The Role of Research in Economic Development

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How important has the role of research been in supporting economic development in North Dakota? It would be all but impossible to account for total expenditures and efforts on behalf of all the private and public efforts carried out within the state. Rather, as an example, the Department of Agricultural Economics' singular efforts in conducting feasibility studies will be used as an illustration.

A total of 18 feasibility studies, each unique in terms of subject matter addressed and the depth of analysis, have been completed during the 18-year period 1970-1987 (Table 1). A combined total expenditure of just over one-half million dollars ($520,000) was expended or an average of only $28,888 per year. Seven of the 18 studies were what is regarded in the profession as full-fledged feasibility studies, costing $398,000 or 76 percent of the total expenditure for an average cost of $56,857 per study.

These studies have contributed to 35 new plants being constructed in North Dakota since 1970 (Table 2). Total capital expenditures for the completed plants totaled almost $232 million and averaged $6.62 million per plant. A potential exists for 13 additional processing facilities with estimated capital expenditures approaching $250 million.

Economic impacts associated with processing plants already constructed in the state have been significant. A total of 528 new direct jobs have been created (Table 3). Secondary employment resulting from the increased economic activity created by those plants resulted in an additional 810 jobs or a total of 1,338 new jobs. Additional total business activity of nearly $65 million was created by the 35 facilities established in the state. An additional 2,351

Table 1. Economic Feasibility Studies Completed by the Department of Agricultural Economics and Level of Funding, North Dakota State University, 1970-1987.

Type of Feasibility Study	Funding Level
	-----$000 -----
Commercial greenhouses	46
Flax shive pelleting	18
Sunflower oil - an alternative energy source	36
Pasta processing	78
Wheat gluten processing	72
Small livestock slaughtering plants	2
Sunflower processing	74
Hog farrowing system	18
Large livestock slaughtering plants	13
Alfalfa pelleting	11
Flax fiber processing	12
Portable seed cleaning units	3
Malt plants	42
Sugarbeet processing	26
Small livestock slaughtering plants	9
Dry edible bean processing	50
Sunflower oil conversion to methyl ester	7
High fructose corn syrup processing	3
Total	520

Table 2. Total Number of Plants and Capital Investment and Potential Plants Associated with Feasibility Studies Conducted by the Department of Agricultural Economics, North Dakota State University, 1970-1987.

Item	Plants Number	Plants Percent	Capital Investment	Percent of Total
			--------$000--------	
Completed facilities	35	73	231,594	48
Potential facilities	13	27	248,695	52
Total	48	100	480,289	100

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new jobs and $125 million in additional business activity would materialize if all the potential facilities were constructed and operationalized.

A composite picture showing completed or under construction projects with another category of potential facilities provides an overview of the individual studies and contributions for the entire period (Table 4). What this illustrated analysis portrays is that applied research in the form of feasibility studies has a high payoff for the state. Analysis of the 18-year period 1970-1987 indicates that for every dollar invested in feasibility research, $478 in capital investment resulted (Table 5). The ratio of increased annual total business activity from operation of those plants was 133 to 1, meaning that for every one dollar invested in research 133 dollars in additional business activity was created. An approach from a different perspective tells us that for every thousand dollars invested in feasibility research, 1.09 new direct jobs were created and 1.67 secondary or indirect jobs were created for a total of 2.76 jobs for every one thousand dollars invested in feasibility studies.

The university has placed great importance on objective economic feasibility analyses. A new plant start-up, expansion of an existing operation, or an entirely new product venture require sound credible feasibility analysis. Emphasis on the technical feasibility of a given project or development proposal must be adequately researched to assure projects will not be destined for failure for technical reasons. Once technical feasibility has been determined as favorable, economic feasibility can be investigated. Economic feasibility will, in most instances, address a broad array of questions

Table 3. Economic Impacts Associated with Feasibility Studies Conducted by the Department of Agricultural Economics, North Dakota State University, 1970-1987.

Item	Direct Employment	Secondary Employment	Total Employment	Additional Total Business Activity
				----------$000 ----------
Completed facilities	528	810	1,338	64,534
Potential facilities	403	1,947	2,351	125,554
Total	931	2,757	3,689	190,088

Table 4. Economic Impacts in North Dakota Attributable to Feasibility Studies Conducted by the Department of Agricultural Economics, North Dakota State University, 1970-1987.

		Facilities Completed or Under Construction					Potential Facilities				
Feasibility Study	Investment in Research	Number of Plants	Capital Investment	Direct Workers	Secondary Employment	Additional Gross Business Volume	Number of Plants	Capital Investment	Direct Workers	Secondary Employment	Additional Gross Business Volume
	-----$000 -----		----$000 ----	number	number	-----$000 -----		----$000 ----	number	number	-----$000 -----
Commercial greenhouse	46	—	—	—	—	—	1	920	10	9	914
Flax shive pelleting plant	18	—	—	—	—	—	1	412	5	13	761
Sunflower oil as an alternative energy source	36	—	—	—	—	—	1	1,645	18	50	3,493
Pasta plant	78	1	6,600	55	59	3,444	—	—	—	—	—
Wheat gluten processing plant	72	—	—	—	—	—	1	26,268	61	165	8,065
Small-scale livestock slaughtering plant	2	2	354	24	42	1,074	—	—	—	—	—
Sunflower processing plant	74	3	111,000	150	333	28,234	—	—	—	—	—
Hog farrowing system	18	24	3,600	24	144	14,928	—	—	—	—	—
Large-scale hog slaughtering plant	13	—	—	—	—	—			(not feasible)		
Alfalfa pelleting plant	11	—	—	—	—	—	2	1,101	6	104	2,810
Flax fiber processing	12	—	—	—	—	—	1	300	3	43	1,193
Portable seed cleaning units	3	2	40	2	0	22	—	—	—	—	—
Malt plant	42	1	50,000	40	168	10,912	—	—	—	—	—
Sugarbeet processing plant	26	2	60,000	233	64	5,920	—	—	—	—	—
Small livestock slaughtering plants	9	—	—	—	—	—	3	350	12	9	892
Dry edible bean processing	50	—	—	—	—	—	1	1,567	24	297	15,786
Sunflower oil to methyl esters conversion plant	7	—	—	—	—	—	1	6,132	24	46	4,381
High fructose corn syrup processing plant	3	—	—	—	—	—	1	210,000	240	1,211	87,259
Total	$520	35	$231,594	528	810	$64,534	13	$248,695	403	1,947	$125,554

Table 5. Return on Investment for Feasibility Studies Completed by the Department of Agricultural Economics, North Dakota State University, 1970-1987.

Item	Ratio
Investment in research to capital investment	478:1
Investment in research to additional business activity	133:1
Direct jobs to investment in research	1.09:$1,000
Total jobs to investment in research	2.76:$1,000

that include raw product supply; processing technology, if involved; market demand factors; plant size, cost, and profitability; distribution systems (transportation costs); and an assessment of overall competitive factors. An integrated study of technical and economic feasibility leads to an accurate analysis and assessment of overall economic feasibility of a given economic development project.

North Dakota State University has a wide array of resident areas of expertise. This expertise resides within 11 departments in the College of Agriculture and associated departments within other colleges, e.g., engineering and business. These departments maintain secondary information bases and associated analytical systems that make it possible to conduct a wide range of economic feasibility studies.

Economic feasibility study results presented earlier illustrate that this type of research is a viable public activity that can increase both agricultural and nonagricultural business activity and contribute to economic development in the state.

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years. There is a vital need for increased federal funding to support primarily fundamental research programs in a number of areas of post-harvest technology of agricultural products.

The structure of an expanded research program with $130 million in new funds should take the following form according to the 1986 ESCOP report:

Competitive research grants to individual researchers.
Centers of excellence grants to interdisciplinary groups.
Increase in basic Hatch funds.
Graduate fellowships.
Post-doctoral fellowships.
Equipment grants.

A report issued in June 1987 by the New Farm and Forest Products Task Force to the Secretary of Agriculture emphasizes that diversification of agriculture and forestry must become a national priority. The report goes on to say that significant opportunities exist for the development of new farm and forest products to meet real market needs - particularly in industrial, non-food application areas.

At a more local level, at the initiative of the Governor's office and the Economic Development Commission in North Dakota, a committee has been given the charge to study the feasitiblity of establishing a Center for Alternative Agricultural Production and a Center for Agricultural Commodities Processing and Utilization at North Dakota State University.

I would like to comment briefly on centers of excellence. An article in the December 1987 issue of Food Technology reports that nationwide activity to establish centers for industry/university cooperative research is at an all time high. There are now more than 28 "centers" of food science in the United States. I believe this number reflects the importance of such centers and why North Dakota should become involved in a similar undertaking. The process for establishing each of the 28 centers was somewhat different and the goals for one are not exactly the same as for another. Nonetheless, nearly all these programs have some key common goals:

Enhance utilization research.
Transfer information to industry.
Aid development of new businesses.
Provide technical and marketing assistance.
Become stronger in chosen areas of specialization.
Attract food processing to the state.

If a Center for Agricultural Commodities Processing and Utilization were to be developed at North Dakota State University, the goals should be similar to those just enumerated. Most food-type centers have developed as a direct result of strong food science, dairy science or food related departments. In fact, the basic impetus for the Northern Crops Institute (NCI) came as a direct result of the need to expand the work that was being done by the faculty and staff of the Cereal Science and Food Technology Department. The growing need for the department to make presentations to trade team delegations, conduct applied quality research, and disseminate quality and technical information and travel overseas to provide technical and quality data to buyers all indicated a need for improved and expanded facilities. Creation of a Center for Agricultural Commodities Processing and Utilization needs as its backbone a strong department committed to research in cereals and foods.

I look forward to the future with excitement and optimism, but I also recognize that such a center is very dependent upon adequate funding to provide the necessary faculty, facilities and equipment to make it a success. An equally important prerequisite for such a center to be a success is for it to be interdisciplinary in nature.