.27 for South Dakota.¹¹ Respending of new income in the state would add more to personal incomes than the increase in incomes of the first to receive it. Part of the added income dollar is paid to bring in merchandise to the area, but part will accrue as local incomes in the form of wages and salaries, profits, rents, interest and other forms of local income. The original income change is expanded with each round of spending through the "multiplier" effect.¹²

A technique for estimating income multipliers for local areas has

used the ratio of employment in basic industries to non-basic industries. This technique was applied to the data on industrial employment in South Dakota (appendix tables B-18 and B-19¹³). The state multiplier derived by Rapp was used to derive adjusted multipliers for each of the six trade areas according to the ratio of basic and non-basic industries.¹⁴

¹⁰Expenditures grouped from farm budgets have been classified according to the industries receiving the farm expenditures as business receipts.

The classification is as follows:

Retail trade: Building depreciation, building repairs, machinery depreciation, livestock expense, crop expense, and fuels.

Selected service trade: Machinery repairs.

Banking: 60% of the interest charge.

Insurance: Premiums on farm insurance.

Local government: Taxes on property.

Farming: Net income of farmers, 40% of interest charge, hired labor, and payroll from the operation, maintenance and replacement cost of the irrigation unit (operation, maintenance, and repair—O M & R costs).

¹¹John Rapp, *An Economic Analysis of South Dakota*, South Dakota Industrial Development and Expansion Agency, Pierre, South Dakota, 1965.

¹²For an explanation of the multiplier process: see: Charles M. Tiebout, *The Community Economic Base Study*, Supplemental Paper 16. The Committee for Economic Development, New York, 1962. pp. 59-61.

¹³See: Tiebout, *op. cit.*

¹⁴The adjustment of the state multiplier to each of the trade areas is derived from the ratio of employment in the basic industry to the total industry. The basic industry is determined as the positive difference between the industry percentage of employment in the area and the percentage that industry is of total employment nationally. The multiplier can express the degree of self-sufficiency of an economy. In general, a given investment will give greater stimulus to a local economy with a lower proportion of basic industry.

The dominant basic industry in South Dakota is agriculture. The percentage of state employment is 30.5. Subtraction of 6.6, the percentage of U. S. employment in agriculture, gives a positive difference of 23.9%. The basic industries are identified by the positive numbers in table B-19. The area of Sioux Falls has the only manufacturing that is clearly considered an export industry.

An area with a high proportion of its total employment in the non-basic industries is likely to have a high multiplier because new income would change hands several times before leaving the area. Conversely, an area with a high proportion of its employment in basic industries is likely to have a low multiplier because new income would readily be spent for goods and services supplied from outside the area.

Results of the Analysis of Impacts from Irrigation

Irrigation practices that have been reported economically feasible to farmers, if adopted, would increase farm expenditures and net farm incomes. Further changes in purchases have been projected to result in increased personal income and business volume in each trade area.

The summation of the annual change in farm income and expenditures, unadjusted for price changes over time, is presented in appendix table A-13. The total of the annual change in net farm income and farm expenditures, adjusted to 1957-1959 price levels, resulting from proposed irrigation development in the six trade areas is given in table 7. The total rise in net farm income totals slightly over \$40 million for the six trade areas. The distribution by trade areas is in appendix table A-14. A few livestock and cash crop accounts are negative because in some instances farm profits appeared to be greater by using available resources for feed grains and forage. However, the feed base for livestock in the area would be increased.

Table 7. Summary of changes in annual net farm income and selected farm expenditures resulting from irrigation development within six trade areas in eastern and central South Dakota in 1957-1959 dollar values.

Net Farm Income	\$40,093,393
Selected Farm Expenditures	
Interest	6,959,036
Taxes	2,233,791
Insurance	394,389
Buildings	
Depreciation	621,633
Repair	801,052
Machinery	
Depreciation	2,952,778
Repair	1,388,010
Livestock	5,617,325
Crop	3,216,621
Motor Fuel	1,498,746
Hired Labor	4,080,406
*OM&R Personnel ..	1,689,574

*Operation, maintenance and repair of irrigation unit.

Table 8. Increase in annual personal income of farmers and classification of receipts of increased farm expenditures in 1957-1959 dollar values.

Increase in Personal Income of	
Farmers	\$42,877,007
Net Farm Income	40,093,393
40% of	
Interest Payments ...	2,783,614
Increase in Receipts by Class	
Hired Labor	4,080,406
OM&R Personnel	1,689,574
Retail Trade	14,708,155
Service Trade	1,388,010
*Wholesale Trade	8,745,681
Banking	4,175,422
Insurance	394,389
Local Government	2,233,791

*Wholesale receipts were calculated as a ratio of retail receipts.

Table 8 traces effects of enlarged farm expenditures on the increase in business volume to the class of firms receiving the expenditures.

An assumption is that farmers provide 40% of the additional capital requirements and borrow 60%. The interest charges of \$6,959,036 from table 7 are accordingly divided in table 8 so that farmers receive \$2,783,614 and bankers receive \$4,175,422. The direct effect of the higher farm expenditures resulting from irrigation investment and operation appear in appendix table A-16. The final estimates of larger area incomes after the multiplier effects are in table 9. Of the increase of \$126 million in the state, \$111 million would be within the trade areas having the irrigation potential and nearly \$15 million would be in other areas.

Estimation of Personal Income¹⁵

The initial increment in personal income within a trade area is equal to the sum of the increases for each class of income recipients associated with the adoption of irrigation by farmers. These classes include increments to farmers, hired labor, personnel of irrigation districts, and

the derived increments of income of persons in industries receiving the increased farm expenditures. As the initial rise in personal income continues and is respent within the trade area or state, the effect is multiplied to give a higher final increase in personal income according to the multiplier found for each area.

An estimate of the initial increment for the six trade areas was over \$55.5 million, from table 9. After respending, the state would gain the effect of more than \$126 million in new personal income annually.

Although most of the secondary effects of larger personal incomes remain in the respective trade areas, it is noted in table 9 that impacts of nearly \$15 million would be felt on personal incomes in other trade areas of the state.

¹⁵The change in personal income by industry classification was calculated from the relationships of industry revenues and industry personal income as illustrated in figures 2 through 8. From interviews with ten officials of companies dealing in farm insurance, a figure of .20 was selected as the proportion of added insurance premiums that remain in the local area as compensation and profit.

Table 9. Increment in annual personal income by trade areas and the state in 1957-1959 dollar values.

Trade Area	First Increment in Personal Income	Multiplier	Final Increment in Personal Income
Sioux Falls	\$ 1,067,433	2.41	\$ 2,572,514
Brookings-Madison	830,390	1.64	1,361,840
Aberdeen	45,242,191	2.07	93,651,335
Yankton-Vermillion	1,626,648	1.63	2,651,436
Pierre-Ft. Pierre	5,936,479	1.59	9,439,002
Mobridge	890,679	1.72	1,531,968
Six trade areas	\$55,593,820	2.00	\$111,208,095
Other trade areas.....			\$ 14,989,876
South Dakota	\$55,593,820	2.27	\$126,197,971

**Estimation of Impacts on
Retail Sales and Service Business**

Part of the increased farm expenditures from the adoption of irrigation practices would be spent with retail firms. The increase in personal incomes has been estimated by summing the direct gains in net farm income and the indirect income gains going to the recipients of greater farm expenditures. From the total increment in personal incomes, a portion would become personal expenditures in the retail trade and a portion to the service industries.

The coefficient from the analysis presented in figure 7 was estimated to be 0.5335. With a rise of \$1.00 in personal income, people would have a propensity to spend about 53 cents with retail industry. The analysis for the service industry, presented in figure 8, indicated that about 7 cents of the extra dollar of state income would be spent with service industries. Together, these expenditures would account for 60 cents of each extra dollar of income. The results of the application of these values appear in table 10 for the retail trades

in table 11 for the service industries. Three-fourths of the impact would result because of the Oahe Project.

The effects on retail trade and service receipts for the state are larger than the sum for the trade areas because some of the new spending would be in the state but outside the individual trade areas. The differences in the impacts among trade areas are due to the variation in the extent of irrigation potential and the differences in the local multipliers.

The retail centers appear to get more than four-fifths of the effect on sales from the rise in multiplied personal income rather than from larger receipts received directly from farmers making additional expenditures to establishments because of irrigation. However, firms who benefit from the general rise in area personal incomes are not necessarily the same firms as those receiving expenditures from farmers who irrigate. This observation has implications for policies regarding cost-sharing of resource development.

Table 10. Annual increment to retail trade from irrigation development by trade areas and state in thousands of dollars.

Trade Areas	From Increased Farm Expenditures	From Increased		Total	
		Personal Income	1957-1959 Prices	1963 Prices	
Sioux Falls	241	1,372	1,613	1,679	
Brookings-Madison	153	727	880	916	
Aberdeen	11,633	49,963	61,596	64,121	
Yankton-Vermillion	677	1,414	2,091	2,177	
Pierre-Ft. Pierre	1,745	5,036	6,781	7,059	
Mobridge	259	817	1,076	1,121	
Six Trade Areas	14,708	59,329	74,037	77,073	
Other Trade Areas		7,998	7,998	8,325	
South Dakota	14,708	67,327	82,035	85,398	

Table 11. Annual increment to service trade from irrigation development by trade areas and state in thousands of dollars.

Trade Areas	From Increased		Total	
	Farm Expenditures	Personal Income	1957-1959 Prices	1963 Prices
Sioux Falls	54	183	237	267
Brookings-Madison	42	97	139	156
Aberdeen	1,029	6,649	7,678	8,677
Yankton-Vermillion	74	188	262	297
Pierre-Ft. Pierre	166	670	836	945
Mobridge	23	109	132	148
Six Trade Areas	1,388	7,896	9,284	10,490
Other Trade Areas		1,064	1,064	1,203
South Dakota	1,388	8,960	10,348	11,693

The service industries in South Dakota would receive about \$1.4 million of new business directly from the impetus of irrigation development. After the multiplier effect and the gain of approximately \$9 million from spending from higher area personal incomes, the final effect on receipts for firms in the service industries was estimated to be approximately \$11.7 million annually in 1963 prices. The impacts on receipts may be a reason that service industries strongly favor resource development.

Estimation of Total Receipts, Retail Trade and Service Industries

The numbers of retail establishments existing in 1963 and persons employed are shown in appendix table A-17 and for services in appendix table A-18. The addition of new business from irrigation development varies by trade areas and the resulting relative impact on an area economy would not be the same for all trade areas.

Table 12 shows the volume of retail trade before and after addition

of the increment due to irrigation. Three-fourths of the effects would be in the Aberdeen area where retail sales would rise 58%, from \$109,-632,000 to \$173,753,000. The Pierre-Ft. Pierre trade area would experience a rise of nearly 19% in retail sales; Yankton-Vermillion and the Mobridge areas, 3% to 4%; and the Sioux Falls and Brookings-Madison areas, less than 2%. A relatively small dollar gain may be a significant percentage gain for areas with relatively low volume. For the state, the increment of \$85,398,000 would increase the volume of retail trade by almost 10%, from \$875,543,000 to \$960,941,000.

The increment for state retail sales is \$8,325,000 larger than the sum of the increments within the six areas. A large part of this difference would be spent in other trade areas of the state, especially those having a large city. With larger selection of goods these cities attract customers for some items from other designated trade areas, and would gain from greater personal incomes in adjoin-

ing trade areas. Examples are cities of Watertown, and to some extent, Mitchell. Because of proximity to the proposed Oahe project, Huron and Redfield stand to gain significant economic stimulus from devel-

opment of the Oahe Irrigation Unit. Table 13 shows the increased volume of selected service trade. Almost three-fourths of the effect in the state accrues to the Aberdeen trade area. However, the boost in

Table 12. Annual estimated retail sales before and after irrigation development by trade areas and the state.

Trade Area	Thousands of Dollars (1963 prices)			Percent Rise
	Before	Added	After	
Sioux Falls	173,417	1,679	175,096	1.0
Brookings-Madison	57,982	916	58,898	1.6
Aberdeen	109,632	64,121	173,753	58.5
Yankton-Vermillion	57,932	2,177	60,109	3.8
Pierre-Ft. Pierre	37,698	7,059	44,757	18.7
Mobridge	33,200	1,121	34,321	3.3
Six trade areas	469,861	77,073	546,934	16.4
Other trade areas	405,682	8,325	414,007	2.1
South Dakota	875,543	85,398	960,941	9.8
West North Central	21,054,215	85,398	21,139,613	.4
United States	244,201,777			

Table 13. Annual estimated service trade receipts before and after irrigation development by trade areas and the state.

Trade Area	Thousands of Dollars (1963 prices)			Percent Rise
	Before	Added	After	
Sioux Falls	20,255	267	20,522	1.3
Brookings-Madison	4,759	156	4,915	3.3
Aberdeen	7,863	8,677	16,540	110.4
Yankton-Vermillion	3,668	297	3,965	8.1
Pierre-Ft. Pierre*	4,168	945	5,113	22.7
Mobridge	2,396	148	2,544	6.2
Six trade areas	43,109	10,490	53,599	24.3
Other trade areas	42,825	1,203	44,028	2.8
South Dakota	85,934	11,693	97,627	13.6
West North Central†	2,802,908	11,693	2,814,601	.4
United States	44,586,261			

*Represents totals for 169 of the 170 service establishments. One establishment not included because of disclosure problem. Receipts for the one service establishment included in *other trade areas*.

†Additional trade is assumed same for the region as the state for purposes of calculation.

demand for services could revolutionize the commercial service trades. The increase in volume is 110%, from \$7,863,000 to \$16,540,000. The Pierre-Ft. Pierre trade area would gain nearly 23%; the Yankton-Vermillion and the Mobridge areas, 6% to 9%; and the Brookings-Madison area, 3.3%. The Sioux Falls area, having the fourth largest increment of \$267,000 would experience only a 1.3% increase because of its already large volume of business in service industries.

The estimated impact on the state service industry is \$1,203,000 larger than the sum of impacts on area service trades. Huron, Mitchell and Watertown and some smaller towns would likely receive increases in service trade. The state's service trade also includes recreation enterprises. The Black Hills and other areas with recreational facilities would receive benefits of increased patronage.

Effects of Increments in Trade Volume on Size of Business Establishments

The average size of business establishments can be affected by the increments in the volume of retail trade and selected service trade. The average volume of business per establishment in 1963 was calculated before and after the addition of increment estimated from the effects of irrigation development. The size of establishment is expressed in index numbers, with the West North Central region as a base of 100. The results are presented in table 14 for retail establishments and table 15 for service establishments.

The average volume of business in 1963 for South Dakota retail trade establishments had an index of 86 compared to an index of 100 for the seven-state region. Without increasing the number of firms, the added business activity would increase the index for the state to 94. The average size of establishment in the state

Table 14. Comparison of the average business for retail establishments before and after irrigation development by trade areas, state and region.

	Average Volume Retail Trade Dollars (1963 prices)			Index West North Central-100	
	Before	Added	After	Before	After
Sioux Falls	133,295	1,291	134,586	100	101
Brookings-Madison ..	96,637	1,526	98,163	73	74
Aberdeen	114,678	67,072	181,750	86	136
Yankton-Vermillion	103,266	3,880	107,146	78	80
Pierre-Ft. Pierre	112,196	21,009	133,205	84	100
Mobridge	94,587	3,194	97,781	71	73
Six Trade Areas	114,461	18,775	133,236	86	100
Other Trade Areas ..	114,212	2,344	116,556	86	87
South Dakota	114,077	11,127	125,204	86	94
West North Central..	133,023	540	133,563	100	100
United States	142,981			107	

Table 15. Comparison of the average business for service establishments before and after irrigation development by trade areas, state and region.

Trade Area	Average Volume Service Trade Dollars (1963 prices)			Index	
	Before	Added	After	Before	After
Sioux Falls	27,595	364	27,959	91	92
Brookings-Madison	16,467	540	17,007	54	56
Aberdeen	20,423	22,538	42,961	67	141
Yankton-Vermillion	15,157	1,227	16,384	50	54
Pierre-Ft. Pierre	24,663	5,591	30,254	81	100
Mobridge	15,359	949	16,308	51	54
Six Trade Areas	21,816	5,309	27,125	72	89
Other Trade Areas	20,941	588	21,529	69	71
South Dakota	21,371	2,908	24,279	70	80
West North Central	30,390	127	30,517	100	100
United States	41,996			138	

would then be about as far below the region as the region is below the national index of 107. However, in the six trade areas the average size of retail establishments would equal the seven-state region.

The index numbers exhibit the effect of concentration of irrigation. The Aberdeen area would experience an increase in the index number of size of establishment from 86 to 136. The Pierre-Ft. Pierre index would go from 84 to 100. The average trade per service establishment indicated for the state in table 15 would go from an index of 70 to 80, assuming no new entries, but that increased business activity would be spread over firms existing in 1963.

Estimation of Gain in Personal Income and Retail and Service Trade

The personal income gains from irrigation are estimated in table 16 and divided among the number of establishments and employed per-

sons as of 1963. The gain of over \$85 million in retail sales for the state accounted for nearly \$14 million of new personal income in the six trade areas plus \$1.6 million in the other trade areas of the state. State personal income was calculated to rise \$2,162 per establishment and \$460 per person. In the six trade areas rise in average personal income was calculated to be \$3,648 per establishment and \$768 per person.

Calculations for service receipts, from table 17, show a possible rise in personal income per establishment in the state of \$636 and \$242 per person employed. State service employees outside the irrigation areas could benefit by \$49 in personal income on the average.

Effects of Increments of Trade Volume on Employment

The effects of increased business volume would be expected to result in larger business volume for an existing number of employees, or they

would result in both larger volume per employed person and greater employment.

With the employment in the retail trades held constant at the 1963 figures, the average volume of sales per employed person would change with irrigation development according to table 18. South Dakota has ranked higher in average business

receipts per employed person than for establishments, reflecting relatively small firms. For the six trade areas, retail sales per employed person were found to be equal to the regional average with the extent of irrigation development that existed in 1963. After development, four of the trade areas would exceed their 1963 averages and also the regional

Table 16. Increase in retail sales and personal income per establishment and employed person from irrigation development by trade area and state (1963 prices).

Trade Area	Total Thousands of Dollars		Establishment Dollars		Employed Person Dollars	
	Retail Sales	Personal Income	Retail Sales	Personal Income	Retail Sales	Personal Income
Sioux Falls	1,679	326	1,291	251	223	43
Brookings-Madison	916	178	1,526	297	373	72
Aberdeen	64,121	12,458	67,020	13,022	14,680	2,852
Yankton-Vermillion	2,177	423	3,880	754	895	174
Pierre-Ft. Pierre	7,059	1,372	21,009	4,082	4,968	965
Mobridge	1,121	218	3,194	621	867	168
Six trade areas	77,073	14,975	18,775	3,648	3,952	768
Other trade areas	8,325	1,618	2,344	456	503	98
South Dakota	85,398	16,593	11,153	2,162	2,368	460

Table 17. Increase in service trade receipts and personal income per establishment and employed person from irrigation development by trade area and state (1963 prices).

Trade Area	Total Thousands of Dollars		Establishment Dollars		Employed Person Dollars	
	Service Receipts	Personal Income	Service Receipts	Personal Income	Service Receipts	Personal Income
Sioux Falls	267	58	364	79	127	28
Brookings-Madison	156	34	540	118	250	54
Aberdeen	8,677	1,899	22,538	4,932	7,713	1,688
Yankton-Vermillion	297	65	1,227	268	565	124
Pierre-Ft. Pierre	945	207	5,559	1,218	2,182	478
Mobridge	148	32	949	205	417	90
Six trade areas	10,490	2,295	5,309	1,161	2,029	444
Other trade areas	1,203	263	588	129	223	49
South Dakota	11,693	2,558	2,908	636	1,107	242

average, meaning additional employment could result after the personal income levels of persons already working in retail trades would have risen to the regional average of personal income for persons employed in regional retail trades.

The average receipts for employed persons in service trade are compared in table 19. Three trade areas show a rise in average receipts above their 1963 levels and the revised regional average. This increase could result in new employ-

Table 18. Comparison of the average sales per person occupied in retail trade before and after irrigation development by trade areas, state and region.

Trade Area	Average Volume Retail Trade Dollars (1963 prices)			Index West North Central-100	
	Before	Added	After	Before	After
Sioux Falls	23,012	223	23,235	95	96
Brookings-Madison	23,637	373	24,010	98	99
Aberdeen	25,099	14,680	39,779	104	164
Yankton-Vermillion	23,821	895	24,716	99	102
Pierre-Ft. Pierre	26,529	4,968	31,497	110	130
Mobridge	25,677	867	26,544	106	110
Six Trade Areas	24,092	3,974	28,066	100	116
Other trade areas	24,502	476	24,978	102	103
South Dakota	24,280	2,368	26,648	101	110
West North Central	24,129	98	24,227	100	100
United States	24,528			102	

Table 19. Comparison of the average receipts per person occupied in selected services before and after irrigation development by trade areas, state and region.

Trade Area	Average Volume Service Receipts Dollars (1963 prices)			Index West North Central-100	
	Before	Added	After	Before	After
Sioux Falls	9,618	127	9,745	106	107
Brookings-Madison	7,627	250	7,877	84	87
Aberdeen	6,989	7,713	14,702	77	162
Yankton-Vermillion	6,973	565	7,538	77	83
Pierre-Ft. Pierre	9,626	2,182	11,808	106	130
Mobridge	6,749	417	7,166	75	79
Six Trade Areas	8,340	2,029	10,369	92	114
Other Trade Areas	7,936	223	8,159	88	90
South Dakota	8,134	1,107	9,241	90	102
West North Central	9,055	38	9,093	100	100
United States	10,421			115	

ment rather than an increase in average receipts above the regional average.

Increase in Number of Establishments and Persons Employed

An expansion that could occur in the number of establishments and of employed persons as an impact from irrigation development is suggested in table 20. These estimates are likely conservative because calculations assumed that the average volume of trade per employed person would rise to the regional average before any new persons would be employed in a trade area. The first effects are considered to be the full employment of persons working in retail and service trades, and then an expansion in the number of establishments. The associated gains in personal income would be presumed to go to firms and employees already in the area.

An expansion would likely increase the number of establish-

ments. If the number of establishments existing in 1963 were to absorb the extra business until the average volume became equal to that in the West North Central Region, the number of retail establishments in the Aberdeen area (956) would increase by 345 to total 1,301.

The Aberdeen area would gain 157 service establishments, assuming that new establishments would enter the area only after the average volume of receipts were to become equal to the West North Central Region.

The increase in new establishments would be in the Aberdeen trade area from the effects of concentrated development of the Oahe Unit. In other areas the additions to business volume would be assumed to become absorbed by existing establishments because they would not have risen to the regional average. However, several trade areas would gain in employment, as firms expand.

Table 20. Estimated increase in number of establishments and persons employed in retail trade and service trade from increase in business volume by trade area and state from 1963*

	Retail Trade		Service Trade	
	Establishments	Persons Employed	Establishments	Persons Employed
Sioux Falls	0	0	0	28
Brookings-Madison	0	0	0	0
Aberdeen	345	2,555	157	694
Yankton-Vermillion	0	49	0	0
Pierre-Ft. Pierre	0	266	0	98
Mobridge	0	44	0	0
Six trade areas	345	2,914	157	820
Other trade areas	0	340	0	0
South Dakota	345	3,254	157	820

*Assumes that new establishment enters industry only after existing establishments have gained in business volume above the average for the West North Central Region. Also assumes new employees would be hired only after business volume per employed person is increased to average business volume for employed persons in the West North Central Region.

The Aberdeen and the Pierre-Ft. Pierre areas would gain employment in both trades. Mobridge could gain 44 persons in retail employment and Sioux Falls 28 in services. Trade areas other than in the localities of irrigation development were estimated to gain 340 new persons in retail employment.

A conclusion from table 20 is that South Dakota's retail trade could attain 345 new establish-

ments and 3,254 new employees in retailing. One hundred fifty-seven new establishments and 837 new employees may be the impact on opportunities in business and employment in services. These gains, however, would follow the beneficial effects of an expansion in business volume and the associated income for establishments and persons already in the respective trade areas.

Summary and Conclusions

Consequences from development of feasible irrigation potential that would accrue to the existing economy have been of greater interest in this investigation than the proposed development of entirely new industries. This study has investigated the meaning of resources allocated to irrigation with special attention to the retail and service industries.

People in a region require understanding of impacts from the purposes served by development in order to make choices consistent with their objectives. The people are represented in trade areas, as arbitrarily described in this report; in resource areas, as river basins; and in political districts, whether Congressional or sub-divisions of state government.

Total benefits from resource development exceed returns to individual investors. Area personal income in this study represented a common welfare standard. After payment of non-local taxes, the income receivers are free to spend disposable incomes over a range of choices. Emphasis in this report has been on propensities for spending on retail and service industries.

Summary

The increment to personal income in the state directly from the increase in annual expenditures associated with the adoption of feasible irrigation, assuming the presence of surface water supplies, was estimated to be near \$55.6 million. After respending, the total state gain in incomes would be \$126 million. Over \$111 million

would accrue to residents of trade areas where the new farm expenditures would be made and nearly \$15 million from spillover spending in other areas.

The multiplied gains in income were estimated to lead to \$85.4 million additional spending in the retail trades. If the extra spending were to be distributed evenly among the number of firms existing in 1963, the average annual volume of trade for South Dakota retail firms would rise by more than \$11,000 and for service establishments by nearly \$3,000. Incomes of proprietors and paid employees may be improved and selection from stocks made larger for customers.

With increased trade volume there would appear new opportunities for employment and businesses. Annual personal income per person employed in the state was estimated to rise \$460 for retail trade and \$242 for services, assuming 1963 employment levels. Areas with concentrated development would be expected to experience these impacts first. If new establishments and employment were to enter a trade area after it had achieved equality in average volume of trade to establishments and persons employed in the region, new opportunities for business firms and employment could appear. The major effect, however, is taken to be the improvement in sales receipts and personal income for firms and people already in the state.

Conclusions and Implications

Personal income is a measure common to all residents of an area. An estimate of the gain in personal income leaves area residents with choices about how to spend it. They may choose consumer goods or improved public services.

Certain geographic areas may be selected for resource development. If a given amount of public investment were to be made for the purpose of utilizing labor supply and unused capacity in off-farm enterprises, the location could be different than if the goal were to obtain the multiplier effects of added new business firms and employment in an area of concentrated development. Although estimates may be in error, they can aid in a ranking in the priority of public investment. The participation in costs by conservancy sub-districts, for example, might be made according to set criteria.

The key decision about irrigation is made by the farmer. Even if estimated to be profitable, irrigation may not fit into the individual farmer's plans. Adjustment in enterprises and requirements for labor and capital can be estimated through research and the technical decisions in management explained in an educational program. Having reliable irrigation supply firms in areas with irrigation potential is another key factor in development. Credit agencies in a local area could expect to be closely involved with implementation of irrigation development plans.

Much of the advantage of irrigation development would be to the existing business firms through an

increase in volume and reduction in average costs. They could benefit without making substantial additional investment or the direct adjustments in operation that would be required of the farmer going into irrigation.

The gain in sales to farmers is only part of the total gain to retail and service businesses. Expenditures from higher area personal incomes are the basis for most of the increase in business receipts. Expanded opportunities may serve to retain people in the state.

A corollary to resource development is education. Besides improving the productivity of its basic economic sector, a state has concern for the preparation of people to work in non-basic sectors of the economy if the full benefits from development of resource potential are to be realized. Educational facilities, as a consequence, require planning in order to equip young people with skills to take advantage of opportunities both in farming and in non-farm businesses.

Limitations of the Study

The procedures applied subject this analysis to questions concerning the accuracy of the results. The trade areas were delineated arbitrarily, although they include major growing trade centers. Effects were attributed to one trade area even though they would extend to others. Trade patterns do not conform to county lines. Because of their proximity to development areas, trade centers of Huron, Watertown, and Mitchell would likely receive significant effects not specifically assigned to them. On the other hand,

some impetus may not have been recognized. Wholesaling, for instance, would possibly be influenced in a few centers of major importance. Although recognized, estimates of additional impacts were not tasks of this analysis.

The method of analysis may not be totally appropriate for the data available. Grouping of occupations into a meaningful industry classification is difficult where employment in some occupations is low. The estimation of an income multiplier for a regional economy without clear boundaries is subject to error. The spending of future income can be estimated from spending in the past, but a change in preferences can shift receipts to other industries and other areas.

This report is limited in suggestions for positive action. Policy decisions are made after examination of alternative ways of using resources. There are purposes other than irrigation to which water might be allocated. An evaluation of the impacts from other proposals for development would rely on future research. Means by which the wishes of people can be expressed and their preferences counted are to be provided by units of government and other institutions.

Suggestions for Answering Further Questions

A recommended step in the continuing investigation of the collective effects of irrigation on area personal income is the business activity originating in handling and processing industries receiving added agricultural production. This has been accomplished to a greater

degree for proposed federal project-type irrigation plans than for plans involving development of scattered areas having potential for private development using a variety of techniques, including sprinkler irrigation.

Regardless of whether more livestock feeding of increased feed production would be on farms or in specialized feedlots, the overall effect would likely remain in the area. Other opportunities may arise for expansion of existing processing plants or for investment in new plants. Adaptation of new crops and advances in transportation have importance in the expansion of markets open to an area's agriculture.

The severity of adjustment in switching to irrigated farming in terms of labor and capital and the willingness of people to accept new requirements are keys to development of an area through this means of expanding its basic industry. This question requires more answers than does the question of whether the adjustment is economically profitable to the adopter. Participation in costs by the off-farm beneficiaries becomes a possible instrument for getting development.

The effects of irrigation development on public services provided by state and local bodies of government is a proper topic for further study. Higher area personal incomes could bring higher assessed valuations as bases for property taxes and also larger revenues from sales and excise taxes. The efficient provision of high quality

public services would be a favorable attraction to further economic expansion in the state and local communities.

The arrangement by which residents may participate in the investment in the productivity of their area and to share in the bene-

fits is a topic for research involving several disciplines. The use of public funds in promoting initiative and in implementing resource development is a possible means for stimulating regional economic development as well as a topic for further investigation.

APPENDIX A

Appendix Table A-1. Acreage of the Oahe Unit by county.

Sub-unit	County	Acreage	
Lake Plain:			
	Brown	243,000	
	Day	3,000	
	Marshall	34,000	
	Spink	165,000	445,000
Missouri Slope:			
	Sully	47,500	
	Potter	2,500	50,000
Total Acreage			495,000

Source: U. S. Department of the Interior, Bureau of Reclamation, Missouri-Oahe Projects Office. Report on Oahe Unit, Huron, South Dakota, May 1965.

Appendix Table A-2. Acreage of the South Dakota Pumping Division Units by region and county.

Region	Unit	County	Acreage	
Northern:				
	Pollock-Herreid	Campbell	15,000	15,000
Central:				
	Fort Thompson	Buffalo	7,480	
	Culdesac	Hughes	5,444	
	Joe Creek	Hughes	4,420	
	Rousseau	Hughes	2,215	
	Fort Hale	Lyman	1,138	
	Grass Rope	Lyman	4,340	
	Iron Nation	Lyman	1,739	
	LaRouche	Stanley	1,789	28,565
Southern:				
	Greenwood	Charles Mix	4,930	
	Tower	Charles Mix	1,980	
	Yankton	Yankton	1,105	8,015
Total Acreage				51,580

Source: United States Department of the Interior, Bureau of Reclamation, Missouri-Oahe Projects Office. Report on South Dakota Pumping Division, Appendixes A, B, C, D. Huron, South Dakota, April 1959.

Appendix Table A-3. Feasible irrigable acreage in the Big Sioux Basin by county.

Region	County	Acreage	
Upper Big Sioux:	Brookings	31,220	31,220
Lower Big Sioux:	Lincoln	4,200	
	Minnehaha	6,720	
	Moody	10,150	
	Union	6,790	27,860
Total Acreage			59,080

Sources: Preliminary estimates by Bureau of Reclamation. See also: U. S. Department of the Interior, Bureau of Reclamation, Missouri-Oahe Projects Office. Report on Big Sioux Basin and Missouri Terrace Area. Huron, South Dakota, January 1968.

Appendix Table A-4. Feasible irrigable acreage in the Missouri Terrace Area by county.

County	Location
Clay	17,800
Yankton	10,700
Union	16,500
Total Acreage	45,000

Sources: Preliminary estimates by Bureau of Reclamation. See also: U. S. Department of the Interior, Bureau of Reclamation. Missouri-Oahe Projects Office. Report on Big Sioux Basin and Missouri Terrace Area. Huron, South Dakota. January 1968.

Appendix table A-5. Oahe Unit. Summary of the "Lake Plains" farm budgets with irrigation and dryland, and the changes in farm income and farm expenditures resulting from irrigation.

	With Irrigation	Dryland	Changes from Irrigation
			Dollars
Net Farm Income	44,462,852	10,965,217	33,497,635
Gross Farm Income	100,096,698	29,399,130	70,697,568
Crop Subtotal	22,640,198	7,557,921	15,082,277
Feed Grain	2,342,300	2,300,421	41,879
Hay and Forage	238,200	89,323	148,877
Wheat	1,951,498	5,168,177	-3,216,679
Sugar Beets	18,108,200		18,108,200
Livestock Subtotal	74,864,000	20,649,173	54,214,827
Meat	74,452,900	20,436,651	54,016,249
Farm Perquisites	2,592,500	1,192,036	1,400,464
Total Farm Expenditures	55,633,846	18,433,913	37,199,933
Interest	9,355,813	4,242,123	5,113,690
Taxes	3,261,162	1,479,583	1,781,579
Insurance	547,300	256,495	290,805
Buildings			
Depreciation	917,600	404,826	512,774
Repair	1,154,500	508,637	645,863
Machinery			
Depreciation	4,539,200	2,168,192	2,371,008
Repair	1,883,400	854,262	1,029,138
Livestock	6,254,900	1,483,078	4,771,822
Crop	4,740,869	2,467,558	2,273,311
Motor Fuel	2,335,075	1,276,959	1,058,116
Hired Labor	3,248,427	276,577	2,971,850
Utilities	305,000	139,607	165,393
Water + OM & R	2,852,300		2,852,300
Sows and Feeders purchased ..	14,238,300	2,876,016	11,362,284

Source: United States Department of the Interior, Bureau of Reclamation, Report on Oahe Unit. Appendix Q, Economic and Social Impacts, Missouri-Oahe Projects Office, Huron, South Dakota, May 1965, p. 25.

Appendix Table A-6. Oahe Unit. Summary of the "Missouri Slope" farm budgets with irrigation and dryland, and the changes in farm income and farm expenditures resulting from irrigation.

	With Irrigation	Dryland	Changes from Irrigation
	Dollars		
Net Farm Income	4,580,048	951,583	3,628,465
Gross Farm Income	10,732,402	2,896,270	7,836,132
Crop Subtotal	2,395,102	678,979	1,716,123
Feed Grain	118,100	139,679	-21,579
Hay and Forage	12,200	5,977	6,223
Wheat	192,202	533,323	-341,121
Sugar Beets	2,072,600		2,072,600
Livestock Subtotal	8,051,400	2,103,127	5,948,273
Meat	8,005,900	2,082,449	5,923,451
Farm Perquisites	285,900	114,164	171,736
Total Farm Expenditures	6,152,354	1,944,687	4,207,667
Interest	1,087,787	476,977	610,810
Taxes	381,938	173,017	208,921
Insurance	60,200	23,805	36,395
Buildings			
Depreciation	104,500	47,574	56,926
Repair	129,900	54,363	75,537
Machinery			
Depreciation	491,800	215,008	276,792
Repair	203,600	87,338	116,262
Livestock	684,000	168,122	515,878
Crop	522,031	328,342	193,689
Motor Fuel	249,625	141,041	108,584
Hired Labor	345,773	37,623	308,150
Utilities	33,600	13,393	20,207
Water + OM & R	320,500		320,500
Sows and Feeders purchased.....	1,537,100	178,084	1,359,016

Source: United States Department of the Interior, Bureau of Reclamation, Report on the Oahe Unit, Appendix Q, Economic and Social Impacts, Missouri-Oahe Projects Office, Huron, South Dakota, May 1965, p. 25.

Appendix Table A-7. South Dakota Pumping Division. Summary of the northern region farm budgets with irrigation and dryland, and the changes in farm income and farm expenditures resulting from irrigation.

	With Irrigation	Dryland	Changes from Irrigation
		Dollars	
Net Farm Income	502,080	227,715	274,365
Gross Farm Income	2,183,535	1,144,655	1,038,880
Crop Subtotal	188,030	319,105	-131,075
Feed Grain	5,036	2,850	2,186
Hay and Forage	7,298	3,135	4,163
Wheat	141,780	250,990	-109,210
Flax	33,916	62,130	-28,214
Livestock Subtotal	1,812,859	712,310	1,100,549
Meat	1,683,728	624,055	1,059,673
Farm Perquisites	182,646	113,240	69,406
Total Farm Expenditures	1,681,455	916,940	764,515
Interest	465,373	287,375	177,998
Taxes	160,720	129,295	31,425
Insurance	27,825	18,525	9,300
Buildings			
Depreciation	34,939	22,325	12,614
Repair	51,259	33,345	17,914
Machinery			
Depreciation	177,061	134,045	43,016
Repair	68,987	52,155	16,832
Livestock	85,357	45,980	39,377
Crop	98,609	54,530	44,079
Motor Fuel	132,564	91,675	40,889
Hired Labor	217,918	36,670	181,248
Utilities	16,124	11,020	5,104
Water + OM & R	144,719	-----	144,719

Source: Figures adapted for this report from U. S. Department of the Interior, Bureau of Reclamation, Missouri-Oahe Projects Office. Report on South Dakota Pumping Division, and Appendixes A, B, C, D, Huron, South Dakota. April 1959.

Appendix Table A-8. South Dakota Pumping Division. Summary of the central region farm budgets with irrigation and dryland, and the changes in farm income and farm expenditures resulting from irrigation.

	With Irrigation	Dryland	Changes from Irrigation
		Dollars	
Net Farm Income	1,016,854	427,280	589,574
Gross Farm Income	4,364,601	2,070,824	2,293,777
Crop Subtotal	190,581	237,650	-147,069
Feed Grain	6,154	9,604	-3,450
Hay and Forage	16,042	2,030	14,012
Wheat	168,385	226,016	-57,631
Livestock Subtotal	3,795,649	1,682,856	2,112,793
Meat	3,723,201	1,650,600	2,072,601
Farm Perquisites	378,371	150,318	228,053
Total Farm Expenditures	3,347,747	1,643,544	1,704,203
Interest	926,235	500,270	375,965
Taxes	353,528	248,346	105,182
Insurance	57,166	25,634	31,532
Buildings			
Depreciation	82,505	41,510	40,995
Repair	112,302	53,214	59,088
Machinery			
Depreciation	356,284	198,562	157,722
Repair	132,710	76,846	55,864
Livestock	174,539	61,950	112,589
Crop	179,544	85,876	93,668
Motor Fuel	250,387	135,212	115,175
Hired Labor	340,421	151,508	188,913
Utilities	32,828	14,616	18,212
Water + OM & R	349,298	-----	349,298

Source: Figures adapted for this report from U. S. Department of the Interior, Bureau of Reclamation. Missouri-Oahe Projects Office. Report on South Dakota Pumping Division, and Appendixes A, B, C, D, Huron, South Dakota. April 1959.

Appendix Table A-9. South Dakota Pumping Division. Summary of the southern region farm budgets with irrigation and dryland, and the changes in farm income and farm expenditures resulting from irrigation.

	With Irrigation	Dryland	Changes from Irrigation
		Dollars	
Net Farm Income	290,867	90,171	200,696
Gross Farm Income	1,377,336	475,107	902,229
Crop Subtotal	11,466	20,683	-9,217
Feed Grain	6,054	8,987	-2,933
Hay and Forage	5,412	3,268	2,144
Wheat		8,428	-8,428
Livestock Subtotal	1,255,074	398,567	856,507
Meat	1,225,674	383,517	842,157
Farm Perquisites	110,796	55,857	54,939
Total Farm Expenditures	1,086,469	384,936	701,533
Interest	231,031	90,859	140,172
Taxes	72,569	37,668	34,901
Insurance	16,710	8,299	8,411
Buildings			
Depreciation	20,003	8,557	11,446
Repair	30,181	14,018	16,163
Machinery			
Depreciation	86,127	40,592	45,535
Repair	34,938	15,910	19,028
Livestock	325,440	117,949	207,491
Crop	40,725	16,641	24,084
Motor Fuel	50,673	21,328	29,345
Hired Labor	50,799	8,127	42,672
Utilities	9,744	4,988	4,756
Water + OM & R	117,529		117,529

Source: Figures adapted for this report from U. S. Department of the Interior, Bureau of Reclamation. Missouri-Oahe Projects Office. Report on South Dakota Pumping Division, and Appendixes A, B, C, D, Huron, South Dakota. April 1959.

Appendix Table A-10. Big Sioux Basin. Summary of the "Upper Big Sioux" farm budgets with irrigation and dryland, and the changes in farm income and farm expenditures resulting from irrigation.

	With Irrigation	Dryland	Changes from Irrigation
		Dollars	
Net Farm Income	1,890,658	1,537,187	353,471
Gross Farm Income	7,595,230	6,695,854	899,376
Crop Subtotal	1,414,641	395,900	1,018,741
Feed Grain	322,687	110,661	212,026
Hay and Forage	9,376	3,975	5,401
Wheat	247,520	224,948	22,572
Beans	835,058	-----	835,058
Flax	-----	56,316	-56,316
Livestock Subtotal	5,957,139	6,076,504	-119,365
Farm Perquisites	223,450	223,450	-----
Total Farm Expenditures	5,704,572	5,158,667	545,905
Interest	979,563	814,131	165,432
Taxes	305,028	290,261	14,767
Insurance	76,257	72,565	3,692
Buildings			
Depreciation	45,548	50,763	-5,215
Repair	37,819	43,661	-5,842
Machinery			
Depreciation	244,757	253,765	-9,008
Repair	111,473	78,738	32,735
Livestock	876,500	843,498	33,002
Crop	547,777	451,596	96,181
Motor Fuel	103,155	78,738	24,417
Hired Labor	149,003	48,358	100,645
Utilities	21,678	19,738	1,940
Water + OM & R	280,648	-----	280,648
Sows and Feeders purchased	1,925,366	2,112,855	-187,489

Source: South Dakota State University, Department of Economics. Budgets prepared for the U. S. Department of the Interior, Bureau of Reclamation. Missouri-Oahe Projects Office. Report on Big Sioux Basin and Missouri Terrace Area. Huron, South Dakota. January 1968.

Appendix Table A-11. Big Sioux Basin. Summary of the "Lower Big Sioux" farm budgets with irrigation and dryland, and the changes in farm income and farm expenditures resulting from irrigation.

	With Irrigation	Dryland	Changes from Irrigation
		Dollars	
Net Farm Income	1,381,224	1,067,073	314,151
Gross Farm Income	5,528,292	4,907,038	621,254
Crop Subtotal	1,679,750	542,070	1,137,680
Feed Grain	146,997	375,045	-228,048
Hay and Forage	516,343	13,965	502,378
Wheat	241,851	153,060	88,791
Beans	774,559		774,559
Livestock Subtotal	3,704,662	4,221,088	-516,426
Farm Perquisites	143,880	143,880	-----
Total Farm Expenditures	4,147,068	3,839,965	307,103
Interest	837,457	689,420	148,037
Taxes	256,806	227,304	29,502
Insurance	64,201	56,826	7,375
Buildings			
Depreciation	32,474	35,089	-2,615
Repair	27,664	30,246	-2,582
Machinery			
Depreciation	207,617	183,539	24,078
Repair	96,864	57,535	39,329
Livestock	566,028	585,901	-19,873
Crop	423,988	386,179	37,809
Motor Fuel	89,499	57,570	31,929
Hired Labor	168,338	53,680	114,658
Utilities	15,098	14,835	263
Water + OM & R	249,744		249,744
Sows and Feeders purchased	1,111,290	1,461,841	-350,551

Source: South Dakota State University, Department of Economics. Budgets prepared for the U. S. Department of the Interior, Bureau of Reclamation, Missouri-Oahe Projects Office. Report on Big Sioux Basin and Missouri Terrace Area. Huron, South Dakota. January 1968.

Appendix Table A-12. Missouri Terrace Area. Summary of the "Missouri River Terrace Area" farm budgets with irrigation and dryland, and the changes in farm income and farm expenditures resulting from irrigation.

	With Irrigation	Dryland	Changes from Irrigation
		Dollars	
Net Farm Income	2,386,412	1,023,897	1,362,515
Gross Farm Income	8,624,536	6,131,423	2,493,113
Crop Subtotal	3,997,302	701,025	3,296,277
Feed Grain	1,106,392	551,149	555,243
Hay and Forage	688,463	126,098	562,365
Beans	699,594	23,778	675,816
Potatoes	1,502,853	-----	1,502,853
Livestock Subtotal	4,363,236	5,166,400	-803,164
Farm Perquisites	263,998	263,998	-----
Total Farm Expenditures	6,238,124	5,107,526	1,130,598
Interest	1,560,249	1,263,065	297,184
Taxes	293,021	256,176	36,845
Insurance	73,255	64,044	9,211
Buildings			
Depreciation	54,455	60,206	-5,751
Repair	47,660	53,222	-5,562
Machinery			
Depreciation	491,705	446,015	45,690
Repair	255,936	157,497	98,439
Livestock	840,310	884,313	-44,003
Crop	967,259	492,886	474,373
Motor Fuel	252,791	157,377	95,414
Hired Labor	274,899	76,661	198,238
Utilities	27,570	21,044	6,526
Water + OM & R	405,075	-----	405,075
Sows and Feeders purchased	693,939	1,175,020	-481,081

Source: South Dakota State University, Department of Economics. Budgets prepared for the U. S. Department of the Interior, Bureau of Reclamation, Missouri-Oahe Projects Office. Report on Big Sioux Basin and Missouri Terrace Area. Huron, South Dakota. January 1968.

Appendix Table A-13. Summation of annual change in farm income and farm expenditures from irrigation development in South Dakota trade areas.
(Unadjusted for price level.)

	Trade Area		
	Sioux Falls	Brookings-Madison	Aberdeen
		Dollars	
Net Farm Income	699,340	467,916	33,497,635
Gross Farm Income	1,309,156	1,125,699	70,697,568
Crop Subtotal	1,931,968	1,433,198	15,082,277
Feed Grain	58,638	128,948	41,879
Hay and Forage	525,581	188,417	148,877
Wheat	56,444	54,919	-3,216,679
Beans	740,209	1,117,230	.....
Flax .....	.....	-56,316	.....
Sugar Beets .....	.....	.....	18,108,200
Potatoes	551,096	.....	.....
Livestock Subtotal	-622,812	-307,499	54,214,827
Meat	-294,520	.....	54,016,249
Farm Perquisites .....	.....	.....	1,400,464
Total Farm Expenditures	609,816	657,783	37,199,933
Interest	203,084	219,362	5,113,690
Taxes	32,266	25,514	1,781,579
Insurance	8,067	6,379	290,805
Buildings			
Depreciation	-3,772	-6,168	512,774
Repair	-3,681	-6,783	645,863
Machinery			
Depreciation	32,060	-236	2,371,008
Repair	61,097	47,063	1,029,138
Livestock	-28,771	25,762	4,771,822
Crop	197,987	109,955	2,273,311
Motor Fuel	55,294	36,049	1,058,116
Hired Labor	145,581	142,415	2,971,850
Utilities	2,559	2,036	165,393
Water + OM & R	307,302	371,630	2,852,300
Sow and Feeders purchased	-399,257	-315,195	11,362,284

Appendix Table A-13. Summation of annual change in farm income and farm expenditures from irrigation development in South Dakota trade areas—
Continued.

	Trade Area		
	Yankton-Vermillion	Ft. Pierre-Pierre	Mobridge
		Dollars	
Net Farm Income	1,063,577	4,036,614	455,790
Gross Farm Income	2,481,117	9,738,102	1,430,687
Crop Subtotal	2,078,315	1,583,248	-45,269
Feed Grain	348,702	-23,950	1,107
Hay and Forage	358,290	19,924	4,474
Wheat	-8,428	-381,696	-126,266
Beans	427,994		
Flax			-28,214
Sugar Beets		1,968,970	103,630
Potatoes	951,757		
Livestock Subtotal	347,863	7,763,652	1,397,963
Meat	333,513	7,699,879	1,355,846
Farm Perquisites	54,939	391,102	77,993
Total Farm Expenditures	1,417,540	5,701,488	974,897
Interest	328,379	956,235	208,538
Taxes	58,235	303,657	41,871
Insurance	14,244	66,107	11,120
Buildings			
Depreciation	7,804	95,075	15,460
Repair	12,641	130,848	21,691
Machinery			
Depreciation	74,470	420,674	56,856
Repair	81,369	166,313	22,645
Livestock	179,624	602,673	65,171
Crop	324,504	277,673	53,763
Motor Fuel	89,771	218,330	46,318
Hired Labor	168,216	481,656	196,655
Utilities	8,889	37,409	6,114
Water + OM & R	374,063	653,773	160,744
Sows and Feeders purchased ..	-304,669	1,291,065	67,951

**Appendix Table A-14. Summary of annual change in net farm income and farm expenditures resulting from irrigation development by trade areas.
(Deflated to 1957-1959 price level)**

	Sioux Falls	Brookings- Madison	Aberdeen	Yankton- Vermillion	Pierre- Ft. Pierre	Mobridge
Net Farm Income	655,426	438,534	33,497,635	1,009,394	4,036,614	455,790
Farm Expenditures						
Interest	179,720	194,126	5,113,690	306,727	956,235	208,538
Taxes	28,554	22,579	1,781,579	55,551	303,657	41,871
Insurance	7,139	5,645	290,805	13,573	66,107	11,120
Buildings						
Depreciation	-3,644	-5,959	512,774	7,927	95,075	15,460
Repair	-3,556	-6,554	645,863	12,760	130,848	21,691
Machinery						
Depreciation	30,976	-228	2,371,008	73,492	420,674	56,856
Repair	54,068	41,649	1,029,138	74,197	166,313	22,645
Livestock	-27,798	24,891	4,771,822	180,566	602,673	65,171
Crop	191,292	106,237	2,273,311	314,345	277,673	53,763
Motor Fuel	53,424	34,830	1,058,116	87,728	218,330	46,318
Hired Labor	136,440	133,472	2,971,850	160,333	481,656	196,655
Water—O M & R	74,083	89,564	1,258,585	71,967	173,444	21,931

Appendix Table A-15. Increase in personal income of farmers and classification of recipients of increased farm expenditures by trade area. (In 1957-1959 dollars.)

	Sioux Falls	Brookings- Madison	Aberdeen	Yankton- Vermillion	Pierre- Ft. Pierre	Mobridge
Farmers						
Net Income	655,426	438,534	33,497,635	1,009,394	4,036,614	455,790
40% of Interest	71,888	77,650	2,045,476	122,691	382,494	83,415
Hired Labor	136,440	133,472	2,971,850	160,333	481,656	196,655
O M & R Personnel	74,083	89,564	1,258,585	71,967	173,444	21,931
Retail Trade	240,694	153,217	11,632,894	676,818	1,745,273	259,259
Service Trade	54,068	41,649	1,029,138	74,197	166,313	22,645
*Wholesale Trade	285,944	59,877	7,351,989	264,500	682,053	101,318
Banking	107,832	116,476	3,068,214	184,036	573,741	125,123
Insurance	7,139	5,645	290,805	13,573	66,107	11,120
Local Government	28,554	22,579	1,781,579	55,551	303,657	41,871

*Wholesale trade was calculated from the historic ratio between retail and wholesale sales.

Table A-16. Increment in annual personal income from irrigation development by industrial class of recipients and trade area. (1957-1959 dollars).

	Sioux Falls	Brookings-Madison	Aberdeen	Yankton-Vermillion	Pierre-Ft. Pierre	Mobridge	Six Trade Areas
Farmers	727,314	516,184	35,543,111	1,132,085	4,419,108	539,205	42,877,007
Others	340,119	314,206	9,699,080	494,563	1,517,371	351,474	12,716,813
Hired labor ..	136,440	133,472	2,971,850	160,333	481,656	196,655	4,080,406
O M & R							
Personnel ..	74,083	89,564	1,258,585	71,967	173,444	21,931	1,689,574
Retail trade ..	46,767	29,770	2,260,271	131,506	339,107	50,374	2,857,795
Service trade..	11,830	9,113	225,175	16,234	36,389	4,955	303,696
Wholesale trade	17,814	3,730	458,029	16,478	42,492	6,312	544,855
Banking	22,461	24,262	639,109	38,335	119,510	26,063	869,740
Insurance	1,428	1,129	58,161	2,715	13,221	2,224	78,878
Local government ..	29,296	23,166	1,827,900	56,995	311,552	42,960	2,291,869
Total	1,067,433	830,390	45,242,191	1,626,648	5,936,479	890,679	55,593,820

Appendix Table A-17. Number of establishments and persons occupied in retail trade by trade area, state, region, and United States, 1963.

Trade Area	Number of Establishments		Total	Persons Occupied*	
	Total	With Payroll		Active	Paid
				Proprietors	Employees
Sioux Falls	1,301	1,043	7,536	1,122	6,414
Brookings-Madison ..	600	462	2,453	558	1,895
Aberdeen	956	734	4,368	849	3,519
Yankton-Vermillion ..	561	447	2,432	527	1,905
Pierre-Ft. Pierre†	336	261	1,421	282	1,139
Mobridge	351	277	1,293	346	947
Six trade areas	4,105	3,244	19,503	3,684	15,819
Other trade areas	3,552	2,783	16,557	3,265	13,292
Huron	422	336	1,905	380	1,525
Mitchell	574	486	2,842	548	2,294
Watertown	801	585	2,993	717	2,276
South Dakota	7,675	6,007	36,060	6,949	29,111
West North Central ..	158,275	118,097	872,565	148,097	724,468
United States	1,707,931	1,206,087	9,956,198	1,545,999	8,410,199

*In text reference is made to persons occupied as *persons employed*.

†Does not include Buffalo County because of disclosure problem.

Source: U. S. Bureau of the Census. Census of Business, 1963. Retail Trade.

Appendix Table A-18. Number of establishments and persons occupied in service industries by trade area, state, region and United States, 1963.

Trade Area	Number of Establishments		Persons Occupied*		
	Total	With Payroll	Total	Active Proprietors	Paid Employees
Sioux Falls	734	356	2,106	693	1,413
Brookings-Madison	289	125	624	304	320
Aberdeen	385	193	1,125	393	732
Yankton-Vermillion ..	242	112	526	255	271
Pierre-Ft. Pierre	170	89†	433†	157†	276*
Mobridge	156	67†	355‡	147‡	208†
Six trade areas	1,976	942	5,169	1,949	3,220
Other trade areas	2,045	1,083	5,396	2,068	3,328
Huron	209	113	439	128	311
Mitchell	312	145	755	297	458
Watertown	361	155	692	302	390
South Dakota	4,021	2,025	10,565	4,017	6,548
West North Central ..	92,230	41,964	309,533	90,926	218,607
United States	1,061,673	504,356	4,278,464	1,016,923	3,261,541

*In text reference is made to persons occupied as *persons employed*.

†One establishment in Buffalo County and two in Hyde County are not included because of disclosure problem.

‡Three establishments in Ziebach County are not included because of disclosure problem. Persons occupied are included in *other trade areas*.

Source: U. S. Bureau of the Census. Census of Business, 1963. Selected Services.

APPENDIX B

Appendix Table B-1. Major Groups of Retail Trade by Kind of Business.

Lumber, Building Materials, Hardware,
Farm Equipment dealers.
General Merchandise Group stores.
Food stores.
Automotive dealers.
Gasoline service stations.
Apparel, Accessory stores.
Furniture, Home Furnishings, Equip-
ment stores.
Eating, Drinking places.
Drug stores, Proprietary stores.
Other Retail stores.
Nonstore retailers.

Source: U. S. Bureau of the Census, Census of Business, 1963 Retail Trade.

Appendix Table B-2. Major Groups of Selected Service Trade by Kind of Business.

Hotels, Motels, Tourist Courts, Camps.
Personal services.
Miscellaneous Business services.
Auto repair, Auto services, Garages.
Miscellaneous repair services.
Motion pictures.
Amusement, Recreation services, except
Motion Pictures.

Source: U. S. Bureau of the Census, Census of Business, 1963 Selected Services.

Appendix Table B-3. Average sales per establishment in retail trade 1939-1963.

Trade Area	Average Sales Per Establishment				
	1939	1948	1954	1958	1963
	Dollars				
Sioux Falls	21,464	82,783	92,578	96,130	133,295
Brookings-Madison	15,574	62,632	71,525	77,529	96,637
Aberdeen	16,795	73,916	77,001	91,672	114,678
Yankton-Vermillion	16,507	70,308	79,384	76,437	103,266
Pierre-Ft. Pierre	15,550	64,755	75,274	92,487	112,196
Mobridge	11,306	55,629	64,723	83,181	94,587
South Dakota	17,228	69,186	81,409	88,129	114,345
West North Central	20,913	74,022	91,831	104,666	133,023
United States	23,748	73,760	98,724	111,639	142,981

Source: U. S. Bureau of Census, Census of Business, Retail Trade, 1939, 1948, 1954, 1958, 1963.

Appendix Table B-4. Index of average sales per establishment in retail trade 1939-1963.

Trade Area	Index				
	1939	1948	1954	1958	1963
Sioux Falls	103	112	101	92	100
Brookings-Madison	74	85	78	74	73
Aberdeen	80	100	84	88	86
Yankton-Vermillion	79	95	86	73	78
Pierre-Ft. Pierre	74	87	82	88	84
Mobridge	54	75	70	79	71
South Dakota	82	93	89	84	86
West North Central	100	100	100	100	100
United States	114	100	108	107	107

Source: U. S. Bureau of Census, Census of Business, Retail Trade, 1939, 1948, 1954, 1958, 1963.

Appendix Table B-5. Number of establishments in retail trade 1939-1963.

Trade Area	1939	1948	1954	1958	1963
Sioux Falls	1,607	1,482	1,487	1,639	1,301
Brookings-Madison	896	767	690	679	600
Aberdeen	1,313	1,221	1,027	1,099	956
Yankton-Vermillion	635	624	631	634	561
Pierre-Ft. Pierre	373	351	339	345	336
Mobridge	480	429	376	387	351
Huron	556	481	488	476	422
Mitchell	863	714	705	699	574
Watertown	1,030	1,002	873	940	801
South Dakota	9,817	8,993	8,338	8,758	7,657
West North Central	197,909	179,246	176,207	173,959	158,275
United States	1,770,355	1,769,540	1,721,650	1,788,325	1,707,931

Source: U. S. Bureau of Census, Census of Business, Retail Trade, 1939, 1948, 1954, 1958, 1963.

Appendix Table B-6. Average annual salary for employees in the retail trade industry, 1963.

	Average Salary	Index
South Dakota	\$3,012	96
West North Central	3,128	100
United States	3,286	105

Source: U. S. Bureau of Census, Census of Business, Retail Trade United States Summary, 1963.

Appendix Table B-7. Average receipts per establishment in selected service trade 1939-1963.

Trade Area	Average Receipts in Dollars Per Establishment				
	1939	1948	1954	1958	1963
	Dollars				
Sioux Falls	3,927	14,069	18,422	18,945	27,595
Brookings-Madison	2,262	7,489	11,578	13,053	16,467
Aberdeen	2,631	11,147	14,091	14,430	20,423
Yankton-Vermillion	2,468	8,119	15,233	15,251	15,157
Pierre-Ft. Pierre	2,538	6,477	17,750	18,850	24,663
Mobridge	1,511	5,456	8,829	12,887	15,359
South Dakota	3,799	11,943	14,746	15,790	21,371
West North Central	3,888	12,174	21,291	23,948	30,390
United States	5,216	15,330	29,898	33,198	41,996

Source: U. S. Bureau of Census, Census of Business, Selected Services, 1939, 1948, 1954, 1958

Appendix Table B-8. Indexes of average sales per establishment in selected service trade 1939-1963.

Trade Area	1939	1948	1954	1958	1963
Sioux Falls	101	116	86	79	91
Brookings-Madison	58	62	54	54	54
Aberdeen	68	92	66	60	67
Yankton-Vermillion	63	67	72	64	50
Pierre-Ft. Pierre	65	53	83	79	81
Mobridge	39	45	41	54	51
South Dakota	98	98	69	66	70
West North Central	100	100	100	100	100
United States	134	126	140	139	138

Source: U. S. Bureau of the Census, Census of Business, Retail Trade 1938, 1948, 1954, 1958, 1963.

Appendix Table B-9. Number of establishments in service industries 1939-1963.

Trade Area	1939	1948	1954	1958	1963
Sioux Falls	532	495	609	831	734
Brookings-Madison	286	235	256	320	289
Aberdeen	379	367	394	491	385
Yankton-Vermillion	186	176	236	299	242
Pierre-Ft. Pierre	106	107	120	160	170
Mobridge	133	125	123	150	156
Huron	181	149	181	211	209
Mitchell	282	240	218	331	312
Watertown	301	272	280	367	361
South Dakota	3,655	2,838	3,333	4,272	4,021
West North Central	62,423	53,593	76,458	88,787	92,230
United States	570,057	559,559	785,589	975,250	1,061,673

Source: U. S. Bureau of Census, Census of Business, Selected Services, 1939, 1948, 1954, 1958 and 1963.

Appendix Table B-10. Average annual salary for employees in the selected service trade industry, 1963.

	Average Salary	Index
South Dakota	\$2,768	88
West North Central ...	3,151	100
United States	3,738	119

Source: U. S. Bureau of Census, Census of Business, Selected Services, United States Summary, 1963.

Appendix Table B-11. Personal income with retail trade as industrial origin and sales volume of retail trade, South Dakota, (in 1957-1959 dollars.)

Year	Personal Income* \$1,000	Sales Volume† \$1,000
1939	53,719	378,360
1948	99,045	691,291
1954	121,795	706,171
1958	122,145	761,374
1963	148,079	841,060

Source:

*U. S. Department of Commerce, Survey of Current Business, August, edition of 1940, 1949, 1955, 1959, 1964.

†U. S. Bureau of Census, Census of Business, Retail Trade, South Dakota, 1939, 1948, 1954, 1958, and 1963.

Appendix Table B-12. Personal income with selected service trade as industrial origin and volume of receipts of selected service trade, South Dakota, (in 1957-1959 dollars.)

Year	Personal Income* \$1,000	Volume of Receipts† \$1,000
1939	18,595	24,534
1948	27,446	47,942
1954	22,436	54,732
1958	21,847	67,252
1963	34,677	76,048

Source:

*U. S. Department of Commerce, Survey of Current Business, August edition of 1940, 1949, 1955, 1959, 1964.

†U. S. Bureau of Census, Census of Business, Selected Services, South Dakota, 1939, 1948, 1954, 1958, and 1963.

Appendix Table B-13. Personal income with wholesale trade as industrial origin and sales volume of wholesale trade, South Dakota. (in 1957-1959 dollars.)

Year	Personal income* \$1000	Sales Receipts† \$1000
1939	316,104	22,727
1948	900,578	51,313
1954	844,443	55,556
1958	949,645	59,583
1963	972,497	71,228

Source:

*U. S. Department of Commerce, Survey of Current Business, August edition of 1940, 1949, 1955, 1959, 1964.

†U. S. Bureau of Census, Census of Business, Wholesale Trade, South Dakota, 1939, 1948, 1954, 1958, 1963.

Appendix Table B-14. Compensation of officers plus distributed profit and interest payment received by samples of bank corporations, U. S. (in 1957-1959 dollars.)

Year	Compensation plus Profit \$1,000	Interest Payment \$1,000
1958	1,819,229	7,941,846
1960	2,070,626	9,446,281
1961	2,231,254	10,147,195
1962	2,335,569	11,120,773
1963	2,532,654	12,073,949

Source: U. S. Treasury Department, Internal Revenue Service, U. S. Business Tax Returns, 1958-59, 1960-61, 1961-62, 1962, 1963.

Appendix Table B-15. Payroll and property tax revenue of local government in South Dakota (in 1957-1959 dollars.)

Year	Payroll*	Property Tax†
1954	44,462	58,816
1955	46,264	58,440
1956	49,293	60,633
1957	49,629	52,930
1958	55,889	65,124
1959	55,850	66,589
1960	58,766	71,048
1961	62,534	71,979
1962	66,603	74,148
1963	71,460	78,501

Source:

*U. S. Bureau of Census, Statistical Abstract of the United States, Editions from 1955 through 1964.

†Division of Taxation, Classified County Expenditures, Pierre, South Dakota, November, 1959, 1964.

Appendix Table B-16. Total personal income and sales volume of retail trade, South Dakota (in 1957-1959 dollars.)

Year	Sales Volume* \$1,000	Total Personal Income† \$1,000
1939	378,306	452,479
1948	691,291	1,059,666
1954	706,171	972,222
1958	761,374	1,139,027
1963	841,060	1,302,718

Source:

*U. S. Bureau of Census, Census of Business, Retail Trade, South Dakota, 1939, 1948, 1954, 1958, 1963.

†U. S. Department of Commerce, Survey of Current Business, August edition of 1940, 1949, 1955, 1959, 1964.

Appendix Table B-17. Total personal income and volume of receipts of selected service trade, South Dakota (in 1957-1959 dollars.)

Year	Volume of Receipts* \$1,000	Total Personal Income† \$1,000
1939	14,410	452,479
1948	47,942	1,059,666
1954	54,732	972,222
1958	67,252	1,139,027
1963	75,052	1,032,718

Source:

*U. S. Bureau of Census, Census of Business, Selected Services, South Dakota, 1939, 1948, 1954, 1963.

†U. S. Department of Commerce, Survey of Current Business, August edition of 1940, 1949, 1955, 1959, 1964.

Appendix Table B-18. Percentage distribution of employed persons in industries within the United States, South Dakota, and trade areas in South Dakota, 1960

Industry	U. S.	S. D.	Sioux Falls	Brookings Madison	Aberdeen	Yankton Vermillion	Pierre Ft. Pierre	Mobridge
Agriculture	6.6	30.5	21.0	37.6	33.3	38.2	30.0	41.0
Forestry	.1	.1					.1	
Mining	1.0	1.0	.2					.1
Construction	5.9	6.4	5.6	4.3	5.0	5.0	16.3	5.9
Manufacturing	27.1	6.6	13.4	4.0	4.8	3.7	2.1	2.3
Food and Kindred Products	(2.8)	(3.6)	(9.4)	(2.5)	(1.9)	(1.5)	(.4)	(.7)
Railroad	1.5	.9	.7	.8	1.7	.3	.6	1.0
Trucking	1.4	1.5	2.4	1.4	1.3	1.3	1.1	1.0
Other Transportation	1.4	.4	.8	.2	.4	.5	.4	.1
Communications	1.3	1.1	1.5	.7	1.1	.8	1.0	.7
Utilities	1.4	1.2	1.4	.8	1.1	1.1	.5	1.3
Wholesale	3.4	3.5	5.6	2.7	4.2	2.5	2.0	2.5
Food and Dairy	2.6	2.2	2.3	2.2	2.1	2.1	1.5	3.1
Eating & Drinking	2.8	3.4	3.2	3.9	3.1	3.3	3.9	3.8
Other Retail	9.4	9.8	10.4	9.5	11.0	9.4	8.9	9.2
Finance	4.2	2.8	4.0	1.9	3.1	1.6	1.5	2.2
Business Service	1.2	0.4	.6	.5	.3	.3	.4	.1
Repair Service	1.3	1.6	1.6	1.7	1.6	1.4	1.3	1.8
Private Household	3.0	2.9	3.0	3.6	3.2	2.5	2.4	1.8
Other Personal Services	3.0	2.7	2.6	2.0	2.6	2.1	2.6	2.2
Entertainment	.8	.7	.8	.8	.7	.6	.1	.6
Hospitals	2.6	3.0	3.2	1.8	2.9	4.8	2.0	1.6
Education	5.2	6.9	5.3	12.0	6.3	10.8	6.7	6.6
Welfare and Religion	1.3	1.5	1.8	1.5	1.5	1.7	1.4	1.6
Other Professions	2.5	1.7	2.2	1.2	1.8	1.1	1.4	1.1
Public Administration	5.0	4.7	3.4	3.2	4.9	3.1	9.6	4.8
Industries not Reported	4.0	2.5	2.9	1.8	2.0	1.9	2.2	3.7
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: U. S. Bureau of Census, U. S. Census of Populations: 1960, General Social and Economic Characteristics, South Dakota.

Appendix Table B-19. Derived percentage of basic industries within South Dakota and trade areas in South Dakota, 1960.

Industry	S. D.	Sioux Falls	Brookings Madison	Aberdeen	Yankton Vermillion	Pierre Ft. Pierre	Mobridge
Agriculture	23.9	14.4	31.0	26.7	31.6	23.4	34.4
Forestry							
Mining							
Construction .....	.5					10.4	
Manufacturing							
Food and							
Kindred Products .....	.8	6.6					
Railroad .....				.2			
Trucking .....	.1	1.0					
Other Transportation							
Communications .....		.2					
Utilities							
Wholesale .....	.1	2.2		.8			
Food and Dairy .....							.5
Eating and drinking .....	.6	.4	1.1	.3	.5	1.1	1.0
Other retail .....	.4	1.0	.1	1.6			
Finance							
Business service							
Repair service .....	.3	.3	.4	.3	.1		.5
Private Household .....			.6	.2			
Other personal service							
Entertainment .....						.2	
Hospitals .....	.4	.6		.3	2.2		
Education	1.7	.1	6.8	1.1	5.6	1.5	1.4
Welfare and religion .....	.2	.5	.2	.2	.4	.1	.3
Other professions							
Public administration						4.6	
Industries not reported							
Total	29.0	27.3	40.2	31.7	40.0	41.3	38.1

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