

A LOCATION ANALYSIS OF THE COMMERCIAL VEGETABLE
CANNING INDUSTRY IN WISCONSIN

by

STANLEY IVEN VINGE, JR.

B. S., Wisconsin State University-Platteville, 1965

A MASTER'S THESIS

submitted in partial fulfillment of the

requirements for the degree

MASTER OF ARTS

Geography

Department of Geology and Geography

KANSAS STATE UNIVERSITY
Manhattan, Kansas

1967

Approved by:


Major Professor

LD
2668
T4
1967
V535
c.2

ACKNOWLEDGEMENT

The author wishes to thank those individuals who devoted much of their time in advising and helping him with his study. Suggestions by Mr. Charles Bussing, Assistant Professor of Geography, were most helpful in formulating the study and in defining its scope. Dedicated supervision by Dr. Stephen Stover, Assistant Professor of Geography, promoted efficient organization and improved the quality of the writing. Appreciation is also expressed to the other members of the thesis committee who contributed their valuable time and efforts.

Special thanks are given to Mr. Marvin Scott, Field Superintendent of the Waunakee Plant, Oconomowoc Canning Company, for his willingness to supply the author with data. Without such data this study could not have been so precise.

The work of the typist, Joyce Vinge, also needs to be acknowledged, for she often placed this thesis ahead of other duties. Her dedication and clerical skills were prime factors in the completion of this work.

TABLE OF CONTENTS

CHAPTER	PAGE
I. INTRODUCTION	1
Purpose of the Study	2
Justification of the Study	3
II. THE CANNING INDUSTRY--AN EXAMPLE OF A COMMERCIAL FOOD	
MANUFACTURING INDUSTRY	5
Economic Importance	6
Scale of Manufacture	9
Marketing System	19
Growth of the Industry	21
Industrial Structure and Organization	22
General Location Factors	25
III. THE VEGETABLE CANNING INDUSTRY SURVIVES IN WISCONSIN	28
The History of Canning in Wisconsin	28
Analysis of Plant Locations	29
IV. THE CHANGING PERSONALITY OF WISCONSIN'S VEGETABLE CANNING	
INDUSTRY	48
V. CONCLUSIONS OF THE STUDY AND FUTURE PROBLEMS	57
Conclusions	57
Future Problems	58
BIBLIOGRAPHY	68

LIST OF TABLES

TABLE	PAGE
I. Economic Importance of Commercial Food Manufacturing Industries in the United States, 1963	7
II. Economic Importance of Commercial Food Manufacturing Industries in Wisconsin, 1963	8
III. Acreage, Production, and Value of Commercial Vegetable Crops for Processing by Selected States, 1965	10
IV. Harvested Acreage and Production of Selected Vegetable Crops for Processing: Wisconsin, 1966	11
V. Employment-Size Class of Selected Canneries in Wisconsin, 1965	18
VI. Distribution of Canning Plants According to Areas by Decades in Wisconsin, 1900-1940	34
VII. Results of the "Nearest Neighbor" Measurement of Factories Canning Selected Crops in Wisconsin, 1965	36
VIII. Number of Processors Packing Specific Vegetables: Wisconsin, 1957 and 1965	51
IX. Land-Man Ratio: Wisconsin, 1920-1959, and the U.S., 1959 . .	60
X. Per Cent of Farm Operators Working Off the Farm: Wisconsin, 1900-1959 and the U.S., 1959	61
XI. Civilian Per Capita Consumption of Vegetables Canned: United States, 1955-1964	64

LIST OF FIGURES

FIGURE	PAGE
1. Harvested Acreage of Selected Vegetables for Processing:	
Wisconsin, 1944-1964	12
2. Production of Selected Vegetables for Processing: Wisconsin,	
1944-1964	13
3. Value of Selected Vegetables for Processing: Wisconsin,	
1944-1964	14
4. Food and Kindred Product Industry Expenditures: United States,	
1958 and 1963	16
5. Quantity of Vegetables Canned: United States Pack of Selected	
Items, 1954-1964	23
6. Canned Fruit and Vegetable Factories in the United States,	
1958	27
7. Distribution of Canning Factories in Wisconsin, 1966	31
8. Distribution of Canning Factories in Wisconsin, 1945	33
9. Regression Analysis of Green Pea Acreage as Related to	
Distance from the Waunakee Canning Factory	37
10. Regression Analysis of Sweet Corn Acreage as Related to	
Distance from the Waunakee Canning Factory	38
11. Green Pea Acreage Totals at Selected Intervals from the	
Waunakee Canning Factory, 1966	39
12. Sweet Corn Acreage Totals at Selected Intervals from the	
Waunakee Canning Factory, 1966	40
13. Ratio of the Number of Canning Plants Per Canning Company:	
Wisconsin, 1930-1967	50

FIGURE	PAGE
14. Snap Bean Acreage by County in Wisconsin, 1949	54
15. Snap Bean Acreage by County in Wisconsin, 1964	55
16. Production of Selected Vegetables: Wisconsin, 1947-1965	62

CHAPTER I

INTRODUCTION

The economy of Wisconsin is based upon primary agricultural activities and manufacturing industries related to these activities. Dairying has been the most important agricultural enterprise in Wisconsin for some time, and presently is among the leading economic activities. The popularity of dairying has often overshadowed many of the other important economic activities of the state, such as commercial vegetable canning.

The vegetable canning industry, like other commercial manufacturing industries, is comprised of the activities of collecting raw materials, processing them, and marketing the finished products. Where such a manufacturing industry will locate is dependent upon a number of factors related to these three activities. Examples of such locational factors include sources of raw materials, transportation availability and costs, sources of labor, and market areas. More specifically, the location of canning factories in Wisconsin can be better explained by examining a more detailed list of locational factors. This list includes an adequate water supply, a low economic level of living, a lower tax rate, competition from other factories, and air pollution. The effects of these factors can be examined individually and/or as a unit to explain factory distributions within a state-wide area, factory locations at certain communities, and factory locations within these communities.

As stated in a variety of economic geography textbooks, the vegetable canning industry tends to locate near its source of raw materials,

or in other words, near the major vegetable growing areas. However, this is not enough. This paper will look farther, pinpointing factory locations within particular communities. The purpose of this detailed examination is two-fold, in that the author is attempting to explain the rigidity of factory locations since their founding and to offer some insight as to future factory locations.

Along with factors influencing the location of such a manufacturing industry, there are a number of characteristics forming the personality of the industry. Characteristics such as number of employees, size and location of industrial site, amount of capital investment, period of operation, labor supply, and location of marketing areas help to describe the vegetable canning industry's make-up. The personality of this industry is not easily defined, for it is a dynamic industry greatly influenced by forces outside its sphere of control. A decreasing labor supply, government imposed wage rates, and unpredictable weather conditions have forced cannery officials to modify the character of the industry. This paper will, in part, attempt to show how the growth of this industry, exemplified by an increase in capital investments, a greater product diversity, and a trend toward year-around operation, is also altering the industry's personality.

Purpose of the Study

The purpose of this study is to examine geographically the commercial vegetable canning industry in Wisconsin, with emphasis on an analysis of canning factory locations, and a redefinition of the personality of the industry.

The specific objectives are: .

1. To examine the economic geography of the vegetable canning industry in Wisconsin
2. To determine and analyse the factors affecting the original location of vegetable canning factories in Wisconsin
3. To point out the influence of these initial location factors at the present time
4. To show what changes have occurred to alter the personality of the canning industry in Wisconsin.

Justification of the Study

There has been much previous work done on the economic geography of agricultural industries. However, very little of this work has focused on the vegetable canning industries, especially those in Wisconsin. Agronomists, food scientists, and agricultural economists have studied individual aspects of the industry, but geographers have paid little attention to this activity.

Wisconsin was chosen as the area of study for a number of reasons. With regard to vegetables it is a national leader in terms of harvested acreage, tons produced, and cases packed. Within the state there is a large number of canning factories processing a variety of vegetables. This product diversity allows for comparisons to be made between different types of canning factories, thereby facilitating analysis of the industry in its entirety. Also, a range in the scale of manufacture is present from the small, locally owned company operating only one plant to the

larger, nationally prominent, multiplant company. Finally, the author's familiarity with this producing area has simplified the data gathering procedure and eased the pain of library research.

CHAPTER II

THE CANNING INDUSTRY--AN EXAMPLE OF A COMMERCIAL FOOD MANUFACTURING INDUSTRY

An industry is an operation whereby labor and capital are systematically applied to produce a commodity and distribute that commodity, in its original or modified form, to its market.¹ Included in this broad category are operations involving primary and secondary economic activities. Within the scope of the latter economic activity, we must be more specific in our definition of an industry. This leads to the term "manufacturing," which involves the conversion of a resource into a useful product. This conversion, often called processing, may be accomplished by hand, by machine, or by another agent.² Industries, then, which fall into the classification of secondary economic activities commonly are called manufacturing industries. An example of such an operation is the commercial food manufacturing industry.

Since the passing of the water-powered grist mill, the door-to-door meat salesman, and the wax-capped Mason jar, food manufacturing industries have become economically more sound. As their economic strength increased, these industries supplying meat products, dairy products, canned fruits and vegetables, and beverages have, more than ever, become separate entities under the broad heading of food manufacturing.

It is difficult to discuss these various individual industries as a single group. Besides the differences in commodities produced, each

¹A. M. Nielsen, Economic and Industrial Geography (New York: Pitman Publishing Corp., 1950), pp. 558-9.

²Ibid.

industry uses a different processing method and displays a different geographical distribution. The vegetable canning industry in Wisconsin is an example of one of these individual food manufacturing industries. Even though it may not be the best representation of a food manufacturing industry, many characteristics of the two are similar.

Economic Importance

Chronologically, the development of the commercial food manufacturing industry followed that of several other major manufacturing industries. From its initiation in the middle and late 1800's, food processing in the United States has grown to be one of the nation's largest industries. To validate the economic importance of this industry in the United States, considerations involving the value of products sold, the number of factories, the value of raw materials, and the number of persons employed must be examined. Table I demonstrates the importance of this industry in each of the previously mentioned categories. According to data from the Bureau of Census, commercial food manufacturing industries lead all others in value of shipments, cost of raw materials, and total employees. Following at a close second, these industries trail printing and publishing industries in value added by manufacture. It, therefore, seems safe to assume that the later development of this industry has not hampered its growth.

The same set of factors can be used in a measurement of the economic importance of the vegetable canning industry in Wisconsin. Table II demonstrates the relative importance of this industry to the state. This table, when compared with Table I, also shows that a particular type of industry can be more important to its local area than is a group of related industries to the nation.

TABLE I
ECONOMIC IMPORTANCE OF COMMERCIAL FOOD MANUFACTURING
INDUSTRIES IN THE UNITED STATES, 1963

Item	United States Total Manufacturing	Food and Kindred Products	Per Cent Of Total	Industrial Rank
Establishments, total	306,617	37,521	12.2	2
All employees (ave. for year)	16,234,506	1,643,111	10.1	1
Cost of materials (\$1000)	229,683,800	46,784,435	20.4	1
Value of Shipments (\$1000)	420,528,098	68,466,487	16.2	1
Value added by manufacture, adjusted (\$1000)	192,103,102	21,825,516	11.4	2

Source: U. S. Bureau of the Census, Census of Manufactures, 1963.

TABLE II
ECONOMIC IMPORTANCE OF COMMERCIAL FOOD MANUFACTURING
INDUSTRIES IN WISCONSIN, 1963

Item	Wisconsin Total Manufacturing	Food and Kindred Products	Per Cent Of Total	Industrial Rank
Establishments, total	7,937	1,814	22.9	1
All employees (ave. for year)	461,807	58,714	12.7	1
Value added by manufacture, adjusted (\$1000)	5,363,153	754,500	14.1	2
Capital expenditures, new (\$1000)	280,665	49,578	17.7	2

Source: U. S. Bureau of the Census, Census of Manufactures: Wisconsin, 1963.

Wisconsin has for some time been a national leader in the production of vegetables for processing. Table III lists the more important vegetable producing states by area, focusing on harvested acres, tons of production, and dollar values. From this table it can be noted that Wisconsin is the leader in harvested acreage, but falls second to California in tons produced and in value of production. However, because Table III includes vegetables grown to supply freezing plants as well as canning plants, it misrepresents the overall canning picture. Wisconsin's position in relation to that of California's would be greatly improved if only vegetables grown for canning were considered.

Green peas, sweet corn, and snap beans are the three most important canning crops in Wisconsin. They comprise roughly 89 per cent of the canning crop acreage, and approximately 81 per cent of the farm value of vegetable crops. An individual crop breakdown shows peas accounting for 42 per cent of the canning crop acreage and 42 per cent of their farm value. Sweet corn follows with 36 per cent and 25 per cent respectively, and snap beans are next with 25 per cent and 15 per cent.³ Table IV supplies additional information on these and the two other vegetable crops selected for study. These five vegetable crops are those most important to the Wisconsin canning industry. Figures 1, 2, and 3 graphically describe their acreage, production, and value trends since 1950.

Scale of Manufacture

Even though the commercial food manufacturing industry is large in size, it is relatively small in scale. Nevertheless, the scale of manu-

³Aaron C. Johnson, "Wisconsin Processing Crop Statistics," Resource Report (Madison: University of Wisconsin, November, 1966), p. 1.

TABLE III

ACREAGE, PRODUCTION, AND VALUE OF COMMERCIAL VEGETABLE
CROPS FOR PROCESSING, BY SELECTED STATES, 1965

State	Acreage (Acres)	Production (Tons)	Value (\$1000)
New York	91,200	408,720	16,645
New Jersey	60,000	393,140	22,198
Pennsylvania	33,820	176,530	7,114
Delaware	42,060	80,430	6,846
Maryland	69,050	261,300	12,365
Ohio	30,910	583,130	16,925
Indiana	32,540	350,950	9,595
Illinois	111,120	414,530	17,083
Michigan	52,780	223,740	15,056
Wisconsin	276,410	782,470	35,191
Minnesota	156,570	437,360	16,320
Idaho	31,150	113,070	4,488
Washington	139,770	370,460	26,729
Oregon	110,600	403,790	25,673
California	205,750	2,680,830	133,390
U.S., Total	1,630,670	8,338,830	400,846

Source: U.S.D.A. Agricultural Statistics: 1965.

TABLE IV
HARVESTED ACREAGE AND PRODUCTION OF SELECTED VEGETABLE
CROPS FOR PROCESSING: WISCONSIN, 1966

Product	Harvested Acreage	Tons	Production Per Cent Of U. S.	Rank In U.S.	No. of Plants Packing Item
Green Peas	124,400	128,130	25.2	1	63
Sweet Corn	115,900	457,800	23.4	2	49
Snap Beans	43,300	86,600	16.5	3	25
Cucumbers for Pickles	15,000	50,100	9.4	4	11
Beets	6,300	53,600	27.6	2	15

Source: Wisconsin Cannery and Freezers Association, 1967.

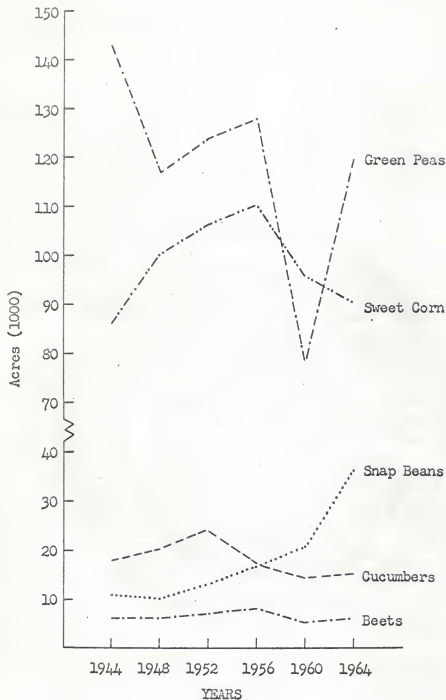


FIGURE 1

HARVESTED ACREAGE OF SELECTED VEGETABLES
FOR PROCESSING: WISCONSIN, 1944-1964

Source: Aaron Johnson, "Wisconsin Processing Crop Statistics" Resource Report. Madison: University of Wisconsin, November, 1966.

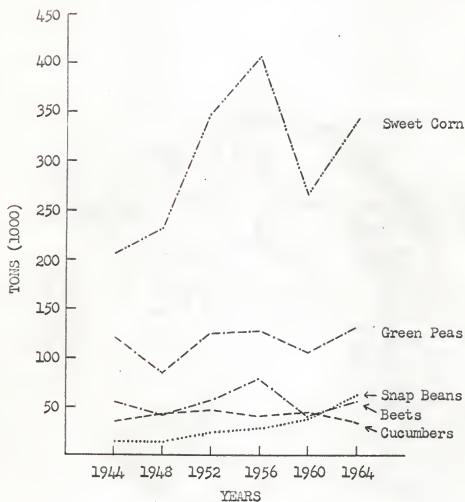


FIGURE 2

PRODUCTION OF SELECTED VEGETABLES FOR PROCESSING:
WISCONSIN, 1944-1964

Source: Aaron Johnson, "Wisconsin Processing Crop Statistics" Resource Report. Madison: University of Wisconsin, November, 1966.

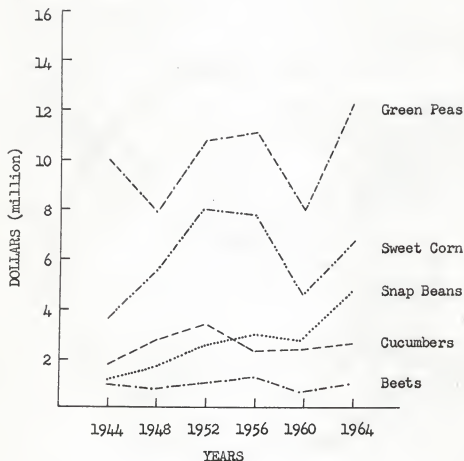


FIGURE 3

VALUE OF SELECTED VEGETABLES FOR PROCESSING:

WISCONSIN, 1944-1964

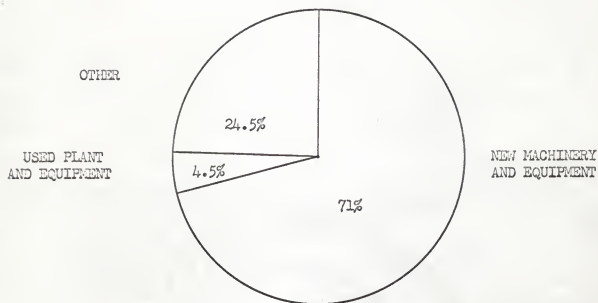
Source: Aaron Johnson, "Wisconsin Processing Crop Statistics" Resource Report. Madison: University of Wisconsin, November, 1966.

facture for any one food processing industry is changing. Logically, the changes have been toward larger scale operations, and have caused modifications in the structure of the broad food industry classification. Figure 4 gives an indication of these changes. The primary reason for this shift to larger scale operations seems to have been the emphasis on greater production efficiency.

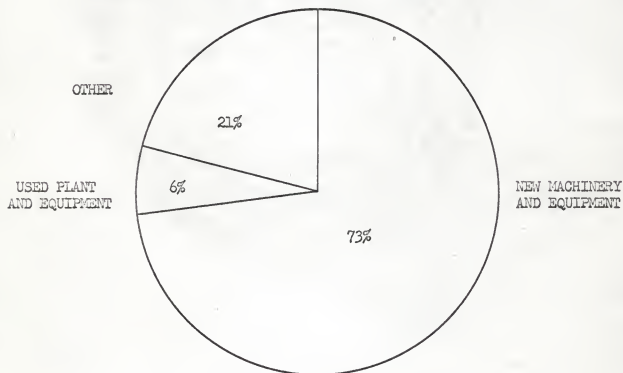
The vegetable canning industry in Wisconsin, like other food manufacturing industries, is trending toward a larger scale of manufacture. However, it is still a small-scale industry. An analysis of the industrial factors indicating scale of operation will reinforce this statement. Examples of such factors are the number of employees, the period of operation, the characteristics of the raw materials, the nature and complexity of processing methods, the amount of capital investment, the degree of mechanization, the characteristics of the finished products, and the complexity of the marketing system.

The first factor to be dealt with, the number of employees, can be represented in different ways. Because the cannery does not operate at a maximum production level throughout the year, its labor needs rise and fall during peak and slack canning periods. During the peak period a factory may need a labor supply ten to twenty times that of the slack period. Maximum production usually occurs during the months June to September, while the minimum period extends from December to April.

The most accurate representation of a cannery's labor needs should be based upon its number of full-time employees. In addition, the large number of part-time laborers should be noted, and their importance



1958 - \$1,000,000,000 Total



1963 - \$1,250,000,000 Total

FIGURE 4

FOOD AND KINDRED PRODUCT INDUSTRY EXPENDITURES: U.S., 1958 & 1963

Source: U.S. Bureau of the Census, Census of Manufactures: General Summary, 1963.

recognized. Table V, showing full-time employment figures for most of Wisconsin's canning factories, gives no reference to fluctuations caused by changing needs within the year, and is a good example of misleading data. Nevertheless, Table V does show that there are only a few canning factories in the state employing more than 100 people throughout the year.

The short season of operation, mentioned in the previous discussion of employment, is another factor related to a small-scale industry. The length of the canning season is dependent upon the number of product varieties canned, the quantity of each variety canned, the perishability of each crop, and, to a lesser degree, the weather conditions during the harvesting season.

The vegetable canning industry in Wisconsin has traditionally operated from early June to mid-September, with a brief change-over period between the green pea and sweet corn packs. This change-over period occurs in late July and/or early August. Presently, greater product diversification and increased product quantities are lengthening this industry's period of operation. Multiproduct factories may now pack vegetables until late December or early January. This fact, again, tends to enlarge the scale of manufacture of the industry.

The characteristics of the raw materials play an important role in determining the scale of operation of the vegetable canning industry. The location of these materials and their degree of perishability have tended to strengthen the small-scale nature of the industry. Even though vegetable crop production demonstrates areal specialization, the area involved is of considerable size. This has led to the establishment of a number of small factories which process vegetables grown in their local area. Because of

TABLE V
EMPLOYMENT-SIZE CLASS OF SELECTED CANNERIES IN WISCONSIN, 1965

	Number of Full-Time Employees					
	1-3	4-7	8-19	20-49	50-99	100-249
Number of Canneries	1	2	18	17	5	3

Source: U. S. Bureau of the Census, County Business Patterns: Wisconsin, 1965.

excessive transportation costs and the danger of spoilage, a cannery seldom transported raw vegetables over 50 miles to be processed.

The complexity of processing methods, the amount of capital invested, and the degree of mechanization are three interrelated factors also depicting scale of manufacture. During its early years, the canning industry relied on hand labor, used crude machinery, and reinvested only a limited amount of capital toward improvements. But, as it grew larger, the industry realized the importance of economic efficiency, and, especially since World War II, has increased its progressiveness. Larger amounts of capital have been invested to enlarge operations, machines have replaced hand labor, and the overall complexity of the industry has increased. These factors, like the others discussed, are continuing to increase the scale of operations of the vegetable canning industry.

Marketing System

The marketing system of food manufacturing industries is complex and highly organized. Individual industrial types vary in their market structure, even though their market distribution may be similar. Beyond the demands of the local market, most food products are channeled to the larger urban centers located in eastern, southern, and western areas of the United States.

The marketing system of the vegetable canning industry in Wisconsin exemplifies that of many food manufacturing industries. Like many other food products, raw vegetables are bulky and contain much waste material. Nevertheless, such vegetables can be converted to a compact, waste-free

form, conducive to easy handling and long periods of storage.⁴ One outstanding advantage of this process is the uniform supply of vegetables during the year.

The complete job of transporting a vegetable product from producer to consumer involves many functions. Examples are the storage of canned goods in warehouses until shipment, the financing of the product while enroute, and the actual transportation of the good from producer to consumer.⁵

Canneries in Wisconsin store most of their own finished products until purchased by a wholesaler or retailer. These purchases are made through canned food brokers who act as selling agents for canners. Canning companies very seldom sell their products under their own brand name. Most buyers prefer their own label on the cans, and the canning companies are most willing to accommodate them.

Vegetable products are shipped from canneries in Wisconsin to a wide range of wholesale and retail distribution centers. The vast majority of these centers are located in the eastern and southern parts of the United States in cities such as New York, Philadelphia, Baltimore, Memphis, New Orleans, and Miami. Other large centers located closer to the producing area include Chicago, St. Louis, and Kansas City. Due to the distance factor involved, about two-thirds of Wisconsin's canned vegetable production is shipped by rail. The other one-third, shipped by truck,

⁴Wallace A. Rehberg, Cooperative Arrangements Among Small Processors of Farm Products, Wisconsin Agricultural Experiment Station, Research Bulletin 243 (Madison: University of Wisconsin, June, 1963), p. 42.

⁵Information Division of the National Canners Association, The Canning Industry, Fifth Edition, (Washington: The National Canners Association, 1963), p. 28.

is economically confined to a radius of approximately 500 miles.⁶ Exceptions to this truck transportation mileage limit could be cited, especially for retailers transporting their purchased products great distances. However, these exceptions are few.

Growth of the Industry

Food manufacturing industries have shown a more consistent growth pattern than many of the other major industrial groups. The uniformity of this growth since World War II exemplifies the stability of the industry. Production increases are primarily dependent upon the demand for food products (domestic and foreign), the availability of capital, and fluctuations of the business cycle.

Product demands are most often influenced by population increases, new food varieties, price changes, and advertising. Of these factors, population growth has the greatest effect on the demand for a product over a long period of time. The other factors listed influence short-term alterations in product quantities sold.

Without available capital an increase in production is virtually impossible for any industry. This capital may be in the form of profits from the sale of finished goods, or in the form of credit made available by lending institutions. Most well established industries, such as the canning industry, rely primarily on capital gained from the sale of their goods.

Fluctuations of the business cycle moderately affect the demand for food products. Individual food manufacturing industries are affected more

⁶Information received from an interview with Marvin P. Verhulst, Executive Secretary of the Wisconsin Canners and Freezers Association, on March 9, 1967.

by these fluctuations than is the food industry as a whole. These variations in the business cycle may cause an increase or decrease in the demand for particular types of foods, but the indispensability of their product gives most food manufacturing industries a distinct advantage over other manufacturing industries.⁷

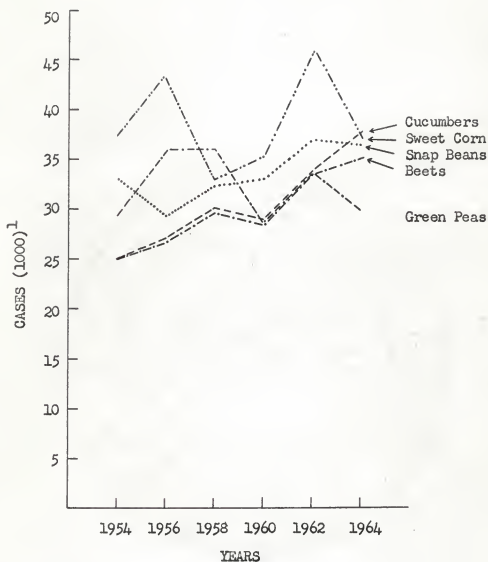
The vegetable canning industry in Wisconsin is affected by the growth factors generally associated with the food industry, and it also has to cope with local factors influencing production. As mentioned earlier, each canning factory is scaled to process the vegetable crops in its local area. Therefore, the vegetable crop production potential of that area may become a limiting factor in an attempt to increase processing capacity. However, even if a plant is surrounded by a potentially large crop producing area, competition for that area from other food manufacturing industries may limit production. Finally, the cannery must retain good relations with local vegetable producers, so that increased canning needs can be met.

The vegetable canning industry has been growing steadily since World War II. Figure 5 shows this increase and emphasizes the fluctuations in production from 1954 to 1964. If this growth is to continue at its present rate, problems such as a short period of operation, labor shortages, rapidly increasing capital requirements, and industrial inefficiency must be alleviated.

Industrial Structure and Organization

From an industry built upon a number of small, locally owned and operated companies the food manufacturing industry has grown into large

⁷E. B. Alderfer, Economics of American Industry (New York: McGraw-Hill Book Company, 1942), p. 416.



¹Equivalent Cases of 24 No. 303 Cans

FIGURE 5

QUANTITY OF VEGETABLES CANNED: U.S. PACK
OF SELECTED ITEMS, 1954-1964

Source: U.S.D.A., Agricultural Statistics, 1964 and 1965.

multiplant financial organizations. This structural change was fostered by an increased demand for a greater variety and quantity of products, and a greater need for larger amounts of capital.⁸ By consolidating many of the smaller companies into larger operations, industrial efficiency has been greatly increased, and a more rapid rate of growth has been possible.

A brief analysis of the structure of the vegetable canning industry in Wisconsin exemplifies the general structure of the food processing industry. The uppermost level in the heirarchy of the canning industry's organization is the company. The functions of the canning company are primarily administrative in nature. These functions usually include all aspects of crop production, processing methods, and marketing. Company policy is directed from the central or branch offices, and is recognized at the lowest levels of the organization.

Under the direction of the company offices, the canning factory functions as a secondary unit at the local level. Besides its processing duties, the canning factory officials act as local administration representatives. Having its own staff the factory performs many functions similar to those of the company offices. Its most important administrative function is to pacify the lower levels of the organization, namely, the crop producers and the factory employees.

The lowest level of the organizational heirarchy includes the vegetable producers, or vegetable contractors. Each canning factory is responsible for its own supply of vegetables, and must, therefore, contract acreage in the area to supply the necessary amounts. This procedure benefits the canner by allowing him to estimate the amount and quality of

⁸Ibid., p. 417.

his raw materials in advance of the canning season. His goal is to operate his factory at optimum efficiency by controlling his source of supply. The farmer also benefits from this contractual arrangement. With a guaranteed price and the assurance of a market for his crop, he can look forward to a stable cash crop income.⁹

General Location Factors

In general, where a commercial manufacturing industry will locate is dependent upon a number of factors related to the activities of collecting raw materials, processing them, and marketing the finished products. Examples of such locational factors include sources of raw materials, sources of labor, sources of fuel and/or power, and market areas. Based upon questionnaire results from 463 various manufacturers in Wisconsin, the following location factors were found to be the most important:¹⁰ 1) wages (including labor productivity and availability), 2) markets, 3) raw materials, and 4) taxes. More specifically, the three most important location factors listed for food processing industries in the state were markets, raw materials, and wages.¹¹

It was noted earlier that the commercial vegetable canning industry is located close to its source of raw materials. The perishable nature of these materials and the cost of long hauls from field to factory have encouraged clustered factory distributions. In the United States there are three main areas of vegetable processing. The first, in the West,

⁹Ibid., p. 473.

¹⁰Bureau of Business Research and Service, "Industrial Development in Wisconsin," Wisconsin Committee Reports (Madison: University of Wisconsin, 1957), p. 39.

¹¹Ibid., p. 40.

includes California, Oregon, Washington, and Utah; the second, in the North Central area, includes Minnesota, Wisconsin, Illinois, Michigan, Indiana, and Ohio; and the third, in the East, includes Pennsylvania, New York, New Jersey, Maryland, and Delaware. Within each of these areas over half of the production of each vegetable is centered in four states.¹² Figure 6 gives a general indication of canning factory locations in the United States. Later discussions in Chapter III will examine the distribution of canning factories in Wisconsin in greater detail.

¹²Rehberg, op. cit., p. 42.

CANNED FRUIT AND VEGETABLE FACTORIES IN THE U.S. BY STATE, 1958

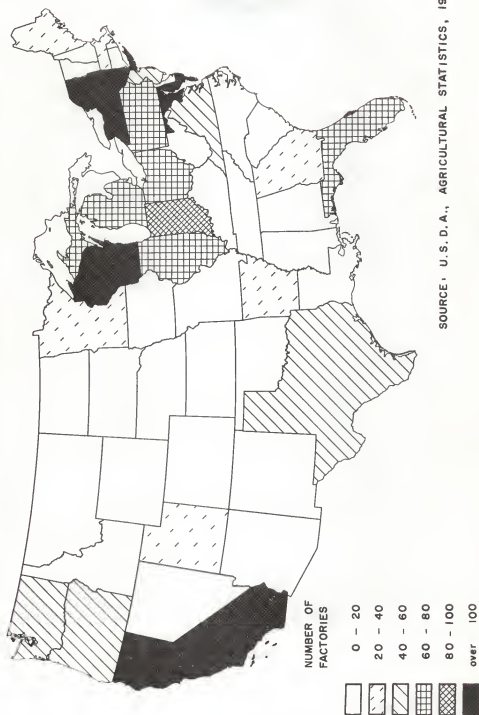


FIGURE 6

CHAPTER III

THE VEGETABLE CANNING INDUSTRY SURVIVES IN WISCONSIN

The History of Canning in Wisconsin

A brief history of Wisconsin's canning industry will serve as a background for later consideration of factors affecting initial plant locations within the state. In this regard four stages of the industry's development will be discussed: 1) the early years of rapid growth, 2) the leveling-off period, 3) the effects of two world wars, and 4) the period since World War II.

The canning industry was introduced to Wisconsin in 1887, with the first factory located at Manitowoc. Within the next three years two more plants were established at Green Bay and Sheboygan. By 1900 a total of 21 canning factories were operating within the state, and a number of new plants were under construction.¹³ Most of these plants canned only one or two products, with a strong emphasis on the production of green peas. The earlier factories were found in the extreme eastern portion of the state, along the Lake Michigan shoreline. As the industry grew, factory sites expanded slightly toward the interior of the state.

The period of rapid expansion continued through the early 1900's. Wisconsin became the leader in pea production in 1906, and continued its rapid rate of factory construction until 1918. Even though construction slackened in the early 1920's, the industry was still in an important period of expansion. Company reorganizations were modifying the structure

¹³Vere E. Bufton, Wisconsin Vegetables for Commercial Production, Wisconsin Agricultural Experiment Station, Special Bulletin 71 (Madison: University of Wisconsin, August, 1958), pp. 26-7.

of the industry, making it economically more stable. This reorganization continued through the 1930's and 1940's, denoting a leveling-off period in industrial growth.¹⁴

The vegetable canning industry in Wisconsin was affected by World Wars I and II like many of the other manufacturing industries in the United States. The increased demand for food, especially canned food, called for rapid increases in vegetable production. The canneries responded to this demand, but not by increasing their number of processing units. Instead, the production capacity of existing units was increased. Therefore, this third major period of the industry's growth was marked by an increased production capacity per factory.

The final period to be noted, that after World War II, again stresses change. The "booming" nature of the war period faded slowly, giving the canning industry a chance to gain new economic strength. The effects of few restraints on capital and an increasing trend toward mechanization facilitated new growth in the industry. A more detailed discussion of this growth will be presented in Chapter IV.

Analysis of Plant Locations

In trying to analyse a location problem, there are two aspects that must be considered. First, the initial location factors, explaining why the item in question originally located where it did, and second, the survival location factors, explaining why the item has been able to remain. The second aspect of such a problem will be used to explain the present distribution of vegetable canning factories in Wisconsin.

¹⁴ibid.

A three-fold approach will be taken in attempting to analyse these canning factory distributions. A broad analysis of area locations within the state will lead the examination. An analysis of why particular community locations were chosen will follow, and lastly, a more detailed analysis of locations within these communities will conclude the study. The purpose of this detailed examination is to determine, if possible, what locational factors played the greatest role in the establishment of vegetable canning factories in the state. To simplify this examination, only the factories canning the five most important vegetables in the state will be considered. These crops, green peas, sweet corn, cucumbers for pickles, snap beans, and beets, are a good representation of total vegetable production within the state.

It has been pointed out in Chapter I of this paper that vegetable canneries locate close to vegetable growing areas. Because this general principle holds true for both the initial and present plant locations, an analysis of present factory locations in relation to cropping areas can be applied to early factory-cropping area relationships.

Vegetable production within the state displays a clustered distributional pattern, showing the effects of regional crop specialization. This type of pattern is associated with each of the five vegetable crops selected for study. Figure 7 shows the present distribution of canning factories in Wisconsin. Unfortunately, detailed data accurately indicating vegetable crop distributions are not available.

Since information concerning original plant locations during the early 1900's is scarce, analysis of these early locations must be based on historical information supplied by existing plants. One of the earliest

DISTRIBUTION OF CANNING FACTORIES IN WISCONSIN, 1966.

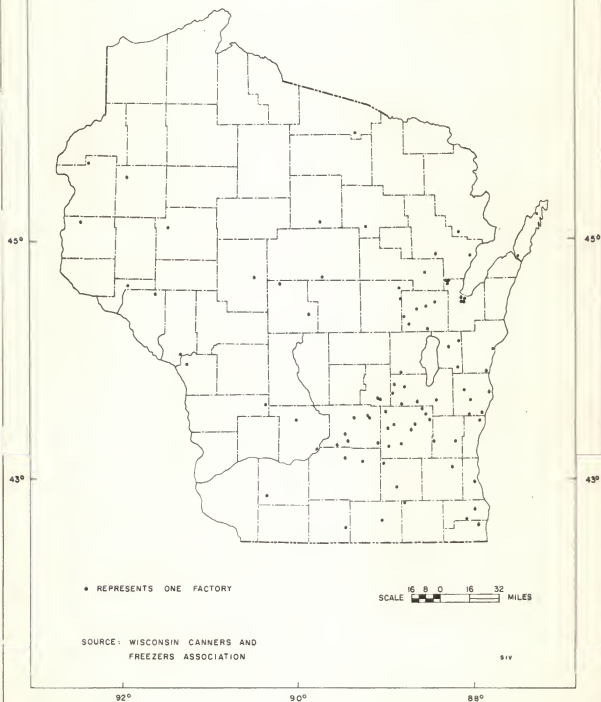


FIGURE 7

maps available to the author showing the distribution of canning factories in Wisconsin is for the year 1945. See Figure 8. Location data prior to 1945 are shown in Table VI and are given only for two general geographic areas of the state. However, it does indicate the early development of the Lake Michigan shoreline, and the dominance of the southeastern part of the state.

There are two locational factors most instrumental in determining the association between producing areas and factory locations. These are the degree of perishability of the crop and the cost of transporting the crop from field to factory. The greater the degree of perishability, the smaller the area a factory can serve. For example, a factory canning a very perishable crop may have all its acreage within a twenty mile radius, while another factory canning a crop not so perishable may extend its cropping area to forty or fifty miles. However, it must be remembered that the mileage radius for any one crop is also affected by the transportation cost. Costs for very bulky, heavy crops may decrease this radius.

An attempt has been made to examine in greater detail this relationship between factory location and producing area, using two different statistical measures. First, by examining the degree of closeness between factories canning each of the five vegetable crops chosen, an indication should be given as to which factories are most affected by perishability and transportation costs. To measure this degree of closeness, the "Nearest Neighbor Technique" was selected for use. The second statistical measure, linear regression, attempts to determine the relationship between vegetable acreages and distance of these acreages from the canning factory. This statistic should also give an indication of which vegetables are most

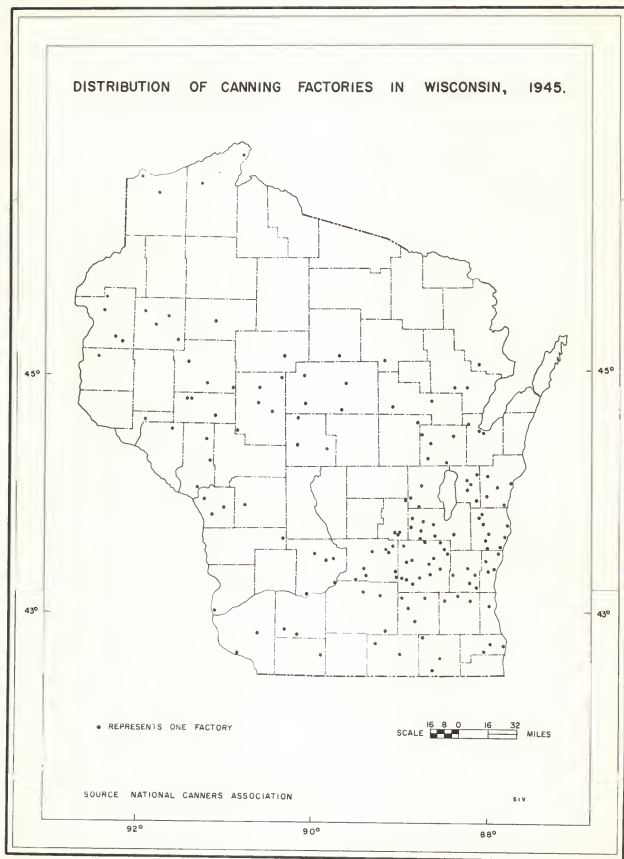


FIGURE 8

TABLE VI
DISTRIBUTION OF CANNING PLANTS ACCORDING TO AREAS
BY DECADES IN WISCONSIN, 1900-1940

Year	No. of Plants		
	State Total	S.E. Area	N.W. Area
1900	15	15	0
1910	49	41	8
1920	126	92	34
1930	169	118	51
1940	146	105	41

Source: Francis A. Krause "The Wisconsin Canning Industry," Wisconsin Commerce Papers, I (November, 1948), p. 20.

affected by perishability and transportation costs. In combination, these measures should help to describe factory distributions within the major vegetable growing areas.

The "Nearest Neighbor" statistic was computed for factories canning each of the five vegetable crops--green peas, sweet corn, cucumbers for pickles, snap beans, and beets. The results are cited in Table VII. The inaccurate findings computed for cucumbers for pickles resulted from the very low number of factories canning this crop. The other figures seem to be fair indications of the effects of perishability and transportation costs on each type of factory. Therefore, green pea and snap bean acreages would be expected to extend greater distances from a factory than would beet and sweet corn acreages.

To test this hypothesis, contracted acreages of peas and sweet corn were examined for a selected factory in Dane County, Wisconsin. A random sample of 28 per cent of the pea growers and 32 per cent of the sweet corn growers was taken, and a regression analysis was computed to determine the relationship between a grower's distance from the factory and his acreage of peas or sweet corn. The results of this analysis are shown in Figure 9 and Figure 10, respectively, and as indicated, there is a definite relationship between these two variables.

However, in graphing the pea and sweet corn grower locations chosen in each random sample, a uniform pattern of increasing acreages, as related to distances from the factory, was not noted. Instead, a clustered pattern of grower locations was presented. A graph of these distributions is shown in Figure 11 and Figure 12.

The explanation of this clustered grower distribution is directly tied to harvesting efficiency; the increased mechanization of harvesting

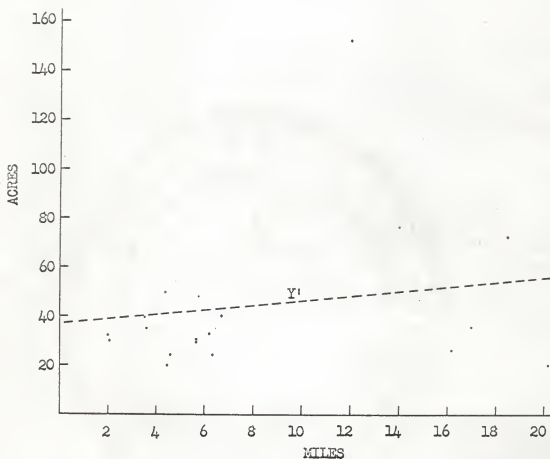
TABLE VII
RESULTS OF THE "NEAREST NEIGHBOR" MEASUREMENT OF FACTORIES
CANNING SELECTED CROPS IN WISCONSIN, 1965

Crop Canned	R-Value ¹	C-Value ²
Beets	0.304	17.10
Sweet Corn	0.577	5.60
Green Peas	0.695	4.05
Snap Beans	0.744	2.32
Cucumbers for Pickles	1.082 ³	0.54

¹A ratio of R=1 indicates a random distribution of points. When R is less than 1, the pattern will tend toward aggregation or clustering; when R is greater than 1 the pattern will tend toward uniformity or dispersion.

²If the value of C is equal to or exceeds 1.96, we can say that the investigated pattern would be expected to arise by chance only five times out of one hundred, or five per cent of the time.

³This value is meaningless, based on the value of C.



$$Y' = 36.7 + 0.94X$$

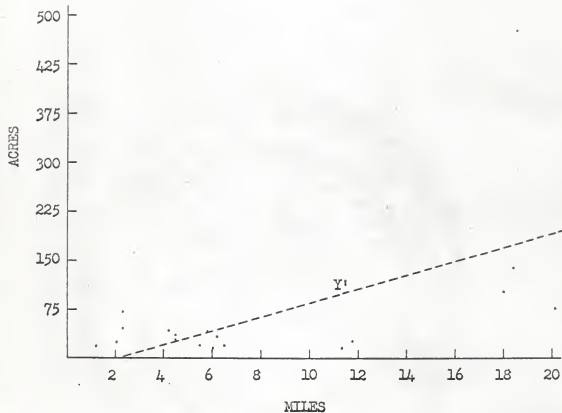
$S_{yx} = 19.13$ Standard error of estimate

$r = 0.709$ Coefficient of correlation

FIGURE 9

REGRESSION ANALYSIS OF GREEN PEA ACREAGE
AS RELATED TO DISTANCE FROM THE WAUNAKEE CANNING FACTORY

Source: Waunakee Plant, Oconomowoc Canning Company



$$Y' = -23.2 + 10.6X$$

$S_{yx} = 81.57$ Standard error of estimate

$r = 0.652$ Coefficient of correlation

FIGURE 10

REGRESSION ANALYSIS OF SWEET CORN ACREAGE
AS RELATED TO DISTANCE FROM THE WAUNAKEE CANNING FACTORY

Source: Waunakee Plant, Oconomowoc Canning Company

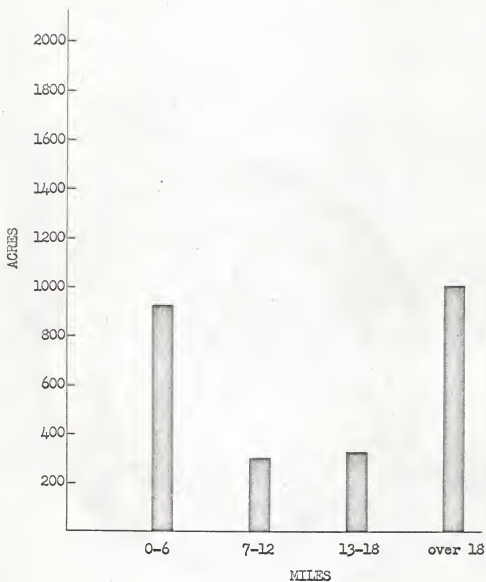


FIGURE 11

GREEN PEA ACREAGE TOTALS AT SELECTED INTERVALS
FROM THE WAUNAKEE CANNING FACTORY, 1966

Source: Waunakee Plant, Oconomowoc Canning Company

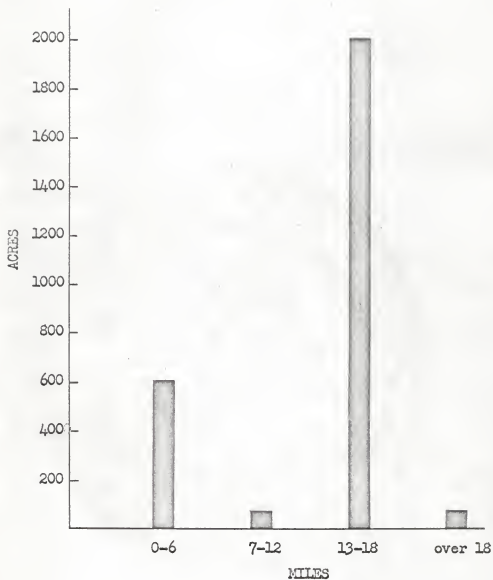


FIGURE 12

SWEET CORN ACREAGE TOTALS AT SELECTED INTERVALS
FROM THE WAUNAKEE CANNING FACTORY, 1966

Source: Waunakee Plant, Oconomowoc Canning Company

procedures having led to a greater emphasis on minimizing the non-operating time of harvesting machines. Transporting these harvesting machines from field to field represents a large portion of this time. Therefore, conditions promoting maximum efficiency would find growers located near one another.

Other explanations of this clustered grower distribution involve factors related to physical cropping conditions, grower crop choices, and local weather conditions. The physical conditions associated with the production of peas and sweet corn have a minor effect on the location of these crops in Dane County. Examples of such physical conditions include type of soil, terrain, and drainage. Grower crop choices influence this clustered pattern to a greater degree, for not every farmer is willing to grow peas or sweet corn as a cash crop. Therefore, it is the responsibility of canning factory representatives to enlist growers located near existing producing areas. The effects of local weather conditions during the harvesting season encourage the canning factory to disperse its cropping areas at various distances from the plant. In this way, a local shower may not cause all harvesting operations to cease, or a local frost may not damage or destroy a factory's entire contracted acreage.

In summary, it has been concluded that canning factory locations, both past and present, are influenced by the perishability of the crop and the cost of transporting that crop from field to factory. This has led to a clustered distribution of canning factories within the state. The degree of clustering depends upon the degree of perishability of the crop and its transportation cost. Factories canning highly perishable products with a high transportation cost tend to locate nearer one another than do

factories canning less perishable products with lower transportation costs. Lastly, it was also noted that contract growers supplying the plant with peas and sweet corn are distributed at various distances from the plant, influenced by the physical and cultural conditions of the area.

After examining the location of vegetable canning plants in relation to cropping areas, the next step is to determine why these factories chose to locate in certain communities. Most of the communities or settlements containing a canning factory in the early 1900's were small in size, housing less than 2,000 people.¹⁵ They were agriculturally oriented, and functioned at a low economic level. Many canneries that were established in such communities have remained until the present time. Also, many aspects of these canning communities have changed little since the early 1900's. Therefore, an analysis of communities presently containing a canning factory should give a good indication of conditions at the time of initial factory establishment.

The list of factors affecting plant locations includes the availability of rail transport, an adequate water supply, a suitable labor supply, lower tax rates, and an absence of competition from other manufacturing industries. There has been no attempt to rank these factors in order of importance, for they act as a unit in their influence on factory locations. Nevertheless, it should be realized that each factor varies in the degree to which it influences these plant locations.

The availability of rail transport played a key role in determining the community location of vegetable canning factories in Wisconsin.

¹⁵Kenneth Bertrand, "Rural Agglomerated Settlements in the Eastern Lake Shore Red Clay Dairy Region of Wisconsin," Wisconsin Academy of Arts and Letters, Transactions XXXIV (1942), pp. 47-8.

Historically, towns in Wisconsin offering rail services were focal points for the establishment of industrial and commercial activities. One of the most popular industrial activities in such towns was vegetable canning.¹⁶ The early importance of the railroad to the canning factory has remained to the present time. An examination of 83 factory locations, in nearly as many communities, revealed that over 95 per cent of these factories were linked with the rest of the country by means of a railroad in 1966. This examination included a wide range of plants, from the uniproduct factory to the multiproduct factory. Those factories not located adjacent to a rail line were served by either a federal or state highway, and were very small-scale operations.

A second locational factor deemed necessary for the operation of a vegetable cannery was the presence of an adequate water supply. Large quantities of water used in the preparation and canning of vegetables have always been necessary. Today, even more than in the past, water has become an indispensable tool of this industry. The water should be of good drinking quality, and low in mineral salts.¹⁷ For this reason most factories now acquire their water from wells rather than surface supplies.

From the examination of 83 canning factories in the state it was found that a large number of these factories were located near a surface water supply. In fact, 85 per cent of them were near a stream, river, or lake. Because most of these factories are presently not using such supplies, the importance of these water sources has decreased. However,

¹⁶Ibid., p. 58.

¹⁷W. V. Cruess, Commercial Fruit and Vegetable Products (New York: McGraw-Hill Book Company, 1938), p. 57.

with such a high per cent of factories located near a surface water supply it might be assumed that these supplies were important initial location factors. Therefore, water used for cleaning, canning, and disposal operations came from such supplies. Of these three activities, waste disposal was undoubtedly the most common use of surface supplies.

Another location factor drawing a canning factory to a particular community is the presence of a suitable labor supply. The suitability of the labor force, in this case, does not refer to large numbers of skilled workers. Instead, the cannery seeks locations where adequate numbers of part-time workers or seasonal workers are available. The majority of these include housewives, students, and farmers.¹⁸ The small size of a community had no effect on early cannery labor needs, for these needs were commonly not great. Labor supplies, then, were not very instrumental in determining initial vegetable canning factory locations. But, as factory operations began to expand, demands for larger labor supplies increased accordingly. Soon, local labor supplies could not meet the needs of the factories. This led to the introduction of migratory workers in Wisconsin's canning industry, temporarily alleviating the problem of labor shortages.

As the canning industry continued to grow in Wisconsin, labor problems became more and more acute. Man-power shortages, created by three definite changes in the industry's overall labor picture, have increased to the present time. First, there has been a large decrease in the number of part-time and migratory laborers in the nation, as well as in Wisconsin; second, workers have chosen other types of work, based on the poor working conditions and low wages associated with most canneries; and lastly, the emphasis on greater economic efficiency has caused this industry to turn

¹⁸Alderfer, op. cit., p. 476.

to mechanization in all aspects of its operations. It seems likely, then, that these factors will continue to influence labor problems for many years.

If there was ever a question in the minds of canning officials as to which size community (large or small) would be best for factory locations, the answer was undoubtedly affected by tax rates. Small communities enjoying the advantage of lower tax rates were, therefore, more favorable locations.¹⁹ This tax advantage has remained and has continued to aid the survival of canneries in small communities.

A final factor influencing the location of canning factories in certain communities is related to competition from other vegetable canneries and other manufacturing industries, due to the competition for labor and materials. The presence of another vegetable cannery may seriously limit the development of new cropping areas, thereby restricting a factory's growth. Nevertheless, there are some larger communities supporting more than one manufacturing industry, including some supporting two vegetable canning factories. Logically then, the importance of this last factor in determining plant locations will vary with the characteristics of individual communities.

The final aspect of this analysis of vegetable canning factory locations in Wisconsin will concentrate on factory sites. The choice of plant location within a community is influenced primarily by a need for a few acres of relatively flat land, situated on the edge of the settlement area. By locating away from the center of the community, factories have

¹⁹John Alexander, Economic Geography (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1963), p. 296.

room for future expansion, and residential areas are not strongly affected by waste disposal and air pollution problems.

During the early development of canning factories waste disposal was a minor problem. Those factories located near a natural water body often used this stream, river, or lake as a disposal unit. Those factories not located near a natural water supply constructed disposal ponds or used the community's waste facilities. Because most community waste disposal systems were not constructed to handle the large amounts of waste associated with vegetable canning, few factories relied on such a system. Presently, most factories utilize high pressure irrigation methods of waste disposal, spraying the liquid wastes on nearby fields. However, waste ponds are still common, and are many times used in conjunction with irrigation methods. These techniques offer a more sanitary method of waste disposal.

Air pollution was an early problem associated with canneries. Soot, coal dust, and waste odors often made the canning factory an unpopular community industry. With the conversion of coal furnaces to oil or gas and the increased use of waste irrigation equipment, this problem was reduced. Today the many factories bordered by residential areas demonstrate how an industry may modify its operations to promote good public relations.

The objectives of this chapter have been to determine and analyse the factors affecting the early locations of vegetable canning factories in Wisconsin, and to point out the influence of these factors at the present time. From this examination and discussion it can be seen that some changes have occurred. However, many of the factors affecting

initial plant locations continue to play an important role in keeping these locations fairly rigid. Changes in other aspects of the industry, causing shifts in the distribution of canning factories, will be discussed in the next chapter.

CHAPTER IV

THE CHANGING PERSONALITY OF WISCONSIN'S VEGETABLE CANNING INDUSTRY

Along with factors influencing the location of vegetable canning plants in Wisconsin, there are a number of characteristics forming the personality of this industry. These characteristics, discussed in Chapter II, have experienced considerable change since the establishment of the canning industry in the state. The dynamic nature of this industry is an integral part of its personality, and will probably continue to be so in the future.

There have been two broad changes in the characteristics of Wisconsin's vegetable canning industry. Both of these changes resulted from industrial progress, and instigated modifications in all branches of the industry. The increasing trend toward factory agglomeration and the evolution of the multiproduct factory have had striking effects on the industry's personality.

The consolidation of a number of small companies into larger, multi-plant organizations has occurred in many food manufacturing industries. However, this trend has been most obviously noticeable in the vegetable canning industry. Logically, it was the larger canning companies that initiated this trend. With adequate supplies of capital backing and established markets, these larger companies were able to purchase smaller companies located in many of the major vegetable producing areas.

The earliest period marking a decrease in the number of companies and an increase in the number of plants per company was 1930-1935. This

trend continued until a leveling-off period was reached in the early 1940's. At this time effects of the Second World War led to an increase in the number of canning factories. This resulted in a fairly constant ratio of number of plants per company. Then, after the war this ratio again began to increase. Figure 13 graphically describes the ratio of plants per company since 1930.

From the graph in Figure 13 it can be seen that the period following World War II was one displaying first an increase, then a decrease in factory-company ratios. The late 1940's and early 1950's were years associated with an increasing ratio of plants per company. A peak period was reached in the late 1950's, and through the early and middle 1960's a ratio of 1.6 plants per company has remained. Nevertheless, it appears that there will continue to be growth in the size of firms over time, with fewer companies and an increasing number of factories being controlled by a single company.²⁰

After discussing factory agglomeration trends for the canning industry in total, it might be interesting to examine briefly this trend for factories canning selected vegetable crops. Green peas and sweet corn have been the two most important vegetable crops in Wisconsin since the establishment of the vegetable canning industry. Therefore, it would be expected that these two crops should be canned by the greatest number of factories. Also, factories canning these vegetables should have the greatest influence on total plant per company ratios.

The trend in factory agglomeration since World War II is demonstrated in Table VIII for selected vegetable canning factories in Wisconsin. As

²⁰Bufton, op. cit., p. 28.

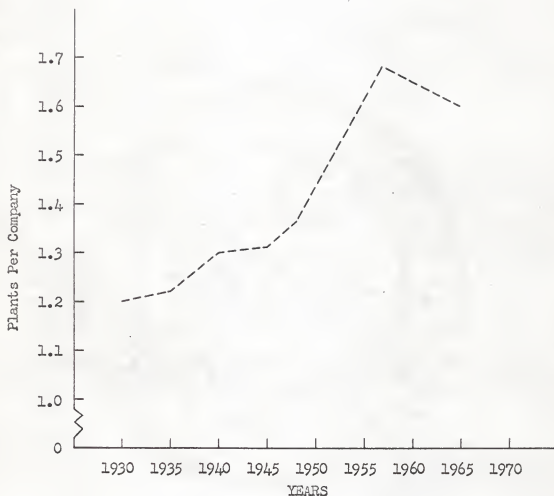


FIGURE 13

RATIO OF THE NUMBER OF CANNING PLANTS PER CANNING COMPANY
IN WISCONSIN, 1930-1967

Source: Wisconsin Department of Agriculture (1930-1948) and the
Wisconsin Cannery and Freezers Association (1957-1967)

TABLE VIII

NUMBER OF PROCESSORS PACKING SPECIFIC VEGETABLES:
WISCONSIN, 1957 and 1965

Product	<u>No. of Companies</u>		<u>No. of Plants</u>		<u>Plants per Company</u>	
	1957	1965	1957	1965	1957	1965
Total	70	64	122	102	1.75	1.60
Green Peas	58	41	94	62	1.62	1.51
Sweet Corn	46	33	64	48	1.39	1.45
Snap Beans	26	22	32	25	1.23	1.14
Beets	13	13	15	14	1.15	1.08
Cucumbers for Pickles	4	10	n.d.	11	n.d.	1.10

Source: Wisconsin Cannery and Freezers Association, 1966.

expected, green pea and sweet corn canning products do have the largest plant per company ratios. The decrease in most ratios between 1957 and 1965 resulted from the decrease in number of canning companies and canning factories, and did not cause a large decrease in total vegetable production during this period. The largest portion of the decrease in the number of companies and factories was the result of many small, single-factory companies merging with larger ones. Also, some of these smaller companies ceased operating.

The second noticeable change in the personality of Wisconsin's vegetable canning industry, a trend toward multiproduct factories, is related to the trend toward factory agglomeration. Greater demands by retail and wholesale buyers caused companies to increase and diversify their vegetable production. The smaller companies, operating only one or two plants, could not meet these demands. Therefore, the larger companies with many factories became more common.

There are two ways canning companies can diversify their production. They can operate a number of small plants in areas producing the vegetables they want to market, or they can relocate vegetable production to correspond with the distribution of their larger factories. The former of these two plans was, and still is, grossly inefficient. The second, however, was feasible, and became an important characteristic of the canning industry in Wisconsin.

The trend toward multiproduct factories is exemplified by the rigidity of canning factory locations and the flexibility of certain vegetable crop distributions. With a decrease in the total number of canning factories in Wisconsin the overall distribution of canning factories

in the state has shown a definite change. See Figure 7 and Figure 8, showing canning factory distributions in 1945 and 1966. The decrease in the number of small canning factories has played the greatest part in changing these distributions.

When market demands called for a greater variety in vegetable products, canning officials began to analyze the factors affecting the location of vegetable crops. Their purpose was to determine which crops could be relocated in other established producing areas. The results of this analysis indicated that the state's most important vegetable crops, green peas and sweet corn, would be the most difficult to redistribute. Other crops, such as beets, snap beans, and cucumbers were found to have greater locational flexibility. Therefore, they were redistributed to existing green pea and sweet corn producing areas.

Canning factories have engaged in product diversification and vegetable crop redistribution most actively since World War II. An examination of Figures 14 and 15 will demonstrate how one of these crops, snap beans, has been redistributed. Notice how well the 1964 distribution of this crop corresponds to the 1966 distribution of canning factories shown in Figure 8. Also, it can be noted from Figures 14 and 15 that there is a definite increase in crop specialization. This aspect of vegetable crop redistribution is exemplified by the lesser number of counties growing snap beans and the increased production in selected counties. In fact, there is evidence of greater regional specialization in the production of all vegetables in the well-established zones of northwest, north central, east, and southeast Wisconsin.

SNAP BEAN ACREAGE IN WISCONSIN BY COUNTY, 1949

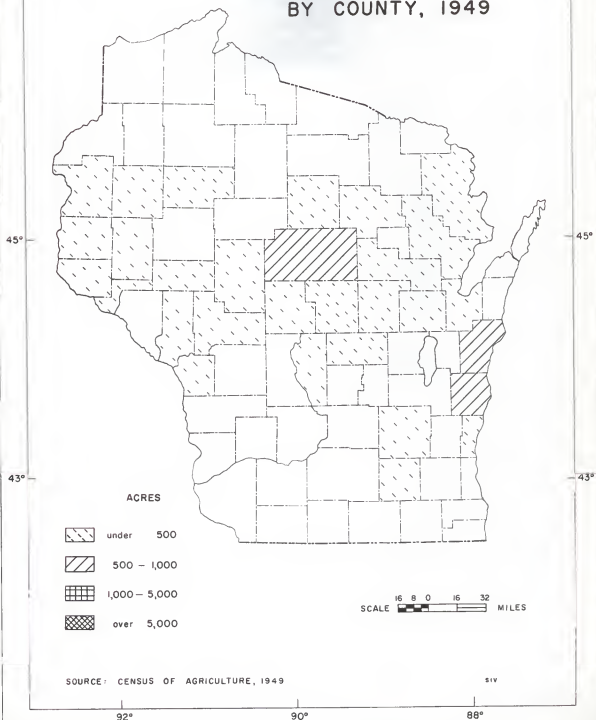


FIGURE 14

SNAP BEAN ACREAGE IN WISCONSIN BY COUNTY, 1964

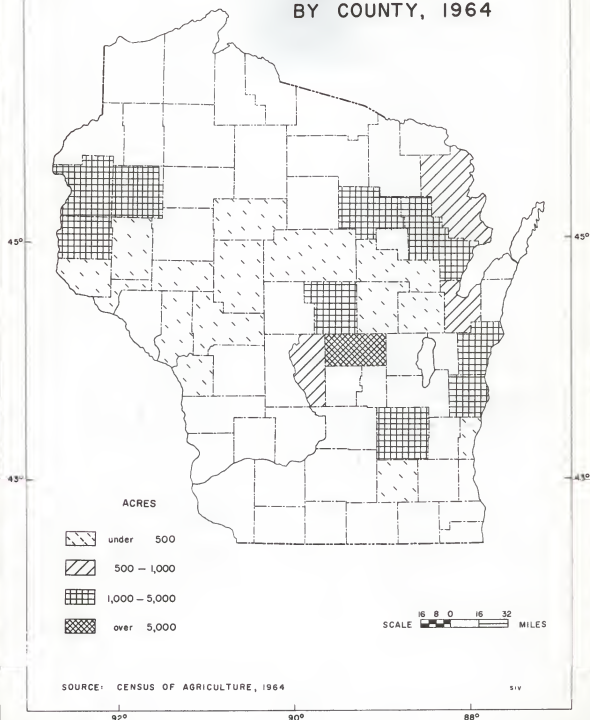


FIGURE 15

The evolution of the multiproduct factory and the trend toward factory agglomeration have had far-reaching effects on many aspects of the vegetable canning industry. In addition to altering cropping patterns, these changes have tended to increase the length of a factory's operating season and have promoted a shift toward greater mechanization in the field and in the factory. In turn, these changes have promoted greater economic efficiency, increased the uniformity of capital requirements throughout the year, eased labor problems, and strengthened the marketing power of individual companies. In general, product diversification has aided the canning industry in its efforts to become a large-scale industry.

CHAPTER V

CONCLUSIONS OF THE STUDY AND FUTURE PROBLEMS

Conclusions

In conclusion, a number of the concepts put forth in this paper need summarization. The examination of the economic geography of the vegetable canning industry in Wisconsin illustrates this industry's trend toward larger scale operations. Increases in the complexity of processing methods, the amount of capital invested, and the degree of mechanization exemplify this trend.

From the analysis of canning factory locations in Wisconsin it can be concluded that factors affecting these locations have changed little through time. Vegetable canneries are still located near their perishable raw materials; they are still influenced by transportation costs; they continue to rely on rail transport; they still enjoy lower tax rates; they, more than ever, need an adequate water supply; and, they still face air pollution and waste disposal problems. Changes in the distribution of vegetable canning factories have resulted from a decrease in the number of operating plants rather than from an increase in the number of new plants.

Two factors greatly influencing these distribution changes have been quite noticeable since World War II. The first, increased factory agglomeration, promoted the greatest change. Larger companies with adequate capital backing and established markets were able to purchase smaller companies, and thereby eliminate many of the small, inefficient factories. Secondly, greater product diversity per factory caused a shift in the location of various vegetable-growing areas. Generally, this shift was a movement of a variety of vegetables into the established green pea and

sweet corn producing areas. This of course resulted in an increase in the size of canning operations in these areas, and discouraged such a build-up in areas unfavorable for green pea and sweet corn production.

Future Problems

Even though dairying has continued to be one of the most important agricultural activities of the state, commercial vegetable canning has played a very significant role in strengthening Wisconsin's economy.²¹ The importance of vegetables as a cash crop, and the ease with which these crops fit into the total agricultural picture are two good reasons for their success in the state.

A closer look at the reasons why vegetables fit so well into Wisconsin's farming program may offer some clue as to the future of this industry in the agriculture of the state. The success of vegetable crops can be attributed to their harmonious association with the dairy system, their diversification of farm income sources, their utilization as a live-stock feed, their ability to be used easily in crop rotation systems, and the nitrogen-fixing characteristics of some vegetables. All of these factors allowing vegetables to be a part of the state's agricultural make-up are susceptible to fluctuations brought on by changes in the nation's agricultural policy. These changes could very easily create new problems for the commercial vegetable canning industry.

One very significant change in U. S. agriculture that could seriously affect vegetable production in Wisconsin is the present shift toward highly

²¹James L. App, Vegetable Enterprise Selection in Central Wisconsin, Wisconsin Agricultural Experiment Station, Research Bulletin 247 (Madison: University of Wisconsin, January, 1964), p. 3.

specialized commercial farms. Statistics show that Wisconsin and United States farms are becoming larger in size, more mechanized, and more specialized in the products they sell. If these trends continue, the usefulness of vegetables as a cash crop may decline. Farmers, or farming corporations, would consequently rely less on supplementary cash crops to stabilize and diversify their incomes. For this reason, more vegetables would have to be supplied by commercial farms rented or owned by the canning companies.

An indication of these changes taking place in Wisconsin is shown in Table IX and Table X. From these tables it can be seen that Wisconsin farms are growing larger in size, and more of the state's farm population is seeking employment in other sectors of the economy. The effects of this movement toward large-scale commercial farms in the state is a slow one, as the majority of Wisconsin farms are family owned and operated.

Like most other industries, commercial vegetable canning is continually seeking to increase production. Even though Wisconsin acreages of canning vegetables have shown no upward trend since World War II, increasing yields have boosted the quantities of these vegetables during the post-war years.²² Note Figure 16, showing the production changes of Wisconsin's five most important vegetable crops.

This increase in vegetable production following the Second World War can be attributed to a number of factors. These factors include an increase in the use of large-scale irrigation methods, a greater mechanization of harvesting and canning procedures, development of new markets, and the adoption of additional vegetable crops in established producing areas.²³

²²Johnson, op. cit., p. 2.

²³App, loc. cit., p. 3.

TABLE IX

LAND-MAN RATIO: WISCONSIN, 1920-1959, and the U.S., 1959

Year	Land in Farms (Acres)	Ratio: Land in Farms to Rural Farm Population (Acres/Man)
1920	22,148,223	24.2
1930	21,874,155	25.1
1940	22,876,494	26.2
1950	23,254,749	32.0
1959 (Wis.)	21,156,223	37.1 ^a
1959 (U.S.)	1,120,088,729	51.6 ^b

^aComputed from estimates of the population made by the Department of Rural Sociology, University of Wisconsin.

^bU. S. rural farm population for 1959 taken from Current Population Reports: Population Characteristics, (Sines P-20, Number 98, Revised, February 25, 1960.

Source: Douglas G. Marshall, Wisconsin Population Changes and Prospects, 1900-1963, Wisconsin Agricultural Experiment Station, Research Bulletin 241 (Madison: University of Wisconsin, March, 1963), p. 31.

TABLE X
 PER CENT OF FARM OPERATORS WORKING OFF THE FARM:
 WISCONSIN, 1900-1959, and the U.S., 1959

Year	Per Cent Working Off the Farm Over One Day	Per Cent Working Off the Farm Over 100 Days
1930	24.6	8.3
1940	24.2	10.3
1950	34.7	16.3
1959 (Wis.)	40.7	23.7
1959 (U.S.)	44.9	29.9

Source: Douglas G. Marshall, Wisconsin Population Changes and Prospects, 1900-1963, Wisconsin Agricultural Experiment Station, Research Bulletin 241 (Madison: University of Wisconsin, March, 1963), p. 34.

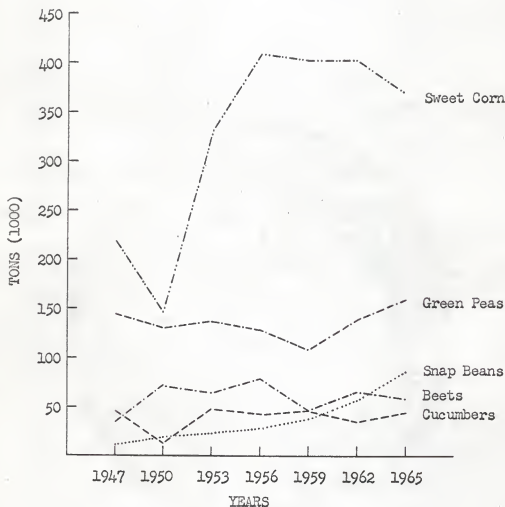


FIGURE 16

PRODUCTION OF SELECTED VEGETABLES:
WISCONSIN, 1947-1965

Source: Aaron Johnson, "Wisconsin Processing Crop Statistics" Resource Report. Madison: University of Wisconsin, November, 1966.

As would be expected, vegetable production increases are related to the growth of canning companies. In turn, a growth in processing units can be associated with a growth in retailing units. Each of these three divisions can be thought of as a link in a production and distribution chain, with the whole chain being controlled by product demand. This demand is evidenced by noting Table XI, showing the consumption of canned vegetables from 1955 to 1964. The increase in the demand for vegetables has instigated an expansion at both ends of the marketing system, and it may lead to a reshuffling in the marketing procedure. Retail food store sales in the United States have increased about 9 per cent during the period 1960-1963,²⁴ while the United States pack of canned vegetables has shown a slower growth, only 2.5 per cent during the same period.²⁵

Larger canneries, with greater marketing power, may no longer rely on brokers and wholesalers to purchase and distribute the company's products. Similarly, large retailing firms may no longer need the services of wholesalers, for they can more easily deal with the source of supply--the canning factory.

Future increases in vegetable production would most likely continue to be related to a growth in the size of processors. As pointed out in earlier parts of this paper, those factories operating at an economically efficient level, with large amounts of capital backing, have the best chance of surviving. However, it must be remembered that the future of the

²⁴United States Bureau of the Census, Statistical Abstract of the United States: 1964. (Washington: Government Printing Office, 1964), p. 820.

²⁵United States Department of Agriculture, Agricultural Statistics: 1965. (Washington: Government Printing Office, 1966), p. 258.

TABLE XI
CIVILIAN PER CAPITA CONSUMPTION OF VEGETABLES CANNED:
UNITED STATES, 1955-1964

Year	Consumption (lbs.)
1955	43.4
1956	43.9
1957	43.9
1958	44.7
1959	44.8
1960	44.3
1961	44.5
1962	46.1
1963	46.4
1964	45.8

Source: United States Department of Agriculture. Agricultural
Statistics: 1965.

vegetable canning industry is dependent upon the demand for canned vegetable products.

Another important aspect of the canning industry that could easily develop into a future problem is this industry's overwhelming dependence on rail transportation. It was cited in Chapter III that the availability of rail transport was a primary factor in determining early plant locations in Wisconsin. The continued importance of rail transport is indicated by the large quantity of vegetables still shipped by rail. Therefore, future plant locations would, presumably, be associated with rail transport.

Just as canneries are dependent upon rail transport to speed their products to market, railroads in Wisconsin depend upon canning factories to supply a part of their operating revenue. The present growth trends of these two industries seem to be increasing this interdependence. As canneries move closer to being large-scale operations, they increase their total amount of products to be transported. They may also increase the period of time in which their products are transported, thereby helping the railroad industry. In turn, railroads continue to improve their equipment and strive to offer faster, more efficient service. By making rail transport more economical and efficient, the rail industry receives more of the canning industry's business.

On the other hand, the growth of the canning industry may lead to less dependence on rail transportation. As companies become larger and display greater marketing power, they begin dealing directly with large retail outlets. Many of these large retailing outlets, such as nation-wide food stores, supply the transportation needed to bring the canned products

to the consumer. Many of these stores rely on truck transportation, rather than rail, because of its flexible delivery nature.

Other transportation problems that might arise are those associated with movement of the raw products from field to factory. As vegetable canneries become larger, their source of supply will more than likely extend greater distances from the factory. Therefore, the development of an efficient, low-cost transportation system to carry the raw products to the factory is essential. The development of such a system would undoubtedly involve utilization of larger hauling units to compensate for the greater distances. However, at some point the hauling unit becomes too large to be operative in the harvesting fields. In this case, smaller auxiliary units could act as shuttles between the harvester and the hauling unit.²⁶

As raw product transportation units continue to increase in size, there will be a greater need for faster unloading methods at the factory. Presently, the largest share of harvesting costs can be attributed to slow, inefficient unloading procedures at the factory. Trucks may often be forced to spend over an hour waiting to be unloaded, leaving the harvesters in the field at a stand-still. There must be closer harmony between field operations and factory operations if vegetable canning is to continue its rapid rate of expansion.

Finally, unlike vegetable canning industries in many other states, Wisconsin's canning industry has not received a great amount of competition from the freezing industry. True, the freezing of vegetables is practiced in the state, but not at a level as high as those being canned. At the

²⁶Austin J. Hayden, "Transportation From Field to Plant," Canner/Packer CXXVIII Number 4, (April, 1959), p. 38.

present time, the popularity of canning greatly overshadows that of freezing. However, the future may bring a change in this situation.

Of course, there are many problems facing the vegetable canning industry that cannot easily be alleviated. The seasonal nature of its operations, the increasing labor shortages, the adverse affects of government policies, and the influence of local weather conditions are but a few examples. Nevertheless, the canning industry continues to grow and continues to reduce the obstacles before it. Functioning as an integral part of Wisconsin's agriculture, this industry should become even more important to the economy of the state. Indeed, the future of the commercial vegetable canning industry in Wisconsin does look bright.

BIBLIOGRAPHY

A. BOOKS

- Alderfer, E. B. Economics of American Industry. New York: McGraw-Hill Book Co., 1942.
- Alexander, John W. Economic Geography. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1963.
- Cruess, W. V. Commercial Fruit and Vegetable Products. New York: McGraw-Hill Book Co., 1938.
- Nielsen, A. M. Economic and Industrial Geography. New York: Pitman Publishing Corp., 1950.

B. PUBLICATIONS OF THE GOVERNMENT, LEARNED SOCIETIES, AND OTHER ORGANIZATIONS

- App, James L. Vegetable Enterprise Selection in Central Wisconsin. Wisconsin Agricultural Experiment Station, Research Bulletin 247. Madison: University of Wisconsin, January, 1964.
- Buften, Vere E. Wisconsin Vegetables for Commercial Production. Wisconsin Agricultural Experiment Station, Special Bulletin 71. Madison: University of Wisconsin, August, 1958.
- Bureau of Business Research and Service. "Industrial Development in Wisconsin." Wisconsin Committee Reports. Madison: University of Wisconsin, 1957.
- Information Division of the National Cannery Association. The Canning Industry. Washington: The National Cannery Association, 1963.
- Johnson, Aaron C. "Wisconsin Processing Crop Statistics." Resource Report. Madison: University of Wisconsin, November, 1966.
- Marshall, Douglas G. Wisconsin Population Changes and Prospects, 1900-1963. Wisconsin Agricultural Experiment Station, Research Bulletin 241. Madison: University of Wisconsin, March, 1963.
- Rehberg, Wallace A. Cooperative Arrangements Among Small Processors of Farm Products. Wisconsin Agricultural Experiment Station, Research Bulletin 243. Madison: University of Wisconsin, June, 1963.

- United States Bureau of the Census. County Business Patterns: 1965, Wisconsin, Vol. II. Washington: Government Printing Office, 1966.
- United States Bureau of the Census. Statistical Abstract of the United States: 1964. Washington: Government Printing Office, 1964.
- United States Bureau of the Census. United States Census of Manufactures: 1963. Industry Statistics, Vol. II. Washington: Government Printing Office, 1966.
- United States Bureau of the Census. United States Census of Manufactures: 1963. Area Statistics: Wisconsin, Vol. III. Washington: Government Printing Office, 1966.
- United States Department of Agriculture. Agricultural Statistics: 1964. Washington: Government Printing Office, 1965.
- United States Department of Agriculture. Agricultural Statistics: 1965. Washington: Government Printing Office, 1966.
- Wisconsin Canners and Freezers Association. Statistics on the Wisconsin Canning and Freezing Industry. Madison: Wisconsin Canners and Association, 1967.

C. PERIODICALS

- Bertrand, Kenneth. "Rural Agglomerated Settlements in the Eastern Lake Shore Red Clay Dairy Region of Wisconsin." Wisconsin Academy of Arts and Letters, Transactions, XXXIV (1942), pp. 47-62.
- Hayden, Austin J. "Transportation From Field To Plant." Canner/Packer, CXXVIII (April, 1959), p. 38.
- Krause, Francis A. "The Wisconsin Canning Industry." Wisconsin Commerce Papers, I (November, 1948), pp. 1-161.

A LOCATION ANALYSIS OF THE COMMERCIAL VEGETABLE
CANNING INDUSTRY IN WISCONSIN

by

STANLEY IVEN VINGE, JR.

B. S., Wisconsin State University-Platteville, 1965

AN ABSTRACT OF A MASTER'S THESIS

submitted in partial fulfillment of the

requirements for the degree

MASTER OF ARTS

Geography

Department of Geology and Geography

KANSAS STATE UNIVERSITY
Manhattan, Kansas

1967

The vegetable canning industry, like other commercial manufacturing industries, is concerned with the activities of collecting raw materials, processing them, and marketing the finished products. Where such a manufacturing industry will locate is dependent upon a number of factors related to these three activities. Examples of such locational factors include sources of raw materials, sources of labor, sources of fuel and/or power, and market areas. Traditionally, the vegetable canning industry is said to be located near the raw materials source.

This paper does not attempt to challenge this locational concept, but narrows the scope of the concept to allow for a closer examination of the location of vegetable canning factories in Wisconsin. Factors such as the presence of an adequate labor supply, the availability of transportation routes, the importance of water, and the effects of overlapping vegetable crop distributions are instrumental in determining factory sites. A three-fold approach is taken in attempting to analyse the location of such canning factories; an analysis of area locations within the state, an analysis of why particular community locations were chosen, and an analysis of locations within these communities.

Along with factors influencing the location of such a manufacturing industry there are a number of factors or characteristics forming the personality of the industry. Characteristics, such as, number of employees, size and location of industrial site, amount of capital investment, period of operation, labor supply, and location of marketing areas help to formulate the vegetable canning industry's make-up. The personality of this industry is not easily defined, for it is a dynamic industry greatly influenced by forces outside its sphere of control. This paper in part

attempts to show how this industry, exemplified by an increase in capital investments, a greater product diversity, and a trend toward year-around operation, is rapidly altering its personality.

In conclusion, a number of the concepts put forth in this paper need summarization. The examination of the economic geography of the vegetable canning industry in Wisconsin illustrates this industry's trend toward larger scale operations. Increases in the complexity of processing methods, the amount of capital invested, and the degree of mechanization exemplify this trend. From the analysis of canning factory locations it can be concluded that factors affecting these locations have changed little through time. In fact, changes in the distribution of vegetable canning factories have resulted from a decrease in the number of operating plants rather than from an increase in the number of new plants. These decreases can be directly linked with the trend toward larger scale operations by noting the movements toward factory agglomeration and greater product diversity per factory.

Even though there are difficult problems facing the commercial vegetable canning industry in Wisconsin, it continues to grow in size and scale. Functioning as an integral part of Wisconsin's economy, this industry should become even more important to the state.