FOOD TECHNOLOGY FACT SHEET

FOOD AND AGRICULTURAL PRODUCTS RESEARCH AND TECHNOLOGY CENTER

WWW.FAPC.OKSTATE.EDU

OKLAHOMA STATE UNIVERSITY™

A Comparison of Plant Location Determinants: Food Versus Non-Food Agricultural Processors

Rodney B. Holcomb
Agricultural Economist

Jeannin Flores-Bastidas
Research Assistant

Mike D. Woods
Extension Economist

Introduction

Activities that add value to raw inputs are an important link between agriculture, forestry and the broader economy. While most value-added activities occur in urban areas, the share of agriculture and forest products-based processing in non-metro areas is large compared with other industries in non-metro areas. Overall, about 30 percent of value-added manufacturing for five major agricultural and forest products-based industries (food, tobacco, lumber, paper and leather products) occurred in non-metro areas during 1994 (Table 1).

Table 1. Shares of Rural and Urban Manufacturing Value-Added, by Industry in the U.S., 1994.

Industry	*Rural (%)*	*Urban (%)*
Primarily agricultural- and wood-based products	29.3	16.3
Food processing	13.6	10.1
Lumber and wood products	7.4	1.4
Pulp and paper products	7.2	3.1
Leather and leather products	0.6	0.2
Tobacco products	0.5	1.6
Other manufacturing	70.7	83.7
Industrial machinery and equipment	8.7	10.4
Chemicals	8.5	12.0
Electrical equipment	7.4	10.1
Transportation equipment	6.5	11.9
Fabricated metal products	6.0	6.0
Rubber and miscellaneous plastics	5.9	4.1
Textile products	5.4	1.2
Primary metal products	6.0	3.9
Apparel	4.0	2.0
Printing and publishing	3.7	8.3
Stone, clay and glass	3.3	2.3
Furniture	2.3	1.3
Instruments	2.3	6.7
Miscellaneous manufacturing	1.3	1.6
Petroleum and coal products	1.1	1.9
All manufacturing	100	100

Source: Economic Research Service, United States Department of Agriculture. ERS analysis of U.S. Bureau of the Census, special tabulation of 1994 Annual Survey of Manufacturers data.

For all other manufacturing industries, the non-metro share of values added was less than 17 percent (USA-ERS). Oklahoma, like many states in the central United States, has determined that rural economic growth may be realized through attracting firms that make use of each state's raw agricultural commodities.

Factors influencing industrial location decisions have been discussed in many different studies (e.g. Rees, 1979; Schmenner, 1991; Kieschnich, 1981; Hekman, 1982; Premus, 1982; Blair, 1987; and Premus, 1982). Many of these studies focused on the traditional firm location factors: availability of labor, cost of labor, proximity to markets, access to inputs, etc. Sloggett and Woods (1989) reported in a study related to Oklahoma that factors affecting site location usually include the following: markets, labor, raw materials, transportation, industrial site, utilities and financial capital. Ratings for these factors were found to vary within a given industry and from one time period to another.

While traditional factors, such as those related to labor and markets, still play a role in location, the studies mentioned above also show that personal and quality of life factors are more important now than in the past. Recently, *Area Development* magazine performed a corporate survey that indicated many quality of life factors, such as low crime rate, rating of public schools, health facilities, housing cost and hosing availability, were highly considered in plant location decisions. Yet, these studies have not compared or contrasted food and non-food processing firms comprised in the general category of "value-added agribusiness."

This fact sheet summarizes the results of study that examined factors affecting location decisions among value-added firms in the state of Oklahoma (Flores-Basitdas, et. al, 1999). The purpose of the study was to gain an improved understanding of how communities can better attract and retain manufacturing firms, as well as to assist in their future growth. The results obtained through surveys of food and non-food processing firms have been analyzed. These evaluations will provide an information source for Oklahoma communities and the state itself when considering ways to attract or retain manufacturing firms. These findings may also have relevance to other states and their communities, especially those located in the same geographic region as Oklahoma.

The Survey

The Oklahoma Food and Agricultural Products Research and Technology Center, in conjunction with the Oklahoma Department of Commerce, developed the questionnaire as part of Commerce's biannual industry survey. The Site Selection section was presorted into five categories: 1) Availability of infrastructure, 2) Cost of infrastructure, 3) Factors within these categories were rated on a five-point Likert scale, with "1" representing no importance and "5" representing vital importance.

Thirty-seven respondents corresponded to food processing firms and 41 to non-food processing firms (Table 2). Comparisons of factor importance for both food-processing companies and non-food processing companies were made using the Pearson Chi-square statistic and a 95 percent confidence level.

Results and Observations

Table 3 depicts mean factor ratings. Factor with a mean of 3.5 or above were chosen to indicate the greatest level of importance to food and non-food processing firms. Food processing firms considered cost of real estate, cost of labor, proximity to markets and consumer centers, availability of raw materials, state sales tax exemption on manufacturing/processing equipment, community attitude toward business development and low crime rate as highly important factors in location decisions. Non-food processing firms considered availability of real estate, cost of real estate, cost of labor and low crime rate as the most important factors. Comparisons between these two groups are discussed in the following text, segmented into four categories: infrastructure (availability and costs), labor, business climate and quality of life issues.

Infrastructure

Availability of real estate is very important for non-food processing firms, while the cost of real estate is very important for both food and non-food processors. Availability and cost of water and

Table 2. Number of surveys sent and received, classified by SIC code.

SIC Code	SIC Description	Sent*	Received
Food and Kindred Products Processing Firms			
201	Meat packing and processing	132	11
202	Dairy products	10	0
203	Canned and frozen specialties	14	1
204	Flour, grain products and prepared food for animals	71	7
205	Bread and bakery products	36	6
206	Sugar and candy products	23	5
207	Animal and vegetable oils	5	0
208	Soft drinks and Liquors	24	5
209	Canned foods	59	3
Total		374	38
Non-Food Products Processing Firms			
22	Textile mill products	20	2
23	Apparel and textile products made from fabrics	2	0
24	Lumber and wood products (excluding furniture)	250	21
25	Furniture and fixtures	112	10
31	Leather and leather products	36	7
39	Miscellaneous manufacturing industries	2	1
Total		422	41

Source: Economic Research Service, United States Department of Agriculture. ERS analysis of U.S. Bureau of the Census, special tabulation of 1994 Annual Survey of Manufacturers data.

Table 3. Mean rating of factors from the Oklahoma Site Selection Survey.

	Food Processing Firms		Non-food Processing Firms	
Site selection factors	Mean Rating	Std. Deviation	Mean Rating	Std. Deviation
Availability				
Real estate	3.15	1.36	3.60	1.39
Water	2.87	1.39	2.34	1.31
Electricity	3.00	1.41	3.21	1.44
Natural gas	2.97	1.47	2.82	1.49
Waste treatment/disposal	2.86	1.57	2.56	1.48
Highway system	2.97	1.40	3.09	1.49
Rail system	1.65	1.16	1.34	0.69
Port access	1.47	1.05	1.17	0.44
Major airport	1.84	1.17	1.60	1.15
Telecommunications 2.47	1.42	2.78	1.33	
Cost				
Real estate	3.68	1.33	3.56	1.43
Water	3.07	1.38	2.69	1.36
Electricity	3.31	1.35	3.04	1.51
Natural gas	3.23	1.34	2.48	1.39
Waste treatment/disposal	2.65	1.49	2.56	1.43
Construction	3.05	1.45	3.17	1.51
Trucking	3.10	1.44	3.19	1.61
Rail shipments	1.65	1.27	1.53	1.00
Barge shipments	1.39	0.94	1.31	0.84
Telecommunications 2.34	1.30	2.65	1.44	
Labor				
Availability of skilled labor	3.21	1.47	3.36	1.42
Availability of unskilled labor	3.28	1.33	3.02	1.47
Cost of labor	3.55	1.38	3.87	1.38
Worker/technical training programs	2.39	1.28	2.17	1.32
Right to work status in Oklahoma	2.78	1.69	2.78	1.62
Low union profile	2.94	1.73	3.31	1.78

	Food Processing Firms		Non-food Processing Firms	
Site selection factors	Mean Rating	Std. Deviation	Mean Rating	Std. Deviation
Business climate				
Proximity to markets/consumer centers	3.71	1.29	3.02	1.50
Availability of raw materials	3.57	1.19	3.41	1.44
Proximity to suppliers of primary inputs	3.31	1.32	2.90	1.42
State sales tax exemption on manuf./proc. equip.	3.84	1.15	3.34	1.49
State and local tax incentives (credits/refunds)	3.31	1.41	3.09	1.59
Unemployment insurance taxes	3.47	1.24	3.14	1.40
Oklahoma Freeport law	1.92	1.34	2.04	1.26
Community attitude towards business development	3.73	1.20	3.29	1.53
Quality of life issues				
Low crime rate	3.63	1.28	3.75	1.37
Rating of public schools	3.21	1.29	3.34	1.35
Colleges/Universities in area	3.07	1.38	3.00	1.37
Recreational opportunities	3.05	1.11	2.82	1.32
Cultural opportunities	2.94	1.16	2.65	1.25
Climate	3.28	1.11	3.17	1.13
Health facilities	3.26	1.15	3.02	1.21
Housing availability	3.26	1.15	3.04	1.28
Housing costs	3.18	1.13	3.41	1.48

cost of natural gas have a greater significance (statistically) to food processors than non-food processors. Of lower importance to both food and non-food processing firms are availability of a rail system (mean rating of 1.65 and 1.34, respectively), port access (means of 1.47 and 1.17, respectively) and the costs of rail shipments (1.65 and 1.53) and barge shipments (1.39 and 1.31). These ratings may suggest that most Oklahoma processors ship products by trucks, making use of the state's interstate highways.

Statistical analysis suggests that the availability of telecommunications is significantly more important for non-food processing firms, although neither group gave this factor a mean rating greater than three. Twelve firms considered "availability of telecommunications" as "very important," and 16 firms considered this factor "important." One might expect responses from metro responses from metro areas to have altered this rating, but six of the 28 respondents are in Oklahoma City, two are in Tulsa and 20 firms are in non-metro areas.

In the past, communications may have been a general concern of manufactures, but the growing dependence on telecommunications services and technologies has made this factor a very important matter for virtually all manufactures, independent of their location (i.e. metro area of non-metro area.) However, many small communities in rural regions of Oklahoma have not obtained fiber optic systems and/or other forms of telecommunications technology. In fact, some communities still maintain party lines in their phone systems. Even with mean rating of less than three for this factor, the dependence upon telecommunications may hinder the willingness of manufacturers to locate in these rural regions.

Labor concerns

The labor factor with the highest ratings for both food processors and non-food processors in this category of factors is cost of labor (means of 3.55 and 3.87, respectively). Work/technical training programs (2.39 and 2.17) and right to work status in Oklahoma (2.78 and 2.78) scored the lowest for the two types of firms. Low union profile (2.94 and 3.31) had notably higher ratings. No statistically significant difference between food processors and non-food processors were found in the responses to labor concerns.

Business Climate

Processing firms consider the following factors important (with mean ratings greater than 3.5): market proximity, raw material availability, state sales tax exemption and community attitude toward business development. Non-food processing firms do not indicate mean factor ratings greater than 3.5 for any of the factors in this category (Table 3).

Quality of Life Issues

On a personal level, respondents were requested to evaluate personal factors that may have affected their own decision to locate in Oklahoma. The leading or more important factor for both food and non-food processors appears to be low crime rate (mean rating of 3.63 and 3.75, respectively).

Colleges and universities in the area are considered important characteristics for food processing firms (mean rating of 3.07), a statistically significant difference from non-food processing which were three. Although the mean ratings for this factor, and their associated standard deviations, were very close, the Pearson Chi-square test used to find significant differences repeatedly indicated a difference in response between food and non-food processors.

Both food and non-food firms also indicated mean values greater than three for climate, health facilities, housing availability and housing costs. Of less importance numerically are cultural opportunities (mean of 2.94 for food processing firms and 2.65 for non-food processing firms). Approximately one-third of the respondents did, however, indicate that these two factors were either important or very important in their personal decision to locate in Oklahoma.

Conclusion

Many economists have indicated that plant location decisions are based mostly upon cost advantages. However, this study and previous studies suggest that many decision-makers base site selection on factors other than input and transportation costs. An area's attractiveness to manufacturers may also be related to factors that do not directly affect profit margins. Because plant location decisions impact the economic base of a region, state and local government authorities may be able to use these "other" factors to attract value-added processors to primarily rural communities.

Table 4 indicates the top 25 location decision factors as rated by both food and non-food value-added processors in this study. It seems that tax incentives and crime rates are top 10 factors considered by both food and non-food processors. However, Oklahoma food processors give more consideration to water supply, cost of water and cost of natural gas than do non-food processors. Given the necessity of water and natural gas for most food processing operations, this is not surprising. Conversely, non-food value-added processors have factors such as housing costs and the ratings of public schools in their top 10.

Incentives packages to attract value-added agricultural product processors may be more effective when focused not only on the availability and cost of infrastructure items, but also on certain business climate and quality of life factors. To increase the likelihood of attracting and retaining value-added facilities to non-metropolitan areas in Oklahoma and other states, suggestions for rural communities include:

- Consider the adequacy of local utilities, particularly the availability and quality of water, and the costs of water, natural gas and electricity.
- Encourage the availability of sufficient qualified labor through educational programs, possibly in conjunction with local colleges and universities.
- Promote the improvement of area telecommunications as fax and Internet connections are vital to virtually all forms of business.
- Crime rates adversely affect location decisions, so if possible advertise the relative safety of the community.

While this study focused on value-added processing firms, the economic development goals and available resources of activities. Further research efforts are needed to compare the attitudes and preferences of value-added manufacturing firms to those of firms involved in other forms of manufacturing and service industries. It is through such efforts that both metro and non-metro communities can determine the best form of business to pursue or attract given their comparative advantages and growth objectives.

Table 4. Top 25 Factors (by mean rating) Impacting Location Decisions for Food and Non-food Value-Added Agricultural Processors.

Food Processing Firms		Non-Food Processing Firms	
Site selection factors	Mean Rating	Site selection factors	Mean Rating
State sales tax exemption on manufacturing/processing equipment	3.84	Cost of labor	3.87
State and local tax incentives (refunds/credits)	3.84	Low crime rate	3.75
Community attitude toward business development	3.73	Real estate availability	3.60
Proximity to markets/consumer centers	3.71	Real estate cost	3.56
Real estate cost	3.68	Availability of raw materials	3.41
Low crime rate	3.63	Housing costs	3.41
Availability of raw materials	3.57	Availability of skilled labor	3.36
Cost of labor	3.55	State sales tax exemption on manufacturing/processing equipment	3.34
Unemployment insurance taxes	3.47	Rating of public schools	3.34
Electricity cost	3.31	Low union profile	3.31
Proximity to suppliers of primary inputs	3.31	Community attitude toward business development	3.29
Availability of unskilled labor	3.28	Electricity availability	3.21
Climate	3.28	Trucking cost	3.19
Health facilities	3.26	Construction cost	3.17
Housing availability	3.26	Climate	3.17
Natural gas cost	3.23	Unemployment insurance taxes	3.14
Availability of skilled labor	3.21	Highway system availability	3.09
Rating of public schools	3.21	State and local tax incentives (refunds/credits)	3.09
Housing costs	3.18	Electricity cost	3.04
Real estate availability	3.15	Housing availability	3.04
Trucking cost	3.10	Availability of unskilled labor	3.02
Water cost	3.07	Proximity to markets/consumer centers	3.02
Area College/University	3.07	Health facilities	3.02
Construction cost	3.05	Area College/University	3.00
Recreational opportunities	3.05	Proximity to suppliers of primary inputs	2.90

References

Area Development Online, Site and Facility Planning. 1997 Corporate Survey. http://www.area-development.com/CORPSV97.htm

Blair, J.P. and R. Premus. " Major Features in Industrial Location: A Review." Economic Development Quarterly, 1(1987): 72-84.

Flores-Bastidas, J., R.B. Holcomb, M.D. Woods, C.P. Lyford. "Factors Affecting Agribusiness Firm Location Decisions: A Site Selection Survey Approach for Oklahoma." Oklahoma State University Dept. Agricultural Economics project report.

Hekman, J.S. "Survey of Location Decisions in the South." *Economic Review*, (1982): 6-19.

Kieschnick, M. Taxes and Growth: *Business Incentives and Economic Development*. Studies in Development Policy 11. Washington, D.C.: Council of State Planning Agencies, 1981.

Premus, R. Location of High Technology Firms and Regional Economic Development. Subcommittee on Monetary and Fiscal Policy of the Joint Economic Committee, U.S. Congress, G.P.O., Washington, D.C., June 1982.

Rees, J. "Regional Industrial Shift in the U.S. and the Internal Generation of Manufacturing Growth Centers in the Southwest." In *Interregional Movements and Regional Growth*, edited by W. Wheaton. Washington, D.C.: Urban Institute, 1979.

U.S. Department of Agriculture, Economic Research Service. *Rural Conditions and Trends: Rural Industry* Issue, Vol. 8, No. 3 Edited by Doug Bowers and Fred Gale, 1998.

Schmenner, R.W. "Geography and the Character and Performance of Factories." *In Industry Location and Public Policy,* edited by H.W. Herzog Jr. and A.M. Schlottmann,pp. 241-256. Knoxville: University of Tennessee Press, 1991.

Sloggett, G. and M.D., Woods. *Critical Factors in Attracting New Business and Industry in Oklahoma*, Stillwater, OK: September 1989.

Oklahoma State University, in compliance with Title VI and VII of the Civil Rights Act of 1964, Executive Order 11246 as amended, Title IX of the Education Amendments of 1972, Americans with Disabilities Act of 1990, and other federal laws and regulations, does not discriminate on the basis of race, color, national origin, sex, age, religion, disability, or status as a veteran in any of its policies, practices or procedures. This includes but is not limited to admissions, employment, financial aid, and educational services.

Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Samuel E. Curl, Director of Cooperative Extension Service, Oklahoma State University, Stillwater, Oklahoma. This publication is printed and issued by Oklahoma State University as authorized by the Dean of the Division of Agricultural Sciences and Natural Resources and has been prepared and distributed at a cost of 73 cents per copy. MHG 0204.