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CENDAK and South Dakota: An Economic Impact Study

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An Economic Impact Study

by

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ABSTRACT

CENDAK is an acronym for the Central South Dakota Water Supply System and is a multi purpose water delivery system which would use Missouri River water from Lake Oahe. The project would service 300,000 acres of farmland. Other potential uses of the project would be for a municipal and industrial water supply system.

Economic activity generated from construction of CENDAK is estimated at $911.9 million, providing over 10,700 temporary, full- and part-time employment opportunities in the 10 year construction process and in industries which support construction of the project.

Annual operation, maintenance, and repair costs of CENDAK would generate $20.9 million in economic activity while creating 224 full- and part-time jobs.

Water delivered through CENDAK for irrigation purposes would annually generate between $121.1 million and $212.8 million in economic activity, providing employment of 1,352 to 2,362 full- and part-time jobs with total wages of $16.9 million to $28.7 million.

With the establishment of CENDAK, other industries which utilize South Dakota produced commodities could expand or set up operations in the state, resulting in higher tax revenues for state and local governments.

The construction, operation, and maintenance of the CENDAK project would have a major impact on the economy of South Dakota.

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INTRODUCTION

Water. The mention of it causes people to thirst, the lack of it causes people to move or perish. Water is an integral part of our lives, It is required for nearly every thing we do. Water quenches our thirst, produces our food, cleans our clothes, and provides many types of recreation. Water is essential for our survival. Water was instrumental in settling this country. Where water was plentiful, civilization prospered. Where water was lacking, nothing but the indigenous plants and animals survived. In many areas of the West, water had to be developed before industry and commerce could grow.

South Dakota typically experiences extreme changes in temperature and precipitation. Drought has played a major role in the economies of nearly all rural communities in the state as well as having a significant impact on the larger population centers. Many of our rural young have chosen a life outside of agriculture, due in part, to these extreme changes. Irrigation, and the existence of a safe clean water supply, could play a substantial role in keeping our rural communities alive and growing, while providing an opportunity to increase the value of commodities produced from South Dakota soil. Water will be a major area of research and extension focus in the new Northern Plains Bio Stress Labratory at SDSU.

This study identifies the total economic impact (direct, indirect and induced effects) that the Central South Dakota Water Supply System (CENDAK) would have on the economy of South Dakota, including effects on other industries in the economy. Data for this study were taken from the 1988 Rescoping Report for the project. All figures were adjusted to represent 1990 dollar values.

Overview of the CENDAK Water Supply System

CENDAK is a multi purpose water delivery which uses Missouri River water from Lake Oahe. This project would supply water to irrigate approximately 300,000 acres of farmland. The project is planned to be built over several years in three stages. Stage 1 involves the irrigation of approximately 105,000 acres. Stage 2 would irrigate an additional 98,000 acres. Stage 3 is designed to irrigate 97,000 acres. Stage 1 would be located in the central region of South Dakota, east of the Pierre, Lake Oahe area in Hughes, Hyde, Hand counties. Stage 2 would operate in Hyde, Hand, and Faulk counties. Stage 3 would irrigate land in Hughes, Hyde, Hand, Faulk, and Beadle counties.

Measures of Economic Importance

Several factors can be used in determining the importance of one industry to the economy of a state or region. Traditional measures include income (personal & business), employment, value added, and industry output.

Personal Income is important when looking at how an industry affects consumer industries in an economy. Expenditures for food, clothing, automobiles, recreation, etc. fall into this category.

Business Income is important in looking at the economic viability of the sector and its ability to reinvest the capital required to keep the physical facilities in working order and to adopt new technology as it is made available.

Employment is important when looking for those industries in an economy which may have the greatest impact given positive or negative changes in the economy. Industries that employ a higher percentage of the people in the work-force in a region may be singled out for additional support by government.

Value added represents the additional value an industry adds to the raw materials it uses when producing its own output or the amount that industry adds to intermediate goods and services. It is the sum of employee compensation, proprietary income, indirect business taxes, and other property income. This figure shows how much "new wealth" is added by an industry in a given region.

Total Industry Output is the total gross output of an industry. It is a direct measure of the impact an industry has on a region. It includes the value of any raw materials produced as well as the added value contributed by the industry.

This study will look at all five measures in determining what affect CENDAK has on other industries in the state.

Economic Effects

There are three types of effects used in determining the economic contribution of an industry (or a change in an industry) on the economy of a state or region; direct, indirect, and induced.

Direct effects are the actual dollar sales, costs, wages paid, etc. of a given industry or change to the industry. Indirect effects account for the added economic activity generated by input suppliers and output users of a given industry's commodity. Induced effects represent the added economic activity generated as employees of the affected industry as well as business owners, spend money in their communities. The summation of the direct, indirect, and induced effects represent the total economic impact on a given region of a change in an industry located within that region.

THE IMPACT OF CONSTRUCTION

Total Economic Impacts

The construction of CENDAK would involve the expenditure of an estimated $522.8 million dollars, Table 1. This expenditure, carried over several years, would occur in three stages. Stage one would cost $262.1 million and would result in an total increase in economic activity of $457.2 million (Figure 1). Stage 1 would result in an increase in employment of 5,365 full and part-time jobs. These workers would earn approximately $115.2 million in wages. Business owners in the state would realize an additional $117.7 million in income. Added value to South Dakota products would amount to $252.4 million.

Stages 2 and 3 would involve direct expenditures of approximately one half that of Stage 1 ($136.1 million and $124.6 million respectively, Table 1). Construction expenditures on these two stages would generate $237.4 million from Stage 1 and $217.3 million from Stage 2 (Figures 2 & 3). Approximately 2,788 full and part-time jobs would be created by expenditures on Stage 2 construction. Some of these jobs would be filled by workers from Stage 1 who would move from one stage of construction to another as work progresses on the project. Stage 2 workers would earn $59.8 million in additional wages. Stage 3 construction would result in the employment of

Table 1. Construction Cost Estimates for the CENDAK Water System.

Capital Costs	Inital Stage (105,000A)	2nd Stage (98,000)A	3rd Stage (97,000)A	Total (300,000)A
			($1,000)	
Main Canal System	129783	46236	39568	215587
Right of Way	1581	918	637	3136
Distribution System	44612	41552	41297	127461
Right of Way	1515	1411	1402	4328
Transmission Facilities	8159	6721	5660	20541
O&M Facilities	5918	2532	2532	10982
Project Mitigation	3976	2116	1760	7852
Surface Drainage	116	108	108	332
Archeological Salvage	228	228	228	683
Subtotal	195887	101821	93193	390902
Contingencies Engineering & Overhead	66232	34290	31364	131886
TOTAL	262119	136111	124557	522788

Source: Rescoping Report on the Central South Dakota Water Supply System, Table 5-2. Aug. 1988. Adjusted to 1990 $ Values.

Figure 1.

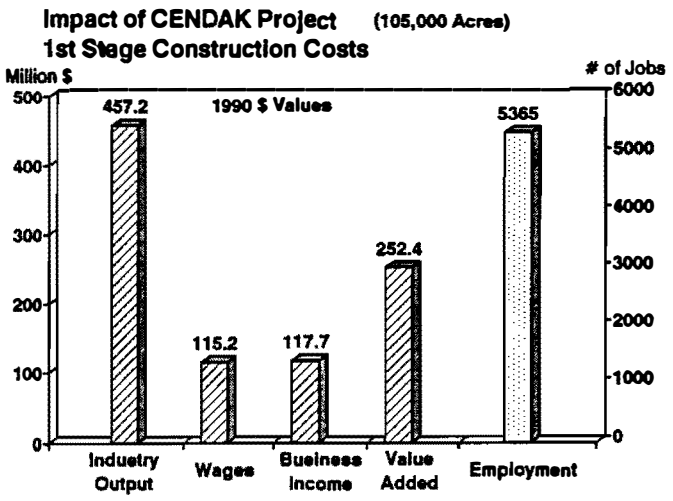


Figure 2.

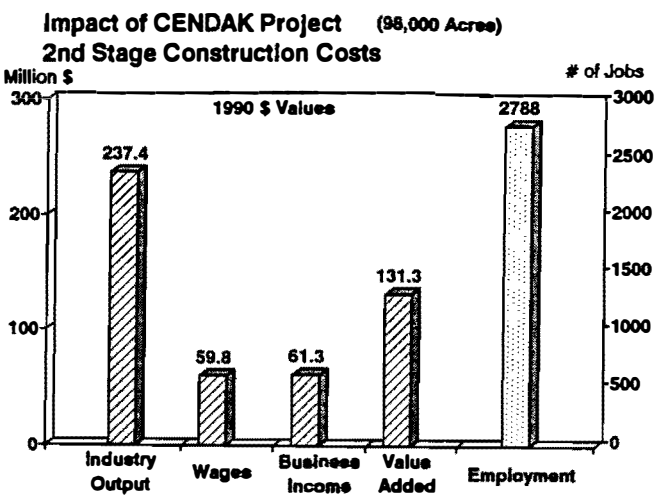
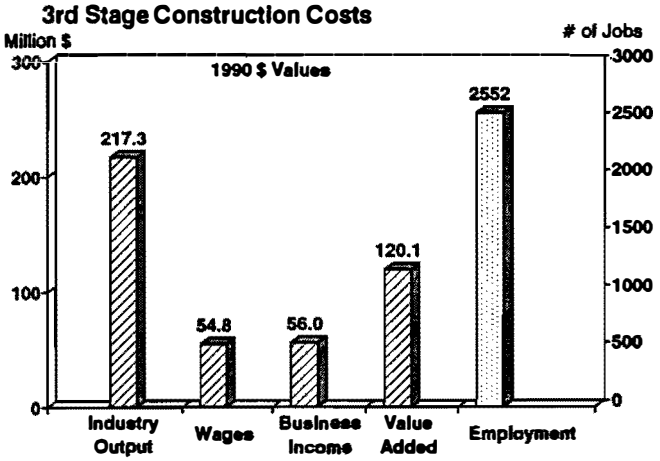


Figure 3.



2,552 workers on the project and in other industries in the state. These workers would earn $54.8 million in wages and be part of the $120 million in added value generated by this stage of construction. Note - dollar values for wages and business income are included in value added figures. Value added is included in the total industry output amounts for a given activity.

Impact of Construction on Other Industries

Major industries indirectly impacted by the construction of CENDAK include: Service, Retail Trade, Housing, Medical, Finance, Wholesale Trade, and Recreation. Total Industry output of the above industries would be increased by $137.5 million during Stage 1, $71.3 million during Stage 2, and $65.3 million in Stage 3, Figures 4, 5, 6.

Expenditures on wages in the retail trade industry would increase by $9.5 million during Stage 1, $4.9 million in Stage 2, and $4.5 million in Stage 3. The medical, service, wholesale trade, finance and recreation industries would also see significant increases in wages paid to their employees as they serve construction workers and their families. Employment in the above six industries would increase by 1,990 full and part-time jobs during Stage 1. Thus, construction of CENDAK would result in a major impact to the regions in which construction takes place during the construction phase. This impact would last until the construction of the project is completed, after which, the impacts of the operation, maintenance, and increased agricultural production would replace the construction impacts and have more long term effects on the economy of the region and the state.

Figure 4.

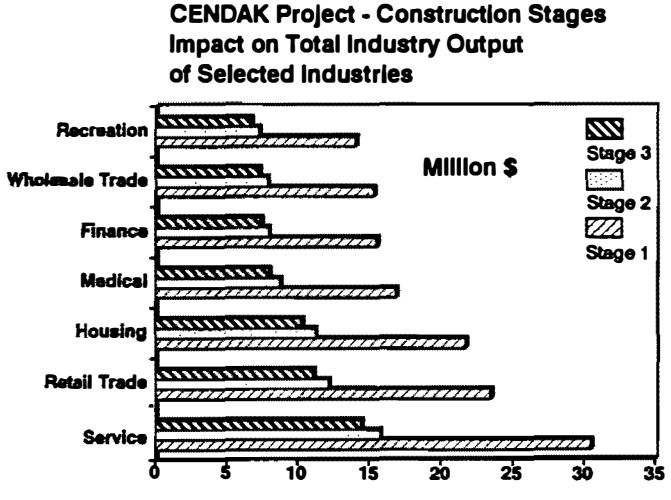


Figure 5.

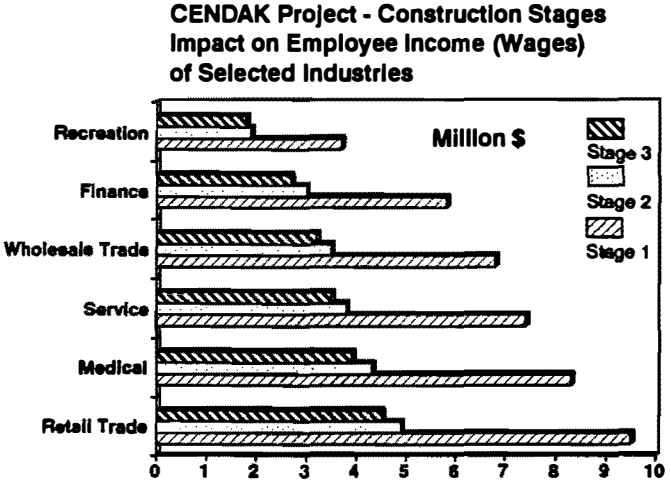
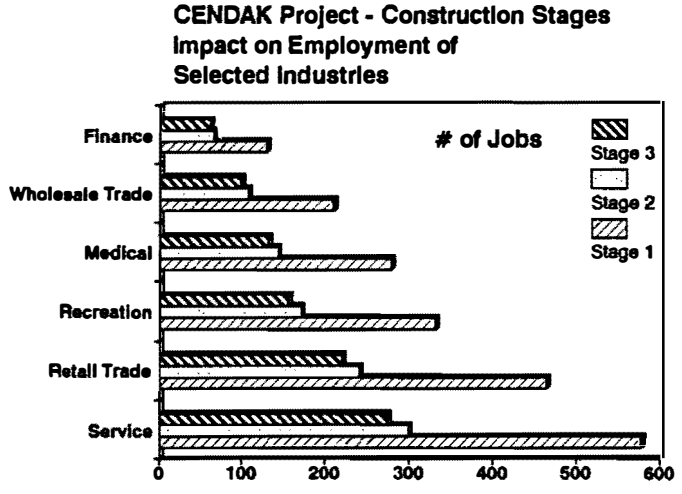


Figure 6.



OPERATIONAL COSTS OF CENDAK

Operations, Maintenance, and Repair - Annual Costs

Table 2 presents the information from the rescoping document of the CENDAK project with respect to the annual operation and maintenance of the CENDAK facilities (not including annual costs for drainage, on-farm mitigation, and energy costs). These figures have been converted to 1990 dollar values.

Total Economic Impacts

Total direct expenditures for operations and maintenance on the facilities required to operate the completed CENDAK project (300,000 acres) are estimated at $9.3 million. These expenditures would have indirect and induced impacts of $5.4 million for a total economic impact of $14.2 million, Figure 7. This includes $3.6 million in new wages, creating 158 new jobs and earning an additional $4.4 million in business income.

Impacts by stages of construction are shown in Figure 11. Employment of Stage 1 would increase by 76 full and part-time jobs. Stage 2 would see 42 new jobs created and Stage 3 would account for 40 new employment opportunities.

Impacts on Other Industries

Impacts on selected industries in the economy which are affected by indirect and induced business transactions are given in Figure 8, 9, and 10 for the completed project and in Figures 12, 13, and 14 by construction stages.

The retail trade industry would be greatly affected by expenditures for annual operational and maintenance of the CENDAK facilities. $772 thousand in additional business output would be realized in the retail trade industry, of which, $314 thousand would be paid as wages to 15 new

Table 2. Summary of Annual Operational Costs of Rescoped CENDAK Project

Cost	Initial Stage	2nd Stage	3rd Stage	Total
		($1,000)		
OM&R CENDAK Facilities				
Salaries & Benefits	1816	909	909	3635
Services & Supplies	896	448	448	1792
Equipment Reserve	556	279	279	1114
Power Transmission	330	228	131	688
Mitigation Facilities	40	22	17	79
Subtotal	3638	1886	1784	7308
OM&R Services				
Wheeling of Energy-East River EPC	265	248	245	758
Energy for Pumping @ 2.5 mills	129	121	118	368
Mainstem Storage P-SMBP	279	26	257	797
Subtotal	673	629	620	1922
Contribution to Emergency Operating Fund	40	35	35	110
Total	4351	2550	2440	9341

Source: Rescoping Report on the Central South Dakota Water Supply System, Table 5-3. Aug. 1988. Adjusted to 1990 $ Values.

Figure 7.

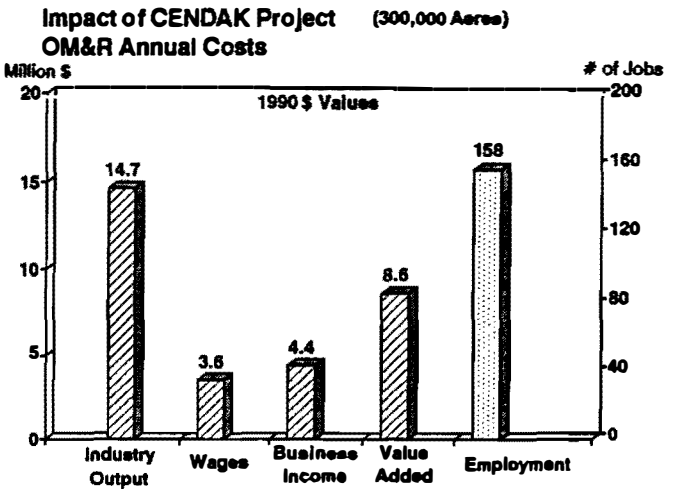


Figure 8.

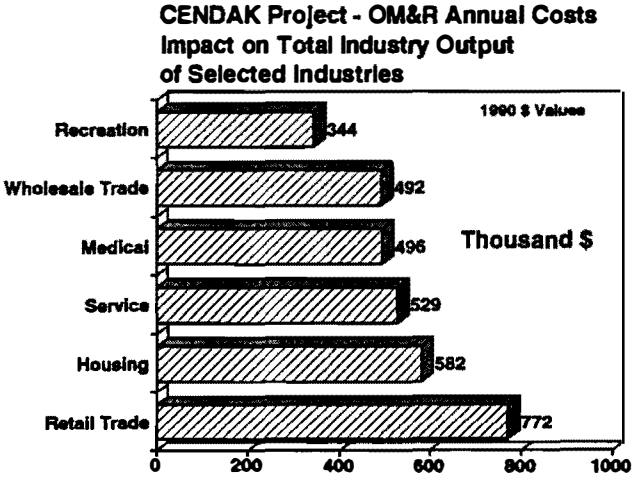


Figure 9.
CENDAK Project - OM&R Annual Costa Impact on Employee Income of Selected Industries

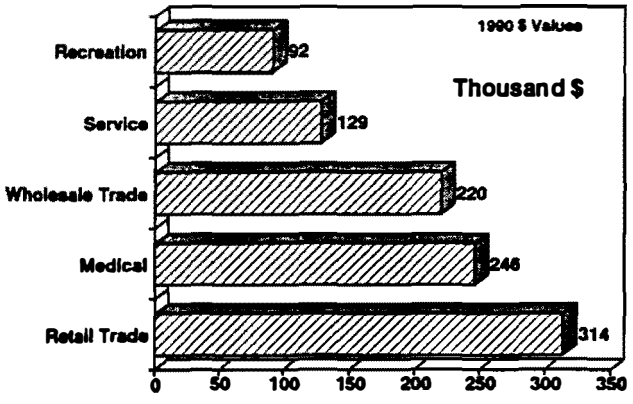


Figure 10.
CENDAK Project - OM&R Annual Costs Impact on Employment of Selected Industries

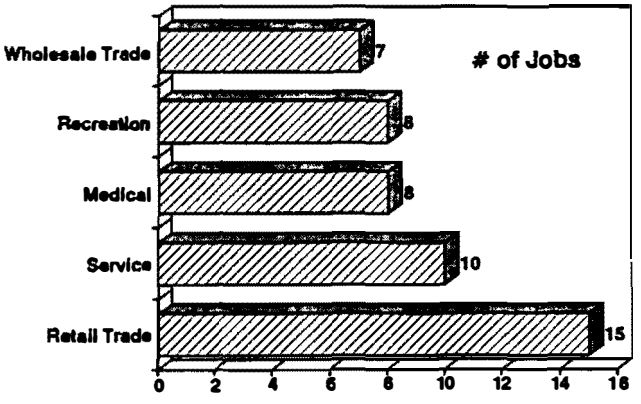


Figure 11.
Impact of CENDAK Project OM&R Costs, Stages 1-3

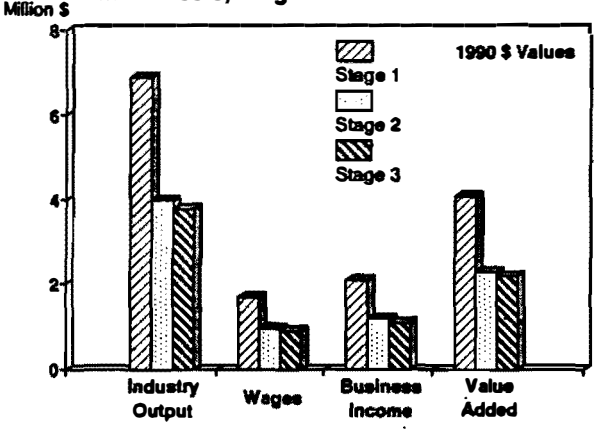


Figure 12.
CENDAK Project - Annual OM&R by Stages Impact on Total Industry Output of Selected Industries

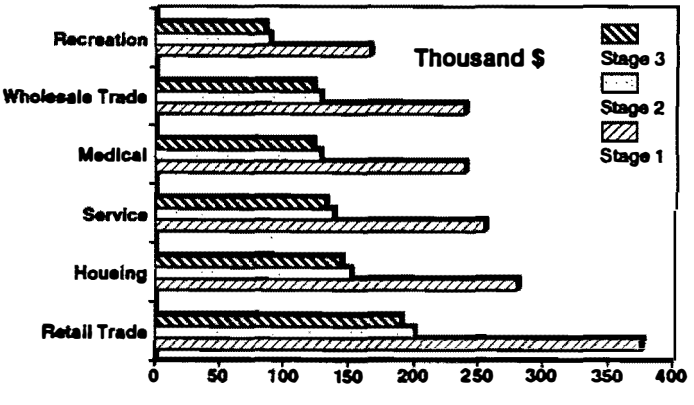


Figure 13.

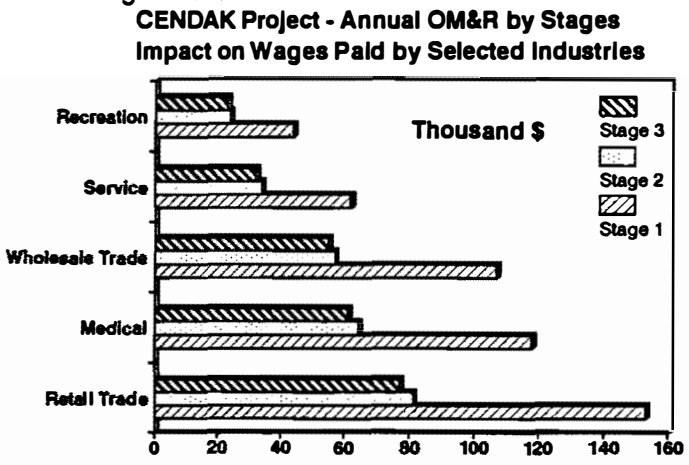
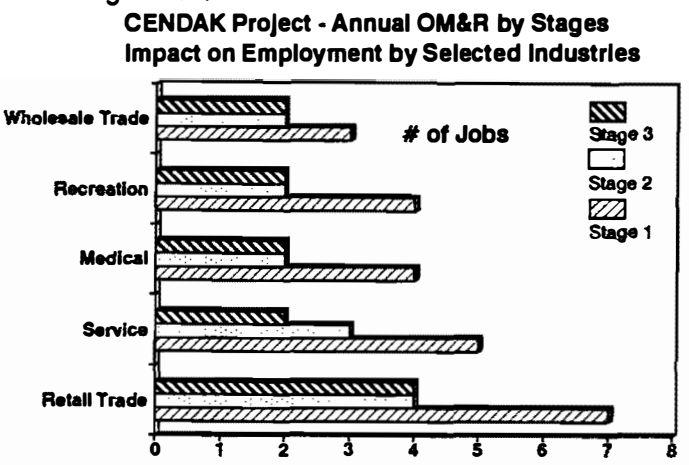


Figure 14.



employees. $582 thousand in housing industry output would be generated as people employed by the CENDAK project and others hired by businesses supporting CENDAK would purchase and rent homes and apartments. Medical expenditures would increase as these new employees and their families require medical services. Recreational business would also be affected as more people seek recreational opportunities. These impacts would be long-term impacts on the region, lasting as long as the CENDAK project is functioning or until new technological or operational methods are adopted and installed.

Total Annual Costs

In addition to the annual operation, maintenance, and repair costs associated with the CENDAK facilities, other annual costs would be incurred for drainage of the system, on-farm mitigation, and the cost of energy required to operate the water transmission facilities (pumphouses, etc.). This section demonstrates the impact that all annual costs of the CENDAK project would have on the state. Data used for this portion of the analysis is given in Table 3.

Table 3. Total Annual Costs of the Rescoped CENDAK Project

	($1,000)
Annual OM&R Facilities	7308
Annual OR&M Services	1922
Emergency Fund Contributions	110
Annual Cost of Drainage	469
Annual Economic Cost of On-Farm Mitigation	572
Annual Economic Cost of Energy (22.2-2.5 mills)	$2,894
Total Annual Costs	$13,276

Source: Rescoping Report on the Central South Dakota Water Supply System, Table 5-4. Aug. 1988.
Adjusted to 1990 $ Values.

Total Economic Costs

The total direct annual costs of operating the CENDAK system facilities would be $13.2 million, Table 3. The $13.2 million would generate an estimated $20.9 million in increased economic activity in the state, Figure 15. This would include the creation of 224 new full and part-time jobs with wages of $5.1 million and increased business income of $6.4 million. $12.4 million would be added to the value of goods and services generated in South Dakota.

Impact on Other Industries

Increasing economic activity by $13.2 million dollars would result in an increase in the retail trade industry of $1 million, Figure 16. Housing would increase by $839 thousand. The service industry would increase in output by $750 thousand. The medical, wholesale trade, and recreation industries would also be greatly affected. Employment would increase by 21 jobs in the retail trade industry, 14 jobs in services, 12 jobs in medical offices in the region and 12 jobs working in the recreation industry, Figure 18. The new retail trade workers would have $439 thousand in wages to spend and new medical workers would earn $348 thousand, Figure 17.

BENEFITS FROM INCREASED AGRICULTURAL PRODUCTION

The benefits from increased agricultural production resulting from the CENDAK project were computed in the 1988 Rescoping Document according to four criteria. The first was according to guidelines in a Planning Report/Draft Environmental Statement (PR/DES Conditions) which was submitted by the Regional Director, Missouri Basin Region in 1986. The second criteria was according to general farm management practices with the inclusion of producing feeder steers with the crop output generated from the CENDAK project (Farm Management Conditions). This

Figure 15.

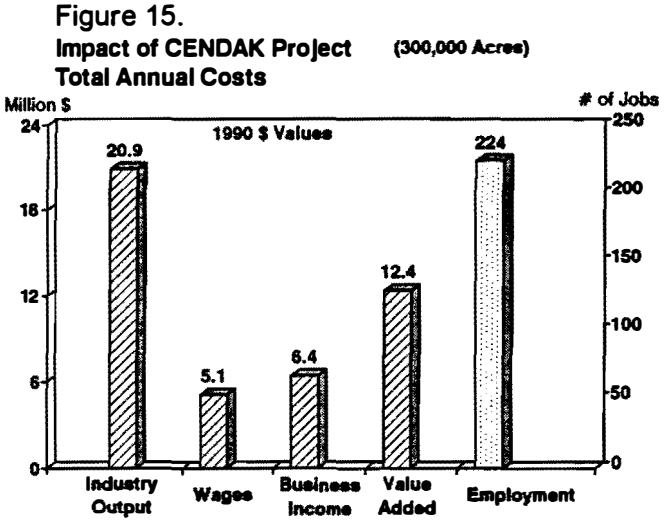


Figure 16.

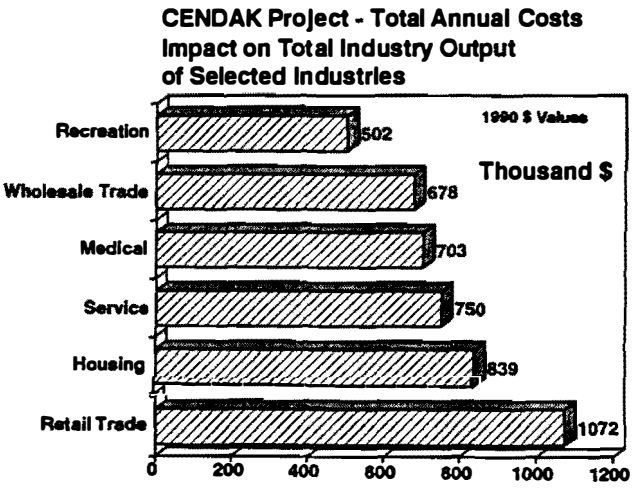


Figure 17.

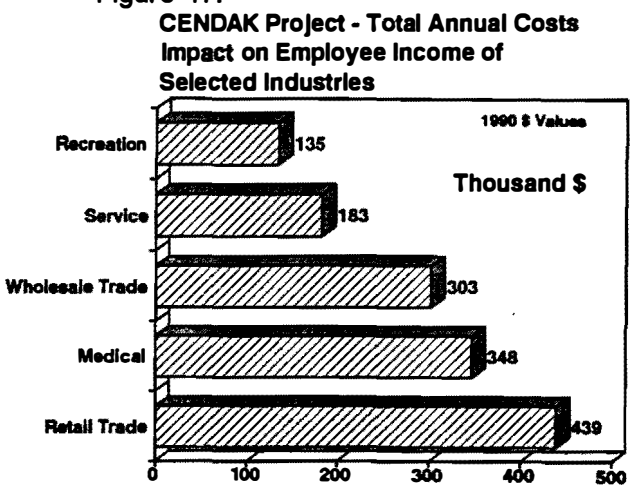
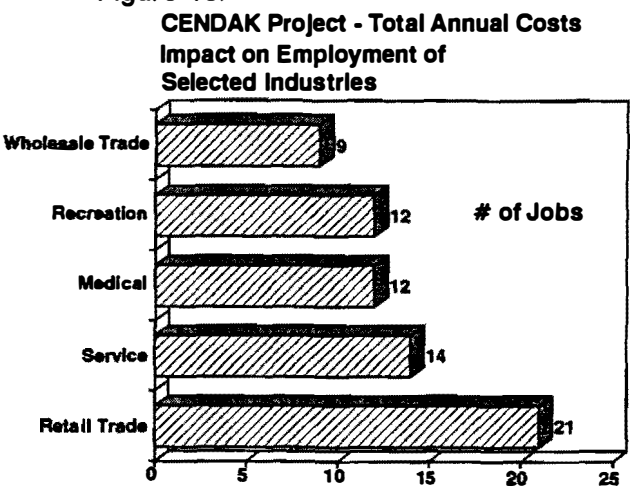


Figure 18.



criteria was determined to be the most realistic use of total crop production of the CENDAK project. The third criteria was according to Principles and Guidelines of the Water Resource Council (P&G Conditions). The fourth criteria was similar to the P&G conditions minus an increment of benefit from program crops (i.e. the government program subsidy for corn production), (P&G Conditions minus Subsidy). The direct effects of these four evaluation criteria are given in Table 4. All four decision criteria includes benefits from pressurized sprinkler irrigation. More information on the differences between the criteria can be found in the 1988 rescoping document.

PR/DES Conditions

Total Economic Impact

The direct benefits from increased agricultural production resulting from the PR/DES conditions was estimated in the 1988 rescoping document to be $101 million, Table 4. These benefits would generate a total of $185.6 million in economic activity in the state, Figure 19. Employment would increase by 2,071 full and part-time jobs. These employees would earn $25.7 million in wages and when combined with added business income of $57.7 million and various indirect business taxes, value added in the state would increase by $91.9 million.

Impact on Other Industries

Industries significantly affected by irrigated agriculture under the PR/DES conditions (outside of agriculture) are; service, retail trade, wholesale trade, finance, medical, and recreation. Increases in total industry output of these industries from the PR/DES conditions are given in Figure 20. The service industry would generate another $8.7 million in total economic activity. The retail trade industry would increase by $7.3 million. The recreation industry would increase by $4.5 million.

Increases in wages of non-agricultural industries under the PR/DES conditions include $3.3 million for the 100 new employees in the wholesale trade industry, Figures 21-22. The 165 new workers in the service industry would earn $2.1 million. The medical and recreation industries would both see 107 new full and part-time employees.

Table 4. Estimated Total Annual Benefit for Alternative Premises

	($1,000)
PR/DES Conditions	
Irrigation w/o sprinkler pressure	84132
Sprinkler Pressure Benefit @42/AC	14339
Subtotal	98471
Other (railroad)	2563
Total Benefits	101034
Real Farm Management Conditions	
Irrigation with Feeders w/o pressure	98292
Sprinkler pressure benefit	14339
Total Benefits	112631
P&G Conditions	
PR/DES Alternative Irr Benefits	84132
Reduction for P&G Farm Prices	26987
P&G Irrigation Benefits	57146
Sprinkler Pressure Benefit	14339
Subtotal, Irrigation Benefits	71485
Other (railroad)	2563
Total Benefits	74047
P&G Conditions minus Subsidy	
P&G Irrigation Benefits	57146
Double Subsidy Reduction	8000
Subtotal	49146
Sprinkler Pressure Benefit	14339
Subtotal, Irrigation Benefits	63484
Other (railroad)	2563
Total Benefits	66047

Source: Rescoping Report on the Central South Dakota Water Supply System, Table 5-6. Aug. 1988. Adjusted to 1990 $ Values.

Figure 19.
Impact of CENDAK Project
PR/DES Conditions, Total Annual Benefit

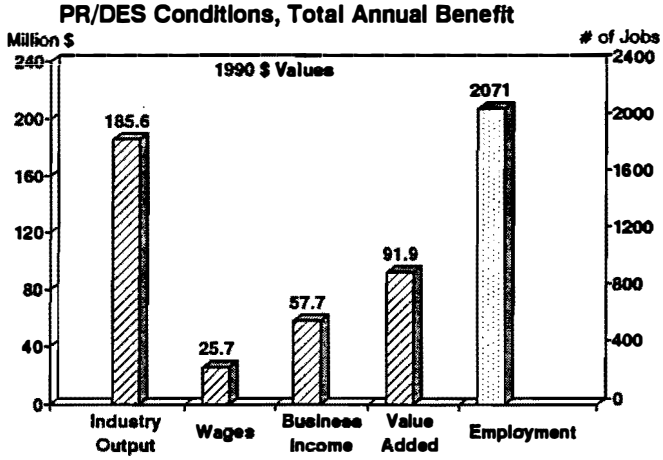


Figure 20.
CENDAK Project - PR/DES Conditions
Impact on Total Industry Output
of Selected Industries

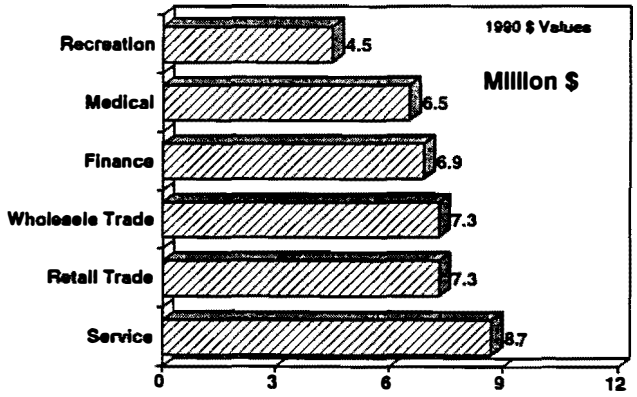


Figure 21.
CENDAK Project - PR/DES Conditions
Impact on Employee Income (Wages)
of Selected Industries

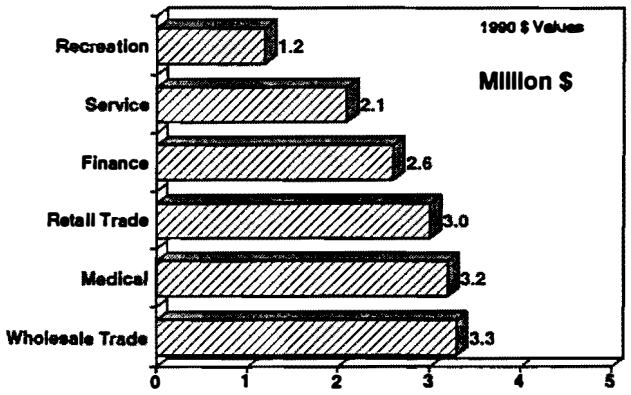
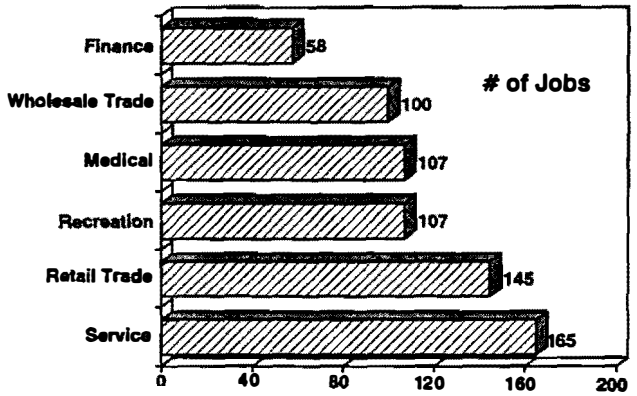


Figure 22.
CENDAK Project - PR/DES Conditions
Impact on Employment of
Selected Industries



Farm Management Conditions

Total Economic Impact

The direct benefits from increased agricultural production resulting from the Farm Management conditions was estimated in the 1988 rescoping document to be $112.6 million, Table 4. These benefits would generate a total of $212.8 million in economic activity in the state, Figure 23. Employment would increase by 2,362 full and part-time jobs. These employees would earn $28.7 million in wages and when combined with added business income of $62.3 million and various indirect business taxes, value added in the state would increase by $100.7 million.

Impact on Other Industries

Industries significantly affected by irrigated agriculture under the Farm Management conditions (outside of agriculture) are; service, retail trade, wholesale trade, finance, medical, and recreation. Increases in total industry output of these industries from the Farm Management conditions are given in Figure 24. The service industry would generate another $9.8 million in total economic activity. The wholesale trade industry would increase by $8.7 million, retail trade industry by $8.3 million. The recreation industry would increase by $5.2 million.

Increases in wages of non-agricultural industries under the Farm Management conditions include $3.8 million for the 116 new employees in the wholesale trade industry, Figures 25-26. The 186 new workers in the service industry would earn $2.4 million. The recreation industry would see an additional 122 new full and part-time employees with wages of $1.4 million.

Figure 23.
Impact of CENDAK Project
Farm Mgmt. Conditions, Total Annual Benefit

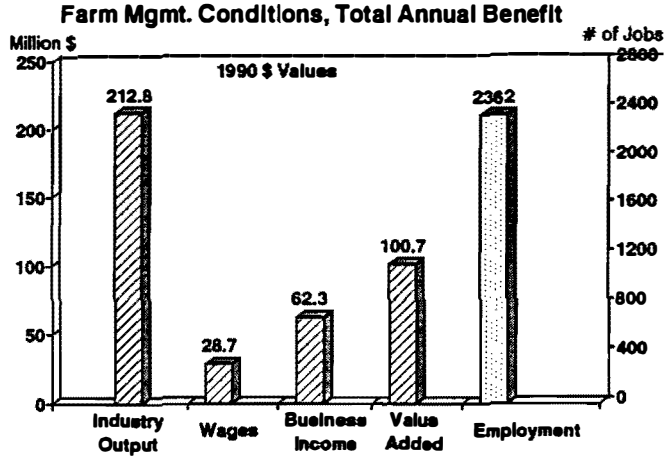


Figure 24.
CENDAK Project - Farm Mgmt. Conditions
Impact on Total Industry Output
of Selected Industries

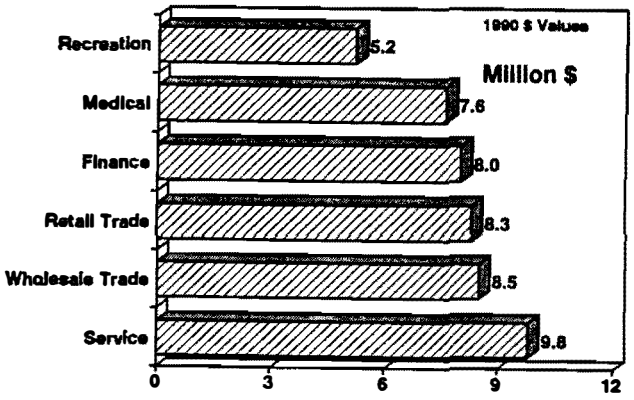


Figure 25.
CENDAK Project - Farm Mgmt. Conditions
Impact on Employee Income (Wages)
of Selected Industries

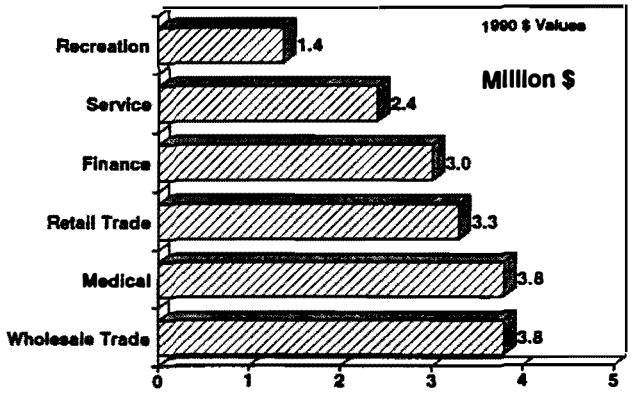
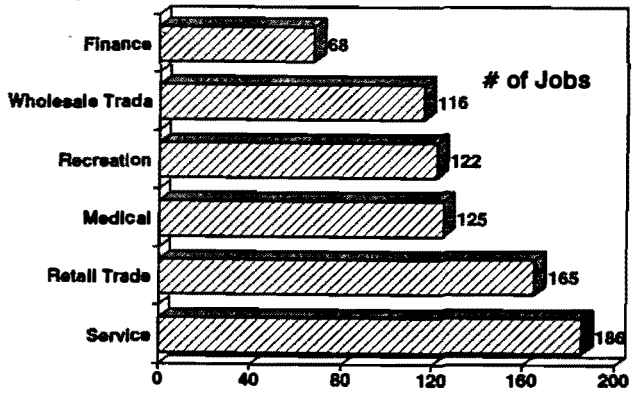


Figure 26.
CENDAK Project - Farm Mgmt. Conditions
Impact on Employment of
Selected Industries



P&G Conditions

Total Economic Impact

The direct benefits from increased agricultural production resulting from the P&G conditions was estimated in the 1988 rescoping document to be $74 million, Table 4. These benefits would generate a total of $135.9 million in economic activity in the state, Figure 27. Employment would increase by 1,517 full and part-time jobs. These employees would earn $18.9 million in wages and when combined with added business income of $42.3 million and various indirect business taxes, value added in the state would increase by $67.5 million.

Impact on Other Industries

Industries significantly affected by irrigated agriculture under the P&G conditions (outside of agriculture) are; service, retail trade, wholesale trade, finance, medical, and recreation. Increases in total industry output of these industries from the P&G conditions are given in Figure 28. The service industry would generate another $6.4 million in total economic activity. The wholesale trade industry would increase by $5.3 million, retail trade industry by $5.4 million. The recreation industry would increase by $3.3 million.

Increases in wages of non-agricultural industries under the P&G conditions include $2.4 million for the 73 new employees in the wholesale trade industry, Figures 29-30. The 121 new workers in the service industry would earn $1.6 million. The recreation industry would see an additional 78 new full and part-time employees with wages of $0.9 million.

Figure 27.

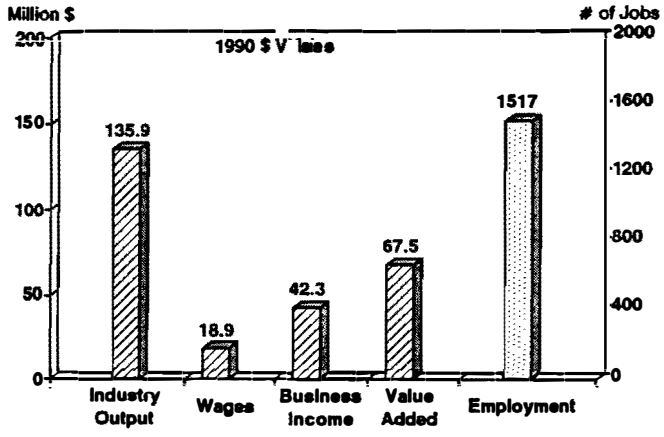


Figure 28.

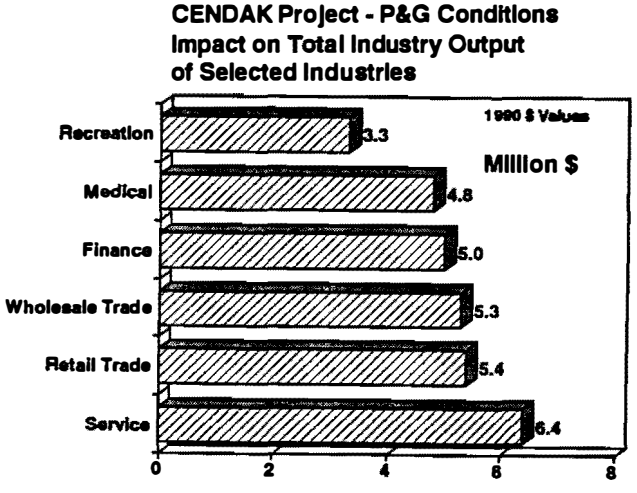


Figure 29.

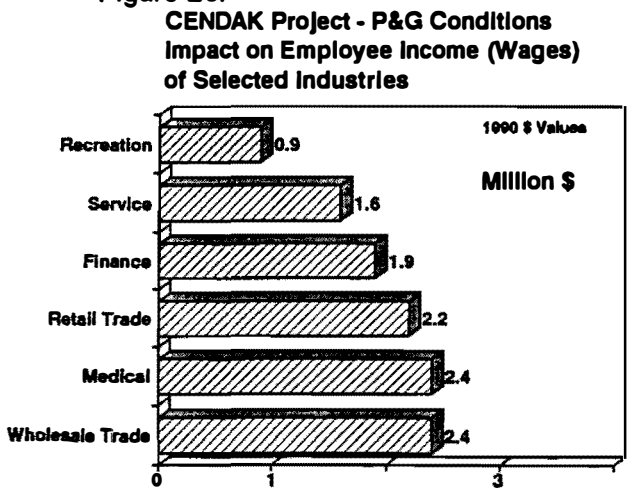
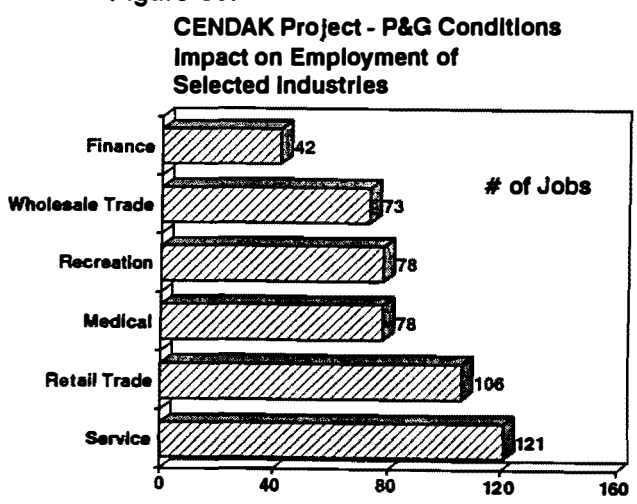


Figure 30.



P&G Conditions Minus Subsidy

Total Economic Impact

The direct benefits from increased agricultural production resulting from the P&G conditions minus subsidy was estimated in the 1988 rescoping document to be $66 million, Table 4. These benefits would generate a total of $121.1 million in economic activity in the state, Figure 31. Employment would increase by 1,352 full and part-time jobs. These employees would earn $16.9 million in wages and when combined with added business income of $37.7 million and various indirect business taxes, value added in the state would increase by $60.2 million.

Impact on Other Industries

Industries significantly affected by irrigated agriculture under the P&G conditions minus subsidy (outside of agriculture) are; service, retail trade, wholesale trade, finance, medical, and recreation. Increases in total industry output of these industries from the P&G conditions minus subsidy are given in Figure 32. The service industry would generate another $5.7 million in total economic activity. The wholesale trade industry would increase by $4.8 million, retail trade industry by $4.8 million. The recreation industry would increase by $3 million.

Figure 31.

Impact of CENDAK Project, Total Annual Benefit
P&G Conditions Without Double Subsidy

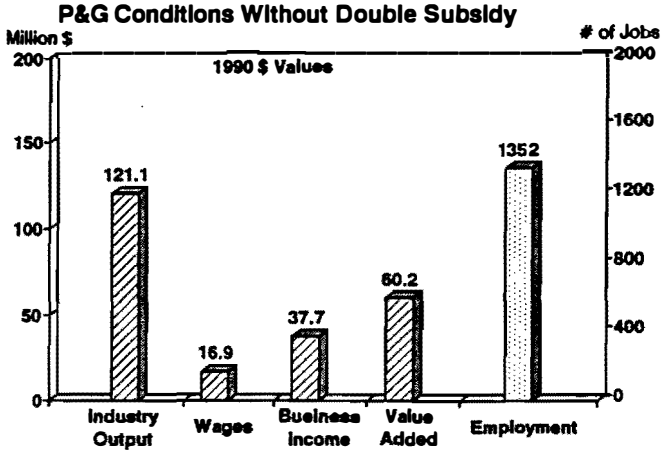


Figure 32.

CENDAK Project - P&G Conditions
Without Double Benefit
Impact on Total Industry Output
of Selected Industries

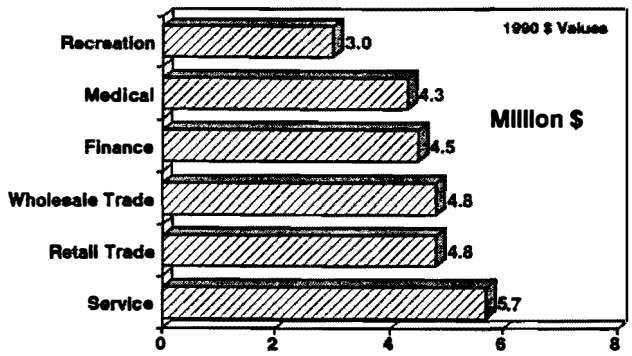


Figure 33.

CENDAK Project - P&G Conditions
Without Double Subsidy
Impact on Employee Income (Wages)
of Selected Industries

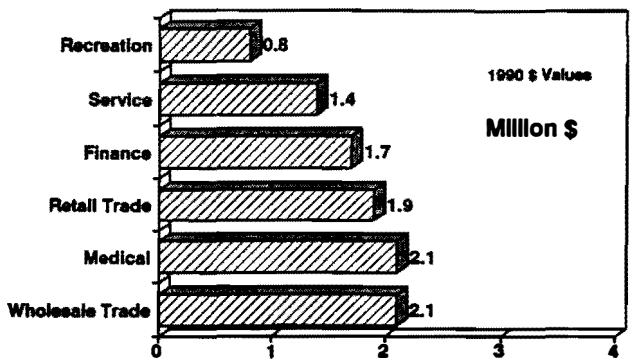
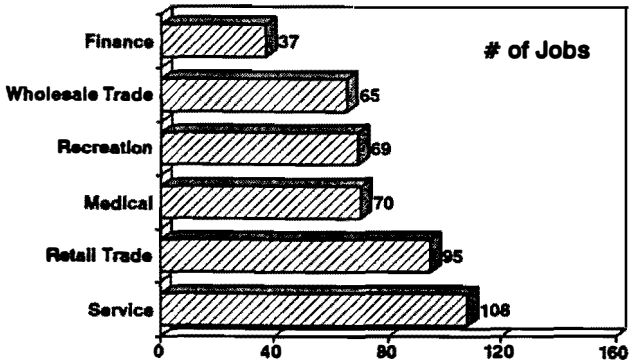


Figure 34.

CENDAK Project - P&G Conditions
Without Double Subsidy
Impact on Employment of
Selected Industries



Increases in wages of non-agricultural industries under the P&G conditions minus subsidy, include $2.1 million for the 65 new employees in the wholesale trade industry, Figures 33-34. The 108 new workers in the service industry would earn $1.4 million. The recreation industry would see an additional 69 new full and part-time employees with wages of $0.8 million.

IRRIGATION BENEFITS, WITH AND WITHOUT FEEDER CATTLE PRODUCTION

Another analysis performed in the 1988 Rescoping Document dealt with the benefits of irrigation and the impact of utilizing crops produced to supplement a cow/calf-feeder livestock operation. Data for these scenarios are given in Table 5. Values have been adjusted from the original tables to represent 1990 dollar values. Irrigation benefits were estimated using the PR/DES conditions above. The impact of pressurized sprinklers was removed. Two different types of crops were used. Basic crop production included corn and alfalfa. Specialty crops included potato production. Not all farms in the original analysis included specialty crops. Estimates by CENDAK region (west, central, and east) are provided below.

Table 5. Estimated Annual Irrigation Benefits, With and Without Feeder Cattle Production.

	West	Central	East	Total
Basic Benefit Area (Ac)	73600	175600	5800	255000
Specialty Benefits Area (Ac)	1300	31000	1000	45000
Total Acreage	86600	206600	6800	300000
Project Benefits - Pr/DES Basis				
Basic ($1,000)	19850	43963	1518	65332
Specialty ($1,000)	5607	12771	423	18801
Totals	25457	56734	1941	84133
Project Benefits with Feeders				
Basic ($1,000)	23954	53755	1782	79492
Specialty ($1,000)	5607	12771	423	18801
Totals	29561	66526	2205	98292

Source: Rescoping Report on the Central South Dakota Water Supply System, Table 5-5. Aug. 1988. Adjusted to 1990 $ Values.

Irrigation Benefits from Crop Production

Total Economic Impact

The direct impact of irrigation was estimated to be $84.1 million dollars for the state; $25.5 million in the west division, $56.7 million in the central division and $1.9 million in the east division. The total economic benefit of the above is given in Figures 35 and 36. $20.7 million in wages would be earned by 1,727 new employees. Businesses would enjoy and additional $48.1 million in business income. Value added in the state would increase by $76 million.

Figure 35.
Impact of CENDAK Project
Irrigation Benefits, PR/DES Conditions

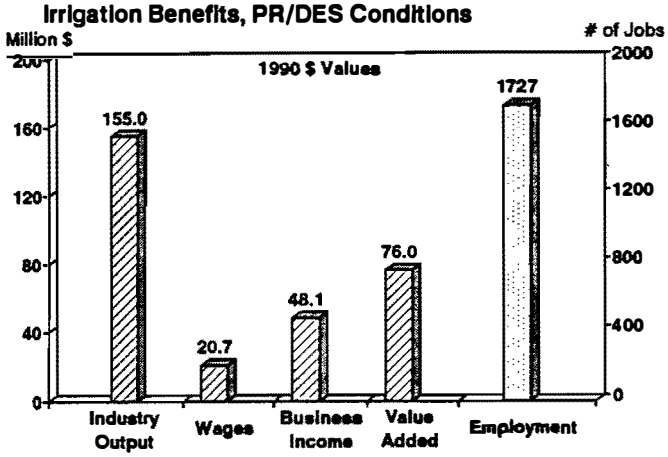
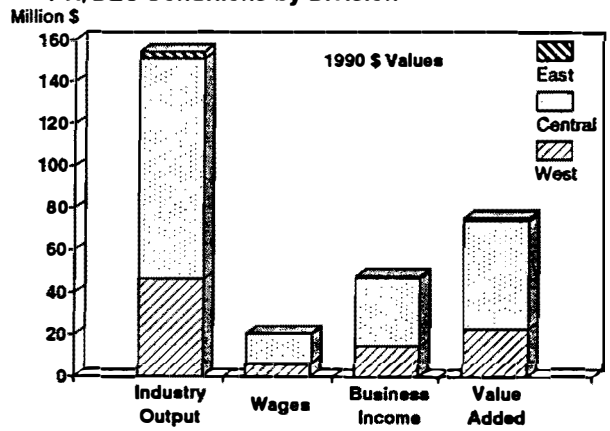


Figure 36.
Impact of CENDAK Project, Irrigation Benefits
PR/DES Conditions by Division



Impact on Other Industries

Industries significantly affected by irrigated agriculture as the same as before under the four decision criteria; service, retail trade, wholesale trade, finance, medical, and recreation. Increases in total industry output of these industries are given in Figures 37 and 38. The service industry would have an increase of $7.3 million in total economic activity. The wholesale trade industry would increase by $6.2 million, retail trade industry by $6.1 million. The recreation industry would increase by $3.8 million.

Figure 37.
CENDAK Project - PR/DES Irrigation Benefit
Impact on Total Industry Output
of Selected Industries

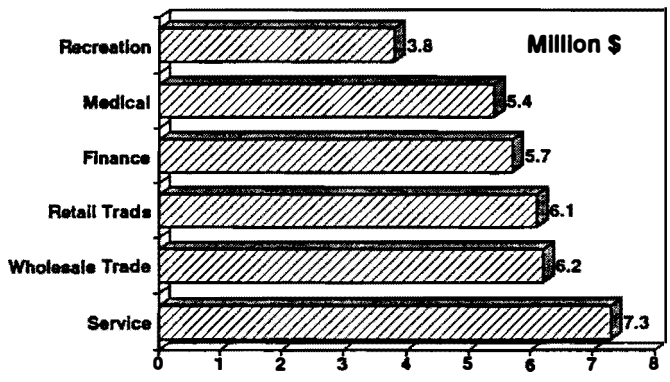
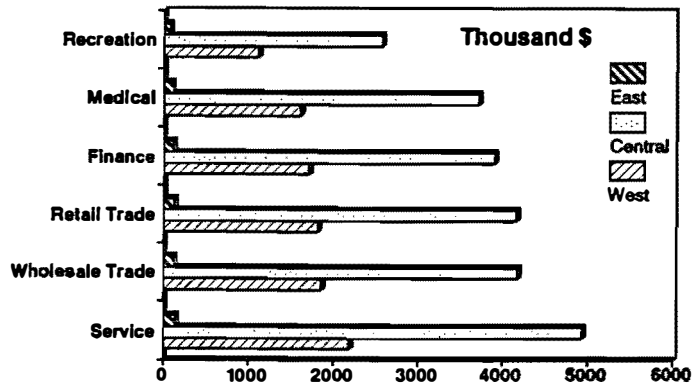


Figure 38.
CENDAK Project - PR/DES Irrigation Benefit
Impact on Total Industry Output
of Selected Industries by Division



Increases in wages of non-agricultural industries due to irrigation of basic and specialty crops include $2.7 million for the 85 new employees in the wholesale trade industry, Figures 39-42. The 138 new workers in the service industry would earn $1.8 million. The recreation industry would see an additional 89 new full and part-time employees with wages of $1 million. Retail trade industry would employ 121 additional full and part-time employees with a payroll of $2.5 million.

Figure 39.

CENDAK Project - PR/DES Irrigation Benefit Impact on Employee Income (Wages) of Selected Industries

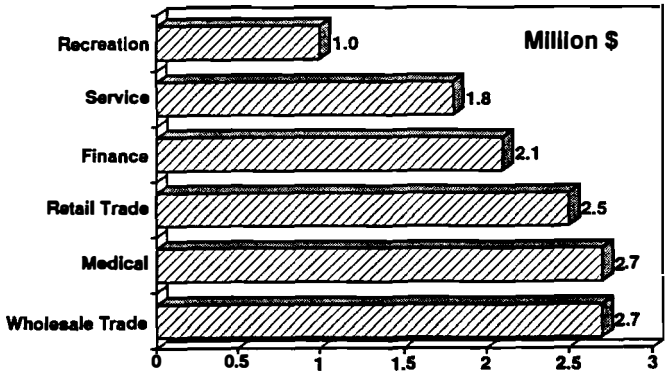


Figure 40.

CENDAK Project - PR/DES Irrigation Benefit Impact on Employee Income (Wages) of Selected Industries by Division

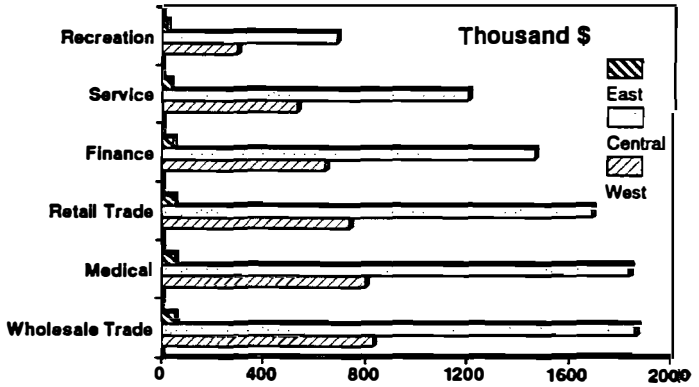


Figure 41.

CENDAK Project - PR/DES Irrigation Benefit Impact on Employment of Selected Industries

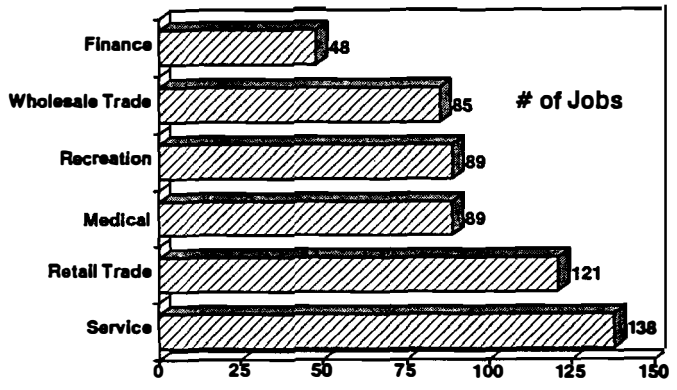
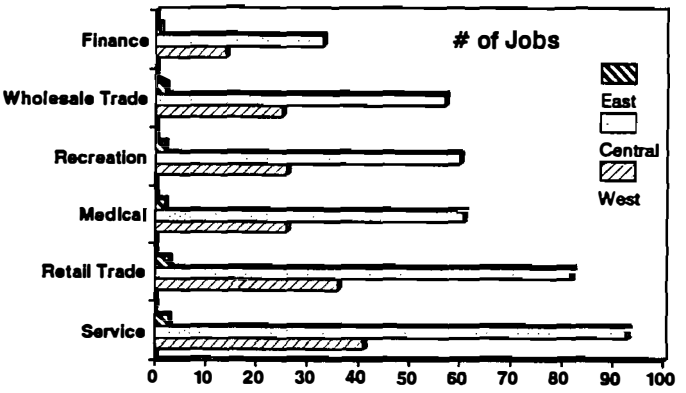


Figure 42.

CENDAK Project - PR/DES Irrigation Benefit Impact on Employment of Selected Industries by Division



Irrigation Benefits with Feeder Cattle Production

Total Economic Impact

The direct impact of irrigation with feeder cattle production was estimated to be $98.3 million dollars for the state; $29.6 million in the west division, $66.5 million in the central division and $2.2 million in the east division. The total economic benefit of the above is given in Figures 43 and 44. $25.1 million in wages would be earned by 2,067 new employees. Businesses would earn an additional $54 million in business income. Value added in the state would increase by $87.8 million.

Figure 43.
Impact of CENDAK Project
Irrigation Benefits, With Feeders

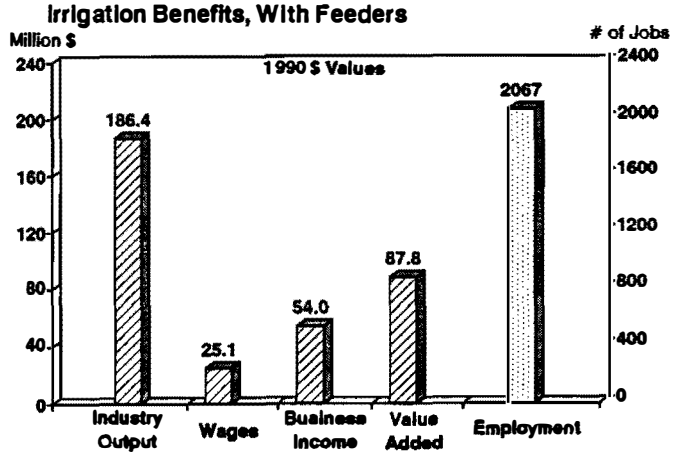
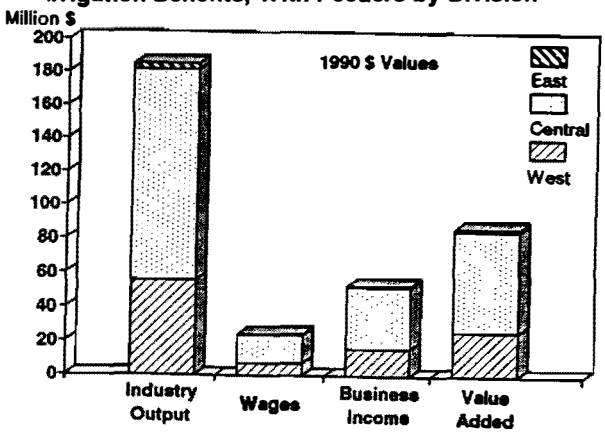


Figure 44.
Impact of CENDAK Project
Irrigation Benefits, With Feeders by Division



Impact on Other Industries

Increases in total industry output of the service, retail trade, wholesale trade, finance, medical, and recreation industries are given in Figures 45 and 46. The service industry would have an increase of $8.6 million in total economic activity. The wholesale trade industry would increase by $7.4 million, retail trade industry by $7.3 million. The recreation industry would increase by $4.5 million.

Increases in wages of non-agricultural industries due to irrigation of basic and specialty crops with feeder cattle production include $3.3 million for the 102 new employees in the wholesale trade industry, Figures 47-50. The 163 new workers in the service industry would earn $2.1 million. The recreation industry would see an additional 106 new full and part-time employees with wages of $1.2 million. Retail trade industry would employ 144 additional full and part-time employees with a payroll of $3 million.

Figure 45.

CENDAK Project - Irrigation Benefit With Feeders, Impact on Total Industry Output of Selected Industries

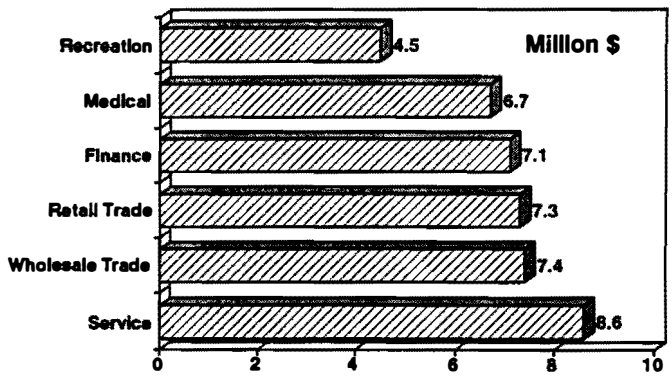


Figure 46.

CENDAK Project - Irrigation Benefit With Feeders Impact on Total Industry Output of Selected Industries by Division

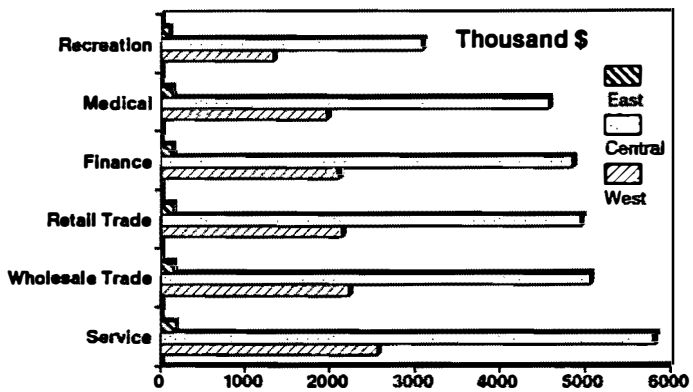


Figure 47.

CENDAK Project - Irrigation Benefit With Feeders, Impact on Employee Income (Wages) of Selected Industries

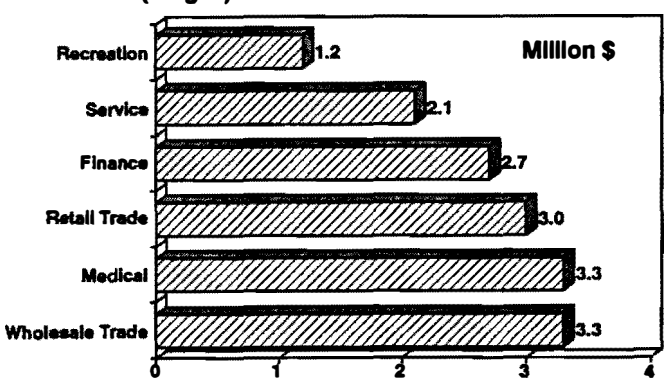


Figure 48.

CENDAK Project - Irrigation Benefit With Feeders, Impact on Employee Income (Wages) of Selected Industries by Division

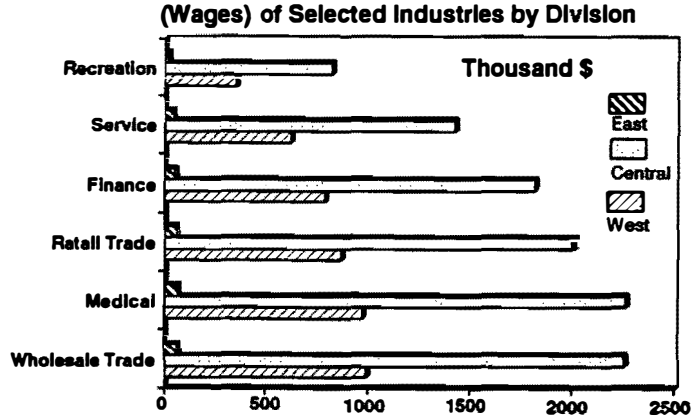


Figure 49.

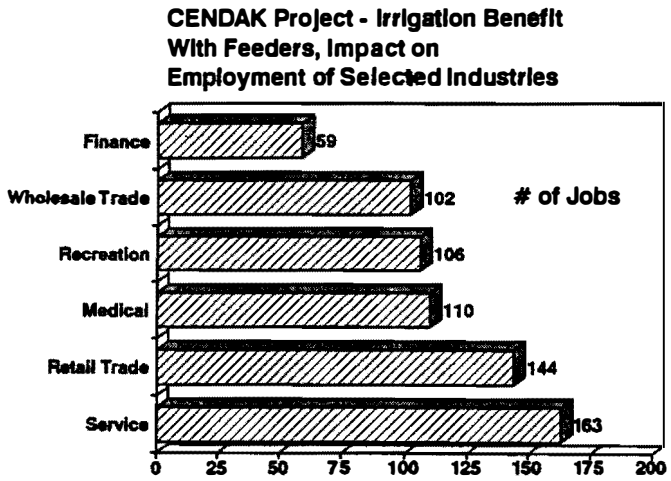
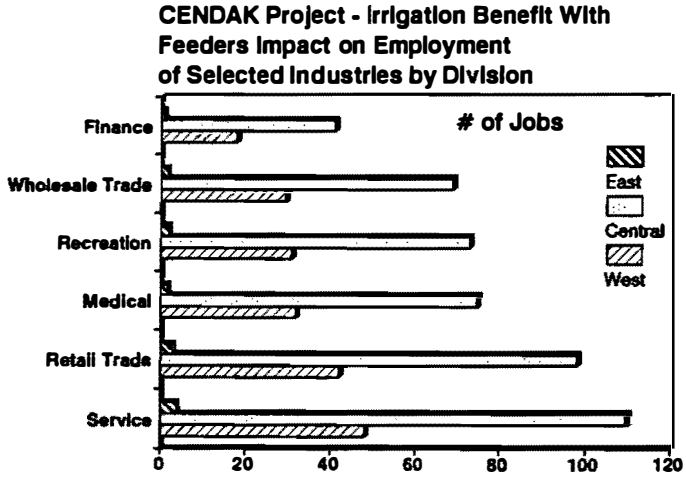


Figure 50.



ADDITIONAL DIRECT IMPACTS OF THE CENDAK

Capital Costs

The above analysis did not include the purchase and construction of the irrigation systems put in by the various producers which participate in the CENDAK project (other than through depreciation in their farm management budgets). An estimate of the direct expenditures for this equipment would be $135 million ($450/acre[1] * 300,000 acres). This is assuming that center pivot irrigation systems would be installed on all 300,000 acres of the project. The $135 million in direct construction expenditures would result in $235.5 million in short-term total economic impact for the state spread over the period of time required for instillation of the sprinkler systems. Additional long term impacts would be generated by the need for maintenance and repair on these systems.

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1 Costs of center pivot irrigation system per acre. Personal Communication, Agricultural Engineering Department, SDSU.

POSSIBLE BUSINESS OPPORTUNITIES

In addition to the benefits from the construction, operation, and maintenance of the CENDAK project as well as the benefits from irrigation, are other benefits which may result from economic activity that could develop due to the presence and operation of CENDAK.

Cattle Feedlots

Such business may be the development of feedlots to feed out calves produced using feed from CENDAK farms, as well as the stable, high protein feed source for feedlot rations.

It is estimated using current, 1992 figures[2] estimate that the cost of gain per hundredweight of $51.69 for 500 pound steers gaining to 1175 pounds, a total of $348.90. Yardage charges amount to $89.20 per head. Thus, an estimate of the added value of feeding a feeder steer to 1175 pounds is $438.10 per head. This implies that a 1,000 head feedlot would contribute a total of $438 thousand to the region in which it is established. The total economic activity generated from the $438 thousand in direct gain, is $885 thousand. This gain in economic activity is facilitated by the construction of CENDAK as a source of a stable feed supply.

Meat Packing Facilities

With the establishment of several feedlots in the state, it would be possible to encourage a major meat packing company to establish or expand existing facilities in the state, further adding value to South Dakota produced commodities beyond what has been presented in this study.

Another potential industry which would benefit from the development of CENDAK would be the ethanol fuels industry. Several communities are exploring the possibility of establishing a new market for corn produced in their areas. CENDAK could insure that a supply of raw materials (corn) would be available for use in such an operation, adding value to a South Dakota agricultural commodity.

Tax Considerations

Industries such as these would also benefit state and local governments through increased tax revenues from property and sales taxes of businesses and employees involved in industries which result, in part, from the establishment of a water project such as CENDAK. Indirect business taxes from the above analysis estimate that $39 million in one time revenues would be generated from the construction phases of CENDAK. Annual tax revenues of $0.9 million from the total annual costs of operations and between $9.7 million and $5.6 million from the four annual benefit scenarios of increase crop production be available. These figures are only rough estimates of the actual tax receipts generated from CENDAK operations and benefits.

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[2] Printout on cost of gain/cwt obtained from DTN Livestock, Livestock Feeding Marging on a computer bulletin board, 6/9/92.

Drought Considerations

It is possible that the greatest long term impact that CENDAK may have on the economy of South Dakota is in drought relief. It has been said that there is no such thing as a "normal" year in this state. South Dakota producers live with extreme fluctuations in temperature and precipitation. CENDAK could assist in alleviating the lack of feed in state during drought years, eliminating the need for livestock producers to sell-down their herds from a lack of feed. Additionally, producers utilizing the project would be subject to less risk by being able to more closely estimate production yields of crops they produce under irrigation. It is estimated that a one percent long-term increase in direct agricultural output in the state would increase economic activity by $144 million. CENDAK would be one way to achieve this increase.

SUMMARY

Water is essential for our survival. South Dakota experiences extreme change is climate and precipitation. Drought has played a major role in the economies of nearly all communities in the state. Irrigation, and the existence of a safe, clean water supply could play a substantial role in economic development of our rural communities. The construction, operation and maintenance of the CENDAK water project would have a tremendous impact on the economy of South Dakota.

Economic activity generated from construction of CENDAK is estimated at $911.9 million, spread over three construction stages of several years each, providing over 10,700 full and part-time employment opportunities in the construction process and in industries which support construction of the project.

The total annual cost of operation, maintenance, and repair of CENDAK would generate $20.9 million in economic activity while creating 224 full and part-time jobs.

Benefits from the use of water delivered through CENDAK for irrigation purposes are estimated to generate between $121.1 million and $212.8 million in economic activity. Providing employment in 1,352 to 2,362 full and part time jobs with total wages of $16.9 million to $28.7 million. Business income would increase between $37.7 and $62.3 million.

With the establishment of CENDAK, other industries which utilize South Dakota produced commodities could expand or set up operations in the state. State and local governments would benefit through taxes collected from higher valued goods and through the expenditure of families employed by industries affected by the CENDAK project.