Analysis of seven decisions to locate industry in rural areas of Iowa

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I. INTRODUCTION

A. The Problem

Industrial location is defined for the purpose of this study as the spatial distribution of industrial plants. The strong industrial growth of the U.S. economy in the post World War II era has involved substantial investments in new plant and equipment by industrial firms. A significant portion of the investment represents the establishment of new plants. The new plants may be the first plant of a new company, a relocation of an existing plant, or a new branch plant of an established firm.

The general awareness of the benefits of industrialization has created an intensely competitive scramble to attract new industry to particular regions, states and communities. It has been estimated that at least 14,000 industrial development organizations have been created to compete for the several hundred annual new plant locations. In other words, there is a substantial excess supply of potential plant locations.

Some communities have been successful in their attempts to attract industry, but many others have had little or no success in their industrialization efforts. A community's success in attracting the desired types of industry is largely dependent upon an understanding of the factors that determine industry demand for plant locations, of the process by which industrial management makes location decisions, and of the importance of various location factors at the different stages of the decision process. The community usually is an active participant in firm

location decisions, and the final location choice often hinges on what the community does or does not do. However, there seems to be a gap between what communities do to attract industry and what they could do if they better understood the decision process involved in plant location selections. This is not necessarily a matter of not doing enough, but possibly of doing the wrong things.

Many location studies have been conducted, but for the most part, they have led to a mass of unrelated data, often in the form of lists of location factors. Lists of location factors are generally of value only as general guides in determining where specific plants will be located. A major weakness of most lists is that they do not clearly specify the importance of factors within the various stages of the location decision process.

Another class of studies is that which deals with location decisions of particular industries. These studies provide little general information about the location decision process because the factors considered and the process utilized varies widely among different industries.

Relatively little attention seems to have been devoted to the actual decision process, and most of the literature on the problem is not definitive. A 1966 article by Thompson (40) represents a useful contribution to knowledge of location problems, but the primary thrust of the work is toward the development of a normative model of the location decision process. In order for communities to formulate and utilize effective industrialization programs, there is a real need to understand the actual decision process utilized by locating firms. The knowledge of "what is" seems quite limited.

A 1971 study by Kaldor and Dahlke (20) provided some valuable information with respect to industrialization efforts and experiences in rural Iowa communities. The study involved an analysis of the supply of potential industrial locations in rural Iowa. The authors found that approximately 98 percent of the communities covered by the survey were engaged in activities to attract industry (20, p. 2). A substantial amount of time, energy and other resources has been expended by the rural communities in their industrialization efforts.

The Kaldor and Dahlke study indicated that the demand by industry for plant locations offered by communities varied considerably by community, with some communities getting more offers and being more successful than others in their efforts to attract industry. A very important unanswered question posed by the authors concerned the explanation of why "some communities have been more successful than others in attracting new businesses" (20, p. 16). The authors noted that "the answer to why some were more successful than others is a critical one for the development of more efficient local, state and national policies to encourage nonfarm business expansion in rural towns" (20, p. 16). Many rural communities, faced with declining employment and income associated with the decreased demand for human resources in farming, have turned to non-farm industrial development in an attempt to increase the export base of their local economies. In order that developmental resources may be efficiently allocated, it is essential that rural communities understand the process by which industrial firms determine their demand for rural plant locations. The basic problem is that this understanding is limited.

B. Objectives of the Study

The study presented here was undertaken to clarify certain ambiguities and confusions about how industries decided on new plant sites in rural areas. In general, the objective of the study is to develop a broader understanding of the determinants of the demand for rural plant locations. More specifically, the objectives of this study are as follows:

1) to classify and describe the mix and pattern of the population of industrial location decisions made favorably for rural Iowa communities during the 1968-70 period;
2) to describe and compare the decision processes used by seven carefully selected cases;
3) to identify the stages in the selection process, and to associate the important factors and participants with each stage in each location case;
4) to determine the extent of the existing knowledge of the location decision process through a review of the current literature;
5) to develop, through analyses of industry background and structure, insight into location factors important in the different stages of the location process used by firms in the selected industries; and
6) to generate a better hypothesis of the industrial location decision process and to help communities use the knowledge appropriately.

II. REVIEW OF THE LITERATURE

A. Theories of Plant Location

Location theory is composed of principles governing the dispersion of economic activity over space. It embraces site selection, survival rates by location, spatial industry equilibria, comparative area advantage, highest expected value for use of space, and optimum location of activities for firms.

Economic theorists, for years, tended to neglect the spatial elements of economic activities. Bos stated that "most economic theories today are very precise in formulating the assumptions about the time structure of their problems, but omit to specify the spatial situation" (4, p. 1). However, Isard notes that even the early theory was stated "in a manner pregnant with spatial implications" (19, p. 25). In recent years, spatial problems have received more attention by economists. Interest has been awakened partially because of the challenge of solving important practical economic problems relating to the optimal dispersion of economic activities.

Johann Heinrich von Thünen is generally considered to have been the father of location theorists. The German writer's seminal book, Der Isolierte Staat in Beziehung auf Landwirtschaft und Nationalokonomie (55), was the real beginning of analytical work in general location theory. Von Thünen was primarily concerned with agricultural locations. His formulation of concentric circles around a central town was intended to account for the types of crops that would be produced at locations different

distances from the central market place. In von Thünen's scheme, the location is given and the type of output at specific points is to be determined. He analyzed the dispersion of agricultural output around the central consumption market. His theory was a least cost theory in which the location of agricultural production was determined by differences in total cost of particular crops, with locational cost differences dependent upon transportation costs and land rents.

Von Thünen's theoretical developments were the beginning of the school of thought professing that the location of activities was determined by the minimization of total costs. Although von Thünen's theory was stated in terms of agricultural production, it is also applicable to the location of manufacturing activities.

Launhardt (23) and Weber (57) were two other German writers instrumental in the development of the theory of location. Launhardt seems to have "explained the location of industry as the decision resulting from two variables; namely, differences in cost and demand at alternative locations" (14, p. 254).

Although von Thünen made significant progress toward a general theory of location, Isard (19) credits Weber (57) with "the first attempt to construct a general location theory" (19, p. 27). Like von Thünen, Weber also formulated a least cost theory of location. He viewed transportation costs, labor costs and agglomerating forces as being the basic factors of location. The location minimizing the sum of the costs was selected. Weber's theory involved substitution between transportation costs and other cost items, just as did von Thünen's. However, there were major

differences in the approaches used by the two writers. Weber's theory searched for the place of location with the type of production given. In von Thünen's work, the location was given and the type of production was to be determined. Von Thünen assumed perfect competition, homogeneous land, homogeneous labor, uniform real wages and one consumption center. Weber assumed that perfect competition existed, that land was not homogeneous, that raw materials were not uniformly distributed and that there were more than one consuming center.

Given the assumptions made, Weber formulated two locational rules. The first rule stated that ". . . the location of manufacturing industries is determined (transportation cost being variable, labor costs constant) by the ratio between the weight of the localized material and the weight of the product" (57, p. xxiv). The larger the resulting "materials index", the stronger the tendency to locate at the local materials site. The smaller the index, the stronger the tendency to locate near the product market. Weber's second locational rule was: "When labor costs are varied, an industry deviates from its transport locations in proportion to the size of its labor coefficient" (57, p. xxv), where the labor coefficient represents the degree of labor intensity of the production process. A firm utilizing relatively labor intensive techniques would tend to be very sensitive to differences in labor costs, whereas a firm utilizing relatively little labor would tend to be insensitive to labor cost differences.

An important contribution made by Weber was his recognition that transportation costs are not the only critical locational factor. Von Thünen avoided the consideration of labor costs as a factor by assuming

uniform real wages and productivity. Without these assumptions, the costs of labor become an important determinant of location. The labor cost factor may even exert a stronger locational pull than the transportation cost factor.

In Weber's formulation, agglomerating or deglomerating forces may offset or reinforce the labor and transportation cost factors. The agglomerative and deglomerative forces tend to concentrate or disperse industry as the cost savings due to proximity of firms varies.

The primary weakness of Weber's theory was probably the omission of demand considerations and institutional factors. Hoover's (15 and 16) work was largely an attempt to strengthen Weber's analysis. Hoover expressed his interest in the effect of demand on location and the effect of location on demand when he wrote that "the shape of the market or supply area is influenced by the advantages of different locations for procurement and processing and by the structure of transport costs" (16, p. 65). Weber had taken demand as being given. Hoover succeeded in clarifying some of Weber's theory, but Greenhut concludes that Hoover's theory ". . . is quite similar to Weber's. The locational choice is again a problem of substitution among costs: now production cost and transportation cost, the ultimate objective being the minimization of these expenses" (14, p. 21).

The weaknesses of the von Thünen-Weber type of location theory may be seen by summarizing the important aspects of the theory. They are:

> (1) the emphasis on the search for the site offering least cost, which site provides that unique substitution among different factor costs which yields the optimum cost position;
> (2) the assumption of a given demand at a particular point

> which remains unaffected by the locational selection of a firm; and (3) the disregard of the locational interdependence of firms (14, p. 257).

Greenhut goes on to assert that the three main points represent the major shortcomings of the von Thünen-Weber location theory because

> (1) site selection involves substitution among not only the cost factors at alternative locations, but also the demand factors at the different sites, (2) market demand is a variable, significantly affected by, and affecting, (3) the locational interdependence of firms (14, p. 257).

The major weakness in Hoover's attempts to extend the theory of location was the failure to fully consider locational interdependence. He proposed an explanation of industrial location in a capitalistic framework, but he confined the analysis largely to a purely competitive system.

The prevailing real world market structure was later recognized to be imperfect rather than perfect competition. Location theorists became increasingly aware of the weaknesses of the classical von Thünen-Weber purely competitive framework, and efforts were, for some time, concentrated upon resolving the problems with the existing theory. Writers such as Fetter (11), Hotelling (18), Lerner and Singer (24), Smithies (35) and Chamberlin (6) concentrated on the locational interdependence resulting from imperfect competition. The demand facing each firm was seen as being dependent upon the products and location of other firms in the market. Firms with plants at different locations would face different demands for their products.

The interdependence theorists generally abstracted from production cost differences, whereas the least-cost theorists had earlier abstracted

from demand differences. The interdependence theorists were concerned with market area considerations. They analyzed the effects of the elasticity of demand, the shape of the marginal cost curve and the magnitude of freight costs. Different freight costs and rival locations resulted in variable effective demand at alternative locations. Plant location was explained in terms of the maximization of product demand.

The interdependence theory of location represented a new development, but it was an inadequate formulation. In abstracting from costs, it was only a partial explanation of locational forces. Interdependence theorists criticized least-cost theorists for abstracting from demand, but they then committed the equally serious error of abstracting from costs. The determination of spatial economic activity is dependent upon both demand and cost factors and upon their interactions.

Lösch (25) made a significant contribution to the location theory by explicitly recognizing variable demand and costs at different locations. He also recognized that, in the long run, adjustments to the forces of competition result in minimum transportation costs. However, the force of demand was dominant in his analysis. He did not combine cost analysis with locational interdependence.

Writers such as Greenhut (14), Isard (19) and Yaseen (60) extended and combined earlier location theories. They analyzed demand, cost and personal factors in developing general location theories based upon the maximization of profit. The writers recognized that plant location is jointly determined by cost and demand factors. The balancing effects of costs and demand were explicitly recognized by Greenhut.

> In every site-selection, a balancing is involved among all factors, demand and cost. No theory is general which abstracts from either. This scissor was realized early in non-spatial economics; paradoxically, it has been missed in the spatial world where it is most in evidence (14, p. 291).

An additional important development by location theorists has been the attempts to formulate general equilibrium systems which are both multi-locational and spatial. Lösch's work was outstanding among the various attempts.

> Although his approach minimizes the elements of interdependence and does not comprehend the space-economy as a whole but as consisting of several major sectors, and, although it has other severe limitations, we have here for the first time an attempt to encompass general spatial relations in a set of equations (19, p. 48).

Lösch failed in his attempt to develop a general equilibrium system, but his work generated additional interest. Von Böventer (54) accomplished a partial synthesis of the existing theory, and he perhaps "has come closest to creating a general system incorporating both distance between discrete locations and spatial extent of activities at locations" (36, p. 6). Stevens and Brackett go on to say:

> Further conceptual and mathematical problems will still need to be solved before a full synthesis of the partial location theories can be achieved. Perhaps the most difficult of these problems is the systematic consideration of scale and aggomeration economies (36, p. 7).

Mathematical programming techniques perhaps can be utilized in a more complete synthesis of location theories. However, the existence of mathematical non-convexities seriously limits the application of programming methods. It also involves static analyses and other questionable assumptions such as fixed demands, constant returns to scale, and infinite

indivisibility. Despite its severe limitations, Stevens (38) believes that the programming approach may prove to be of assistance to location theorists in their efforts to synthesize and extend the theory. According to Stevens,

> the relevant question is whether the adoption of this approach, which appears particularly applicable to location problems, can lead to improvements in and systemization of the theory and eventually to an integrated general model of location and space-economy (38, p. 29).

Most of the recent developments in location theory have regarded the profit maximizing goal as dominant in locational decisions. However, the importance of the theory is magnified by the broad scope of the location process and its profound effects upon the existence of firms and upon social welfare. Karaska and Bramhall (22) indicated the nature of the theory in "The Book in Perspective" section of their Locational Analysis for Manufacturing: A Selection of Readings.

> The theory of location of manufacturing is essentially an exposition of the complex interdependence of forces and reactions implicit in the maximum profits objective. We describe the major elements of an equation expressing this objective as cost items defined as the inputs of each firm, industry and region; and revenue items covering output and demand factors. These elements are qualified through the influence of time and inertia; exogenous forces such as national goals, technology and nature; and spatial limits to competition (22, p. 10).

Future efforts to develop and advance the theory of location are likely to be within the framework of the contemporary theory of the firm. In particular, recent theoretical advances by writers such as Eisner and Strotz (8), Treadway (43), Lucas (26) and Tinsley (41) have contributed to the integration of the element of time into investment theory.

The traditional arbitrary concepts of fixed and variable factors of production have been criticized for years. The recent developments have introduced an alternative in the concept of "quasi-fixed factors". The new formulation introduces the idea of variable speed and cost of adjustment to changing economic conditions. Tinsley (41) developed the theory of forward distributed lags and built in a moving target to get a sequence of optimizations by the firm. Tinsley's contribution, built upon the earlier work of such writers as Eisner and Strotz (8) and Lucas (26) presents a more realistic view of how the firm operates. It leads to a dynamic theory of the firm.

The decision to locate a plant is an investment decision. It is a decision the outcome of which is strongly influenced by conditions changing over time. The theory of location and space economy could perhaps be improved by an awareness of the recent developments in investment theory and other formulations which have tended toward a more representative theory of the firm. Most of the existing location theory has been built upon specific conditions of space and time but, in fact, economic adjustment to changing conditions is a continual process.

B. Industrial Plant Location Decisions and Important Locational Factors

Industrial location decisions in the United States are generally made on the basis of objective economic considerations with subjective personal factors often playing an important determining role in particular decisions. Study after study has indicated that a firm usually attempts "to locate its plant where profits will be maximized, and the location

decision is made by top management. . ." (1, p. 377). Carrier and Shriver (5) "believe that plant locations often involve some response to personal considerations but that the dividing line between purely personal actions and personal actions marked by an economic motivation would uncover few instances of economic 'irrationality'" (5, p. 455). The plant location decision is one of the most critical decisions faced by the entrepreneurs of industrial firms. The competitive position and profitability of the firm is strongly influenced by the choice of location. For most firms, location decisions are not often made and are significantly different in nature and importance than the routine decisions faced in the day-to-day management of industrial firms. Hopeman (17) suggests that "managers usually cannot rely on standard procedures to handle this type of decision, but must depend instead on such guides as judgment, experience, intuition and rules of thumb" (17, pp. 67-68).

Plant location choices are made even more difficult by the large number of factors that must be taken into account in the determination of the impact of particular locations upon the total operation of the firm and its profitability. As Smith (34) indicates,

> . . . the location decision is not . . . taken in isolation, but is related to other considerations such as scale of operations, combinations of factors of production, and market conditions . . . The maximum profit location may be different for different sizes of factories or different combinations of factors, and demand may vary with the choice of location. The interrelation of all these factors makes the analysis of location an extremely complex matter . . . (34, p. 96).

Many studies have been conducted on the questions of why and how firms choose particular plant locations. Most of the analysis has been in terms of important plant location factors. The number and type of

factors vary considerably, with authors generally presenting their own list of considerations they believe to be of significance to location decisions. Most of the lists include such considerations as product markets, transportation, input markets, labor, personal preferences, taxes, community factors, site factors and fuel.

Carrier and Schriver (5) noted that the survey-type studies usually "have not been conducted within the framework of existing theory" (5, p. 450). Nishioka and Krumme (30) have observed that "these studies lack the rigor common to empirical studies in other fields of economics and spatial analysis, and the findings are generally still very much of an exploratory nature" (30, p. 195).

An additional major criticism of most of the survey studies is that they have been limited to a particular phase of a decision-making process. This has resulted in only a partial explanation of the decision-making process. In the conduct of location surveys, it is critically important "to disentangle actual from imaginary reasons, and to separate relevant from irrelevant data, and essential from decorative bits of the information furnished" (28, p. 170). The difficulties involved in achieving these objectives are succinctly stated by Nishioka and Krumme (30).

> The ex post interpretation of decision-makers' ex post rationalization of earlier decisions--in short, the reconstruction of the decision-making process on the basis of subjective information--will require the explicit consideration of the stages at which certain variables enter the decision process and the flexibility of these variables during subsequent stages. In the mind of the survey respondent, certain parts and stages of the location decision process may have shrunk in retrospect into 'the' decision, a decision perceived as a highly simplified equation which was solved simultaneously some time in the past (30, pp. 195-196).

These difficulties place a heavy burden upon the interviewer.

The process of location decision-making is generally thought to include at least two and as many as four or five stages. Thompson (40) believes that a normative model of location selection should include four main stages. The stages are preplanning, selection of the general area, selection of the community and selection of the site (40, p. 2). His

> . . . analysis assumes the existence of a locational problem of broad geographic scope. It should be understood, however, that many site projects are of more limited scope (e.g., choosing the best community within a known region or the best site within a given metropolitan area) and therefore do not require all of the steps described . . . (40, p. 2).

Despite the great diversity in the explanations of stages of the decision process and the importance of locational factors, the literature clearly indicates that the crucial location determinants vary depending on the particular phase of the process. The important factors also show considerable variation among industries, areas, regions, plant sizes and individual firms within particular industries.

The nature of a decision itself differs, as do the locational factors, depending on whether the location involves a new firm, a relocation or a new branch plant. New firms are often "home-grown" establishments started by innovators or former employees of established firms. The new plants are usually located close to home and involve a location decision of relatively narrow scope. Albert and Kellow (1) note, that with respect to relocations and branch plants,

> . . . an existing firm is usually faced with expansion problems or an economically inefficient location and must decide whether to expand at its present location, find an alternate or new location (relocate), or continue its present operation but expand in a newly located branch plant (1, pp. 376-377).

Despite the many complexities and uncertainties faced by firms making location decisions, there are certain locational factors that tend to be explicitly or implicitly considered and weighted during the decision process. The remaining pages of this review will be devoted to a brief presentation of major factors influencing plant location decisions. The emphasis will be upon new and changing industrial location determinants. Many writers believe that traditional location theory has generally been of limited usefulness in predicting most plant locations. As Stevens and Brackett (37) have noted, in many cases

> . . . it continues to decrease in relevance because of the disproportionate weight it gives to location factors whose importance has been dropping and because factors which were not relevant earlier now have a major influence on location decisions (37, p. 1).

Proximity to product markets and raw material supplies have traditionally been important location factors, and this continues to be the case for many industries. However, there is an increasing number of "footloose" industries. The term "footloose" refers to "industries whose location is not dictated by the necessity of minimizing transportation costs on either products or material inputs" (12, p. 79).

Transportation costs have been a major location factor. However, as Stevens and Brackett (37) have concluded,

> . . . their relative importance has declined sharply in recent years because of the decrease in the weight of raw material inputs per unit output for many material processing industries, the increase in value per unit weight of output for final product industries and the cost reductions in transportation services for all industries (37, p. 1).

Higher transportation costs associated with current and expected fuel shortages are likely to again increase the importance of transportation costs as a location factor. Gasoline and diesel fuel prices have increased substantially, and further increases are expected. The labor cost element of transportation is also likely to increase as lower speed limits increase labor requirements. In general, developments associated with fuel shortages will substantially increase the costs of transporting goods and services. The days of "cheap" fuel are over. Transportation costs are likely to increase in significance as a location factor, but the overall effect on plant location is not clear. In some industries there will be a tendency toward more dispersion while in others there will be a tendency for increased centralization. In general, there will be an increased need to locate plants in areas where energy costs may be minimized.

The quality of transportation services, as reflected in speed, dependability and convenience, and access to the transportation system have become increasingly important as location determinants. The increased importance of truck transportation increased the need to locate plants near interstate highways in order to have access to regional and national markets. Energy problems will have an impact upon the quality of transportation services, also. Speed and dependability of service will probably be reduced in most areas. Areas hit by the most significant service problems are likely to be less favored for plant locations. The important thing to note, however, is that quality of transportation service will probably decrease in importance as a location factor relative to the cost of transportation service.

Fuel and power availability is not uniform across the country. Regions, states and areas with larger supplies of fuel and power available will tend to receive an increased share of new plants. Fuel and power availability will be of increasing importance as location determinants, particularly for industries requiring large quantities of energy.

The significance of certain labor considerations has decreased while for other aspects it has increased. Mobility of the skilled labor force and the development of craft labor organizations have largely eliminated significant wage differentials for many types of skilled labor. Interregional wage differentials are still substantial for many types of unskilled and semi-skilled labor. The importance of labor costs as a location factor will largely depend upon the labor intensity of particular types of production and upon the type of labor needed. For industries employing relatively unskilled labor, the existence of significant regional and area wage differentials will ensure the continued importance of labor costs as a location factor. Locating firms that look for "cheaper labor" presumably are attempting to reduce labor costs per unit of output. Thus, the productivity of labor, as well as wage rates, is important.

Labor supply is likely to become more important, particularly "for technical, professional and managerial labor. The changes in technology and the trend toward automation in many industries have increased the demand for such labor substantially faster than the supply" (37, p. 3). The location preferences of the labor in highest demand will exert considerable influence upon firms to locate in preferred areas. An

adequate supply of trainable labor is often a critical location factor for locating firms. The increased participation of women in the labor force will increase the importance of the female labor supply for industries employing women.

The size of the community is an important location determinant for many industries. The trend toward non-metropolitan locations is expected to continue. As Fulton (12) has observed, "many of the factors considered by management in selecting the smaller city will probably persist and cause a continued movement in that direction" (12, p. 5).

Tax considerations have long been thought to be of minor importance in most location decisions. This was largely because tax costs generally account for a very small part of total costs. However, there are indications that the importance of taxes may be increasing. Local taxes now vary much more than in the past. In addition, the increasing spatial uniformity of other costs tends to increase the importance of tax differentials, especially for intraregional location decisions.

The relation between tax costs and the quality of public services is very important to many firms. ". . . the industrialist is increasingly sensitive to the quality of the public services provided by tax revenues and to community attitudes towards industry which may be reflected in local tax policy" (37, p. 3).

Construction cost financing is largely through conventional means, with terms and conditions relatively independent of location. In recent years, the use of industrial revenue bonds has expanded rapidly. The development was initially aimed at smaller companies locating in smaller

communities within underindustrialized areas. The scope of the development has now become much broader. The availability of this new type of financing, at effective rates significantly below that for conventional financing, is likely to continue to be an important location consideration for many companies.

Agglomeration economies have become relatively less important for many industries. External economies now exist for many industries outside of major metropolitan areas. The trend toward decentralization of industry has been reinforced by urban external diseconomies due to high land costs, high tax costs, poor quality public services, traffic congestion and environmental pollution.

The influence of the different levels of government upon industrial location is felt either directly or indirectly by virtually every location decision maker. Government influence is exerted through a number of activities. Four of these types of activities noted by Will (59) are:

> (1) direct ownership or sponsorship of industrial facilities; (2) subsidization programs to directly encourage industrial development; (3) economic development and improvement projects; and (4) legislative and legal actions (59, p. 57).

It seems likely that government influence will continue to increase.

A number of relatively new elements that will probably exert increasing influence upon location decisions are environmental concerns, land use problems, employee transportation difficulties, employment of minority groups and amenities. Amenities, in particular, are increasing in importance in many location decisions. Amenities

> . . . are generally non-economic factors such as climate, cultural and recreational facilities, educational institutions, pleasant residential neighborhoods, and the like (37, p. 7).

These factors have an effect upon the quality of living.

In recent years there has been a tendency for many location decisions not to be based on economic factors alone. The spatial distribution of many of the important location requirements has become increasingly uniform. In many situations in which the economic factors are equally satisfied by a number of communities, the final location decision is based upon the "personal preferences" of the executive decision maker. This factor may even outweigh economic considerations in some cases, resulting in a location choice based upon maximum satisfaction rather than maximum profit.

There exists no perfect formula for making a riskless location choice. The important location factors suggested by the literature can only serve as general guides for the decision maker. Virtually every location decision represents a unique case, and what is important in one case may be irrelevant in another.

Most writers would agree that location decisions are generally based upon the objective of profit maximization. However, as Simon (32) has observed, in an imperfectly competitive world, "what action is optimal for one firm depends on the actions of the other firms" (32, p. 262). Also, to make the optimal decision each decision-maker is required to "outguess one's opponents, but not to be outguessed by them" (32, p. 266). The criticism is that this is logically inconsistent for all firms to achieve. The same criticism, however, is equally applicable to the general theory of the imperfectly competitive firm.

A location decision is one of the most important decisions to be made by management. The decision generally will have a major effect upon the entire scope of the firm's operations. It is generally associated with changes in such things as capacity, input combinations, type of product, market composition and location, input supply sources, transportation requirements, scale of operations or a combination of such changes. The typical location decision is complex and of far reaching importance to the profitability of the firm.

C. Hypothesized Location Decision Model

The hypothesized location decision model for this study consists of a series of layers representing the different stages of the decision process. It is believed that the process of making plant location decisions involves some type of screening procedure in which less desirable areas, states and communities are successively eliminated from consideration on the basis of particular location factors. Different factors are expected to be of significance at the different stages of the process. It is also hypothesized that different people would be involved in the various stages of the process. It is assumed that plant location decisions are generally based upon the objective of profit maximization, with different firms weighing cost and demand factors differently.

The hypothesized model evolved from the review of location theory literature and from interest in the question of the probabilities of communities being successful in attracting industry. That is, the focus is on industrial firms as demanders of plant locations. Plant location

demand factors are seen as interacting with the plant location supply factors in the process by which firms select plant locations. In general, the location decision process is believed to involve a process of elimination in which potential locations are screened according to increasingly specific locational considerations until all but one community are eliminated. The community selected is expected to be the "best" or profit maximizing location from the vantage point of firm decision makers.

III. CASE STUDY METHOD

A. Introduction

A substantial number of empirical location studies have been conducted in recent years. The studies have been of many different types and have focused on many different aspects of the location problem. The usefulness of the studies also varies widely. Even the better studies are of limited value in determining the relative importance of factors in different stages of the location decision process, and the actual decision process generally goes unexplained.

B. Comparison of Alternative Methods

The strengths and limitations of the statistical method of research have been widely discussed. The method involves making a sample survey to gather data. The data generated through the random sample is then used to generate estimates of the "true" population values. In other words, the researcher generalizes from the randomly selected sample to the population. The case study method is less widely used and understood.

With respect to the comparison of alternative research methods, Raymond Bauer of the Harvard Business School noted that

> . . . somehow there has developed a myth that there are two kinds of research: "case research" and "scientific research", and that these two are in opposition. I want to take a position of firm opposition to this dichotomy. It is true that "case research" would generally be used at the "exploratory" or "hypothesis generating" end of the continuum rather than at the hypothesis testing end, although case . . . research can also be used for hypothesis testing. It is further true, . . . , that most

> discussions of research have taken as the paradigm of good research the hypothesis testing end of the continuum. However, the generating of hypotheses and their formulation in testable and significant form is an essential part of the business of research and one which is just as vital as the testing of hypotheses (42, pp. 50-51).

A primary disadvantage of the case study method is that it is not valid to develop population inferences when the cases are not selected at random. That is, the researcher can not generalize to the population when there is no random sample. However, as has been observed, the case study method may be very useful in generating testable hypotheses.

The case study method is also useful in analyzing other types of research problems.

> When we desire a great deal of information concerning each individual or occurrence to be studied, much of our data may be non-quantitative by its very nature. In such an event we employ the case study method of investigation, the purpose of which is to consider in detail the characteristics peculiar to the individual case . . . (7, p. 12).

In effect, the case study method may be utilized to obtain in-depth information concerning the situations of interest.

The basic problem upon which this study is focused is that knowledge of the actual location decision process is very limited. Budget and time limitations precluded the drawing of a sizeable random sample and the development of population inferences. In addition, the case study method seemed well-suited to a detailed analysis of location decisions that were expected to involve multiple stages and participants. It was believed that, in order to develop a complete understanding of industrial location decisions, it was necessary to analyze each decision in great depth. The personal involvement of a trained, experienced, and

professional investigator was expected to allow the gathering of complete and accurate information from each participant in the respective location decisions.

In general, the case study method seemed to be the most efficient way to increase knowledge of the location decision process. Although the use of the case study method would preclude making generalizations to the population of location decisions, the development of detailed knowledge of selected location decisions was expected to be useful in generating hypotheses about the actual location decision process.

C. Interviews of Location Decision Participants

The case study method was utilized to "surround" a small number of location decisions with complete and concise information on the location decision process, its stages and the factors of major importance at each stage. In-depth personal interviews of industrial management decision-makers, plant managers, intermediaries and community development leaders were conducted to obtain data pertaining to all aspects of the location decision. Formal questionnaires were not used. The use of a highly structural interview questionnaire would have provided data easy to process and possibly to interpret, but field tests indicated that relatively unstructured interviews would provide more complete information. The interview format used was structured only to the extent that the respondent was encouraged to discuss all aspects of the location decision process. The decision participants were encouraged to discuss the complete location decision but were in no way guided into particular

responses. The opinions expressed by the participants in the decisions were carefully studied and compared. Every effort was made to ensure that the data gathered would permit an accurate and complete understanding of the decision process.

D. Use of Secondary Data

Secondary data was extensively used to develop an industry section for each of the cases. The industry data used was generally related to structure, degree of competition, production processes, technology, market demand, input requirements, number and size of firms, size of the industry and important industry location factors. The secondary data complemented the primary interview data and provided valuable insights into particular decisions. Secondary data was also used to resolve the few conflicts that existed in the interview data.

IV. POPULATION OF NEW RURAL IOWA INDUSTRIAL LOCATIONS AND SELECTION OF SEVEN CASES FOR STUDY

A. Population of New Rural Iowa Industrial Locations

The population of new rural Iowa industrial locations was taken from a 1971 study by Kaldor and Dahlke (21) which concerned industrialization efforts and experiences in rural Iowa communities. The new plant locations were revealed by a survey of all Iowa communities with 1970 populations of 1,600 to 8,499 and located more than twenty miles from a metropolitan center.

Among the 115 rural towns in the survey, 337 new plants, employing three or more people, located in the 1968-70 period. This was an average of 3.1 new locations per community. There were 47 towns in the smallest town size category (population 1,600 to 2,499), 35 towns in the medium town size category (2,500 to 4,499) and 33 towns in the largest town size category (4,500 to 8,499). Of the new plant locations, 92 were in the smallest towns, 110 were in the medium sized towns and 135 firms were in the largest towns. The new locations by type of business, by town size and by December 1970 employment are presented in Tables 4.1 through 4.4. As shown by Tables 4.1 and 4.2, the major portion of the new locations in town sizes 1 and 2 had less than 10 employees. However, as Table 4.3 indicates, a relatively larger number of town size 3 locations employed 10 or more workers. Table 4.4 shows that 234 locations, or 69 percent of the total, employed less than 10 workers.

Table 4.1. New locations by type of business and by December 1970 employment, for town size 1[a]

Type of Business	3 - 4 employees Number	Percent	5 - 9 employees Number	Percent	10 and over employees Number	Percent	Total Number	Percent
Construction	1	2.3	2	7.7	--	--	3	3.2
Agricultural manufacturing	5	11.4	3	11.5	5	22.7	13	13.4
Other Manufacturing	7	16.0	4	15.4	3	13.6	14	15.2
Transportation, communication and other public utilities	1	2.3	2	7.7	--	--	3	3.2
Finance, insurance and real estate	1	2.3	--	--	1	4.5	2	2.2
Wholesale and retail trade	22	50.0	12	46.2	8	36.4	42	45.7
Business and repair service	4	9.1	1	3.8	2	9.1	7	7.6
Personal service	1	2.3	--	--	--	--	1	1.1

[a]Source: (21)

Table 4.1. Continued.

Type of Business	3 - 4 employees Number	Percent	5 - 9 employees Number	Percent	10 and over employees Number	Percent	Total Number	Percent
Entertainment and recreation	1	2.3	1	3.8	1	4.5	3	3.2
Professional and related services	1	2.3	1	3.8	2	9.1	4	4.3
TOTAL	44	100.0	26	100.0	22	100.0	92	100.0

Table 4.2. New locations by type of business and by December 1970 employment, for town size 2[a]

Type of Business	3 - 4 employees Number	Percent	5 - 9 employees Number	Percent	10 and over employees Number	Percent	Total Number	Percent
Construction	--	--	2	5.4	1	5.0	3	2.7
Agricultural manufacturing	--	--	4	10.8	6	30.0	10	9.1
Other Manufacturing	6	11.3	6	16.2	5	25.0	17	15.4
Transportation, communication and other public utilities	--	--	2	5.4	--	--	2	1.8
Finance, insurance and real estate	2	3.8	3	8.1	--	--	5	4.5
Wholesale and retail trade	33	62.3	20	54.1	3	15.0	56	51.0
Business and repair service	6	11.3	--	--	1	5.0	7	6.4
Personal service	4	7.5	--	--	1	5.0	5	4.5

[a]Source: (21).

Table 4.2. Continued.

Type of Business	3 - 4 employees Number	Percent	5 - 9 employees Number	Percent	10 and over employees Number	Percent	Total Number	Percent
Entertainment and recreation	1	1.9	--	--	--	--	1	0.9
Professional and related services	1	1.9	--	--	3	15.0	4	3.6
TOTAL	53	100.0	37	100.0	20	100.0	110	100.0

Table 4.3. New locations by type of business and by December 1970 employment, for town size 3[a]

Type of Business	3 - 4 employees Number	Percent	5 - 9 employees Number	Percent	10 and over employees Number	Percent	Total Number	Percent
Construction	4	11.1	2	5.3	4	6.6	10	7.4
Agricultural manufacturing	1	2.8	--	--	13	21.3	14	10.4
Other manufacturing	1	2.8	4	10.5	16	26.2	21	15.5
Transportation, communication and other public utilities	1	2.8	2	5.3	3	4.9	6	4.4
Finance, insurance and real estate	3	8.3	--	--	--	--	3	2.2
Wholesale and retail trade	17	47.2	26	68.4	24	39.3	67	49.6
Business and repair service	3	8.3	2	5.3	1	1.6	6	4.4
Personal service	1	2.8	--	--	--	--	1	0.7

[a]Source: (21).

Table 4.3. Continued.

Type of Business	3 - 4 employees Number	Percent	5 - 9 employees Number	Percent	10 and over employees Number	Percent	Total Number	Percent
Entertainment and recreation	1	2.8	--	--	--	--	1	0.7
Professional and related services	4	11.1	2	5.3	--	--	6	4.4
TOTAL	36	100.0	38	100.0	61	100.0	135	100.0

Table 4.4. Total new locations by type of business and by December 1970 employment[a]

Type of Business	3 - 4 employees		5 - 9 employees		10 and over employees		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Construction	5	3.8	6	5.9	5	4.9	16	4.7
Agricultural manufacturing	6	4.5	7	6.9	24	23.3	37	11.0
Other manufacturing	14	10.5	14	13.9	24	23.3	52	15.4
Transportation, communication and other public utilities	2	1.5	6	5.9	3	2.9	11	3.3
Finance, insurance and real estate	6	4.5	3	3.0	1	1.0	10	3.0
Wholesale and retail trade	72	54.1	58	57.4	35	34.0	165	49.0
Business and repair service	13	9.8	3	3.0	4	3.9	20	5.9
Personal service	6	4.5	--	--	1	1.0	7	2.1

[a]Source: (21).

Table 4.4. Continued.

Type of Business	3 - 4 employees Number	Percent	5 - 9 employees Number	Percent	10 and over employees Number	Percent	Total Number	Percent
Entertainment and recreation	3	2.3	1	1.0	1	1.0	5	1.5
Professional and related services	6	4.5	3	3.0	5	4.9	14	4.2
TOTAL	133	100.0	101	100.0	103	100.0	337	100.0

The new locations by type of business and by primary market area are presented in Table 4.5. One hundred and ninety-seven locations, representing 58.6 percent of the total, had as their primary market area the community in which they were located. There were 86 firms, or 25.4 percent of the total, with primary market areas outside the community but in Iowa. The remaining 54 new firms, or 16 percent of the total, marketed more than one half of their products and/or services outside of Iowa.

B. Selection of Cases

The export locations, that is, the plants marketing most of their products outside of the community, tend to contribute more to the local economy because the income generated comes primarily from outside the community. Plants producing products for sale primarily outside the community tend to generate larger multiplier effects than do plants selling most of their output within the community. In other words, new export plants tend to have a more pronounced impact upon local employment and income. For this reason, and because competition for such plants among communities is intense, the 140 new exporting plants were selected for further location study. These 140 industrial locations represented 41.1 percent of the new locations and included the plants whose primary market area was outside the community of location but in Iowa as well as those whose primary market area was outside of Iowa.

Tables 4.6 and 4.7 show the classification of the new export locations by type of business, by principal market area, by town size

Table 4.5. New locations by type of business and by primary market area[a]

Type of Business	Primary Market Area: In the community Number	In the community Percent	Outside the community but in Iowa Number	Outside the community but in Iowa Percent	Outside of Iowa Number	Outside of Iowa Percent
Construction	8	4.1	5	5.8	3	5.6
Agricultural manufacturing	6	3.0	13	15.1	18	33.3
Other manufacturing	7	3.6	18	20.9	27	48.2
Transportation, communication and other public utilities	5	2.5	4	4.7	2	3.7
Finance, insurance and real estate	3	1.5	7	8.1	--	--
Wholesale and retail trade	136	69.0	28	32.6	1	1.9
Business and repair service	13	6.6	4	4.7	3	5.6
Personal service	6	3.0	1	1.2	--	--
Entertainment and recreation	3	1.5	2	2.3	--	--
Professional and related services	10	5.1	4	4.7	--	--
TOTAL	197	100.0	86	100.0	54	100.0

[a]Source: (21).

Table 4.6. New export locations by type of business and by primary market area[a]

Type of Business	Outside of community but in Iowa		Outside of Iowa		Total	
	Number	Percent	Number	Percent	Number	Percent
Construction	5	5.8	3	5.6	8	5.7
Agricultural manufacturing	13	15.1	18	33.3	31	22.1
Other manufacturing	18	20.9	27	50.0	45	32.1
Transportation, communication and other public utilities	4	4.7	2	3.7	6	4.3
Finance, insurance and real estate	7	8.1	--	--	7	5.0
Wholesale and retail trade	28	32.6	1	1.9	29	20.7
Business and repair service	4	4.7	3	5.6	7	5.0
Personal service	1	1.2	--	--	1	0.7
Entertainment and recreation	2	2.3	--	--	2	1.4
Professional and related services	4	4.7	--	--	4	2.9
TOTAL	86	100.0	54	100.0	140	100.0

[a]Source: (21).

Table 4.7. New export locations by type of business, by town size and by mean December 1970 employment[a]

Type of Business	Town Size 1 Number	Town Size 1 Mean number of employees	Town Size 2 Number	Town Size 2 Mean number of employees
Construction	3	5.67	2	9.00
Agricultural manufacturing	10	23.90	9	39.67
Other manufacturing	11	27.64	16	25.69
Transportation, communication and other public utilities	2	5.50	1	7.00
Finance, insurance and real estate	2	7.50	4	5.00
Wholesale and retail trade	8	12.75	8	7.50
Business and repair service	5	6.40	1	30.00
Personal service	--	--	1	3.00
Entertainment and recreation	2	8.00	--	--
Professional and related services	3	24.67	--	--
TOTAL	46	17.61	42	21.57

[a]Source: (21).

Table 4.7. Continued.

Type of Business	Town Size 3 Number	Town Size 3 Mean number of employees	Total Number	Total Mean number of employees
Construction	3	13.00	8	9.25
Agricultural manufacturing	12	42.08	31	35.52
Other manufacturing	18	40.06	45	31.91
Transportation, communication and other public utilities	3	16.67	6	11.33
Finance, insurance and real estate	1	4.00	7	5.57
Wholesale and retail trade	13	6.77	29	8.28
Business and repair service	1	50.00	7	16.00
Personal service	--	--	1	3.00
Entertainment and recreation	--	--	2	8.00
Professional and related services	1	8.00	4	20.50
TOTAL	52	28.17	140	22.72

and by the mean December 1970 employment. There were 31 agricultural manufacturing locations and 45 other manufacturing locations among the 140 new export locations. The two types of businesses accounted for 76 of the 140 export locations, or 54 percent of the total.

The 76 agricultural manufacturing and other manufacturing plants were selected for case study consideration because the manufacturing plants tend to have a relatively more significant impact upon local economies than do the non-manufacturing establishments. The manufacturing plants generally employed more workers, and the expected local injection of outside money was greater than for the other plants. Among the 76 manufacturing plants, approximately 41 percent marketed most of their output outside the community but in Iowa, and 59 percent marketed most of their output outside of Iowa.

Tables 4.8 through 4.11 show the new manufacturing plants by primary market area, by type of manufacturing, by town size and by December 1970 employment. The thirty new manufacturing plants with less than ten employees were eliminated from consideration for case study analysis, as were the home-grown firms. Although a location decision was made in these cases, it was believed that the process probably consisted of fewer stages than that involving larger firms with a wider range of location alternatives. There is also relatively less competition among communities for the home-grown firms and for the smaller plants. Home-grown firms generally consider only one community for the location of their first plant. A plant employing less than 10 workers creates less additional employment and income than a plant employing a larger number

Table 4.8. New manufacturing plants with primary market area outside the community but in Iowa by type of manufacturing, by town size and by December 1970 employment[a]

	Town Size 1				Town Size 2			
	Agricultural manufacturing		Other manufacturing		Agricultural manufacturing		Other manufacturing	
	plants	employees	plants	employees	plants	employees	plants	employees
	1	4	4	3	1	5	2	3
	1	10	2	5	1	6	2	4
	1	12	1	40	1	7	2	5
					1	30		
	—	—	—	—	1	34	—	—
TOTAL	3	26	7	62	5	82	6	24
Mean employment		9		9		16		4

[a]Source: (21).

Table 4.8. Continued.

	Town Size 3			
	Agricultural manufacturing		Other manufacturing	
	plants	employees	plants	employees
	1	10	1	4
	1	12	1	14
	1	15	1	15
	2	65	1	23
	—	—	1	30
TOTAL	5	167	5	86
Mean employment		33		17

Table 4.9. Total new manufacturing plants with primary market area outside the community but in Iowa by type of manufacturing and by December 1970 employment[a]

	Agricultural manufacturing		Other manufacturing	
	plants	employees	plants	employees
	1	4	6	3
	1	5	3	4
	1	6	4	5
	1	7	1	14
	2	10	1	15
	2	12	1	23
	1	15	1	30
	1	30	1	40
	1	34		
	2	65	—	—
TOTAL	13	275	18	172
Mean employment		21		10

[a]Source: (21).

Table 4.10. New manufacturing plants with primary market area outside of Iowa by type of manufacturing, by town size and by December 1970 employment[a]

	Town Size 1				Town Size 2			
	Agricultural manufacturing		Other manufacturing		Agricultural manufacturing		Other manufacturing	
	plants	employees	plants	employees	plants	employees	plants	employees
	1	3	1	4	1	10	1	4
	1	4	1	8	1	20	1	5
	1	7	1	30	1	85	1	6
	1	8	1	200	1	160	1	8
	1	19					1	9
	1	22					1	20
	1	150					1	25
							1	30
							1	80
							1	200
TOTAL	7	213	4	242	4	275	10	387
Mean employment		30		60		69		39

[a]Source: (21).

Table 4.10. Continued.

	Town Size 3			
	Agricultural manufacturing		Other manufacturing	
	plants	employees	plants	employees
	1	12	1	5
	1	16	1	8
	1	40	1	15
	1	50	1	16
	1	65	2	20
	1	75	1	25
	1	80	1	26
			1	35
			1	40
			1	41
			1	167
			1	217
TOTAL	7	338	13	635
Mean employment	48		49	

Table 4.11. Total new manufacturing plants with primary market area outside of Iowa by type of manufacturing and by December 1970 employment[a]

	Agricultural manufacturing		Other manufacturing	
	plants	employees	plants	employees
	1	3	2	4
	1	4	2	5
	1	7	1	6
	1	8	3	8
	1	10	1	9
	1	12	1	15
	1	16	1	16
	1	19	3	20
	1	20	2	25
	1	22	1	26
	1	40	2	30
	1	50	1	35
	1	65	1	40
	1	75	1	41
	1	80	1	80
	1	85	1	167
	1	150	2	200
	1	160	1	217
TOTAL	18	826	27	1,264
Mean employment		46		47

[a]Source: (21).

of workers, thus there is less community competition for smaller plants.

A wide variety of products are manufactured by the remaining 46 agricultural manufacturing and other manufacturing plants. Because of differences in such factors as industrial organization and structure, degree of competition, size and distribution of markets, type of production processes, and other location determinants, the location decision process was expected to show significant variation among the different types of manufacturing plants. While it would have been useful to analyze a number of locations producing similar products, the population of new locations did not provide a sufficient number of cases satisfying the other selection criteria. In addition, one primary objective of the study is to understand, from the standpoint of industrial management, the demand for industrial locations in rural Iowa. The Kaldor and Dahlke (21) survey data indicates that many types of firms, producing many different classes of products, demand rural Iowa locations. Given the limited existing knowledge of the location decision process as it affects rural Iowa communities, it was decided that the more useful approach for this study would be to analyze the location decision of a number of different types of firms faced with a wide range of location alternatives. This approach is expected to generate more hypotheses about the location decisions of firms considering rural Iowa for new plant locations.

It was generally attempted to select typical manufacturing plant locations for case study analysis. From the 46 manufacturing firms employing 10 or more workers, 7 cases were selected. The seven

selections include cases from each of the three town sizes, the agricultural manufacturing and the other manufacturing sectors, the different areas of Iowa, the outside of the community but in Iowa and the outside of Iowa market area classifications, and from the entire range of employment sizes.

Each of the seven firms produces a different type of product. The types of manufacturing industries chosen were meat breaking and fabrication, animal feed, frozen bread dough, modular homes, plastics, electronics and steel fabrication. Each of the new locations is, in effect, a branch plant, and firms involved are regional or national corporations. That is, the firms have multi-state or national market areas.

Each of the manufacturing locations is large enough, in terms of the number of employees, to have a significant impact upon the economy of the community in which the plant is located. The number of communities willing to supply a location for such a plant is large relative to the number of locations demanded by firms. Thus, these relatively large firms have many communities from which to choose a plant location. The location decision process in such cases probably involves more specialization by individuals and differentiation of factors by stages than does the location decision process involved in cases of small or home-grown firms. The decisions made in the selected cases were also expected to be based on relatively explicit location criteria.

The sample of cases was not randomly selected. However, the location decisions chosen for case study analysis are fairly typical

of the new industrial locations in Iowa. In addition, the types of new locations selected for study are important in terms of their potential contribution to the economic growth of rural Iowa.

V. ATLANTIC STEEL CORPORATION

(ATLANTIC, IOWA)

In December, 1969, Venetian Ornamental Iron Works, Inc., of Des Moines, located a new steel fabrication branch plant in Atlantic. Venetian Iron is a family corporation owned and operated by the Zenti brothers. Atlantic Steel Corporation was established as a subsidiary of Venetian Iron. Venetian Iron is a custom steel fabricating firm that produces structural steel, miscellaneous ornamental iron products, architectural metals and anchor bolts. The Atlantic Steel plant produces structural steel, hand rails and stairs. Most of the output is distributed outside of Iowa.

A. Industry Structure and Trends

The production of custom structural steel products accounts for much of the company's business. Structural steel has been an increasingly important building material over the last four decades. Building is one of the oldest productive activities of man. For centuries natural stone and timber were the primary building materials. Construction was often a slow and costly process. The historically important development of steel products allowed faster construction at lower costs. The strength, hardness, elasticity and other mechanical properties of steel were of major importance in its adoption as a building material. Over the years, structural steel has been vastly improved through technological advances. Welding, for example, has largely replaced riveting or bolting.

The past several years has been characterized by a trend toward prefabrication of structural steel. Factory production of structural steel components has become increasingly important because of the efficiency of the factory assembly process. On-the-site construction work, which is dependent on the weather, has been largely confined to minimum erection operations. This has tended to decrease construction time and costs. The value of shipments of fabricated structural steel for buildings increased from $1.4 billion in 1967 to $1.9 billion in 1971 (51, p. 25; 52, p. 24), and the total value of fabricated structural steel increased from $3 billion to $3.4 billion during the period (50, p. 179).

The custom structural steel fabricating industry is characterized by many relatively small firms. It tends to be a highly competitive industry. The number of firms in the industry increased from 1,636 in 1963 to 1,865 in 1967. During the same period, the market share of the four largest firms decreased from 15 percent to 13 percent, and the 1970 figures indicate that the degree of concentration in the industry has not changed significantly since 1967 (53, p. 29). Thus, the industry is not dominated by a small number of very large firms. The combined employment of 115 for the two Venetian Iron plants makes the company one of the largest custom steel fabricating plants in the Midwest. The economies of scale in the industry are such that it is possible for relatively small firms to operate efficiently and, thus, to compete effectively for many contracts. There are many steel fabricating firms with only 10-25 employees.

The procedure of bidding for contracts together with the uncertainties involved in developing cost estimates for different types of jobs tend to make it possible for custom steel fabricating firms to compete on a national basis. As an illustration of the nation-wide competition in the industry, Venetian Iron Works currently has jobs in such cities as Des Moines, Iowa; Minneapolis, Minnesota; Dallas, Texas; Atlanta, Georgia; Greensboro, North Carolina; Tulsa, Oklahoma; and Chicago, Illinois. It is not uncommon for firms with West Coast plants to compete effectively for construction jobs on the East Coast. In general, a high degree of competition exists in the industry. Firms compete not only with other firms in the same state or region but also with firms in other states or regions. This seems to indicate that the transportation costs per mile, as a percentage of output value, are relatively low for many of the products of the custom steel fabricating industry.

B. The Location Decision

The decision to locate the new branch plant in Atlantic was the culmination of a location search by Venetian Iron Works. The company wanted to expand its operations, but it was having serious labor problems in its Des Moines plant. Therefore a significant expansion of the existing facility was ruled out. Manpower in the Des Moines metropolitan area was in short supply, and the wage rates were set high by the competition for labor. Venetian Iron was having to compete for labor with large companies such as John Deere, Firestone and Ford. The Des Moines plant was not unionized because the union plan had been voted down, but

the company felt that the plant might soon be organized. The company produces according to contracts which are fixed in terms of product price and in terms of completion dates. Because of the contracts, the company lacks flexibility to profitably deal with sudden large wage increase demands or with strike activity. The employee turnover rate at the Des Moines plant was very high and this was creating additional problems. The skills required in steel fabrication take several months to master, so high labor turnover rates tend to decrease labor productivity. The company decided to build an additional plant to increase profits and to increase their alternatives and flexibility in dealing with the existing and expected labor problems.

The president of Venetian Iron, Mario Zenti, was the primary company official involved in the plant location decision. He at first considered building a plant outside of Des Moines but within a 20-40 mile radius of the city. However, after studying the situation the company decided that to locate the plant so close to Des Moines would give them the same type of metropolitan area labor problems that they already had.

The company decided that, because of labor problems in metropolitan areas, it wanted to locate the new plant 50-70 miles from any major metropolitan area. The president of the company wanted to locate the plant in western Iowa, away from most industry. The Dodge Report indicated that 75 percent of all Iowa industry was concentrated in eastern Iowa. Mr. Zenti believed that, because of the greater concentration of industry in eastern Iowa, there would likely be serious labor availability problems there. The desire to locate away from the major

concentration of industry in the state established the western one half of Iowa as the general area in which the plant would be located. Much of the company's business was east of Des Moines and the U.S. Steel Corporation plant in Gary, Indiana was the primary source of steel input. However, the company felt that the high productivity of the rural Iowa workers would more than offset the higher transportation costs and, thus, allow the company to be competitive in bidding for construction contracts. Within western Iowa, the communities closer than 50 miles to Omaha or Des Moines were eliminated. The company wanted the plant reasonably close to Interstate 80 and that eliminated many communities in southwestern Iowa and in northwestern Iowa.

The Iowa Development Commission was contacted, provided with the company plant location specifications and asked to recommend a few Iowa communities meeting the specifications. The specifications included those discussed above as well as others dealing with such things as labor needs, utility service, plant site, organized labor activity, rail service, community size and community attitude.

Labor costs generally account for more than one third of total costs in the industry. The company wanted to locate in a rural farm community because it was believed that such a community would provide more productive labor than that of urban areas. The key labor factors to the company were the willingness to work and the "generally superior attitudes" of the rural workers. In effect, a rural location was demanded because the company officials believed the productivity of rural workers would be high. The wage rates were expected to be lower in the rural areas,

but this seems to have been relatively less important than labor productivity as a location factor. The critical factor favoring rural areas was, in effect, the expected low labor costs per unit of output.

The president of the company was very interested in the existing industries in the towns being considered for the new plant location. He looked at the number of male employees, at the number of female employees and at the union affiliations. The number of women working indicated the stability of the work force because if the women were working it tended to mean that the family would stay in town. Also, if the wife was working, then the family would have more than one source of income and that would tend to constrain wage demands. Home ownership was also considered an indication of labor force stability.

The company wanted a readily accessible site complete with the necessary utility service. The availability of a large and constant supply of electricity was very important due to the large electrical power requirements of the steel fabrication process.

The president of the company wanted to locate the plant adjacent to a rail line in case there was a need to receive inputs or ship outputs by rail. The availability of rail service was also considered to be important in providing bargaining power when the company was negotiating with trucking firms.

The attitude of the community with respect to industrial development was also important. The company wanted the plant to be a welcome addition to the economy of the community. The company was not seeking gifts, but they needed the cooperation and help of the local industrial

development people in getting the land, the utilities and other necessary services.

The Iowa Development Commission utilized the plant location specifications of Venetian Iron Works in recommending three western Iowa communities for consideration. The three communities recommended were Atlantic, Greenfield and Missouri Valley. The population of Atlantic was approximately 7,300. It is seven miles from Interstate 80 and approximately 60 miles from Omaha. The population of Greenfield was approximately 2,200. It is thirteen miles from Interstate 80 and 55 miles from Des Moines. The population of Missouri Valley was approximately 3,500. It is five miles from Interstate 80 and only 25 miles from Omaha.

Missouri Valley was eliminated from further consideration because it was too close to the Omaha metropolitan area. The president of the company believed that it was too close to Omaha to allow the plant to stay away from metropolitan area labor problems. As discussed earlier, the company believed that rural workers were much more productive. In addition, the problems with organized labor activity were expected to be less in the rural areas.

The availability of labor and the transportation facilities became the critical location factors in choosing between Atlantic and Greenfield. The two communities were about equal with respect to transportation facilities, with Atlantic perhaps having a slight advantage. Each of the two communities had rail service, but Atlantic was on a main line. Atlantic was six miles closer to Interstate 80 than Greenfield.

Atlantic was also situated on a good north-south highway (U.S. 71) while Greenfield was situated on a poorer north-south (Iowa 25) route. The relative labor availability of the two communities seems to have been the most important factor in deciding between the two. It was decided that Greenfield was too small to provide an adequate supply of labor. The expected greater labor availability of Atlantic (population 7,306) as compared to Greenfield (population 2,212) eliminated Greenfield and left Atlantic as the new branch plant location.

The most important location factors in the approximate order of significance in the decision to locate the plant in Atlantic were the availability of highly productive rural labor, the relatively low wage rates, the low degree of organized labor activity, the good transportation facilities, the cooperative attitude of the local residents and the quality and availability of essential public services.

The availability of labor of expected high productivity was the single most important location factor. The rural Atlantic area workers were expected to have the desire to work, to be more conscientious and to generally be much more efficient than urban workers. Skilled metal workers were not available in sufficient quantity, but the important thing to the company was to be able to employ workers who could think and who would be willing to do so to improve their productivity. The president of the company believed that the rural workers were well-educated and very trainable and, thus, that they would make a strong contribution to a profitable operation.

The existing wage scales and the extent of organized labor activity were relatively low. These were important factors in the location decision, but they were much less important than the supply of productive labor.

The transportation facilities of Atlantic were excellent in the eyes of the company. The community was served by good north-south and east-west highways, by a main line railroad and was only seven miles from Interstate 80. The good transportation facilities increased the expected ease with which the plant could receive its inputs and ship its outputs.

The attitude of the Atlantic industrial development officials was important in the location decision. The president of the company met with the president of the Atlantic Industrial Development Corporation to discuss plant site needs. He said he wanted a five-acre site, complete with utilities and located next to the railroad. The development corporation officials optioned the land and worked with Mr. Zenti to get the necessary utility service. The only difficulty encountered was the uncooperative attitude of a local utility company official. Because of the problem, the president of the company almost decided against locating the plant in Atlantic. However, the problem was resolved, adequate service was assured and the decision to locate in Atlantic was finalized. The company then bought the land, and the community shared the cost of utility development.

The local tax structure was favorable, and the company was pleased with it, but tax rates were not a significant factor in the location decision. The president of the company believed that the local tax

structure was not significantly different among communities. The company had their own financing making the availability of mortgage credit unnecessary.

The primary steel input sources of the company were the Bethlehem Steel and the U.S. Steel plants near Gary, Indiana and the C.F. and I. Steel plant in Pueblo, Colorado. At the time the plant location decision was being made, the steel companies used "freight equalization" to eliminate differences in transportation costs from the various steel mills. This significantly lessened the importance of input transportation costs as a location factor. The freight equalization policy has now been eliminated so that steel fabricating firms must pay higher freight charges if inputs are purchased from steel companies located further away from the fabrication plant.

Despite the higher transportation costs that resulted from the abandonment of the freight equalization policy, the management of the company believes that the location decision was optimal with respect to their primary motive, profit maximization. As discussed earlier, the primary location determinant was the expected availability of highly productive labor. The company's expectations about the profitability of the plant were primarily labor productivity expectations. The key expectation was that the rural Atlantic area workers would be very productive, and that this factor would tend to make the plant highly profitable. The expectations have been realized. The output per hour of the Atlantic plant employees is 40-50 percent higher than that of the Des Moines plant workers. In addition, the Atlantic workers are paid approximately $1 per hour less than the Des Moines workers. In other

words, the labor costs per unit of output are substantially lower in the Atlantic plant than in the Des Moines plant, even though the level of technology utilized is essentially the same in the two plants.

The management of the company believes that the economies of scale involved in having larger plants are more than offset by the higher productivity of workers in relatively small rural plants. Man for man, the Atlantic workers are much more productive than the Des Moines workers. The attitude of the rural workers seems to be of critical importance in explaining their high productivity. The rural people, many of them with farm backgrounds, know how to work and are generally willing and anxious to do a good job.

Another factor contributing significantly to the higher labor productivity in the Atlantic plant is the low turnover rate of the employees. The metal working skills required in structural steel fabrication plants generally take at least six months to be mastered. Thus, labor turnover is particularly important. Of the 25 original employees of the Atlantic plant, 19 are still there, are well-acquainted with their responsibilities and are very efficient at their jobs. This is in sharp contrast to the Des Moines plant where over 200 workers must be hired during a typical year to keep the production crew at 50-60 employees.

The lower labor turnover rates at the Atlantic plant result from many interrelated factors, one of the most important of which is probably the relatively stable rural community environment. There seems to be fewer distractions and other pressures that in urban areas tend to create employment instability. In a small town there are fewer

employment alternatives available so a worker tends to stick with a job for a longer period of time than his urban counterpart. In Des Moines, for example, "workers will often change jobs at the drop of a hat" if they can get an additional 5¢ per hour. This type of thing is much less prevalent in the rural community, partly because of the relative scarcity of alternative employment opportunities, but also because rural workers tend to develop a greater sense of loyalty to their employers. In other words, labor attitude is again very important.

The management of Venetian Iron Works, Inc., based their location decision largely upon their expectations of relatively higher labor productivity in rural communities. Although several other factors were important at various stages of the location decision process, the company's location search concentrated upon finding a rural community with a good supply of high "quality" labor. The labor "quality" that was the object of much of the location search was not a particular skill but rather something much more abstract. The critical factor to the company was the quality of labor where "quality" was reflected by willingness to work, interest in the job, general educational level, turnover rates, absenteeism and general productivity. The company located Atlantic Steel Corporation in Atlantic because Atlantic remained after all other communities had been eliminated. Atlantic was expected to be the most profitable location for the plant. Although it is impossible to determine whether the location has resulted in maximum profit, the operation has been a highly profitable one, and it seems that several location factors relatively unique to Atlantic have contributed to its profitability. The

company probably made at least a near optimal location decision given the information available and given the expectations of the management of the company. There is little evidence to suggest that the expectations were invalid. The company officials still believe, after almost four years of experience with the Atlantic location, that their location choice was the optimal one.

The employment of the plant will increase from the present 35 to at least 45 when a current expansion program is completed. The company had been seriously conducting an additional location search for another branch plant. However, the current shortage of basic steel inputs has, at least temporarily, halted the location search. The company is now operating subject to severely constrained input supplies, and the company officials believe that it would not be to their advantage to locate a new plant in the near future. The location decision process was proceeding along the same lines as the earlier one, and the same location factors were being utilized in the process of elimination of prospective communities. This is a further indication that the company was pleased with the decision process that was culminated by the choice of Atlantic for its branch plant location.

VI. DAKOTA BAKE-N-SERV, INC.

(NEVADA, IOWA)

Dakota Bake-N-Serv, Inc., of Jamestown, North Dakota, located a branch plant in Nevada in October, 1968. The plant employs approximately 70 workers, 30 to 45 of whom are Oak Park Academy students that work 20 hours per week. The students work four-hour daytime shifts. Oak Park Academy is a secondary school operated by the Seventh Day Adventist Church. The plant produces frozen bread dough, and most of the product is distributed outside of Iowa.

A. Industry Structure and Trends

The frozen bread dough industry is a new, relatively small industry. Total industry sales in 1972 were approximately $40 million and there were only ten to twelve firms in the industry. Frozen bread dough has been commercially produced and sold only for about the last twelve years. Most of the development of the industry occurred within a two-year period during the early 1960's. The industry has been characterized by a trend toward more automated production techniques in the mixing and shaping of the dough. The efficiency of the freezing process has been increased substantially through the use of advanced quick-freezing methods. The development and adoption of efficient packaging and labeling equipment was one of the more recent technological innovations.

The general acceptance of, and widespread increased consumer demand for, frozen food products in recent years has had a big impact upon the frozen bread and roll dough industry. Millions of households have home

freezers which are utilized to store a variety of foods, including bread dough. The bread and rolls may be baked between visits to the supermarket, and, thus, fresh bread is available in the home throughout the week.

The dough usually includes no preservative because freezing retards spoilage. The lack of preservatives and the fact that the bread is baked at home combine to give the bread the home-cooked flavor that many people prefer. In addition, when the frozen dough is purchased by the consumer and baked in the home, the unit cost of the bread is significantly lower than that of baked bread. This is a particularly important consideration to large families that consume a large quantity of bread products. At a time when many food prices are rapidly increasing, saving a few pennies per unit on a staple food product such as bread can make a big difference in the total household food budget.

Dakota Bake-N-Serv, Inc. started operation in 1964 in Jamestown, North Dakota. The company is a franchise organization which is licensed to use the name and processes of Rhodes Bake-N-Serv, Inc. of Portland, Oregon. The president of Dakota Bake-N-Serv founded the company when he recognized Rhodes frozen bread dough as an outstanding product with great growth potential. The company began by obtaining the Rhodes franchise for North Dakota and South Dakota. The original plant was located in Jamestown, North Dakota in 1964. Since that time, the company has grown to eight manufacturing plants serving thirty states. The market area served by the company stretches from the East Coast to the West Coast and south to approximately the Mason-Dixon line. The company plants are

located in the states of North Dakota, Iowa, Missouri, Wisconsin, Michigan, Massachusetts, Colorado and Washington. Of the eight plants, three were purchased from other companies and five were new locations. The company has doubled its sales for each of the last several years, and it now is the largest firm in the frozen bread dough industry. The products are sold to supermarket chains and to wholesale distributors throughout much of the country.

B. The Location Decision

The original Dakota Bake-N-Serv plant, located in Jamestown, North Dakota, served the market area of North and South Dakota. By 1968, the company had developed a significant market area in Minnesota, of which Minneapolis-St. Paul was particularly important. The market area of the company was expanding to the southeast. The management of the company decided, on the basis of expected sales potential, to expand the company operations by locating a new frozen bread dough plant. One alternative was to locate the plant in Minnesota to serve the already developed Minneapolis-St. Paul market. However, the management of the company did not want their plants so close together that they would compete with each other for sales. Also, the president of the company was very aggressive, and he had high expectations about the future growth of the company. He decided that, in terms of long run profit, rather than locate the plant in Minnesota, it would be better to "leapfrog" to Iowa. An Iowa plant would have the existing Minnesota market for support while it developed other market areas. The decision was made, on the basis of product market considerations, to locate the plant in Iowa.

The selection of a particular Iowa community for the plant location involved some very unique considerations by the management of the company. In particular, the objective function of the company does not consist solely of profit maximization. The company is not a strict profit maximizer. The company, in effect, has two complementary objectives. The first is to earn a profit from company operations. The second objective involves the relation between the management of the company and the Seventh Day Adventist Church. The company is a privately owned corporation, but the management has very close ties to the church.

The church operates a number of private educational facilities for the young people of the Seventh Day Adventist faith. The academies (secondary schools) try to attract private industries to provide work for the sixteen years of age-and-older students. The arrangement is considered beneficial to the academy students, to the academy and to the companies involved. The employment enables students to earn money to pay their way through school. Also, student employment is consistent with the strong church belief that learning should take place everywhere, including places of business, and that the academies should try to train the students to be productive workers. The cooperating companies thus provide needed employment opportunities in which students may do something worthwhile. The students provide the companies with highly productive labor services at reasonable wage rates. The companies help the academy by furnishing a flow of outside money through student work contracts. The three-way complementary relationship between the private companies, the students and the academies seems to be mutually beneficial to all of the parties concerned.

Dakota Bake-N-Serv has a history of close interaction with the educational program of the Seventh Day Adventist Church. The company management has a strong belief in the "work ethic" and in the contribution that gainful employment makes to the development of young people into productive members of society. Of the eight company plants, six are located in communities where the church operates private educational facilities. The objective function of the company includes the earning of profit, but it also includes the provision of meaningful employment opportunities for academy students.

The decision to locate the new frozen bread dough plant in Iowa was based on the product market considerations discussed earlier. The selection of the particular community of Nevada was largely a function of the unique labor situation in the community. The company wanted to locate in a Seventh Day Adventist academy town in order to employ academy students in the plant. Oak Park Academy, located in Nevada, was the only church academy in Iowa. The academy, at the time, was looking for industry to provide student employment. The company management wanted to employ students because of their expected high productivity at reasonable wage rates. The management also wanted to provide work to the students, including some of their own children, because of the strong belief that it would be good training, and it would "keep the students out of trouble". An adequate number of academy students was expected to be available to work in the plant, and the academy was anxious to attract industry to provide student employment, so an agreement was reached to locate the plant in Nevada. The church owned the land, and they agreed to build the building and to lease it to the company.

Nevada was chosen for the plant location primarily because of the unique academy labor situation. However, the community also happened to be near ideal in terms of the market area the plant was to serve. Within a 250 mile radius of Nevada was what was expected to be a very strong market area for the company products. The area included Minneapolis, Omaha, Des Moines and the Quad Cities. More generally, the primary market area to be served by the plant was composed of Iowa, southern Minnesota, central Illinois and eastern Nebraska. Nevada was near the center of that market area. The plant would probably have been located slightly closer to Des Moines if it had not been for the academy in Nevada.

The management of the company, in addition to favoring an academy town, wanted to locate in a rural area. Local people would be employed to supplement the student labor, and the management believed that rural areas would provide more productive labor than metropolitan areas. They were of the opinion that rural people generally know how to work and are less likely to look for excuses not to work. They were also expected to take pride in their work. "Many of them have grown up on farms, so they have learned to get out of bed and get with it." The management of the company also preferred rural areas because of the lower probability of organized labor activity in such areas relative to that of metropolitan areas. The president of the company wanted to "run his own business and make his own decisions", and he believed that there was no way that could be done if the plants were unionized. He also preferred rural areas as a place to live and work. In general, even without the consideration of

the academy, the company management would not have located the plant in a metropolitan area.

The critical locational factors, in the approximate order of importance were the productivity, availability and wages of needed labor; the strength of labor unions in the community; the nearness of markets for outputs; the nearness of markets for raw materials; the quality of the transportation system; and the attitude of local residents toward industrial development. The desire to locate in the center of the expected market area established Iowa as the general area for the plant location. Once Iowa was chosen as the area for the plant location, the decision process was collapsed immediately, and Nevada was selected because there was no other academy located in Iowa. Nevada was selected as the plant location, and the unique labor situation connected with the academy was by far the most important location determinant. Although other locational factors were of relatively less importance, the factors ranked earlier also increased the attractiveness of Nevada as a plant location. There was very little existing or expected organized labor activity in the community. It was near the center of the expected market area, thus, product transportation costs would be near minimum, and fast service could be provided to customers. Nevada was also well situated with respect to raw material markets such as Fergus Falls, Minnesota; Minneapolis, Minnesota; Chicago, Illinois; and Clinton, Iowa. The company operates its own transportation service, and all the output is shipped by truck. Thus, a good highway system was important to the company. Nevada is located just one mile from a good east-west highway (U.S. 30) and only seven miles from a good north-south highway (I-35). Rail service was less important

because rail transportation was to be used only for inputs which occasionally would come from distant points. With respect to the attitude of the local residents toward industrial development, the most important thing to the company was that the administration of the academy showed a genuine interest in, and a need for, the proposed plant.

The decision to locate the frozen bread dough plant in Nevada is believed to have been optimal, particularly with respect to the dual objectives of the company. The company wanted the plant to be a profitable addition to its operations, but it also wanted to provide employment for the academy students. With respect to the Nevada location decision, the evidence strongly suggests that the two objectives were noncompeting. In effect, this means that the firm behaved as if it were a strict profit maximizer.

VII. DESIGN HOMES, INC.

(HUMBOLDT, IOWA)

Design Homes, Inc., Prairie du Chien, Wisconsin, manufactures modular homes and mobile homes for direct sale to consumers. Mr. Frank A. Weeks founded the company and established the first plant in Prairie du Chien in 1967. Mr. Weeks, the president of the company, grew up in the Prairie du Chien area. He had a farm background and also had earlier experience in home building before Design Homes, Inc. was established.

In 1970, Design Homes located a new modular home branch plant in Humboldt. The plant started operating in December, 1970, with a work force of fifteen employees. The plant now employs thirty workers. The majority of the output of the plant is sold outside of the community but within Iowa.

A. Industry Structure and Trends

Modular homes are constructed with interchangeable parts according to standardized patterns and designs. Assembly line techniques are applied in order to take advantage of economies due to specialization of labor and capital equipment. The production process encourages gains in labor productivity from relatively low-skilled workers. The factory-produced homes are transported to the buyer's lot after the sale. In this sense, prefabricated modular homes are more mobile than traditional on-the-site constructed homes but less mobile than "homes on wheels". The assembly line production processes utilized in the modular home industry and in the mobile home industry are similar. The cost economies realized

give the industries a competitive advantage over the conventional home construction industry in the low-cost housing market. The modular home industry constitutes a relatively new field of industrialized housing. With respect to cost and mobility, it occupies an intermediate position between the conventional constructed-on-the-lot housing industry and the mobile home industry.

The production of modular homes accounts for a major part of the output of the prefabricated wood structures industry in which the value of shipments increased from $322 million in 1958 to over $1 billion in 1971 (50, p. 77). The value of shipments of ready-cut and prefabricated wood buildings increased from $348 million in 1967 to $862 million in 1971 (51, p. 12; 52, p. 11). The number of firms producing prefabricated wood structures grew from 364 in 1958 to 549 in 1967. The portion of industry shipment accounted for by the four largest companies in the industry decreased from 28 percent in 1958 to 21 percent in 1967, indicating a lessening of concentration in the industry. However, from 1967 to 1970, the four-firm concentration ratio increased from 21 percent to 30 percent (53, p. 14). Despite the growth in the number of firms, the market share held by the largest companies in the industry actually increased. This implies that the new firms in the industry are generally small companies operating on a local market basis and that much of the growth in demand in recent years has been filled by the larger companies.

The modular home industry is characterized by a large number of relatively small firms, with no single firm or group of firms dominating the industry. The industry constitutes a new field of industrialized

housing and occupies a position between the conventional constructed-on-the-lot housing industry and the mobile home industry with respect to cost and mobility.

The production of modular homes is a relatively new industry in the housing field. The rapidly increasing costs of building conventional homes have priced many potential home buyers out of the market. Many lower income people want to own their own homes, but often find that the cost of buying conventional housing is beyond their means. Large numbers of people, particularly young married couples and older people, are turning to other home-owning alternatives. The growth in the under-30 and over-55 groups of the U.S. population has created a huge market for non-conventional housing.

The mobile home industry has succeeded in capturing the major proportion of the low cost housing market. Approximately 600,000 mobile home units worth approximately $4 billion were sold in 1972, which means that the industry accounted for more than 40 percent of all new single-family homes sold in the U.S. that year (39, p. 105). The growth in the industry has been stimulated by the low price and convenience of mobile homes. The average cost of a fully furnished mobile home in April, 1973, was estimated to be $7,000 as compared to approximately $27,000 for a conventional unfurnished home (39, p. 105). Federal Housing Administration statistics show that average family income for mobile home buyers is less than $8,500, compared to an average income of over $13,000 for buyers in regular FHA programs (29, p. 147).

The market for non-conventional housing is expanding rapidly, and mobile home manufacturers have captured a large share of the market largely because of their production efficiency and mass production techniques. A mobile home cost $11 a square foot to build in 1965, and by 1972, the cost of building was down to $8.50 a square foot (29, p. 147).

The modular home industry has faced stiff cost competition in the housing market, particularly from the mobile home industry. The competition from the conventional housing industry has also been tough in some markets. The cost per square foot of some modular homes in some areas has been higher than that of conventionally built housing. Many conventional home builders are holding their costs down by utilizing factor-made components and, thus, achieving factory efficiencies.

Modular home manufacturers in some states have not been able to produce efficiently because the units must conform to building codes which vary among localities. This problem has become less severe as a number of states have adopted uniform building codes.

As advanced technology is utilized and more efficient factory production methods are developed, the modular home industry is expected to grow, but it is unlikely to match the success of the mobile home industry. Some of the more efficient modular home manufacturers are producing and selling homes for less than $16 a square foot, making their product very competitive in the housing market.

The nature of the modular home industry is such that transportation cost of the finished product is a critical location factor. Shipping a "box of air", as the modular unit has been described, is very costly. The high transportation costs per mile add substantially to the purchase price

as the distance between the production plant and the consumer increases. This tends to eliminate some of the competitive cost advantage which a modular home manufacturer has over a regular home builder.

Another factor dictating a relatively small market area for a modular home plant is the fact that consumers are very reluctant to drive long distances to examine the modular home models. The models are generally situated close to the plant where the sales personnel are available.

B. The Location Decision

In the case of the Design Homes, Inc. modular home branch plant in Humboldt, the president decided on the basis of Design Homes' capital, debt and earnings, to expand the company's operations by locating a new plant away from the main plant in Prairie du Chien, Wisconsin. He felt that it was "good business to have separate profit centers" and to be able to use the local bank for real estate financing.

The first step in the location decision process was to determine the general geographical area where the company wanted the new plant to be located. The expected strong market potential of Iowa was the primary reason why the company wanted to locate the plant in the state. The right-to-work law was another important factor in Iowa's favor. The next criteria set by the president of Design Homes was to locate the plant between 150 and 200 miles from the home plant in Prairie du Chien, Wisconsin. Mr. Weeks wanted the branch plant far enough away from the home plant that the two plants would not compete with one another, but yet he wanted the branch plant within one hour's flying time of the home plant.

Mr. Weeks flies his own airplane, and he wanted to be able to fly to the plant in one hour so that he could readily supervise and coordinate the plant's operations.

A number of Iowa communities falling within the 150 to 200 mile range were selected for investigation. Design Homes was concerned with finding a place large enough to have good rail and truck service, an adequate labor supply and an airport, but yet small enough not to have strong organized labor activity. Both good rail service and good truck service were important because the company expected to use 50 percent rail and 50 percent truck in the transportation of the homes from the plant to the customers' lots and of the lumber from the West Coast to the plant.

The company wanted to locate in a rural community with an adequate supply of rural workers that had farm backgrounds. The president believed such labor to be more work oriented and, thus, more productive. The type and degree of training of the labor force was relatively unimportant because the employees would be trained in the necessary skills. The company would not have located the plant in a town of, for example, 40,000 people where most workers were unionized and where there was a history of labor strife. The preference was for a community with a population between 2,500 and 5,000, although the communities investigated ranged in size up to almost 10,000.

Mr. Weeks selected a number of communities from the desired geographical area and of the preferred size and spent a few days driving around in the area without talking to anyone about building a new plant. He drove through the towns, looked at their overall appearance, looked at the airport, asked about rail and truck service and generally tried to determine

whether the community was progressive. The communities that were found to be lacking with respect to the specifications set by Mr. Weeks were eliminated from the list of potential locations. Letters were then written to the industrial development people in the communities meeting the general specifications set by the company. The possibility of locating a plant in their community was discussed and the communities failing to take positive action were eliminated from further consideration. After this stage in the process of elimination, the three communities of Humboldt, Webster City and Iowa Falls remained as serious contenders for the new Design Homes branch plant. The three communities met the specifications such as good rail and truck service, an airport, adequate labor supply, limited organized labor activity and a population of 2,500 to 10,000.

The final stage involved the selection of one of the three communities for the plant location. There was nothing really negative about Humboldt, Webster City or Iowa Falls, although Webster City was larger than preferred. The primary determining factor in the decision to locate in Humboldt rather than in Webster City or Iowa Falls was the cooperation shown by the people of Humboldt. The officers of the local industrial development corporation checked to see if Design Homes was sound financially, and when they were convinced that it was, they actively worked to get the plant located. When they were told that Mr. Weeks, if possible, wanted a site within walking distance of the airport, they optioned a piece of land adjacent to the airport, flew to Prairie du Chien, sat down in Mr. Weeks' office and showed a real interest in the proposed plant. The help and cooperation provided by the community industrial development

leaders convinced the president of Design Homes that the community was very progressive. The progressive nature of the people of the community, the cooperation provided and the availability of the site between the airport and the railroad were the critical factors in Mr. Weeks' decision to locate the new plant in Humboldt. He was a busy man with little time to devote to the location decision, and he wanted to be sold on the idea of locating his plant in a particular town. The people of Humboldt did the best job of selling their community.

Mr. Frank Weeks, the president of Design Homes, Inc., studied the location problem and made the location decision within a relatively short period of time. The decision was based on profit maximization and at the time it was made, Humboldt seemed to be the optimal choice. The plant has proven to be profitable, but Mr. Weeks now believes the location choice was sub-optimal. Given the location specifications set by Design Homes, the decision was probably the best one. However, the indications now are that an error was made in specifying that the plant be located between 150 and 200 miles from the home plant in Prairie du Chien, Wisconsin. Humboldt is approximately 180 miles from Prairie du Chien. The Prairie du Chien plant sells houses in an area half way to Humboldt, and the Humboldt plant sells houses half way to Prairie du Chien. That is, each of the plants sells within a 90 mile radius, and the area has proven to be too large for one plant to handle. Neither of the plants is doing a good job of selling in the middle area between the two plants. People are generally not willing to drive 90 miles to shop for a modular home. It seems that 50 or 60 miles is about as far as potential customers

will travel. The plants were located too far apart to be able to fully develop the intermediate market area. Locating the branch plant closer to the home plant would have tended to provide more complete market coverage, and, in addition, it would have reduced the cost of transporting men and materials between the two plants.

The specification of locating the branch plant between 150 and 200 miles from the home plant was based on the need to have the two plants far enough apart that they did not compete with one another but yet close enough together that the president of the company could fly between them in an hour or less. The error seems to have been in the company thinking that the plants had to be at least 150 miles apart in order not to compete with one another. The evidence suggests that the location decision was sub-optimal because the expectations upon which the specification that the plants be 150 to 200 miles apart was based were unrealistic.

With the exception of the error in the specified distance between plants, the specifications set by Mr. Weeks were realistic, and the location factors considered were the important ones with respect to the Design Homes objective of maximizing profit. The basic location decision-making process was efficient, and it has been used with success in making two additional location choices.

VIII. GOLDEN SUN FEEDS, INC.

(GRINNELL, IOWA)

In October of 1969, Golden Sun Feeds, Inc. started operation of its new livestock and poultry feed plant in Grinnell. The company relocated the branch plant from Des Moines. The plant, which employs 45 to 60 people, is 95 percent automatic when in normal operation, and embodies the most advanced technology available at the time of construction. Most of the output of the plant is distributed outside of the community but within Iowa.

A. Industry Structure and Trends

The structure of the livestock feed manufacturing industry is characterized by a few large firms and an active competitive fringe of small firms. In 1967, there were approximately 2,400 establishments producing prepared feeds for animals and fowls. The four largest firms in the industry accounted for 23 percent of industry sales (50, p. 16). The large firms generally compete through nonprice means such as product differentiation, quality control and advertising. Price competition and cost reduction are more often used by smaller firms. As the trend toward fewer but larger farms continues, price competition can be expected to become increasingly important (56, p. 483).

The quantity of feed concentrates fed in the U.S. increased from 133 million tons in 1955 to 195 million tons in 1969 (46, p. 424), while during the same period, the number of animal units fed annually increased from 104 million to over 115 million (46, p. 71). The value of industry

shipments increased from approximately $3.2 billion in 1958 to over $5.8 billion in 1971, with much of the growth occurring since 1965 (50, p. 16). The growth of the feed industry has been closely associated with improved protein nutrition and the development of new feeds.

The livestock feed manufacturing industry is both demand and resource based. Manufacturing of livestock feed is basically a fast turnover, low inventory industry. The high costs involved in transporting the raw materials and the finished product make it very important to locate the feed plants near the feed consumption markets as well as near the raw material sources. Iowa, located in the center of the Corn Belt, has long been a very important livestock feeding state and the number of livestock fed increased substantially in the decade of the 1960's. Over the ten-year period of 1960 to 1969, the number of fed cattle marketed in Iowa increased from 2,565,000 head to 4,550,000 head, or 82 percent (31, pp. 2-3). The majority of the cattle fed in Iowa come from outside the state. The leading Iowa suppliers of feeder cattle and calves have been South Dakota, North Dakota, Montana, Wyoming, Nebraska and Missouri. The number of beef cows in Iowa increased from 993,000 in 1960 to 1,394,000 in 1969, or approximately 40 percent (31, pp. 2-3). The availability of the additional calves in the state provided impetus to the Iowa cattle feeding industry and contributed to the increased demand for livestock feed. In the late 1960's, Iowa accounted for almost 20 percent of U.S. fed cattle marketed.

Iowa has led the U.S. in the production of hogs for many years, and has consistently contributed 20 to 25 percent of total U.S. hog production. During the late 1960's, over 20 million head of hogs were marketed

annually in Iowa, and the demand for hog feed has been an important component of the total demand for livestock feed in the state. The demand for poultry, sheep and lamb feed has been important in absolute terms, but relatively much less important than the demand for cattle and hog feed.

The supply of the major livestock feed inputs, corn and soybeans, in Iowa during the late 1960's was large, with the state accounting for 16 percent of the nation's production of soybeans and 20 percent of U.S. corn production. Soybeans were the primary protein source, and corn was the primary energy source for the livestock fed in Iowa. The supply of the two feed ingredients in Iowa increased significantly from 1960 to 1969. Soybean production increased from 65,961,000 bushels to 174,258,000 bushels for a 164 percent increase. The production of corn in the state increased by 22 percent during the period, from 764,288,000 bushels to 932,900,000 bushels (31, pp. 2-3).

Higher per capita income in the 1960's substantially increased consumer demand for meat products, and the feed grain surplus states such as Iowa experienced growth in the livestock feeding industry. The livestock feed manufacturing industry in the state responded to the corresponding feed demand expansion by increasing productive capacity. In 1963, Iowa accounted for almost 20 percent of the 341 feed facility expansions in the U.S. which were recorded in a 1964 study (56, p. 484).

B. The Location Decision

The decision by Golden Sun Feeds, Inc. to locate a new branch plant in Grinnell in 1969 resulted largely from the company's appraisal of the existing and expected feed industry situation. Golden Sun Feeds, Inc. was founded by the Jenson brothers, and by the late 1960's the company had been very active in the livestock and poultry feed business for many years. The home office is in Estherville where the company also has a feed manufacturing plant and a research center.

In 1960, Golden Sun Feeds, Inc. was sold to John Morrell and Co. At about the same time, John Morrell and Co. purchased an existing feed plant in Des Moines. The Des Moines plant had good sacked feed facilities but had very inadequate bulk feed facilities, and the overall plant operation was very inefficient. Much of the company's business, as well as that of the industry, was in bulk feed concentrates. By the late 1960's, the lack of adequate facilities developed into a serious problem. The plant had been unprofitable because of the inefficiencies, and there was a strong need to correct the situation.

Golden Sun considered expanding the Des Moines plant because its location just off the interstate highway was approximately in the center of the existing market area. However, the company decided that an expansion of the Des Moines plant was not feasible. The plant was unionized, and it had been faced with labor problems which would have remained after the expansion. The needed plant addition would have been very expensive with one of the main reasons being the high wage scales of the metropolitan area construction workers. Also, the tax load in Des Moines was

considered to be inequitable. Other locations were considered to have greater profit potential because of the problems facing the Des Moines plant.

The company decided that one or two new, more efficient feed plants were badly needed. The Golden Sun executives felt that the market area served by the Des Moines plant should be divided, with one new plant west of Des Moines and another new plant east of Des Moines. Iowa City was proposed for the eastern location and Atlantic for the western location. The John Morrell and Co. executives vetoed the idea of two new plants, but agreed that one new plant should be built. The two-plant concept was rejected on the basis of the higher fixed costs involved in constructing two plants rather than one. The feeling was that the economies of scale resulting from one relatively large feed plant, incorporating the most advanced technology available, would more than offset the relatively higher transportation costs.

The decision to build one new plant meant that the company needed a location near the center of the existing Des Moines area product market which could also service expected future market expansions. The company wanted to locate fairly close to Des Moines in order to minimize transportation costs, but it also wanted a location where the new plant could efficiently serve new growth areas. The company also wanted to get far enough away from the metropolitan area to escape the problems experienced there. An additional consideration at the early stages of the location decision process was the need to locate the new plant near the John Morrell and Co. packing plant in Ottumwa because the meat scraps were to be used in the livestock feed produced.

The desire of the company to locate the plant in the center of its anticipated product market was the most important location factor because of the need to minimize product transportation costs. This important factor narrowed the feasible area down to an area a few miles east of Des Moines. The nearness of markets for feed inputs such as soybean meal and feed grains together with the availability of meat scraps from the Morrell packing plant in Ottumwa was the second most important location consideration. This further reduced the optimal area of location to between 30 and 60 miles east of Des Moines.

A number of other location specifications important to Golden Sun were utilized to eliminate specific communities within the location choice area. The factors will be listed and discussed briefly in the approximate order of their importance in the location decision.

Transportation facilities were a very important factor in the location decision. The company wanted to locate on a main line railroad where daily switching service was available. A rail spur was not acceptable. The company also wanted the plant to be near an interstate highway.

The local labor market situation was an important location factor. The new company wanted rural workers because "rural workers are 100 percent better workers". There was a strong feeling that rural Iowa people, in general, make very productive employees and, thus, could contribute to the profitability of the plant. The company had confidence that the rural people would provide high quality labor services and have excellent attitudes because many of them have lived on farms and know how to work. Their mechanical skills and experience with livestock feed were considered to be readily adaptable to feed manufacturing. The company did not want

to locate in a town in which the labor market was dominated by one large employer who determined the wage structure. The company is a family-type of business run on a non-union basis, and it believes that with this arrangement, the operations go smoother and involve fewer problems. Although the preference of Golden Sun was for a community without strong union activity, the company is not anti-union. The company had shown that it was willing to pay its workers fair wages and to try to see that the employees were happy with their work.

The quality and availability of local public services was a significant factor in the location decision. The new plant was to be highly automated and would require large quantities of natural gas and electric power. Therefore, the availability of adequate supplies and the rates charged were important considerations. The Golden Sun officials also wanted good living conditions for its employees and that included good schools, streets, parks, housing and a healthy social atmosphere.

Largely on the basis of minimization of product and input transportation costs, the location decision was very close to being made in favor of Grinnell when the president of John Morrell and Co. decided to hire a consulting firm to study the location problem and to recommend feasible locations for the plant. He wanted an expert outside of the company to analyze the situation before the final location decision was made. An agri-business research firm in Manhattan, Kansas was employed for that purpose. The firm studied the number of cattle and hogs and estimated future trends in Iowa livestock feeding to determine where growth could reasonably be expected. Golden Sun wanted to locate the plant where the

demand for their products was growing. Market shares were considered along with demand factors.

The research indicated strong expected growth in cattle and hog production toward the Cedar Rapids area. The consulting firm then recommended that the new feed plant be located in one of three communities. The consultants' recommendations in order of preference were Newton, Grinnell and Marshalltown. The Golden Sun executives eliminated Marshalltown because it was too far north in the product and factor market areas. Newton was eliminated because of concern about possible labor problems. The labor market was dominated by the big Maytag operations, and the wage scales in the community were determined by that company.

Grinnell was then chosen for the location of the plant. The primary factors favoring Grinnell were its nearness to product markets and to major feed ingredient sources. It was estimated that transportation costs would be minimized with a Grinnell plant site. A number of other considerations also pointed to the community as being the optimal location choice with respect to the specifications established by Golden Sun. The plant site was just one mile from Interstate 80 and was located on a direct rail line from Ottumwa so the plant would have ready access to the Morrell packing plant meat scraps. In addition, there was another rail line through Grinnell and daily switching service was available. There was an adequate supply of rural labor, and because the existing industry was so diversified, no one industry dominated the local labor market. It was not a situation in which the industries were hurting each other by hiring away workers and upsetting standard wage scales.

The quality and availability of utilities was more than sufficient to satisfy the plant requirements. Grinnell was also considered to be a good place to live and work. The community had good public facilities such as a hospital, schools and parks. The supply of housing was adequate and the social setting favorable to stability of the work force. In effect, Grinnell had many more pluses than any other location.

The Golden Sun people went to Grinnell to meet with the development corporation officers, and they were given an excellent reception by the people of the community. The company officials talked to some of the existing industry people and were impressed by their comments about the favorable business climate in the community. The people of Grinnell were very friendly and anxious to cooperate in any way possible. The company had their choice of sites in the industrial park, and the five acre site chosen was obtained at a fair price. The city brought the necessary utilities to the site and generally provided "good follow-up and first-class help". The action by the people of Grinnell sealed the location decision in favor of the community. The Grinnell plant started operation in the fall of 1969, and the Des Moines operation shut down a short time later.

The location decision was based on profit maximization. The primary Golden Sun people involved in the decision were the president and the executive vice-president. The two individuals were very knowledgeable of the industry situation and of the important factors to consider in making the location decision. The primary considerations were economic, and the new plant was located in Grinnell because it was decided that it would be the most profitable location. The plant has been in operation

for almost four years, and the Golden Sun executives feel very strongly that the Grinnell location was the optimal choice. The operation has been very profitable. The location decision was made on the basis of expectations about future growth in the demand for their products, and those expectations have been realized.

The new plant incorporated the most efficient technology available. The profit picture would have likely improved had the new plant been located in Des Moines or some other community because of the increased production efficiency resulting from the use of the more advanced technology. However, much of the increased profit probably resulted from the company's decision to locate the plant in Grinnell rather than somewhere else. The situation rapidly changed from loss to profit with the relocation of the plant from Des Moines to Grinnell. This happened even before the market expansion that has since taken place. Profit from the operation further increased when the anticipated growth in product demand actually occurred.

Golden Sun recently made another location decision, and the company had the advantage of almost four years of experience and hindsight to guide them in their choice. The company is now completing a new plant in Fremont, Nebraska that is almost a replica of the Grinnell plant. This indicates that the company is pleased with the efficiency of the highly automated plant in Grinnell and that part of the profit earned in recent years has been due to the adoption of advanced technology. The interesting thing about the new plant to this study is that the location decision was made on the same basis as the earlier decision to locate in Grinnell. The same criteria were utilized to narrow the range of alternative

locations until the process was culminated with the choice of a particular community. The use by Golden Sun of the same decision-making process implies that the company's decision to locate the new plant in Grinnell was near optimal, if not optimal. The primary objective of Golden Sun is to maximize profit, and the company is very much aware of the impact that a location choice has upon profit. A considerable amount of time, effort and money was expended by Golden Sun in the process of making the decision to locate the new plant in Grinnell. The evidence strongly suggests that their choice of location was an excellent one and that the location has made a substantial contribution to the profits earned by the company.

IX. MONROE PLASTICS CORPORATION

(ALBIA, IOWA)

The Monroe Plastics Corporation plant in Albia was put into operation in November of 1969. The plant is, in effect, a branch plant under the control of the parent company, Chicago Molded Products, Inc., of Park Ridge, Illinois. Employment at Monroe Plastics increased from less than 15 in the early stages of the operation to approximately 100 in 1973. Approximately 80 percent of the employees are female. The plant produces thermo-set plastic components for industry, and most of the products produced are distributed outside of Iowa. In the production process, the plastic material is placed into heated molds, compressed and allowed to cure.

A. Industry Structure and Trends

The parent company, Chicago Molded Products, Inc., is in the custom plastic molding industry. In effect, the firms in the industry are basically engineering service organizations because they do not have their own products. The industrial customers specify what products are needed and the custom molding firm uses the specifications to build the molds and other tooling required to produce the products. The tooling is then often sold to the customer, but the custom molding firm produces the specified products. That is, the custom molding firms sell their capability to machine the tooling, to mold the products and to ship a specified quantity according to time tables established by the industrial customers. The contracts agreed upon by the custom molding firms are really promises to provide specified services to the customers.

The custom plastic molding industry is composed of two distinctly different types of operations so that in analyzing the structure of the "industry" it is misleading to lump the different "product groups" together. There are two basic types of plastics produced by the custom plastic molding industry, and the degree of competition differs significantly between the two product groups. The two basic types of plastics are thermo-set plastics and thermo-plastic plastics.

The thermo-set plastics are produced by placing the plastic material in heated molds, compressing it and allowing it to cure. In other words, the plastic is thermo-set by heat, and an actual chemical and physical change takes place in the plastic material. Once the plastic is cured, it cannot be changed or re-used. There is a smaller number of firms in this product group and relatively less competition than in the thermo-plastic plastics group. There is a smaller number of firms and less competition in the thermo-set plastics group because of the high degree of technology required for the heat, pressure and secondary finishing equipment. The relatively small number of firms that stay ahead in the development and adoption of advanced technology in thermo-set plastics are the firms that compete effectively for contracts to produce new and unique industrial plastic components. In many situations one of the firms is able to produce something that no other firm can produce.

The thermo-plastic plastics are produced by heating the plastic material until it is melted and then injecting it into a closed and cooled mold. The cooling sets the plastic material to a shape, but if it is heated, it softens again and, therefore can be changed or re-used. There are many firms in the injection molding business, and there is a high

degree of competition because much less advanced technology is required. The firms produce relatively homogeneous products, and the barriers to entry into the product group are much lower than in the thermo-set plastics product group.

Custom plastic molding is basically a demand based industry because the unit transportation costs of the low density products are relatively high. The cost of servicing customer accounts also increases significantly as the distance between production points and consumption points increases. Most of the customers are within 300-400 miles of production plants.

The plastics industry has grown rapidly and consistently over the last several years. The value of miscellaneous plastics products shipments increased from approximately $1.9 billion in 1958 to over $7.7 billion in 1971, for an average annual increase of 11.6 percent. During the same period, the number of employees in the miscellaneous plastics products industry increased from 116,000 to 282,000, and the value added per production worker manhour increased at an average annual rate of 5.2 percent. Capital expenditures in the industry were estimated to have been almost $2.2 billion during the 1966-71 period (50, p. 134).

The miscellaneous plastics products industry is characterized by a large number of relatively small firms and a high degree of competition. In 1967, there were almost 5,000 establishments in the industry, and the four largest firms accounted for only 8 percent of industry sales (50, p. 134). The plastics industry is often referred to as a secondary income industry because many housewives are employed and wage rates are relatively low.

The rapid growth of the plastics industry has occurred as industries such as construction, motor vehicle, household durables and packaging have shifted away from traditional materials such as steel, wood and glass and toward materials such as plastics. The substitution of plastics for the more traditional materials may be explained by a combination of cost and service factors. In the motor vehicle industry, which is a major market for plastic products, performance and operating costs depend to a large extent on the weight-to-power ratio. Extra weight means poorer fuel efficiency and rising fuel prices increase the seriousness of the problem. Plastics have a low density relative to metals. Thus, there has been a tendency to reduce the weight of passenger cars and commercial vehicles by substituting plastics for metal in components such as heater parts, cooling fans, instrument panels, handles, ventilation grills, light gears, housings, bearings, pumps, tubing and internal trim. The cost of small plastic automobile parts is often less than comparable metal parts. In addition, in many uses plastic parts are more resistant to friction and, thus, require less lubrication than similar components. A single intricately shaped plastic part is often used to replace several shaped steel parts. The near future is likely to bring automobiles with fenders or entire bodies of flexible plastic. This has already occurred in some recent models.

The construction industry is another major consumer of plastic products. The cost of plastics along with their lightness, corrosion resistance and workability have contributed to their widespread use in the industry. Plastics are used to produce such varied products as wall tiles, gutters, shower enclosures, plumbing fixtures, pipes, lighting

fixtures, ductwork, decorative partitions and electrical wiring devices. Plastics compete mainly in light products for which the load-bearing strength of metal or wood is not essential. Plastic pipe, for example, is easy to install, and it does not rust.

The use of lightweight, transparent plastics is large in the container and packaging industry. The substitution of light, low-cost plastics for metal and glass containers was increased substantially by the use of one-way, disposable containers. In the household durables industry, plastics have been substituted to a large extent for metal and wood in the production of such products as washing machines, refrigerators, vacuum cleaners, sewing machines, furniture and hand tools. The primary competitive advantages of plastics in household products lie in its low cost, its permanent integral color, its durability and its light weight.

The strong growth in the plastics industry is expected to continue as many industries substitute plastic for traditional industrial materials. The primary limiting factor in the growth of the industry is the shortage of high volume plastic resins which are the basic raw materials used in plastics production. The petroleum industry provides the basic "feed stocks" for plastic resins, and the shortage of crude oil limits the supply of the critical input. Thus, the energy crisis has created problems for the plastics industry just as it has for many others.

Chicago Molded Products, Inc. produces both thermo-set plastics and thermo-plastic (injection molded) plastics. Monroe Plastics Corporation was established to produce thermo-set plastics, and the plant makes only that type of plastic. Much of the company's business is carried out through long term contracts with customers. The company produces

intermediate industrial products. No consumer goods are produced. Everything manufactured by the company is a component to be used by other industries. In the mid-1960's, approximately 50 percent of the customers were household appliance manufacturers. Now relatively more of the business is with the automobile industry although the company still produces components for the appliance, electronics and portable tool industries.

B. The Location Decision

The location of the Monroe Plastics Corporation plant in Albia resulted largely from the changing philosophy of the parent company, Chicago Molded Products, Inc. In 1968, the management of Chicago Molded embarked on a serious re-appraisal of what the company was doing, of its long term objectives, and of the optimum way of achieving the objectives. The company had two plants at the time, and the two different arrangements were compared in order to determine which of the types, if either, would be more profitable to the company. The large Chicago plant was compared to the relatively small (100-125 employees) Georgetown, Illinois plant.

Georgetown is a small (population of approximately 4,000) rural town in east central Illinois. The relatively small plant had been in operation for 25 years and the company had had sufficient time to observe the advantages and disadvantages of the operation. The plant was small enough that the manager was well aware of all activities at the plant and could effectively coordinate the production process. He was able to know the workers well and to keep open the channels of direct communication. The plant did not have the problem of many layers of management and

supervisory people as was the case in the large Chicago plant. That is, in the small plant there was efficient total control of the plant by one individual. The plant was large enough to allow for most production economies resulting from specialization of labor. The efficient plant lay-out, adequate labor supply, good transportation facilities and the absence of urban problems were other advantages of the Georgetown plant. In the opinion of the management of Chicago Molded Products, Inc., the Georgetown, Illinois plant was the ideal situation.

The Chicago plant was a conglomeration of various buildings that had been built or bought by the company at different times for different reasons. The physical make-up and arrangement of the plant was not conducive to an efficient flow of production. The plant was so large and the number of employees so great that the diseconomies of scale associated with limitations to efficient management had become very substantial relative to the economies of large scale production. The management of the plant was not able to efficiently control and coordinate the activities of the plant. Another problem in the Chicago plant was the municipal codes with respect to the type of workers that had to perform various functions in the plant. Many of the potential cost saving advantages of automation and modernization were lessened by the "featherbedding" practices which the company was forced to accept. An additional factor that created severe problems in the Chicago plant was the extremely tight labor supply situation in the area. The company was having difficulty finding productive workers to perform many of the essential production tasks. The company was also upset about increasing tax rates in Chicago and with the failure of the local government in providing essential services.

The company decided, on the basis of their analysis of the alternative types of plants, that rather than have one or two large plants, it would be more profitable to have several relatively small plants with 100-125 employees, thus avoiding the diseconomies associated with managing large operations. The smaller plant, according to the experiences of the company, could be efficiently managed by one individual. Due to the nature of the plant operations, it was considered important for the manager to be close to the actual production processes. In addition, such plants were believed to be sufficiently large to take advantage of most production economies. In effect, the small rural plant concept was compared with the large metropolitan plant concept, and the small plant concept was judged to be more profitable, given the company's expectations. The company decided to phase out the Chicago plant and build a new plant. The new plant would be patterned after the highly profitable Georgetown, Illinois plant.

The selection of a broad area for the location of the plant was the first decision for the company to make after the decision to build a new plant was finalized. The president and the executive vice-president of Chicago Molded Products, Inc. were the primary participants in the early stages of the location decision-making process. The company wanted the plant to be somewhere in the Midwest so that it would be near the majority of the company's customers. The primary customers were in an area including Chicago, St. Louis, Detroit, South Bend (Indiana) and Centerville (Iowa). The company executives wanted to locate the plant in the "hub" of the nation in the center of the transportation system.

The search for a plant location was at first concentrated in the area of the existing Georgetown, Illinois, plant in east central Illinois. The idea was to establish a satellite plant that could be supported by the existing operation. The company considered a number of Illinois communities but none of them was acceptable.

The company officers abandoned the satellite plant concept because they were unable to find a suitable community close to Georgetown. The location efforts of the company were then directed toward Iowa in an attempt to get away from the highly industrialized cities around the Chicago metropolitan area and, thus, to find a rural community with a good supply of labor available. The company executives believed that, politically, Iowa was "a much cleaner state" than Illinois. The Iowa government was observed to be relatively more stable and to be more efficient in performing essential public services. The fair tax structure of the state of Iowa was also appealing to the company.

The company's location search attracted the attention of a number of industrial development people whose business was to find plant sites. One of the groups contacting the company was the Iowa Development Commission. The executives of the company were leaning heavily toward an Iowa location at this stage of the location process. From this point forward in the location decision process, the Iowa Development Commission was very active. The company gave the IDC a list of specifications with respect to plant requirements such as land, energy, quantity of labor, types of labor, transportation service and accessibility from the corporate home office in metropolitan Chicago. The company wanted a site in an uncongested area complete with essential utilities. The availability

of energy was a big factor because of the high energy requirements of the thermo-set plastic molding process. The labor supply needed to be sufficient to furnish 100-125 employees of which approximately 80 percent would be women. The availability of special labor skills was relatively unimportant because the company had learned from experience that unskilled people could be quickly trained to perform production work. The business of making plastic was seen as an art to be learned by doing. General mechanical ability, rather than specific skills, was the important requirement for most of the workers to be hired. The cost of the labor was important although the company did not anticipate any tremendous labor cost saving by moving out of Chicago. The minimum wage laws eliminate most of the potential labor cost saving in the industry. Except for highly skilled people, the industry wage rates in rural areas are not much lower than they are in the metropolitan areas. Transportation requirements of the company included daily truck service, access to good highways and a site that was situated such that the company people could get to the plant easily from the metropolitan Chicago area. Because of the accessibility problem, there was a need to be reasonably close to a commercial airport.

The Iowa Development Commission utilized the general company specifications, as discussed above, in recommending several Iowa communities for consideration as potential plant locations. The Commission helped the company by eliminating communities that did not meet the criteria set by the firm. In other words, the Iowa Development Commission tried to fit the company needs with what the communities had to offer. The company was provided information about the communities by the

Iowa Development Commission and by the communities themselves. Much of the information was compiled in "fact files" for the individual communities. The fact files included data concerning such things as population, labor force, unemployment rates, wage scales, labor union activity, local industries, transportation facilities, utility rates, utility availability, tax rates, indebtedness, community facilities, housing and site availability.

The company evaluated the recommended communities on the basis of their potential as profitable plant locations. At this stage, the manager of industrial relations for Chicago Molded Products, Inc., became very active in the location decision process. By a process of elimination the company narrowed the list down to the four communities that offered the most with respect to the location factors that the Chicago Molded executives considered important. The location factors that were most important in eliminating the other communities were labor availability, natural gas and electrical energy availability and the nearness of markets for output. The company wanted a community large enough to furnish an adequate supply of labor without being so big that union activity was a problem. The company had been pleased with their Georgetown, Illinois plant, and the four communities chosen for serious location consideration were of roughly the same size as Georgetown. The populations of the four communities were in the approximate range of 3,000 to 6,500. Energy availability in the four communities also seemed to be adequate to meet the requirements of the plant. The company had a preference for a southeastern Iowa location in order for the plant to be relatively closer to

the output markets. In other words, the company wanted an Iowa location, but they wanted it to be as close as possible to their big customers to the east and south. Toastmaster, a big customer of the company during the location search, had a plant in Centerville, and the Chicago Molded officials were well aware of the advantages of locating their new plant near the key consumption point. A southeastern Iowa location would also have relatively easy access to some of the other primary market areas such as Chicago and St. Louis.

The final four communities which were most seriously considered for the plant location included Albia, Centerville, Chariton and another community further west in Iowa. One reason that Albia was in contention for the plant was that the president of the company had a relative in the town. As a result, he knew about the community. However, it seems that this was a relatively minor factor in the final location decision. Albia, Centerville and Chariton all satisfied the company preference for a southeastern Iowa community, so the three communities had an advantage with respect to the market accessibility location factor. Among the three communities, Centerville was the closest to the primary market areas. A Centerville location would have put the plastic molding plant almost next door to the Toastmaster plant so that the product transportation costs to Toastmaster would have been minimized. A Centerville location would also have been relatively close to the other markets. However, Centerville was eliminated because there were a number of relatively large industries in the town, and the company was very concerned about possible labor availability problems. It was decided that

the strong competition for labor in Centerville would hamper the company's efforts to hire an adequate number of employees at reasonable wages.

The primary location factors responsible for the choice of Albia over Chariton were the availability of energy, the attitudes of the local industrial development people, the unemployment rates in the two counties and the per capita income of the respective counties. The availability of energy was a big factor, and Iowa Southern Utilities assured the company that an adequate supply of natural gas and electrical power would be available in Albia.

The Albia Industrial Development Corporation officials were very significant in causing the company to choose Albia over the other communities. They were very active, straight-forward and cooperative. The company executives were very impressed with the good job that the community development leaders did of selling the community of Albia and its people. The development corporation had the site available, and they agreed to furnish the utility connections plus a paved access street. The big water line to be furnished would allow the company to install a sprinkler system and, thus, to greatly reduce insurance costs of the plant. When the company bought the site, the community annexed the land so the company would have police and fire protection.

Monroe County (Albia) had one of the highest unemployment rates in the state at the time the location decision was made. The rate was much higher than in Lucas County (Chariton). Monroe County was also reported to be one of the poorest counties in the state in terms of per capita income. The company believed that because of the high unemployment rate,

the low income level and the existence of relatively little industry in Albia, the area would furnish a more than adequate supply of labor at acceptable wage rates. There was simply not much competition for labor in the Albia area. The industrial plant location search was completed when Chicago Molded Products, Inc. chose Albia for their new plant location. The relative importance of various location factors at different stages of the decision process has been discussed earlier. The location factors, important with respect to the decision as a whole and in the approximate order of their significance, were the availability and the wage rates of labor; the quality and availability of local public services; the attitude of local residents toward industrial development; the nearness of markets for output; the availability of transportation facilities; the weakness of labor unions in the community; state and local tax rates; the quality and availability of local housing; and the nearness of markets for raw materials.

The company based its plant location decision upon the location factors it considered to be most important in determining the profitability of the plant. The objective was to find a location which would result in maximum profit in the long run. Monroe Plastics Corporation is now earning a profit, and the company executives are relatively pleased with their location choice, but they now believe that the choice was not optimal. In retrospect, it seems that there were probably better locations available. The biggest problem with the location, although it is probably not unique to Albia, is a shortage of good skilled and semi-skilled labor. In particular, the plant needs a plastics engineer and equipment maintenance personnel and their unavailability has created

problems for the company. The company believes that the labor supply was oversold. The labor supply is much tighter than the company expected it to be. The primary factor explaining the shortage of labor is that the biggest plant in town (Chamberlain Manufacturing Corporation) now employs 400 people rather than its usual 200.

The labor turnover in the Albia plant is slightly higher than the company expected, but it is still much lower than it was in the Chicago metropolitan area. The main factor contributing to the higher than expected turnover rate is that "many of the people have not worked in a factory before, and after trying it, some of them decide it is not their cup of tea".

Labor productivity in the Albia plant has been increasing, but it is still not as high as it was in the Chicago plant. This is primarily because the company had many long time employees in the Chicago plant who were "craftsmen" from an earlier generation. The Chicago plant had a good core of highly productive employees who took great pride in their work. The company executives believe that with time, the same sort of thing will develop in the Albia plant. The company also had an incentive plan in Chicago which tended to increase labor productivity. The company expects to institute such a plan in the Albia plant, but it has not yet done so.

On the plus side, the attitude of the Albia workers is quite good. The farm background of many of the employees seems to have had a positive impact on their productivity. The employees generally expect to work in order to earn their pay. This is in sharp contrast to the company's experiences in Chicago where many of the workers acted as if it were the

company's responsibility to make them work. The Albia workers tend to be more interested in understanding what they are doing and in how they can contribute to a more efficient operation. The mechanical aptitude of the Albia workers is generally high because of their rural background. "They know which end of a wrench to grab."

The company based its location decision upon the objective of maximizing the long run profit of the new plant. Given their expectations, the location choice was probably near optimal. However, some of their expectations, at least with respect to the short run, were invalid. The failure of some of the expectations being realized resulted in a sub-optimal location decision. However, the plant is profitable and the company's long term profit expectations are still very high. This expectation is based largely upon the company's experiences with the very profitable plant in Georgetown, Illinois.

X. SPENCER FOODS, INC.

(HARTLEY, IOWA)

In June, 1969, Spencer Foods, Inc., of Spencer, Iowa, established a beef breaking and fabrication operation in Hartley, Iowa. The plant is a branch operation that is closely linked to the company's beef slaughtering facility in Spencer, twenty miles to the east. The original company plans for the Hartley plant included the establishment of a cryogenics research facility. The research was to involve the production of very low temperatures and their effect upon beef, but the plans never materialized. The facilities were found to be not readily adaptable for research and, in addition, general consumer acceptability of frozen beef was limited.

The company's headquarters and a beef slaughtering operation are located in Spencer. In addition, the firm has a slaughter facility at Schuyler, Nebraska, and a pork processing operation in Miami, Florida.

The Hartley plant now specializes in beef breaking and fabrication. Approximately 90 percent of the beef that is processed in the plant comes from the company's slaughter plants, much of it from Spencer. In the Hartley plant, beef carcasses are broken into primal cuts such as chucks and rounds. Some of the beef is then fabricated into smaller, retail-ready cuts. The output of the 150 employee plant is vacuum-packed in uniform size boxes, and most of it is distributed outside of Iowa. The primary market area is the East Coast, but the output is shipped all over the country. Approximately 80 percent of the beef goes directly into retail channels and some goes into the export market. The by-products

such as edible tallow, inedible tallow and meat scraps are shipped to the packing plant in Spencer for processing. The meat scraps are sold for animal feed and much of the tallow is sold for export.

A. Industry Structure and Trends

The meat packing industry was for years characterized by a high degree of concentration. In 1935, the four leading packers (Swift, Armour, Wilson and Cudahy) accounted for 46.6 percent of all commercial cattle slaughter in the U.S. The share of the big four decreased to 38.3 percent in 1947 (58, p. 353). Value added by the four largest packers decreased from 41 percent of the industry total in 1947 to 26 percent in 1967 (27, p. 165). The evidence indicates that the trend toward decreased market shares of the larger firms has continued to the present time.

A number of factors influenced the early development of meat packing into a highly concentrated industry. Among the more important were the development of railroads, the development of refrigeration, the development of mechanical power and the use of the corporate form of business organization. The development of the railroad system made it possible to assemble large numbers of livestock at terminal markets. Packing plants tended to be concentrated near the terminal points. The development of refrigeration and the use of refrigerated rail cars made it possible to slaughter and distribute meat year-round. Technological innovations such as mechanical power provided the physical means for the establishment of large scale, efficient operations by the firms. The dominant firms utilized the corporation and other forms of business organization to gain

the economic power to organize and finance large scale operations, thus giving them a real competitive advantage (27, p. 156).

An additional early development that helped foster and perpetuate the high degree of concentration in the meat packing industry was the growth in branch houses and car routes operated by the dominant firms. The branch house and car route system was the means of product distribution in the late 1800's and early 1900's. Only the large packers had sufficient capital to develop large scale distribution systems. This also contributed to the severe competitive disadvantage of the smaller packers (3, pp. 3-6). The large packers used other methods, many of them illegal, to gain additional advantages over their competitors (3, pp. 12-21).

The Federal Trade Commission was authorized in 1917 to investigate the meat packing industry. The resulting investigation provided evidence of a high degree of monopolization of the industry by the large firms. The Department of Justice brought court proceedings against the "big five" of the industry. In 1920, the case was settled in an out-of-court agreement known as the Consent Decree. The packers agreed to cease activities mentioned in the suit and to sell certain properties. Since that time, the meat packers and the courts have engaged in a number of legal conflicts. The packers have at various times sought relief from the provisions of the Decree, and the government has filed additional complaints against the big packers. The court action against the big packers almost certainly had some impact upon the structure of the meat packing industry. The big packers did become less aggressive in their

competitive policies. However, it is probable that economic forces were dominant in bringing about decreased concentration.

The meat packing industry has, for the last four decades, been characterized by decentralization as well as by deconcentration. Although these were two different developments, the evidence indicates that their causes were closely interdependent.

The data indicates that much of the decline in market shares has been at the expense of the largest firms. In recent years, Iowa Beef Packers, Inc. has grown rapidly, and the firm is now probably the leading beef packer in the United States. However, its growth has probably not altered the overall degree of concentration (27, p. 166).

The basic causes of the deconcentration of the industry included the influx of independent packers brought about by reduced entry barriers and the decreased growth rates of the large national packers relative to the overall industry growth rate (3, p. 53). Some of the reduction in barriers to entry resulted from the provisions of the Consent Decree and from other anti-trust regulations. The industry structure was also affected by such factors as innovations in plant technology, development of the motor truck, development of the highway system, specialization by species, specialization of processes, changes in wholesale and retail meat markets, increased demand for meat, adoption of federal grades and factor market alterations. These developments tended to lower entry barriers and to decrease the optimum scale of plants. In general, the competitive position of small, new packers was improved relative to that of the large, dominant firms, and this contributed to a lessening of concentration in the industry.

The meat packing centers near the large terminal livestock markets continued to be of primary importance in the industry until after World War I. Since that time, centralized terminal marketing has declined with the movement of slaughter facilities to communities nearer livestock producing areas (27, p. 20). The greatest decrease in cattle slaughter was in large terminal market areas such as Chicago and Kansas City. There was also a very substantial decline in the extent of packer livestock purchases at terminal stockyards. During the period of 1947 to 1961 alone, packers' terminal livestock purchases, as a percent of total purchases, decreased from 76 to 42, and the trend has continued (3, p. 25).

The forced sale of terminal stockyards by the large packers lessened the advantages of centralized packing. However, it seems that economic factors were at least as important as institutional constraints in explaining the trend toward decentralization of the meat packing industry. The two major factors in causing the change were probably the use of truck transportation and innovations in plant technology. The development of rail transportation earlier contributed to the development of centralization in the industry. The later development and widespread use of truck transportation greatly increased the speed and flexibility of distribution systems and contributed to decentralization because packer reliance on rail transportation and on terminal markets was reduced. Thus, it became feasible to locate slaughter facilities away from consumption centers. Advances in refrigeration techniques and other technological innovations complemented truck transportation and contributed to the efficiency and profitability of smaller, more specialized and decentralized packing facilities (3, pp. 22-26).

It is tempting to say that decentralization of the meat packing industry occurred largely because the cost of transporting meat products became less than the cost of transporting livestock. However, that would be misleading, if not erroneous. The shifting comparative advantage of packing plant locations is not that easy to explain. In the long run, the comparative advantage of packing plant locations depends upon the entire range of factors affecting the profitability of the alternative locations. The tendency has been for the meat packing industry to become more supply oriented. This indicates that meat packing profits are relatively higher for locations near slaughter livestock producing areas. The evidence suggests that the comparative advantage of decentralized packing plant locations is due to factors other than relative livestock and meat transportation rates. Until the late 1950's, the transportation rate structure was near neutral with respect to the shipping of meat versus the shipping of livestock. In effect, even though approximately 35 percent of the live weight of cattle is lost during slaughter, until the last fifteen years it cost proportionately more to transport meat than to transport livestock. Thus, there was no real cost saving in shipping meat rather than livestock (58, p. 717).

Relative transportation rates have changed in recent years to decrease the cost of transporting meat relative to livestock and, thus, to favor supply oriented locations. However, at least in earlier years, other factors have been more important in the determination of the comparative advantage of competing beef packing plant locations. The changing location of the industry has been largely due to advantages

associated with such factors as fed cattle location and density, technological innovations, labor costs, labor productivity, unionization, property taxes, utility costs and external economies. These and other factors such as improved marketing information, improved meat grading standards and changes in the retail food industry have contributed to the tendency to locate beef packing plants at interior points near fed cattle producing areas.

The beef packing industry has become increasingly deconcentrated and decentralized. The dominance of the industry by a few large packers has diminished. Many large, old, inefficient plants near terminal markets have been shut down and new, more efficient plants have located in major slaughter livestock producing areas. The plants have also tended to become smaller, partly because there are few additional economies of scale for beef packing plants with capacity of more than approximately 100 head per hour (27, p. 164).

The rate of technological advance in the meat packing industry has generally been low relative to that of other industries. However, there have been a number of significant technological improvements in recent years. One of the more important has been the development and use of continuous on-the-rail systems. The process, in effect, involves the assembly line technique in reverse. The process has been complemented by the development and adoption of labor saving equipment such as mechanized stunners, conveyors, power saws and hide pullers (58, p. 429). With the use of more capital per unit of labor has come a substantial increase in labor productivity in the meat packing industry. This is reflected by the

doubling of the value added per production worker manhour in the industry from 1958 to 1971. During the same period, employment decreased from 201,000 to 160,700 while the value of shipments increased from approximately $12 billion to approximately $19 billion (50, p. 6).

The meat packing industry has been characterized by low profits. Profits as a percentage of stockholders equity and as a percentage of sales have been low relative to that of other food processing industries. Industry sales increased from $13.2 billion in 1960 to $22.7 billion in 1970. However, net return on sales was only 1.1 percent or less during the period (2, p. 2). In the 1960's, investors were attracted to the meat packing industry, primarily because of the potential for increased profit in the industry. Many meat packers became targets for conglomerates hoping to boost meat packing profits through the use of more efficient management techniques. The packing industry in general became more aware of the realities of competition. A new breed of more aggressive and more efficient packers brought about long overdue changes. Unit labor costs were generally lower for the new breed of packers than for the "old-line" packers. These developments tended to accelerate the structural changes and to increase the degree of competition within the industry.

The historical distribution of livestock slaughter plants is given by Tables 10.1 - 10.3 and by Figures 10.1 and 10.2. There were 455 federally inspected plants in 1955 and 725 in 1970. The 725 federally inspected plants, representing only 19 percent of the total number of commercial plants, accounted for almost 90 percent of total commercial

Table 10.1. Number of federally inspected slaughter plants by states[a], March 1, 1955, 1960, 1965 and 1970[b]

State	1955	1960	1965	1970
N. Eng.	19	14	12	13
N.Y.	23	30	34	36
N.J.	17	17	11	11
Pa.	21	26	29	26
Ohio	29	32	35	39
Ind.	14	13	14	14
Ill.	32	39	35	35
Mich.	4	4	5	10
Wisc.	17	19	19	21
Minn.	10	12	15	17
Iowa	21	27	31	41
Mo.	13	17	18	22
N. Dak.	2	--	2	3
S. Dak.	6	7	7	9
Nebr.	18	29	33	34
Kansas	16	16	19	22
Del. - Md.	11	10	8	8
Va.	9	12	12	19
W. Va.	--	--	--	1
N.C.	2	3	4	11
S.C.	1	5	3	2
Ga.	7	5	6	6
Fla.	4	6	8	8
Ky.	7	7	10	13
Tenn.	9	9	10	15
Ala.	4	6	7	7
Miss.	3	5	6	6
Ark.	2	4	4	9
La.	2	4	2	3
Okla.	3	3	4	11
Texas	22	30	37	67
Mont.	4	5	6	6
Idaho	5	6	7	10

[a]New England includes Maine, New Hampshire, Vermont, Massachusetts, Rhode Island and Connecticut.

[b]Source: (44, p. 5; 48, p. 3).

Table 10.1. Continued.

State	1955	1960	1965	1970
Wyom.	1	1	1	2
Colo.	12	14	17	23
N. Mex.	--	1	3	21
Ariz.	1	1	2	6
Utah	4	6	7	9
Nev.	2	2	1	1
Wash.	13	15	17	25
Oreg.	9	9	9	14
Calif.	56	59	60	69
TOTAL (48 States)	455	530	570	725

Table 10.2. Other commercial[a] livestock slaughtering establishments, by states[b], March 1, 1955, 1960, 1965 and 1970[c]

State	Medium[d]				Large[e]			
	1955	1960	1965	1970	1955	1960	1965	1970
N. Eng.	55	46	34	39	18	13	12	4
N.Y.	80	65	59	63	36	29	25	14
N.J.	36	31	26	13	10	8	8	3
Pa.	217	228	175	172	87	92	91	48
Ohio	133	125	130	147	83	81	66	42
Ind.	89	87	55	143	33	23	24	24
Ill.	73	49	48	159	30	22	25	20
Mich.	113	103	91	110	82	87	78	56
Wisc.	12	26	18	96	30	12	14	9
Minn.	24	17	24	250	9	2	6	5
Iowa	21	15	11	170	7	9	8	4
Mo.	20	24	18	42	26	23	20	12
N. Dak.	7	7	6	47	2	3	3	2
S. Dak.	9	5	5	33	2	3	3	--
Nebr.	21	22	21	50	11	7	7	7
Kans.	33	55	100	113	12	12	11	7
Del. - Md.	39	22	26	36	17	16	14	10
Va.	25	19	16	19	12	11	11	3
W. Va.	20	25	21	34	12	13	11	9
N.C.	65	55	46	53	33	29	30	25
S.C.	34	32	25	38	11	13	13	17
Ga.	48	56	50	62	33	38	38	25
Fla.	36	29	28	29	26	19	13	11
Ky.	21	20	14	36	18	21	16	4
Tenn.	38	41	33	40	24	22	18	17
Ala.	47	34	29	44	11	16	10	14
Miss.	24	22	23	41	5	6	4	7
Ark.	37	38	31	34	12	13	17	15
La.	57	58	50	69	14	20	18	20
Okla.	39	25	33	38	27	37	37	26
Texas	121	119	106	121	75	71	69	35
Mont.	19	17	16	21	9	10	11	9
Idaho	20	38	35	40	9	11	11	8
Wyom.	10	7	5	11	--	2	2	--

[a]Non-federally inspected commercial livestock slaughter plants.

[b]New England includes Maine, New Hampshire, Vermont, Massachusetts, Rhode Island and Connecticut.

[c]Source: (45, p. 5; 48, p. 3).

[d]Output of 300,000 to 2 million pounds live weight annually.

[e]Output of more than 2 million pounds live weight annually.

Table 10.2. Continued.

State	Medium[d]				Large[e]			
	1955	1960	1965	1970	1955	1960	1965	1970
Colo.	17	20	20	33	12	10	8	5
N. Mex.	16	22	16	8	2	3	6	--
Ariz.	3	7	8	9	9	9	10	7
Utah	16	12	16	31	10	8	7	8
Nev.	4	3	2	4	--	--	--	1
Wash.	56	41	22	20	19	17	22	8
Oreg.	33	34	35	54	21	13	13	12
Calif.	22	11	11	10	53	48	39	9
TOTAL (48 States)	1,810	1,712	1,538	2,582	952	902	849	562

Table 10.3. Number of livestock slaughter plants[a], by states[b], March 1955, 1960, 1965 and 1970[c]

State	1955	1960	1965	1970
N. Eng.	92	73	58	56
N.Y.	139	124	118	113
N.J.	63	56	45	27
Pa.	325	346	295	246
Sub Total	619	599	516	442
Ohio	245	238	231	228
Ind.	136	123	93	181
Ill.	135	110	108	214
Mich.	199	194	174	176
Wisc.	59	57	51	126
Sub Total	774	722	657	925
Minn.	43	31	45	272
Iowa	49	51	50	215
Mo.	59	64	56	76
N. Dak.	11	10	11	52
S. Dak.	17	15	15	42
Neb.	50	58	61	91
Kans.	61	83	130	142
Sub Total	290	312	368	890
Del. - Md.	67	48	48	54
Va.	46	42	39	41
W. Va.	32	38	32	44
N.C.	100	87	80	89
S.C.	46	50	41	57
Ga.	88	99	94	93
Fla.	66	54	49	48
Sub Total	445	418	383	426

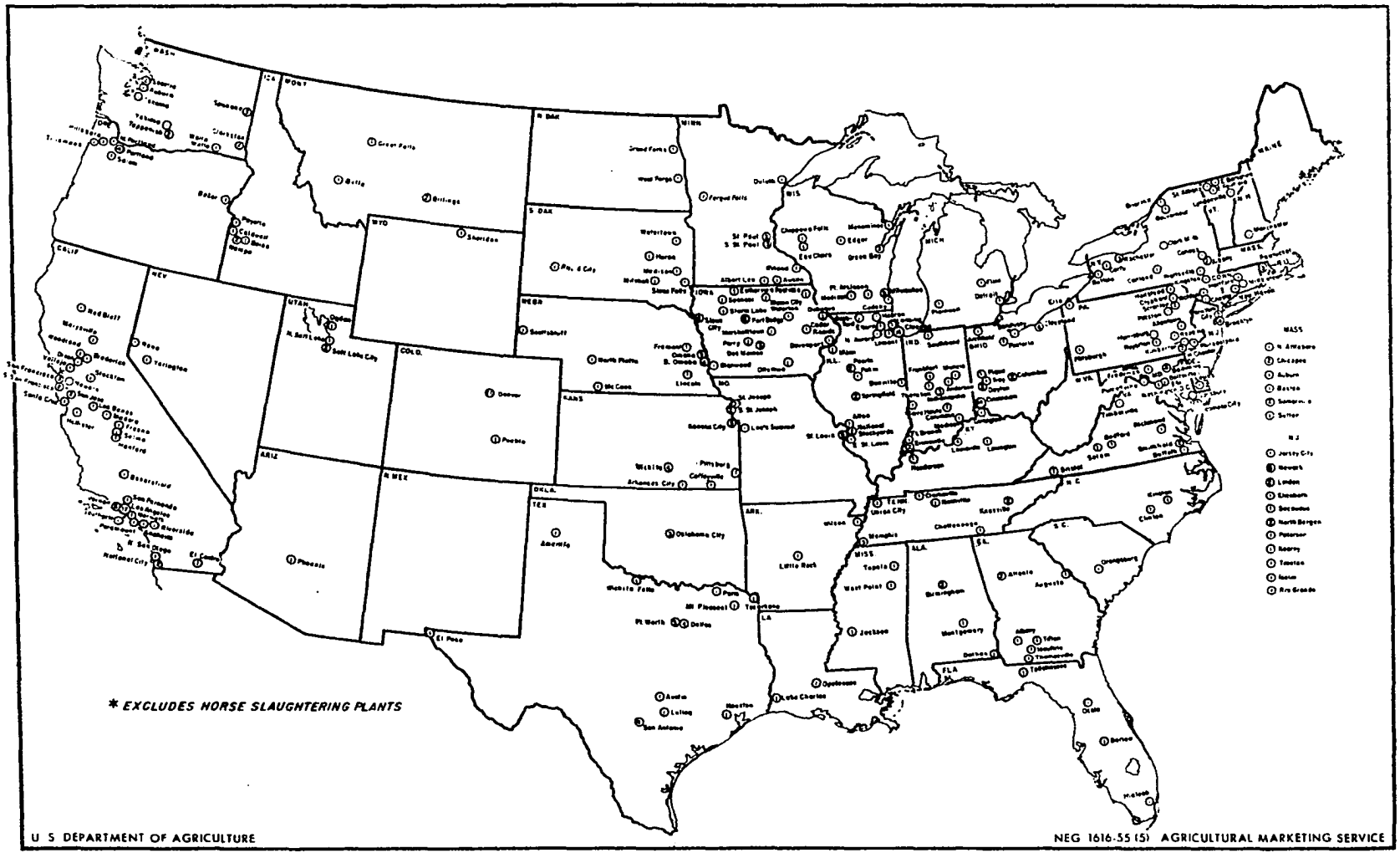
[a]Includes all federally inspected plants plus all plants not under federal inspection with an output of 300,000 pounds or more live weight annually.

[b]New England includes Maine, New Hampshire, Vermont, Massachusetts, Rhode Island and Connecticut.

[c]Source: (44, p. 5; 48, p. 3).

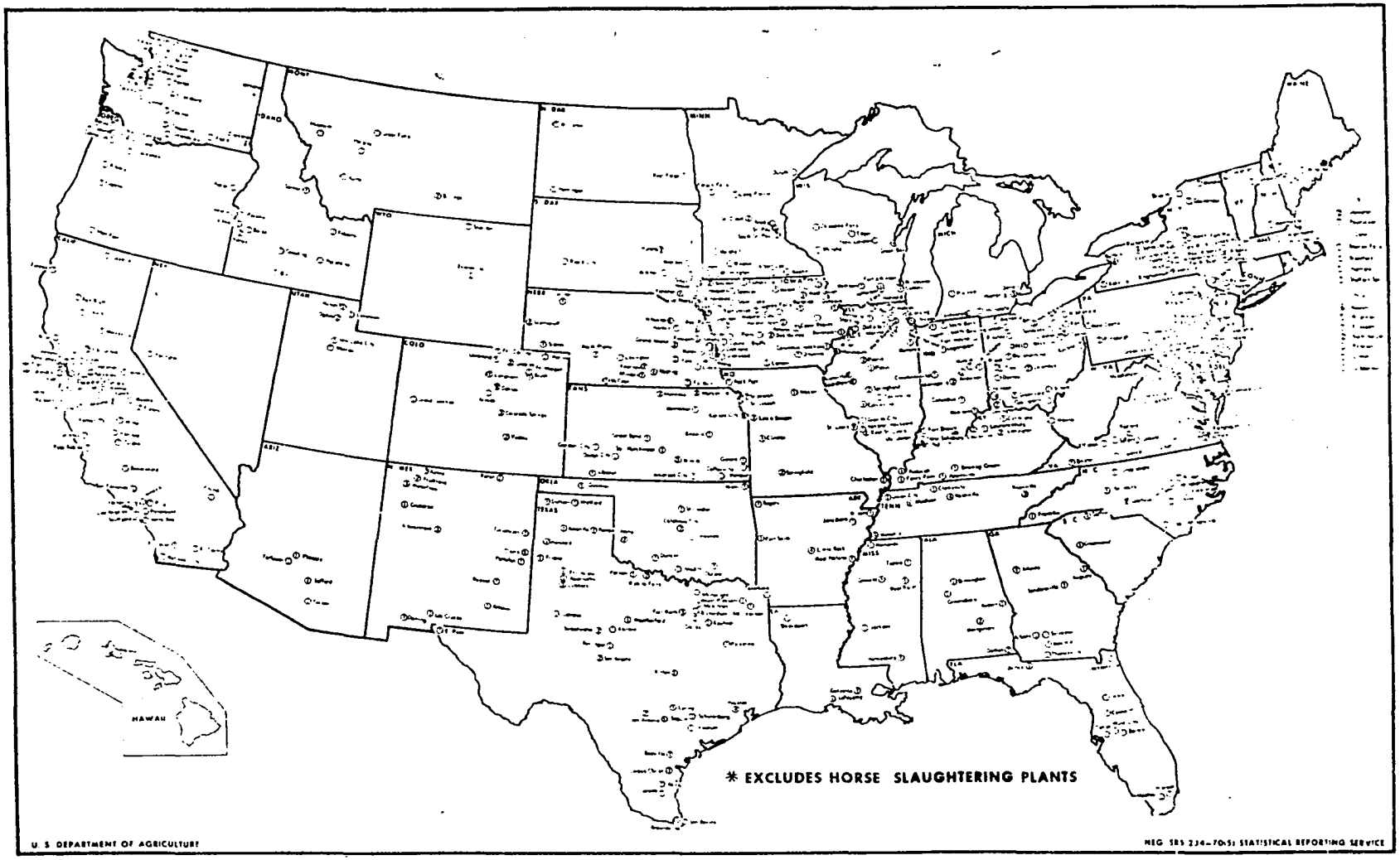
Table 10.3. Continued.

State	1955	1960	1965	1970
Ky.	46	48	40	53
Tenn.	71	72	61	72
Ala.	62	56	46	65
Miss.	32	33	33	54
Ark.	51	55	52	58
La.	73	82	70	92
Okla.	69	65	74	75
Texas	218	220	212	223
Sub Total	622	631	588	692
Mont.	32	32	33	36
Idaho	34	55	53	58
Wyom.	11	10	8	13
Colo.	41	44	45	61
N. Mex.	18	26	25	29
Ariz.	13	17	20	22
Utah	30	26	30	48
Nev.	6	5	3	6
Wash.	88	73	61	53
Oreg.	63	56	57	80
Calif.	131	118	110	88
Sub Total	467	462	445	494
TOTAL (48 States)	3,217	3,144	2,957	3,869



Source: (45).

Figure 10.1. Number and location of Federally inspected slaughter plants*, March 1, 1955



Source: (48)

Figure 10.2. Number and location of Federally inspected slaughter plants*, March 1, 1970

live weight slaughter in 1969 (44, pp. 3-5; 48, pp. 1, 3). Table 10.1 and Figures 10.1 and 10.2 show the change in distribution of federally inspected plants that occurred from 1955 to 1970. The movement was generally away from the primary consumption areas and toward the major livestock feeding areas.

The largest numerical increase occurred in the medium-sized category of non-federally inspected plants. These plants slaughter from 300,000 to 2 million pounds live weight annually. As Table 10.2 shows, the number of medium-sized plants increased from 1,538 in 1965 to 2,582 in 1970. The number of large non-federally inspected plants decreased from 849 to 562 during the same period (48, pp. 1-3). Some of the decrease resulted from large plants becoming federally inspected facilities, but a significant portion of the decrease was probably caused by closings of inefficient operations.

Slaughter plants under federal inspection and non-federally inspected plants with an annual live weight output of 300,000 pounds or more numbered 3,869 in the 48 states on March 1, 1970. This compares to 3,217 such plants in 1955, to 3,144 in 1960 and 2,957 in 1965 (44, p. 5; 48, p. 3). The number of commercial slaughter plants by states is presented in Table 10.3. The data indicates a persistent trend toward decentralization of the meat packing industry.

The distribution of slaughter plants with beef as part of their output is presented for 1955 and 1970 in Table 10.4. The number of plants slaughtering beef decreased in the densely populated consumption areas and increased in the major fed cattle producing areas. The decline in the number of plants slaughtering only cattle and calves implies a decrease

Table 10.4. Number of livestock slaughter plants slaughtering cattle and calves, by species slaughtered, by states[a], March 1955 a d 1970[b]

State	Cattle and calves; hogs, sheep and lambs		Cattle and calves only		Cattle and calves; and hogs		Cattle and calves; sheep and lambs		Total cattle and calves	
	1955	1970	1955	1970	1955	1970	1955	1970	1955	1970
N. Eng.	27	29	24	7	17	3	19	14	87	53
N.Y.	18	67	66	16	27	6	22	20	133	109
N.J.	19	9	7	3	9	1	19	11	54	24
Pa.	98	50	49	56	107	98	55	31	309	235
Sub Total	162	155	146	82	160	108	115	76	583	421
Ohio	78	101	37	29	80	54	37	26	232	210
Ind.	37	9	16	17	73	142	2	8	128	176
Ill.	18	146	35	18	54	34	17	2	124	200
Mich.	37	107	61	24	74	15	13	19	185	165
Wisc.	14	71	18	15	21	31	5	6	58	123
Sub Total	184	434	167	103	302	276	74	61	727	874
Minn.	6	99	15	12	21	158	1	1	43	270
Iowa	8	35	17	23	18	142	--	--	43	200
Mo.	5	34	12	11	34	23	4	2	55	70
N. Dak.	2	29	--	1	9	21	--	1	11	52
S. Dak.	7	27	--	4	7	9	1	--	15	40
Nebr.	13	31	18	28	17	30	2	1	50	90
Kans.	10	67	14	14	36	59	--	1	60	141
Sub Total	51	322	76	93	142	442	8	6	277	863

[a]New England includes Maine, New Hampshire, Vermont, Massachusetts, Rhode Island and Connecticut.

[b]Source: (45, p. 5; 48, p. 7).

Table 10.4 Continued.

State	Cattle and calves; hogs, sheep and lambs		Cattle and calves only		Cattle and calves; and hogs		Cattle and calves; sheep and lambs		Total cattle and calves	
	1955	1970	1955	1970	1955	1970	1955	1970	1955	1970
Del. - Md.	33	18	4	6	8	15	14	13	59	52
Va.	17	19	3	--	16	16	3	2	39	37
W. Va.	8	14	8	2	13	23	3	2	32	41
N.C.	24	13	8	5	59	60	--	--	91	78
S.C.	9	8	--	2	37	45	--	--	46	55
Ga.	1	5	2	3	81	78	--	--	84	86
Fla.	11	15	12	9	39	20	1	1	63	45
Sub Total	103	92	37	27	253	257	21	18	414	394
Ky.	17	12	1	5	18	29	3	1	39	47
Tenn.	26	26	4	2	31	33	1	2	62	63
Ala.	7	5	--	1	55	53	--	--	62	59
Miss.	2	--	--	4	30	49	--	--	32	53
Ark.	1	2	2	4	48	49	--	--	51	55
La.	28	23	7	14	37	54	--	--	72	91
Okla.	5	4	11	15	52	51	--	2	68	72
Texas	66	57	23	26	127	127	2	5	218	215
Sub Total	152	129	48	71	398	445	6	10	604	655

Table 10.4. Continued.

State	Cattle and calves; hogs, sheep and lambs		Cattle and calves only		Cattle and calves; and hogs		Cattle and calves; sheep and lambs		Total cattle and calves	
	1955	1970	1955	1970	1955	1970	1955	1970	1955	1970
Mont.	19	25	3	2	6	6	4	3	32	36
Idaho	24	52	--	5	9	1	1	--	34	58
Wyom.	7	11	--	--	4	2	--	--	11	13
Colo.	15	37	7	12	15	5	3	4	40	58
N. Mex.	12	20	2	2	4	1	--	1	18	24
Ariz.	12	12	--	6	1	3	--	1	13	22
Utah	23	42	1	2	3	2	3	1	30	47
Nev.	6	5	--	1	--	--	--	--	6	6
Wash.	61	33	5	10	16	5	6	4	88	52
Oreg.	40	70	4	5	16	1	3	4	63	80
Calif.	83	35	22	34	5	1	21	16	131	86
Sub Total	302	342	44	79	79	27	41	34	466	482
TOTAL (48 States)	954	1,474	518	455	1,334	1,555	265	205	3,071	3,689

in specialization in cattle slaughter. However, when the data is adjusted for the large number of plants closed in the major consumption areas, the results indicate a trend toward more specialization by species.

The spatial distribution of fed cattle production, upon which the location of the beef packing industry has been increasingly dependent, changed significantly in recent years. In addition, the cattle feeding industry expanded rapidly in response to the increased demand for grain-fed beef by consumers with both the willingness and the ability to pay. Per capita disposable income in the U.S. rose substantially over the period, and, in addition, consumers generally preferred to eat more beef. The number of fed cattle marketed in the U.S. more than doubled from 13,621,000 head in 1960 to 27,866,000 head in 1972 (13, p. 3).

The location of the cattle feeding industry is a function of a large number of variables including the location of feed grain production, the location of feeder cattle production and the location of beef consumption markets. The recent interregional and intraregional shifts in the pattern of distribution of the cattle feeding industry can be largely explained by the first two of the factors listed. Feeder cattle and feed grain are the primary inputs in the production of fed cattle, and the availability of the two inputs has a real impact upon the comparative advantage of an area in fed cattle production. It is important to note that the development of fed cattle production is also facilitated by the existence of a local packing industry.

Iowa led the nation for years in the number of fed cattle marketed. In 1969, when 4,618,000 head of fed cattle were marketed in Iowa, the state accounted for 18.5 percent of the U.S. total. In 1972, 3,986,000

head of fed cattle were marketed in the state. This represented a 13.7 percent decrease from 1969. As a percentage of the U.S. total, Iowa fed cattle marketings decreased from 18.5 percent to approximately 14.3 percent over the period (13, p. 3). In other words, cattle feeding in Iowa decreased in absolute and in relative terms.

Much of the growth of the U.S. cattle feeding industry has occurred in the Southern Plains and in the Range States. The number of feeder cattle produced in those areas has historically been large. Until recently, however, most of the feeder cattle were shipped toward the Corn Belt for finishing. The Corn Belt enjoyed a competitive advantage in the production of feed grain, and fed cattle provided a way of profitably marketing the surplus grain produced in the area. In recent years, the development of irrigation and improved feed grain varieties, along with retirement of land from wheat, resulted in increased feed grain production in the Southern Plains and in the southern part of the Range States. The changing comparative advantage in feed grain production, together with the availability of feeder cattle, led to substantial shifts of the cattle feeding industry toward the Southern Plains and the Range States.

Texas, in particular, has become increasingly important as a cattle feeding state. In 1962, 756,000 fed cattle were marketed in the state. This represented only 5.2 percent of the U.S. total. However, in 1972 the number of fed cattle marketed in Texas was 4,308,000, and the state accounted for approximately 16 percent of the U.S. total (13, p. 3).

The importance of cattle feeding in Nebraska also increased substantially over the same period, both in absolute and in relative terms.

In 1962, 1,822,000 head of fed cattle were marketed in Nebraska, and the state accounted for 12.5 percent of the U.S. total. The Nebraska total increased to 3,990,000 head in 1972, and the state accounted for approximately 14.7 percent of the U.S. total. Other states that experienced significant growth in the cattle feeding industry in recent years were Kansas and Colorado. The two states ranked fourth and fifth, respectively, in the number of fed cattle marketed in 1972 (13, p. 3).

The major cattle feeding states have also been the leading cattle slaughter states for the past several years. The ranking of states by the number of head slaughtered for selected years is presented in Table 10.5. In 1950, the five leading cattle slaughter states were Illinois, California, Iowa, Nebraska and Minnesota. By 1960, Iowa had become the leading state in the slaughter of cattle, and it maintained the position through 1968 when 4,588,000 head were slaughtered in the state. Nebraska replaced Iowa as the leading state in 1969. Iowa cattle slaughter dropped while slaughter in Nebraska increased. Since 1969, Nebraska has remained the leading cattle slaughter state, but in 1972, Iowa cattle slaughter recovered strongly and the state was a close second to Nebraska. Texas, California, Kansas and Colorado followed in that order. Traditionally large cattle slaughtering states such as Illinois, California and Ohio have declined in relative importance during the past two decades. The big gainers were Nebraska, Texas, Kansas and Colorado (47).

Iowa remains a very important state in the slaughter of beef cattle, despite the recent decline. Much of the growth of the beef packing industry in the state seems to have occurred between 1960 and 1969. The

Table 10.5. Commercial cattle slaughter, rank of leading states by number of head slaughtered, for selected years[a]

Rank	1950 State	1950 Number (000)	1960 State	1960 Number (000)	1968 State	1968 Number (000)	1969 State	1969 Number (000)	1972 State	1972 Number (000)
1	Ill.	1,818	Iowa	2,499	Iowa	4,588	Nebr.	4,159	Nebr.	4,699
2	Calif.	1,482	Calif.	2,476	Nebr.	3,847	Iowa	4,130	Iowa	4,662
3	Iowa	1,398	Nebr.	2,137	Calif.	2,919	Texas	3,011	Texas	3,516
4	Nebr.	1,180	Texas	1,492	Texas	2,779	Calif.	2,936	Calif.	2,761
5	Minn.	1,167	Ill.	1,442	Minn.	1,985	Minn.	1,868	Kansas	2,495
6	Kansas	1,015	Minn.	1,424	Colo.	1,574	Colo.	1,714	Colo.	2,461
7	Texas	950	Ohio	1,186	Mo.	1,565	Kansas	1,664	Minn.	1,493
8	Ohio	900	Kansas	1,167	Kansas	1,504	Mo.	1,590	Ill.	1,450
9	Mo.	734	Mo.	1,104	Ill.	1,407	Ill.	1,417	Wisc.	1,108
10	Pa.	688	Colo.	1,046	Wisc.	1,221	Wisc.	1,246	Ohio	1,064
11	Mich.	629	Wisc.	979	Ohio	1,180	Ohio	1,123	Mo.	932
12	Wisc.	608	Pa.	830	Pa.	818	Pa.	762	Pa.	641
13	N.Y.	507	Mich.	718	S. Dak.	720	Okla.	714	Mich.	628
14	Ind.	500	Ind.	653	Okla.	699	S. Dak.	682	Wash.	613
15	Colo.	490	N.Y.	466	Mich.	690	Mich.	670	Okla.	608
	U.S. TOTAL	17,901		25,224		35,091		35,298		35,842

[a]Source: (47).

growth was largely in response to the growth in the fed cattle industry in the state. In 1960, there were 2,565,000 fed cattle marketed in Iowa. The total increased to 4,618,000 in 1969 for an increase of 80 percent (13). Also, much of the growth of the beef packing industry in Iowa since 1960 occurred in the areas of the state that exhibited the most significant growth in the production of fed cattle.

Livestock costs generally account for at least 75 percent of the total value of sales in a meat packing plant. The prices paid for livestock depend largely upon the density of fed livestock production in the area and upon the degree of competition for the livestock. Beef packing operations generally depend upon a multi-county area for their supply of live fed cattle. In analyzing the spatial distribution of beef packing facilities, it is helpful to look at the distribution of fed cattle marketings in the twelve extension program areas of Iowa as shown by Figure 10.3.

As discussed earlier, the number of fed cattle marketed in Iowa increased from 2,565,000 head in 1960 to 4,618,000 in 1969. The four western extension areas of Spencer (Area XI), Sioux City (Area X), Council Bluffs (Area II) and Fort Dodge (Area VII), accounted for over 61 percent of the 2,053,000 head state increase. The Sioux City area led the state in 1960 in fed cattle marketings with 381,000 head. However, by 1962, the Sioux City area was replaced by the Spencer area as the leading fed cattle marketing area. The Spencer area has remained number one since 1962. In 1969, it accounted for 791,000 fed cattle marketed. This represented over 17 percent of the Iowa total. During the 1960-69

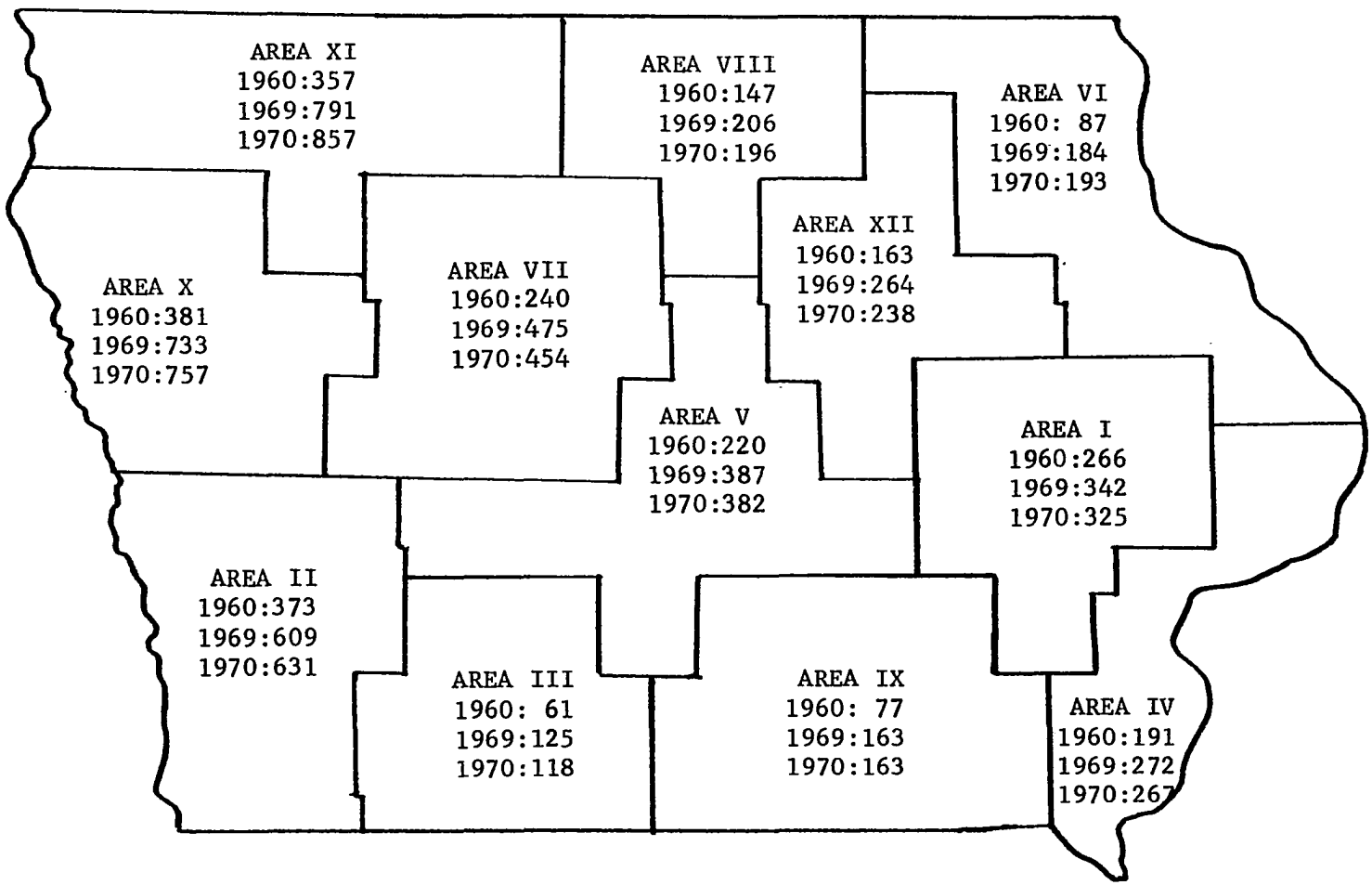


Figure 10.3. Fed cattle marketed by Iowa extension areas for 1960, 1969 and 1970 in thousands (31)

period, the number of fed cattle marketed in the Sioux City area, which adjoins the southwest Spencer area, increased from 381,000 head to 733,000 head. The two areas together accounted for 1,524,000 fed cattle marketed in 1969. This was 33 percent of the state total. The Fort Dodge area, which is adjacent to the southeast Spencer area, increased its fed cattle marketings from 240,000 head in 1960 to 475,000 head in 1969. The Spencer, Sioux City and Fort Dodge areas together accounted for almost two million head or approximately 43 percent of the state total of fed cattle marketed in 1969 (31).

B. The Location Decision

The Spencer Foods, Inc. decision to locate a beef breaking and fabrication plant in Hartley in 1969 was, to a large extent, based upon the fact that the company had a beef slaughtering plant in Spencer. Hartley is a small O'Brien County community, twenty miles west of Spencer. O'Brien County is in the Spencer (Area XI) extension program area.

The Spencer beef slaughtering plant was purchased for $6,000 by the present chairman of the board and six other Minnesota men in 1952 from a group of local businessmen who had unsuccessfully tried to operate the plant. The business grew to become the present Spencer Foods, Inc. The plant replaced the company's southern Minnesota plant that had burned. Rather than rebuild the burned plant, the company decided to buy the existing Spencer slaughtering facility and, thus, locate in a major fed cattle producing area that was expected to grow. The plant, with a 140 head per hour slaughtering capacity, has been operated by the company

since 1952. It has undergone a number of modernization and automation changes which have increased the efficiency of the plant.

In the late 1960's, the company was wanting to establish a beef breaking, fabrication and cryogenics research facility to complement their existing cattle slaughtering plant in Spencer. There was much interest in the meat packing industry with respect to the technology required to efficiently produce and ship frozen beef. The company believed that the future would bring a trend toward the marketing of frozen beef, rather than the traditional chilled beef. Also, demand was tending to shift away from beef carcasses and toward institutional and retail-ready primal cuts. Advances in technology had created a very favorable situation for the establishment of beef breaking and fabrication operations utilizing assembly line techniques. As a percentage of the value of the product, the unit cost of transporting the boxed beef was lower than that of transporting beef carcasses. The boxes of beef are more efficiently packed and handled, and shrinkage, bruising and spoilage losses are lower than for carcass beef. Much of the food processing industry is highly competitive, and it is important for companies to stay abreast of changing conditions.

The company wanted the breaking and fabrication plant to be close to their cattle slaughtering plant in Spencer because much of the beef carcass input of the plant would come from the Spencer operation. The multi-county area around Spencer would continue to constitute the primary market area for the fed cattle input of the company's slaughtering facility in Spencer. In 1969, the area was the most important cattle

feeding area of the state and production was expected to continue to grow. In 1968, the number of fed cattle marketed in the state was 4,350,000, and the Spencer extension area accounted for almost 18 percent of the total. The state of Iowa, as a whole, was expected to remain a leading cattle feeding state. The company's operations in the Spencer area could also draw from the major fed cattle producing areas of northwest Nebraska, southeast South Dakota and southwest Minnesota. The factors discussed earlier that were tending to decentralize the meat packing industry also contributed to Spencer Foods' decision to locate a beef breaking and fabrication plant near the company's cattle slaughtering facility in Spencer. The principle of comparative advantage favored livestock supply oriented cattle slaughtering and beef breaking and fabrication locations. The management of Spencer Foods strongly believed that this would continue to be the case.

The cattle slaughtering plant in Spencer was well established as an efficient operation in the middle of one of the major fed cattle producing areas in the country. The Spencer plant had been a very profitable operation for the company, and one of the primary determinants of its profitability was its location. The establishment of a complementary beef breaking and fabrication plant in the area was expected to be a very profitable addition to the firm's operations. The addition of a breaking and fabrication facility to the Spencer plant would seem to have been the best alternative. However, the estimated construction costs of a new facility were believed to be prohibitively high.

The chairman of the board of Spencer Foods, Inc. then heard through a friend about an available vacant building in Hartley, a small rural community twenty miles west of Spencer. The building had previously been used for an egg-breaking plant. The company officials were very interested in the Hartley location because of the potential adaptability of the building to a beef breaking and fabrication facility and because the company had information that the building could be purchased and remodeled for much less than the cost of a new facility. In addition, there was a large supply of unemployed labor available at low wage rates, primarily because of the shutting down of the egg-breaking facility and of a related creamery. Approximately 100 workers had lost their jobs, and most of them were expected to be willing to work for the minimum wage. Labor costs generally account for about 55 percent of meat packers' operating expenses, so the availability of a large supply of labor at such low wage rates was very attractive to the company. The average hourly wage of beef breakers in the industry at the time was in excess of $3.50 (4).

The company then contacted the Hartley Industrial Development Corporation about the possibility of buying the building and locating the plant in Hartley. The Hartley Industrial Development Corporation people worked hard to get what Spencer Foods needed in order to locate in the community. The most significant action taken by the local industrial development group was their agreement to buy and tear down four buildings adjacent to the vacant building. The land was to be cleared and then leased to Spencer Foods for use as a loading and parking area. The

company was also given assurances about the availability of necessary electric power, water, sewer and other essential public services. The cooperation shown by the local development group indicated a favorable attitude toward the plant. In fact, the community was quite anxious to attract the new industry because the earlier business closing had confronted them with possibly severe adjustment problems.

The company wanted a plant location with good transportation facilities, and the Hartley site seemed adequate in that respect. The site was adjacent to a rail line, and the community was served by a good highway system.

The output was to be shipped primarily by truck. Daily motor freight service was available in Hartley, and this was critical even though the company expected to do some of the trucking itself. The plant would have relatively little cold storage space making it necessary for most of the product to be loaded into trucks immediately. Daily service would also be critical in serving the demands of the company's customers.

The building was available as expected, at a price far below the construction costs of a comparable building. It was believed to be readily adaptable to a beef breaking and fabrication plant at a moderate cost. The company officials believed that buying and remodeling the existing structure would cost much less than building a new plant and, thus, it would contribute relatively more to the profits of the company.

A large supply of low cost labor was available in Hartley, partly as a result of the closing down of the egg-breaking operation and the associated creamery. The necessary labor was available at the minimum

wage level, and there was no significant labor union activity in the community. The company expected its work force to be unionized in the future, but it believed that the cost of labor would remain low relative to that in larger cities. Even if wage rates increased to the levels of other areas, the company would still have enjoyed a temporary competitive advantage. Since labor costs in the operation would account for more than one half of operating expenses, the price of labor was a very important consideration to the company.

The decision was made, without serious consideration of other communities, to locate the plant in Hartley. The primary factors in the location decision, in the approximate order of their importance to the company, were the nearness of markets for inputs, the availability and cost of the vacant building, the availability and wages of needed labor, the quality and availability of transportation services, the attitude of local residents toward industrial development, the quality and availability of local public services and the absence of labor unions in the community.

The availability of an adequate supply of beef inputs was of major importance in the decision to locate the beef breaking and fabrication plant in the Spencer area. The slaughter plant was located in Spencer because the community was situated in one of the major cattle feeding areas in the state, as well as in the nation. Because the major input of the beef breaking and fabrication plant was to be beef carcasses from the Spencer plant, the two plants needed to be close together in order to minimize transportation costs.

The factors such as the vacant building, the good supply of labor at or slightly above the minimum wage, the good transportation facilities, the cooperative attitude of the local people and the existence of adequate public services were important in selecting the particular community of Hartley for the plant location. The evidence suggests that Spencer was the only other community that was at all considered for the location of the breaking and fabrication plant. There would have been definite transportation cost savings in locating the plant next to the slaughtering plant in Spencer. However, that possibility seems to have been ruled out because of such factors as space limitations, high building construction costs and anticipated labor problems. In effect, the company decided that a breaking and fabrication facility was needed, and Hartley was selected for the location without the company seriously considering other communities or devoting much effort to the decision.

The location decision was based upon the motive of profit maximization. However, it is not at all clear whether the location is optimal for the long run. The company was able to buy the existing building at a low price, and the officers expected to be able to adapt the facility at a reasonably low cost. In fact, the remodeling project actually cost much more than was expected, and the plant was still probably not a cost minimizing facility. This implies some error in the company's expectations concerning the relative cost of buying and remodeling an existing building versus that of building a new one. Aside from this error in expectations, the primary difficulty with the Hartley location is the cost of shipping beef carcasses from Spencer to Hartley for breaking and

fabrication and then shipping the edible fat, inedible fat and other by-products back to Spencer for processing. The capacity of the Hartley plant is much larger than was expected and there is no room to build by-product processing facilities for the larger-than-expected quantity of by-products. With respect to transportation costs, it would have been more efficient to locate the breaking and fabrication facility adjacent to the slaughtering plant in Spencer. However, the company's expectations about labor cost and supply have generally been realized. An adequate supply of labor has been available at lower than average wages even though the plant has been unionized. The labor supply would probably have been lower and the cost of labor higher if the company had located the plant in Spencer. However, the Hartley area workers could probably have been induced, by slightly higher wage rates, to work in Spencer.

Transportation economies, together with increased wholesale demand for primal cuts, were important in the decision to locate a breaking and fabrication plant near the company's existing beef slaughtering facility. The transportation rate relationships favored the shipment of broken, fabricated and boxed beef over that of beef carcasses. The fact that the Spencer packing plant would be the primary source of carcass beef established the Spencer area as the area of location.

The company was attracted to Hartley by the vacuum created by the earlier closing of the previous business. The building and the labor were available. Also, the community preferred to incur the costs of attracting a replacement industry rather than to bear the adjustment costs which would be felt if no new industry were attracted. From the

company's standpoint, the location decision involved a compromise between the diseconomies of having two separate plants and the expected cost savings resulting from the existing building and the supply of unemployed labor. The management of the company believes that the Hartley location decision was near optimal. However, the evidence suggests that locating a modern, efficient beef breaking and fabrication facility adjacent to the Spencer slaughtering plant would have resulted in higher long run profits.

XI. UTAH ELECTRONICS

(GUTTENBERG, IOWA)

The Utah Electronics plant in Guttenberg was put into operation in April, 1969. The plant is, in effect, a branch plant of the parent company, the Utah-American Corporation, of Huntington, Indiana. The average level of employment at the plant is 250 workers, of which 90 percent are female. The plant produces loudspeakers for public address systems and private label speakers for such companies as Allied Radio Shack, Lafayette and Team Electronics. The company also produces high-quality speakers for Seeburg, Electro-music and Hammond organ. Most of the output of the Guttenberg plant is distributed outside of Iowa. Utah-American has been designing and producing speakers for over fifty years, and the company, which has a reputation for high-quality products, is the largest producer of speakers and speaker systems in the U.S.

A. Industry Structure and Trends

The U.S. electronics industry, with sales of $30 billion in 1972, ranks as one of the largest and most important industries in the country. It is smaller than the motor vehicle and the primary metal industries, each of which have annual sales in excess of $50 billion, but comparable in size to the meat products industry, the textile mill products industry and other important industries in the U.S. economy (50, pp. 6, 35, 157 and 236).

The electronics industry has been one of the true growth industries of the post World War II period. Total sales increased from $10.1 billion in 1959 to an estimated $33 billion in 1973, for an average annual growth rate of approximately 9 percent (9, p. 93; 10, p. 49). The growth has generally been consistent with the exception of the 1970-72 period during which sales first decreased then advanced sharply. The recession, the winding down of the Vietnam War and the subsequent economic recovery characterized the unusual period for the electronics industry and brought about the erratic sales pattern.

The electronics industry has been responsible for many major technological advances in the U.S. economy. The development and extensive adoption of the electronic computer has significantly affected virtually every sector of the economy. Other developments such as integrated circuits have also had a major impact upon U.S. industries. The electronics industry is of unquestionable importance in the economy. However, there seems to be no generally accepted definitions of what the industry consists of or of how it is structured. One of the main difficulties lies in the tremendous variety of products that exist. It is estimated that over 30,000 basic electronic products are manufactured in the U.S. (33, p. 97). These products range from tiny mini-circuits to large computer systems. The electronics "industry" is actually composed of many different industries or product groups.

There is strong pressure throughout the industry to stay abreast of technological innovations and changes in consumer demand. Some parts of the industry, such as the computer and television segments, are dominated by a small number of large firms. However, many segments of the industry

are characterized by many firms and intense competition. In these segments, capital requirements and other barriers to entry tend to be low relative to many other manufacturing industries (33, p. 97). The low entry barriers, together with the increasing demand for electronic products, have encouraged new firms to enter the industry. The approximate number of firms in the industry increased from 1,000 in 1947 to 3,900 in 1964 (33, p. 1). In 1964, the twelve largest firms in the industry had average sales of $788 million and accounted for 48 percent of total industry sales. At the other extreme were the 3,500 small firms with annual sales of less than $1 million. Average sales for the small firms amounted to only $200,000 (33, p. 59). However, many technological advances are initiated by small, new companies in the industry.

The loudspeaker industry, which is the focus of this analysis, is a growth industry. In recent years, increased consumer demand for electric organs, stereophonic sound systems and quadraphonic sound systems has substantially increased the demand for loudspeakers. The value of shipments of speakers systems, microphones, home-type electronic kits and commercial sound equipment increased from $185 million in 1967 to $259 million in 1969 and to $278 million in 1971 (51, p. 33; 52, p. 31).

Loudspeakers are essentially microphones operated in reverse. They translate electrical impulses into sound waves which can be picked up by the ear. The most common loudspeakers are of the electro-magnetic types. The technology of acoustics is basic in the electronics oriented technology of electroacoustics, stereophonics and quadraphonics (33, pp. 5, 399, and 400).

Most of the changes in loudspeaker design in recent years have been cosmetic in nature. There seems to have been greater consumer interest in how the speaker looks than in its quality. In other words, to many consumers if the speaker is attractive, then it is going to sound good. In response to the increased demand for good appearance relative to the demand for good quality, many companies, for example, are changing from plated to painted speakers. Plated speakers tend to give higher quality sound, but painted speakers tend to be more pleasing to the eye. Painting, rather than plating, also has the effect of decreasing costs of production. This may or may not result in lower prices to the consumer, but it is very probable that it tends to increase the profits of producers.

Loudspeaker production tends to be a labor intensive operation. Because labor costs may constitute more than 50 percent of production costs, a competitive advantage is often enjoyed by firms located in areas where there is an abundant trainable supply of largely female labor available at low-wage rates. The unit transportation costs of the speakers and the electronic components are generally low relative to value. This also contributes to the comparative advantage enjoyed by firms located in low cost-of-labor areas. Most of the capital equipment used is simple. Assembly of the components is done largely by hand with the use of pliers and other small tools. As a result, many firms have entered the industry to compete for the expanding speaker and speaker system market.

B. The Location Decision

The demand for Utah-American products was increasing rapidly in the late 1960's. The company needed additional production capacity because it was unable to meet the strong demand for its speakers and speaker systems. The firm saw the excess demand as an opportunity to increase its profits. However, it was important that the company act quickly. There was a real danger that if the excess demand was not satisfied quickly by Utah-American, another firm in the monopolistically competitive industry would beat them to it.

The president of Utah-American, Frank Pyle, was aware of the competitive pressure, and he was anxious to establish an additional plant as soon as possible. He decided that the Midwest, as the center of the company's actual and potential markets, was the geographical area in which the plant should be located. Iowa, Kansas and southern Illinois were considered as potential locations.

In early 1969, the Jenson Manufacturing Company shut down its loudspeaker plant in Guttenberg, Iowa. The general manager of the plant before it closed was Charley Cain, a radio engineer by profession. The Jenson Company wanted Mr. Cain to move to southern Chicago to assume control of its operations there. However, Mr. Cain did not want to take over the Chicago operation because the Jenson Company was in serious financial trouble. Also, he did not want to live in the Chicago area. He had lived in Guttenberg a number of years and had found the community (population 2,177) to be a very pleasant place to live.

The timing of the Jenson Company plant closing was very important in the ultimate decision to locate the Utah Electronics plant in Guttenberg. Mr. Cain was aware that Utah-American was expanding and that the company needed what the Guttenberg plant could produce. He contacted Mr. Pyle of Utah-American about the possibility of a joint venture to acquire the building and produce loudspeakers. The labor force was trained and available. Mr. Cain had had extensive loudspeaker manufacturing experience, both as an engineer and as a manager. Mr. Pyle had a very high regard for Mr. Cain's ability, and he wanted him to manage the operation wherever it was actually located. In effect, Mr. Pyle wanted Mr. Cain to manage the plant, and Mr. Cain wanted Guttenberg. Mr. Cain argued for Guttenberg because the building and trained labor force were available, and because he liked living in the community.

Mr. Pyle believed that a Midwest location was optimal because it was centrally located in the company's market area. A Midwest location was expected to minimize output transportation costs. A location in the area would also be close to electronic component suppliers in Dubuque, Iowa and in southern Wisconsin. After talking with Mr. Cain, he became convinced that within the Midwest, Guttenberg would be the best location for the plant. To Mr. Pyle, the most important locational factors in favor of Guttenberg were the availability of trained labor, the high labor productivity, the stable labor situation, the building availability and the availability of Mr. Cain to manage the plant.

Mr. Cain had lived in Guttenberg and managed manufacturing operations in the community. He was well acquainted with the labor market situation

and with the other attributes of the community. The necessary skilled labor was available, much of it at wage rates of less than $2.00 per hour. The plant would employ mostly women, and there was not as much competition for female labor as there was in the metropolitan areas. The rural area labor supply was composed primarily of people whose belief in the work ethic was conducive to high productivity. The people knew how to work, partly because of their farm backgrounds, and they were generally committed to performing an "honest day's work for an honest day's pay". Mr. Cain had found this to be in sharp contrast to the labor situation in the many parts of the U.S., Canada and Mexico, in which he had managed plants. The lack of organized labor activity in the community was also important to Mr. Cain.

Mr. Pyle seems to have had an initial preference for a southern Illinois location. Mr. Cain, however, had a strong dislike for Illinois as a plant location. Illinois, to Mr. Cain, had a very restrictive labor regulation that allowed women to work more than eight hours per day only with the permission of the state. In Iowa, women can work more than eight hours per day if they are paid overtime rates. Iowa's right-to-work law, which permits workers to hold employment with or without union affiliation, was also important to Cain.

Guttenberg was also near electronic components suppliers located in such cities as Dubuque, Iowa and Lancaster, Wisconsin. Mr. Cain had been well pleased with the efficient transportation facilities in Guttenberg, despite its being backed up to the Mississippi River. The adequate loading and parking space and the lack of traffic congestion in the

community were considered to be important factors favoring Guttenberg over a large metropolitan area. The local tax structure in Guttenberg was considered to have fewer disadvantages than many other communities, and the inventory tax in Iowa was not as high as in many other states. However, tax considerations were of minor importance in the location decision.

Mr. Pyle and Mr. Cain reached the agreement, after a very short period of consideration, that Guttenberg was the optimal location for the plant. Mr. Pyle then contacted the Jenson Company about buying the building and about employing Mr. Cain as the general manager of the plant. An agreement was worked out and the Utah Electronics plant in Guttenberg started operation in April, 1969. Mr. Pyle, who was then president of Utah-American Corporation, and Mr. Cain, who would be the general manager of the plant, were the primary company participants in the plant location decision. They basically agreed upon the most important considerations. The significant locational factors in the location decision were the skills, the availability and the wages of needed labor; the nearness of markets for outputs; the availability of a suitable building; the nearness of markets for electronic component inputs; the transportation facilities; and the extent of labor union activity in the community. Labor and market considerations were the critical ones in the location decision. The importance of locating in the center of the market area established the Midwest as the geographical area in which the plant would be located. This was important because of considerations such as transportation costs per unit and speed of servicing consumption markets. The

availability of an adequate supply of trained labor at low wage rates was the most important locational factor involved in the choice of Guttenberg over other Midwest communities. The availability of the building was also of major importance because of the opportunity costs involved in the company's shortage of needed production capacity. In other words, Utah-American needed to move quickly to expand their production capacity in order to satisfy the excess demand for its products and increase its profits. The coincidental shut-down of the Jenson operation created a vacuum that effectively pulled Utah-American to Guttenberg.

Mr. Pyle and Mr. Cain each believed that Guttenberg was the optimal location choice, but their preference was based on different considerations. Mr. Pyle, as the president of Utah-American, was more directly concerned about the profitability of the plant. Mr. Cain, as discussed earlier, had personal reasons for wanting the plant located in the community. However, his broad experience in the industry and his generally successful manufacturing experiences in Guttenberg indicated that a loudspeaker plant operated by a well-established firm such as Utah-American would be highly profitable in the community. Although Mr. Cain assumed less risk than Mr. Pyle, he genuinely expected the Guttenberg plant to be a very profitable part of the Utah-American Corporation.

The two men still believe that the location choice was optimal, and there is little evidence to suggest otherwise. Their expectations have generally been realized. The plant was unionized in 1972 for the first time. The labor force was organized primarily because 79 percent of the

workers are related to workers at the unionized John Deere plant in Dubuque. Mr. Cain sees no real harm resulting from the organization of the plant although it requires a great deal of non-productive effort to handle paperwork and negotiations. The location decision was partially based upon the lack of organized labor activity in Guttenberg. However, the recent unionization of the plant could have happened anywhere, and, at any rate, the event has not significantly altered the evidence that the plant location decision was optimal.

XII. COMPARISON OF SEVEN CASES AND HYPOTHESIZED LOCATION DECISION PROCESS

A. Comparison of Seven Cases

The seven industrial plant location decisions analyzed were not randomly selected. The cases chosen are believed to be quite typical, but represent a wide range of specific characteristics. It would be invalid to calculate "sample" averages or proportions from these cases and to generalize to the population of rural Iowa industrial location decisions on the basis of the findings of this study. The seven location decisions can, however, be compared to gain insights into the actual decision process utilized by firms locating plants in rural areas of Iowa. The primary emphasis of this study is upon gaining understanding of the importance of different location factors in the various stages or levels of the decision process, and of the functions performed by the various decision participants in the different phases of the process.

The seven plants were put into operation during the period of October 1968 through December 1970. Some selected characteristics of the plants are presented in Table 12.1. Employment by plant in 1970 ranged from 15 in the case of the Design Homes plant to 200 for Utah Electronics. From 1970 to 1973 employment at the Monroe Plastics plant showed the biggest absolute and percentage increase. As Table 12.1 shows, employment at the industrial plastics plant increased from 30 to 100 during the period, for a 233 percent increase. Employment did not increase at all of the plants. The number of employees decreased at the Golden Sun Feeds plant and

Table 12.1. Plant characteristics by case

Case	Type of Production Process	1970 Employment	1973 Employment	% Growth in No. of Employees	% Male Employees	Primary Market Area
Atlantic Steel Corp. Atlantic, Iowa	Structural Steel Mfg.	26	35	35%	95%	Outside Iowa
Dakota Bake-N-Serv, Inc. Nevada, Iowa	Frozen Bread Dough Mfg.	40	70	75%	50%	Outside Iowa
Design Homes, Inc. Humboldt, Iowa	Modular Home Mfg.	15	30	100%	95%	Iowa
Golden Sun Feeds, Inc. Grinnell, Iowa	Livestock Feed Mfg.	60	53	-12%	95%	Iowa
Monroe Plastics Corp. Albia, Iowa	Industrial Plastics Mfg.	30	100	233%	20%	Outside Iowa
Spencer Foods, Inc. Hartley, Iowa	Beef breaking and fabrication	150	150	--	95%	Outside Iowa
Utah Electronics Guttenberg, Iowa	Loudspeaker Mfg.	200	250	25%	10%	Outside Iowa

remained constant at the Spencer Foods beef breaking and fabrication plant. The proportion of plant employment accounted for by males varies from 10 percent to 95 percent. Female workers make up approximately 90 percent of the 250 employee labor force of the Utah Electronics loudspeaker plant. As can be seen in Table 12.1, the industrial plastics plant also employs mostly women. At the other extreme are several plants with predominantly male employees. For example, the Atlantic Steel fabricating plant employs almost all men. Intermediate in the range is the frozen bread dough plant that employs approximately equal proportions of males and females. The seven plants are all export plants in the sense that most of the products are marketed outside the community of location. For some of the plants the primary market area is the state of Iowa, while for others the major market area is outside of Iowa.

The types of products produced by the seven plants represented in the study includes consumer goods (e.g., frozen bread dough) and intermediate goods (e.g., industrial plastics). The size of the market area served by the respective plants ranges from approximately the northern one-half of Iowa in the case of the modular home plant to nation-wide in the case of the beef breaking and fabricating plant. The seven cases include demand based (e.g., modular homes and livestock feed), resource based (e.g., beef packing) and footloose (e.g., loudspeakers) industries.

A number of characteristics of the respective industries are presented in Table 12.2. The size of the respective industries, as represented by value of shipments, shows considerable variation. The frozen bread dough industry is a relatively new, small industry. The total value of industry

Table 12.2. Comparison of industry characteristics by case[a]

Case	Product Class	Value of Shipments (mils.of $)	Number of Firms	Market Share of Four Largest Firms	Long term Output Growth Rate	Wage Rates	Labor Intensity
Atlantic Steel Corp. Atlantic, Iowa	Fabricated structural steel	3,400 (1971)	1,800-1,900 (1967)	13% (1970)	Average	Average	Average
Dakota Bake-N-Serv, Inc. Nevada, Iowa	Frozen bread dough	40-50 (1972)	10-12 (1973)	60-70% (1973)	Above Average	Below Average	Average
Design Homes, Inc. Humboldt, Iowa	Prefab wood structures	1,000 (1971)	500-600 (1967)	30% (1970)	Average	Average	Average
Golden Sun Feeds, Inc. Grinnell, Iowa	Prepared animal feed	5,800 (1971)	2,400 (1967)	23% (1967)	Average	Below Average	Below Average
Monroe Plastics Corp. Albia, Iowa	Miscellaneous plastics prod.	7,700 (1971)	5,000 (1967)	8% (1967)	Above Average	Below Average	Average
Spencer Foods, Inc. Hartley, Iowa	Beef, not canned nor sausage	8,100 (1968)	N.A.[b]	26% (1967)	Average	Above Average	Above Average
Utah Electronics Guttenberg, Iowa	Audio Equipment (including loudspeakers)	675 (1968)	N.A.	N.A.	Average	Below Average	Above Average

[a]Source: (50), (51), (52), (53).

[b]N.A. - Not available.

shipments is estimated to have been approximately $40 to $50 million in 1972. At the other extreme are the beef packing and the miscellaneous plastics products industries, each of which is characterized by annual industry shipments valued at several billion dollars. The number of firms and the degree of market power concentration also vary widely among the seven industries represented. As Table 12.2 shows, the number of firms in the respective industries ranges from less than fifteen in the case of frozen bread dough to several thousand in the case of miscellaneous plastics products. The market share of the four largest firms in the respective industries varies from approximately 8 percent in the case of miscellaneous plastics products to over 60 percent in the case of frozen bread dough. In other words, among the seven industries represented in the study, the smallest industry in terms of value of shipments also had the smallest number of firms and was characterized by the largest four-firm concentration ratio, while the industry with the largest number of firms had the lowest four-firm concentration ratio.

Table 12.2 also presents estimates of long-term growth rates, wage rates, and degree of labor intensity for the seven industries. The long-term output growth rate among the seven industries, relative to that of all U.S. industry, ranged from average (e.g., fabricated structural steel and prepared livestock feed) to above average (e.g., frozen bread dough and miscellaneous plastics products). Although the audio equipment industry is characterized by only average long-term growth, the electronics industry as a whole is characterized by growth substantially above the average growth of all U.S. industry. Wage rates among the seven

industries, relative to rates paid by all U.S. industry, include below average rates (e.g., miscellaneous plastics products), average rates (e.g., fabricated structural steel and prefabricated wood structures), and above average rates (e.g., beef packing). Among the seven industries represented in the study, the industries paying the lowest relative wages were those in which females accounted for a large proportion of total employment. As can be seen in Table 12.2, the degree of labor intensity in the seven industries ranged from below average (e.g., prepared animal feed) to above average (e.g., electronic components). Much of the prepared animal feed production process is highly automated, therefore the input of labor relative to output is low. In the production of loudspeakers, the reverse is true. The prefabricated wood structures industry is characterized by average labor intensity. This is in sharp contrast to the highly labor intensive construction of conventionally built structures.

The seven plants represented in the location study were new locations and/or relocations. As can be seen in Table 12.3, the reasons for locating the new plants ranged from the need for additional output capacity because of expanded product demand to inefficiencies associated with existing plants. For example, in the late 1960's, the existing Golden Sun Feeds plant in Des Moines was a very inefficient and unprofitable facility. The expected expansion of the market area of the plant to the east and north was also creating some pressure to relocate the plant further east, but the primary problem with the existing plant was its overall inefficiency. The inefficiencies of the plant resulted in high production costs and created serious problems in servicing the product market. In contrast,

Table 12.3. General decision characteristics by case

Case	Type of production process	Main reason for locating plant	General area selected	Main factor in selection of general area
Atlantic Steel Corp. Atlantic, Iowa	Structural steel mfg.	Needed more capacity	Western Iowa	Wanted away from concentration of industry
Dakota Bake-N-Serv, Inc. Nevada, Iowa	Frozen bread dough mfg.	To develop new market area	Iowa	Center of potential product market
Design Homes, Inc. Humboldt, Iowa	Modular home mfg.	To develop new market area	Iowa	Strong product market potential
Golden Sun Feeds, Inc. Grinnell, Iowa	Livestock feed mfg.	Inefficiency of existing plant	East Central Iowa	Center of existing and expected product markets
Monroe Plastics Corp. Albia, Iowa	Industrial plastics mfg.	Inefficiency of existing plant	Midwest	Primary product market area
Spencer Foods, Inc. Hartley, Iowa	Beef breaking and fabrication	Shift in type of product demanded	Vicinity of Spencer, Ia.	Near existing support facility
Utah Electronics Guttenberg, Iowa	Loudspeaker mfg.	Needed more capacity	Midwest	Center of product market

the primary factor behind, for example, Utah-American's decision to locate a new branch plant was the excess demand for the firm's loudspeaker systems.

The size of the general geographic area considered for location by the respective firms varied from a specific community (e.g., Hartley by Spencer Foods) to a multi-state area (e.g., the Midwest by Monroe Plastics). The methods used to select the general area of location included projections of expected directions of market expansion, analyses of existing patterns of industrialization and estimates of resource availability.

As Table 12.3 shows, the primary location factors in the determination of the general geographic area of location varied considerably among the seven cases. The principal factors included the need to be near product markets in order to minimize transportation costs (e.g., Design Homes), the need to locate in a relatively unindustrialized area to ensure the availability of an adequate labor supply (e.g., Atlantic Steel) and the need to be near an existing support facility in the primary input supply area (e.g., Spencer Foods).

Among the cases in which a multi-state area was considered for location purposes, the reasons for selecting Iowa included the potential for product market development in the state and surrounding states, the availability of trained and untrained labor of high productivity, the existence of relatively unindustrialized areas, the relatively unrestrictive labor laws and the stability and efficiency of Iowa government agencies. Dakota Bake-N-Serv, for example, selected Iowa because of its

location in the center of a potentially strong market area. Utah-América chose to locate its loudspeaker plant in Iowa primarily because of the availability of trained, highly productive labor and because of the state's relatively less restrictive labor laws. Among the principal determinants in Chicago Molded Products' decision to locate its industrial plastics plant in Iowa were the existence of relatively unindustrialized areas and the availability of unskilled, but readily trainable labor. The company was also attracted by the stability and efficiency of the government agencies and by the equitable tax structure of the state.

There was considerable variation in the sources of community data used by the firms in evaluating and selecting potential communities within the chosen area of location. Sources of community data included community development organizations, state government agencies, consulting firms and U.S. government publications.

The specifications used by the firms in evaluating and selecting potential communities are dependent upon the nature of the production processes, cost structures, significance of different inputs and other technical and economic considerations. However, the linkages involved in this early stage of the decision process are still not well understood.

The specifications used by the firms in evaluating and selecting potential communities on their initial lists are presented in Table 12.4. Those cases in which very unique considerations precluded the selection of more than one potential community are not included in the table. The frozen bread dough company, for example, selected a single community within its chosen area of location because that particular Iowa community was the

Table 12.4. Specifications used to evaluate and select initial list of communities, by case

Specifications	Custom Steel Fabricator	Modular Home Mfg.	Livestock Feed Mfg.	Industrial Plastics Mfg.
Good supply of trainable rural labor	Yes	Yes	Yes	Yes
Limited labor union activity	Yes	Yes	Yes	Yes
Not close to large metro area	Yes	Yes	Yes	Yes
Good truck service	No	Yes	No	Yes
Good rail service	Yes	Yes	Yes	No
Large supply of electrical power	Yes	No	Yes	Yes
Large supply of natural gas	No	No	Yes	Yes
Near interstate highway	Yes	No	Yes	No
Progressive community	No	Yes	No	No

only one having the desired church operated secondary school academy. The cases for which community specifications are listed in Table 12.4 are those in which more than one specification was used to evaluate and select more than one particular community.

There was also a broad range of methods used by firms in evaluating and selecting potential communities. Design Homes, for example, used the approach of drawing two circles around the home plant, one with a radius of 150 miles and the other with a radius of 200 miles. The president of Design Homes wanted the new branch plant to be located at least 150 miles from the home plant in Prairie du Chien, Wisconsin so the two plants would not compete for sales with one another, but he also wanted the new plant to be located no more than 200 miles from the home plant so that in

approximately one hour he could fly his plane to the branch location. A number of Iowa communities situated from 150 to 200 miles from the home plant were selected for investigation. The president of Design Homes wanted a community large enough to have good rail and truck service, an adequate supply of labor and an airport, but small enough not to have extensive organized labor activity.

Venetian Iron decided that, because of labor problems in metropolitan areas, it wanted to locate its new steel fabrication plant 50-70 miles from any major metropolitan area. The company also wanted the plant to be near Interstate 80 so the company would have ready access to the nation's truck transportation system. The Iowa Development Commission was asked to recommend a few Iowa communities meeting the firm's location specifications.

Golden Sun Feeds wanted to relocate its branch plant in the center of its anticipated livestock feed market area in order to minimize output transportation costs. The availability of raw material inputs was also critical in the establishment of the new location. Golden Sun Feeds employed a consulting firm to conduct a market study and to recommend feasible communities for location.

The number of communities included by firms in their final lists ranged from one to four. Dakota Bake-N-Serv, Utah-American and Spencer Foods each seriously considered only one community. On the other hand, four communities were strong contenders for the Monroe Plastics plant. Three communities were recommended to Golden Sun by the private consultant they employed. Three communities were seriously considered for the Design

Homes plant. The Iowa Development Commission recommended three communities to Venetian Iron for its steel fabrication plant, but the company seriously considered only two of them.

Table 12.5 presents the location factors mentioned by the firm representatives as being important in the respective choices of the final community. In each case, a number of factors were mentioned as being significant location determinants. However, one or two key considerations tended to dominate the final location decision. In the case of the Dakota Bake-N-Serv community selection, for example, the location of the church academy was by far the most important locational consideration. In the case of Spencer Foods' decision as to where to locate its beef breaking and fabrication facility, the availability of a vacant building and the availability of a large supply of low-cost labor near its existing beef slaughter plant were the critical factors in the selection of the community. Similarly, the availability of a trained, low-cost supply of labor, and of a vacant building, dominated the selection of the community for the Utah Electronics plant.

Table 12.6 presents, for those cases in which more than one community was seriously considered, the two most important screening criteria used by the respective firms in selecting the location from the final list of communities. In the cases of the steel fabricating plant, the livestock feed plant and the industrial plastics plant, the availability of trainable rural labor was the most important location factor. To the president of Design Homes, the cooperation and attitude shown by the local people

Table 12.5. Factors mentioned as being important in the final community choice, by case

	Custom Steel Fabricator	Frozen Bread Dough Manufacturer	Modular Home Manufacturer	Livestock Feed Manufacturer	Industrial Plastics Manufacturer	Beef Breaker and Fabricator	Loudspeaker Manufacturer
Good supply of trainable, productive rural labor	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Limited labor union activity	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Reasonably low wage rates	Yes	Yes	No	No	No	Yes	Yes
Good supply of skilled labor	No	No	No	No	No	No	Yes
Near input markets	No	Yes	No	Yes	No	Yes	Yes
Near center of output market	No	Yes	Yes	Yes	Yes	No	Yes
Cooperative and progressive attitude of local people	Yes	No	Yes	Yes	Yes	Yes	No
Efficient transportation facilities	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Availability of a suitable building	No	No	No	No	No	Yes	Yes
Large supply of natural gas and/or electricity	Yes	No	No	Yes	Yes	No	No
Availability of suitable site	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 12.6. Two most important screening criteria used in selecting location from final list of communities, by case

Case	Most Important Factor	Second Most Important Factor
Atlantic Steel Corp. Atlantic, Iowa	Availability of trainable rural labor	Quality of transportation facilities
Design Homes, Inc. Humboldt, Iowa	Cooperation and attitude of local people	Availability of a suitable site
Golden Sun Feeds, Inc. Grinnell, Iowa	Availability of trainable rural labor	Center of product market (minimize transportation costs)
Monroe Plastics Corp. Albia, Iowa	Availability of trainable rural labor	Availability of natural gas and electric power

was the most important factor determining the choice of the location from among the final three communities considered.

Golden Sun Feeds seriously considered three communities for the location of its livestock feed manufacturing plant. Grinnell was selected for the location of the branch plant. The major factors favoring Grinnell were its nearness to product markets and to feed ingredient sources. Transportation costs were expected to be minimized with the Grinnell location. The plant site was situated in an industrial park a mile from Interstate 80 and was adjacent to a rail line with daily switching service. An adequate supply of natural gas and electric power was available for the high energy using plant. There was an adequate supply of rural labor and no one industry dominated the local labor market. Other factors affecting the choice of Grinnell were the amenities of the community and the high quality help provided by the local industrial development corporation. The primary factors important in the elimination of the two other communities were expected labor problems associated with labor market dominance by one firm and expected higher transportation costs associated with locating away from the center of the product market.

In the case of Venetian Iron's decision to locate its custom steel fabrication plant in Atlantic, the Iowa Development Commission recommended three communities for consideration by the company. One of the communities was eliminated from further consideration because it was too close to the Omaha metropolitan area. The president of the company believed that the plant operation would be hampered by metropolitan area labor problems such as a limited supply of trainable labor, high turnover rates and

organized labor activity. The management of the firm believed that the productivity of rural workers would be higher. The other community was eliminated primarily because it was believed to be too small to provide an adequate supply of trainable labor.

The president of Design Homes seriously considered three communities before the final decision was made to locate his modular home manufacturing plant in Humboldt. The principal location factors that contributed to the elimination of the two other communities and to the selection of Humboldt included the progressive nature of Humboldt and the cooperation provided by its industrial development corporation. The people of Humboldt "did the best job of selling their community" to the president of the company.

The ranking of factors of overall importance in the seven location decisions is given in Table 12.7. The ranking of factors varied substantially among the seven cases. In the steel fabricating plant case, for example, the availability of rural labor was the most important location factor, and the relative lack of organized labor activity was second in importance. Similarly, the availability, wages and skills of labor were of primary importance in the loudspeaker plant case. In the modular home and livestock feed cases, it was of primary importance to locate near output markets because the transportation costs of the products is high relative to value. In the beef breaking and fabrication case, it was of major importance to locate the plant near large supplies of fed cattle inputs. The availability of a suitable, vacant building was listed among the five most important factors by only two firms. However, in those two

Table 12.7. Overall ranking of the five most important location factors, by case

	Custom Steel Fabrication	Frozen Bread Dough Mfg.	Modular Home Mfg.	Livestock Feed Mfg.	Industrial Plastics Mfg.	Beef Breaking and Fabrication	Loudspeaker Mfg.
Availability, wages, and/or skills of labor	1	1	-	4	1	3	1
Extent of labor union activity	2	2	2	5	5	-	-
Quality of transportation facilities	3	5	5	3	-	4	5
Nearness of input markets	-	4	-	2	-	1	4
Nearness of output markets	-	3	1	1	4	-	3
Cooperation and attitude of local people	4	-	3	-	3	5	-
Quality and availability of utility service	5	-	-	-	2	-	-
Availability of suitable building	-	-	-	-	-	2	2
Availability of suitable site	-	-	4	-	-	-	-

cases (loudspeakers and beef breaking and fabrication), the availability of a suitable building was the second most important location determinant.

The participants in the respective location decisions, by stage of the process, are shown in Table 12.8. The number and type of participants varied considerably by stages among the seven cases. In several of the cases, the president was the only company representative involved in the location decision. In other cases (e.g., industrial plastics), as many as three top company executives participated in the decision process. In the cases of steel fabrication and industrial plastics, the State Development Commission was involved in the selection of potential communities. Golden Sun Feeds employed the services of a consultant in the selection of feasible communities. In some cases (e.g., livestock feed), utility companies were involved in the selection and evaluation of feasible communities. In several cases, local industrial development groups were involved in the selection and evaluation of final communities.

The objectives upon which the location decisions of the respective firms were based ranged from profit maximization to the maximization of an objective function which included personal considerations. The Golden Sun Feeds location decision, for example, was based upon the objective of profit maximization. In contrast, the Dakota Bake-N-Serv location decision, for example, was based upon two complementary objectives. One of the objectives was to earn a profit from company operations. The second objective was to provide a valuable learning experience for church academy students through gainful employment.

Table 12.8. Location decision participants by stage of process and by case

Stages of Process	Steel Fabrication	Frozen Bread Dough Mfg.	Modular Home Mfg.	Livestock Feed Mfg.	Industrial Plastics Mfg.	Beef Breaking and Fabrication	Loudspeaker Mfg.
Preplanning	President	President	Pres.	1) Pres. 2) Exec. V.P.	1) Pres. 2) Exec. V.P.	President	President
Selection of general area	President	President	Pres.	1) Pres. 2) Exec. V.P.	1) Pres. 2) Exec. V.P.	President	President
Selection of initial list of communities	1) Pres. 2) State Dev. Comm.	N.A.[a]	Pres.	1) Pres. 2) Exec.	1) Pres. 2) Exec.V.P. 3) State Dev. Comm.	N.A.	N.A.
Selection of final list of communities	1) Pres. 2) State Dev. Comm.	N.A.	1) Pres. 2) Local I.D. Grps.	1) Pres. 2) Exec. V.P. 3) Consultant	1) Pres. 2) Exec.V.P. 3) Mgr. of Ind. Relations 4) Local I.D. Groups 5) Utility Co.	N.A.	N.A.
Selection of Community	1) Pres. 2) Local I.D. Groups 3) Utility Co.	1) Pres. 2) Local I.D. Grps. 3) Church Academy Supt.	1) Pres. 2) Local I.D. Grps.	1) Pres. 2) Exec. V.P. 3) Local I.D. Grps. 4) Utility Co.	1) Pres. 2) Mgr. of Ind. Rel. 3) Local I.D. Groups 4) Utility Co.	1) Pres. 2) Local I.D. Group	1) Pres. 2) Plant Mgr.

[a]N.A. - Not applicable.

The location decision, from the point of view of the respective firms, ranged from optimal to sub-optimal. For those cases in which industrial management believes their location decision to have been optimal, the optimality was due to consideration of the relevant location factors and to the correct formulation of expectations with respect to the important factors. The management of Golden Sun Feeds, for example, based their location decision largely upon expectations relating to such factors as product market expansion and rural labor productivity. The expectations have been realized and this has contributed to the optimality of the Golden Sun Feeds location decision.

For those cases in which industrial management believes their location decision to have been sub-optimal, the primary reasons for the non-optimality of the decisions were related to invalid expectations about location factors. In the Monroe Plastics location case, for example, one of the primary location determinants was the company's expectation that the supply of local labor would be adequate to serve the needs of the plant. The labor availability factor was an important one, but the supply of needed labor has been smaller than was expected. This incorrect expectation was the major reason why the location decision was not optimal.

B. Hypothesized Location Decision Process

The industrial location decision process is believed to consist of several stages or levels, with each stage involving a different set of location considerations, a different set of participants, and different information sources. The location decision process is believed to involve a process starting with an entrepreneur expressing a need for new plant

capacity, then articulating requirements and specifications for the community and site. Several potential locations are identified and the more profitable locations are evaluated according to increasingly specific location considerations until one community is selected. The new plant location selection process is a management function in which the general objective is the maximization of expected profit.

In general, the stages and associated elements of the location decision process are hypothesized to be about as follows:

I. Preplanning
   - A. Participants
     1. President of the company
     2. Vice-president of the company
   - B. Functions
     1. Determine product, technology, size and other plant characteristics
     2. Establish general specifications for area, community and site
     3. Determine selection techniques and information sources
     4. Assign responsibilities for various aspects of the decision

II. Selection of general area
   - A. Important factors delineating the general area
     1. Location of product markets
     2. Location of input supplies
     3. Degree of industrialization
     4. Location of competitors

5. Availability and cost of support facilities
6. Availability of fuel and power
7. Labor costs and availability
8. Labor legislation
9. State and local business tax structure

B. Participants
1. President of the company
2. Vice-president of the company

C. Information generation techniques
1. Product market studies
2. Transportation studies
3. Input supply studies
4. Labor cost comparisons

D. Information sources
1. Company records
2. Government reports
3. Personal contacts with "intermediaries" or other businesses
4. General knowledge of area reputations
5. State advertisements

III. Selection and identification of potential communities by name

A. Required community characteristics
1. Availability of workers by skill
2. Labor-management relations
3. Size range of communities
4. Distance to metropolitan areas

5. Access to transportation facilities
6. Quality of needed transportation services
7. Availability of power, water, and sewer services
8. Size and type of other industry
9. Availability of site and/or building

B. Participants

1. Company executive
2. State development agencies
3. Consultants
4. Utility companies

C. Selection techniques

1. Company analysis of community data
2. Recommendations by state development agency
3. Recommendations by utility company
4. Recommendations by private consultant

D. Information sources

1. Community files of state development agency
2. Community development groups
3. Community files of utility companies
4. Consultants
5. Government publications

IV. Selection of community and site

A. Important factors

1. Availability of labor by skill and/or trainability
2. Labor costs
3. Extent of organized labor activity

4. Progressiveness of community
5. Cooperation and attitude of local people
6. Existing industry-community relations
7. Availability and cost of suitable sites
8. Quality of transportation facilities and service
9. Quality of public facilities and services
10. Availability of construction financing

B. Participants
1. Company president
2. Local development groups
3. Utility companies

C. Selection techniques
1. Evaluation of community data by company
2. Talk to community people and analyze their comments
3. Visual inspection of community facilities
4. Talk to plant managers of other industry

D. Information sources
1. Community data filed with "intermediaries"
2. Presentations by local development groups
3. Existing industry executives
4. Utility companies
5. People on the street

Once even a tentative decision has been made to locate a new plant somewhere, the location selection process begins. The first stage is "spaceless" but focuses on elements needed if the plant is to be profitable. This stage typically involves company executives, often only the

president. He can start the actual selection process by authorizing the planning of, and preparation for, a new or relocated plant. The decisions made in this stage shape the rest of the decision process. One of the most important functions performed by the company executive at this stage is to determine the objectives to be achieved by locating the plant. Profit is the general objective, but the expected way of achieving the objective is also needed. If the primary reason for establishing the new plant is to reduce high costs resulting from the current inefficiencies of an existing plant, then the firm probably wants to retain most of the advantages of the existing plant, but also achieve a more efficient operation. This may involve changes such as different technology, rearranging input use, reducing input costs, or reducing transportation costs. If the primary reason for locating the new plant is a shortage of output capacity, then the new plant may just be expected to duplicate existing plants and to provide the additional output needed to service the market. The objectives to be achieved, together with the basic technical and cost characteristics of the plant, will be used in establishing the area, community and site specifications. In the Atlantic Steel Corporation case, the president of the company was the only participant in the preplanning stage. The new plant was needed to expand the output capacity of the company. The major problems associated with the existing metropolitan facility were limited labor availability, high wage rates and low labor productivity. The location specifications established by the firm were based largely on the need to achieve lower labor costs per unit of output.

The determination of selection techniques and information sources to be used, and of participants to be involved, will depend upon the skills of the company executives, the scope and nature of the location problem, the types of information needed, and the services and information available from outside the company. The time and effort devoted to this stage of the decision process may be quite limited, particularly when small companies are involved. The process may be repeated several times before the firm enters the next stage. As a result of poor or limited preplanning, company executives often do not have a clear understanding of objectives or needs. Errors of commission and omission in the preplanning stage are probably major causes of location mistakes.

After the preplanning stage is complete, the firm is ready to select the general area of location. The selection of the geographic area depends upon demand and cost considerations that are unique to the company. The location factors of primary importance in this stage include the location of product and factor markets and considerations that are expected to vary by geographic area. The frozen bread dough, modular homes, livestock feed, and loudspeaker firms based their selection of a general area largely upon the location of existing or potential product markets. The general area for the beef breaking and fabrication plant was selected on the basis of the location of an existing support facility in a major input supply area. The selection of the general area for the steel fabrication plant primarily involved labor availability and concentration of industry considerations. The selection techniques to be used in selecting the general area depend largely upon the nature of the location problem and include, for example, market or transportation

studies. Golden Sun Feeds employed a private consultant to conduct a study of the company's existing and expected product market. The need to minimize the high transportation costs of the livestock feed to be produced, together with the need to compete through service, established the importance of locating near the center of the product market area. Demand growth factors and market shares were considered by the consultant in estimating the center of the proposed livestock feed plant's market area. The results of the market study were then used by the company in making the selection of the general area for the plant location.

In the selection of the general area, company records are probably used extensively to determine primary product and input market areas. Government reports and personal contacts may provide valuable information relative to such factors as location of existing industry and labor availability and cost. The participants in this stage of the decision process are probably the president of the company and perhaps a vice-president or other top level executive. The functions performed in this stage are probably best handled inside company headquarters. The factors important in the selection of the general area often involve considerations about which the company itself has the most accurate information, therefore, there are usually no outside participants involved in the selection of the general area. If consultants or other individuals or groups outside the company are involved at the general area selection stage, it is probably to provide area information or an objective opinion with regard to the best general area for the plant location.

The general area selected by the firm is expected to contain the most profitable community locations for the new plant. The selection of potential communities is believed to be the next stage of the location decision process. Firms appear to select a number of communities for comparison as potential plant locations. The communities are selected and evaluated on the basis of general community specifications established by the firms. In this stage, location factors such as community size, availability of labor, extent of organized labor activity, location relative to metropolitan areas, quality of transportation facilities, and size and type of existing industry are typically of major importance to the locating firm. In selecting potential communities, the modular home firm observed in the study utilized general community specifications relative to such factors as community size, availability of farm-background labor, quality of rail and truck service, site availability, availability of an airport and extent of organized labor activity. The quality of rail and truck transportation service seemed particularly important because of the problems associated with transporting modular homes to customers and with receiving long distance shipments of lumber and other basic inputs. The steel fabricating firm specifications at this stage involved considerations such as distance from metropolitan areas, community size, rural labor availability, extent of organized labor activity, access to an interstate highway, availability of electric power and community attitudes toward new industry. Because of the intense competition in the steel fabricating industry, labor availability, labor costs, and labor productivity were particularly important location

factors in this stage of the location selection process. The availability of electric power was also important because of the large power requirements of welding, cutting and grinding activities.

In the decision stage characterized by the selection and identification of potential communities, it is probably efficient for individuals or groups outside of the company to become involved as participants and information sources. They have more information to contribute in this stage than in the earlier stages. This is because firms generally have little information about individual communities on which to base community selections and comparisons. Also, firms often have limited skills or time available with which to select potential communities. In addition, the firms may not want to reveal their interests at this stage. In the industrial plastics case, for example, the company provided the Iowa Development Commission with community specifications and asked the agency to recommend potential communities and to provide data for the ones recommended. The company headquarters were in Chicago, therefore, the company executives were aided in their selection process by an intermediary with special plant location skills and access to needed community information. Utility company representatives were also involved in this stage of the company decision because the plastics production process would require large and constant supplies of natural gas and electric power. The utility company provided community recommendations and data, particularly as related to natural gas and electric power availability. In addition, federal and state government publications were used as a source of data relating to labor costs and

availability, particularly for female labor. The availability of female labor was important because much of the plant's work force would be made up of women employees.

The steel fabricating case also involved the participation of the Iowa Development Commission in selecting potential communities and in obtaining community information. The livestock feed firm, on the other hand, employed a private consultant to recommend potential communities, because it was important to management to get an objective opinion from someone outside of the company.

In some of the cases observed, the firm seriously considered only one community for the location of its plant. In these cases, the selection of the general area was followed almost immediately by the selection of one particular community for the plant location. The meat packing firm, for example, selected a very small area in the immediate vicinity of its existing beef slaughter plant for the area of location of its proposed beef breaking and fabrication facility. The selection of a particular community followed almost immediately, without the firm seriously considering other possible locations. Very strong attracting forces, in the form of a vacant building and of a large supply of low-cost labor, precluded the consideration of other communities. In the case of the frozen bread dough firm, the state of Iowa was selected as the general area of location on the basis of product market potential. Once Iowa was selected, the community of location was predetermined because the chosen community was the only one having a particular desired type of church-related academy. Similarly, in the case of the loud-speaker firm, the community search was limited in scope by the

availability of a vacant building, of a supply of trained, low-cost labor, and of an experienced, well-qualified plant manager who would not agree to leave the community. The three cases discussed above were not characterized by the selection and evaluation of several potential communities. In effect, once the general area was selected, very unique considerations seemed to predetermine the actual community choice. It seems probable that, the more unique are the location requirements, the more likely the location search is to be limited in scope.

The final stage of the hypothesized location decision process involves the selection of the community and site for the plant. The location factors which are of major importance in this stage probably include the availability of trainable labor, progressiveness of the community, cooperation and attitude of local people, existing community-industry relations, availability and cost of plant sites, and quality of public facilities and services. In this stage the local industrial development groups typically become very active participants and sources of information in the location decision process. In addition, several of the significant location factors are subject to some degree of control by the local people. At this stage of the location selection process, the 3-5 communities still in contention for the plant may be quite equal with respect to a number of considerations utilized earlier by the firm to eliminate less desirable communities. The competition among similar communities tends to be very intense at this stage of the decision process. Therefore, it is particularly important what the communities do, or do not do, at this stage of the community selection process.

In the modular home case, the progressiveness of the community and the cooperation shown by the local development group were probably the most important location factors involved in the selection of one community from the list of three finalists. The local industrial development organization did the best job of selling their community to the president of the company. An additional important consideration was the availability and cost of a strategically located plant site. In the industrial plastics case, the cooperation shown by the local industrial development group and the availability of a suitable site were critical factors in the company's selection of a location from among the four communities on the final list. The local development group evidently made the most of their meetings with the company president, the vice-president, and the manager of industrial relations, because the executives were impressed with the good job that the development leaders did of selling the community and its people. In the case of the steel fabricating firm, the primary factor favoring the selected community over the other two finalists was the proven availability of trainable rural labor of expected high productivity. Because of competitive forces, the availability of relatively low-cost, highly productive labor was of primary importance to the company. The chosen community had the figures to prove that it had the quantity and type of labor needed by the company. The existing industry-community relations were an additional consideration of importance to the president of the steel fabricating firm. The community had done an effective job of helping its existing industry, therefore, the discussions with the managers of the existing plants exerted a positive attracting force upon the locating firm.

In general, the hypothesized location decision process involves multiple stages. In addition, the importance of different location considerations, participants, and sources of information is believed to vary by stage of the process. In some of the cases, one stage of the process was eliminated. This does not alter the basic hypothesis of a multi-stage decision process. A multi-stage process was observed, as was significant variation in the importance of different location factors, participants, and information sources.

XIII. IMPLICATIONS FOR USERS AND USES OF FINDINGS

The plant location decision is one of the most important decisions faced by industrial management. It is important because cost and demand conditions vary by location. The location decision is closely related to other major decisions regarding timing, product mix, technology and size. Because each location is characterized by unique cost and demand conditions, some plant locations tend to be more profitable than others, almost regardless of the product mix or efficiency of the production process. A well-designed, efficiently operated facility may be unprofitable because it is poorly located.

Location choices are often among the more difficult decisions to make because many tangible and intangible location factors must be considered, and because many uncertainties are involved. Alternative locations are difficult to compare because each generally has weaknesses, as well as strengths. One alternative location is rarely better in every way than every other location. Plant location decisions will probably always entail significant risks and sub-optimal decisions will continue to be made. However, an increasing awareness of the importance of location decisions has contributed to the development of more systematic and thorough location decision processes among industrial decision-makers.

Iowa communities and the state of Iowa will continue to allocate resources for activities to attract industry. However, there will probably continue to be a shortage of new plants and an excess supply of potential industrial plant locations. This means that not all rural Iowa communities are likely to be successful in their industrialization efforts. To

avoid waste and to increase the chances of attracting industry, it is important that local development resources be efficiently allocated. Because many communities do not fully understand the important elements of plant location decisions, they may be spending too much on factors of relatively little importance to industry, or too little on factors of great importance. The misallocation problem may be a matter of the type of community actions as much as it is the level of community development spending. It seems likely that community industrialization efforts could be made more efficient through increased awareness of the needs of industry and of the process involved in location selection. Communities can and should learn from the experiences of others.

The decision process employed by locating firms is generally composed of several stages, with different location factors important in the various stages. In most plant location decisions, the early stages of the process probably are beyond the influence of community industrial development organizations. The latter stages of the process, on the other hand, usually involve information gathering from, and negotiation with, communities as participants in the decision. While some of the significant location factors can not be affected by community action, other factors can be changed.

The early stages, preplanning and selection of general geographic area, are generally conducted in corporate headquarters, beyond the influence of local development organizations. In the preplanning stage a high-ranking company officer, often the president, first determines the objectives the company hopes to achieve by locating the new plant.

The location specifications, decision technique, decision participants and information sources to be used may then be determined. The community and site specifications established by the firm are dependent upon closely related decisions regarding, for example, type of product to be produced or technology to be utilized. The nature and the scope of the preliminary planning stage varies considerably among firms, as does the time devoted to this phase of the decision process. The point is that local development officials are not involved.

The selection of the general area of location is also usually done independently of community development efforts. The choice is probably based upon management's best judgment regarding where the more profitable communities may be found. In other words, the general area selected is expected to contain the most profitable locations. The determination of the community location expected to yield maximum profit comes later in the decision process. The general geographic area selected may be as large as a multi-state region or as small as a few square miles.

In most plant location decisions, the primary factor involved in the choice of the general area is probably location relative to product markets. The closely related considerations of transportation costs and speed of delivery seem to be of major concern at this stage. Other primary location factors often influencing the firm's choice of a general area are access to raw material sources, availability and cost of labor, and availability of fuel and power. Considerations of less general importance in the area selection stage include right-to-work laws and other labor legislation, availability of construction financing, state

and local tax structures, location of existing company support facilities, climate, location of competitors and degree of industrialization.

A general area is selected for location by the firm because the area is expected to contain communities having characteristics well-suited to the needs of the company. Different areas are chosen because different firms have different location requirements. Each industry has unique location needs, thus the process of selecting a general area of location varies considerably by industry. Communities should resist the tendency to lump all industries together. They are not all the same, and they do not all have the same requirements.

Most of the factors influencing the firm's choice of a general area of location are not subject to the control of individual community development groups. The local group obviously can not significantly influence the location of a firm's product markets, for example, or change an area's climate. However, through political action the local industrial development groups can and should attempt to shape state laws and programs having an effect upon industrialization. If prospective locating firms are repelled by, for example, the state's pollution, road conditions, business taxation, labor legislation or the quality of its public schools, the chances of individual communities successfully attracting the firms may be reduced. The competitive position of particular communities, relative to that of their in-state neighbors, may be changed by local actions to promote industrialization, while state actions may improve the competitive position of all state communities relative to that of communities in other states.

Once the general geographic area of location is determined by the firm, the next step typically involves the selection of several communities to be investigated as potential plant locations. It is in this stage of the location process that efforts by local industrial development organizations may first have a significant impact upon the industrial location decision. The list of potential communities in the general area selected is compiled on the basis of specifications set by the firm. At this stage of the location process, the firm often utilizes the services offered by state or area development groups, utility companies, railroads, or consultants. These "intermediaries" may simply provide community information requested by locating firms, or they may play an active role in the process of screening communities. The community data available to, for example, the state development agency often forms the basis for preliminary screening of communities. Thus it is of critical importance that communities keep an up-to-date, accurate and complete "fact book" on file with state industrial development agencies and other development organizations.

The location specifications used to screen-out or eliminate unsuitable communities typically are related to such factors as size of community, availability and cost of labor, extent of labor union activity, quality of transportation service and facilities, location relative to metropolitan areas, and quality and availability of utility services. At this stage, the important location factors are, for the most part, not subject to the control of community development groups. However, communities can often avoid early elimination by providing, directly or through intermediaries, ready access to an easy-to-understand, neat,

accurate, compact and up-to-date source of community data. In order for a community to effectively sell itself to a locating firm, it must at least avoid being eliminated before the company representative visits the community. When company specifications are not satisfied by the community, the best of fact files will not prevent elimination, but if what the community has to offer seems to be consistent with the needs of the firm, the "fact file" often helps to keep the community in contention for the plant. The typical locating firm wants to avoid as much uncertainty as possible. Although a community can not generally change the size and quality of its labor force, for example, it can provide needed information about it, and about other important location factors. Communities not providing ready access to such information are at a severe disadvantage in the competitive struggle for new plants.

A very important opportunity for the community to influence the location decision comes when the representative of the firm visits the community. The fact that the community is still in contention for the new plant indicates that the community may be a feasible location. In visiting the community, the company representative hopes to obtain additional data, to check previously obtained data, to inspect sites, to observe available facilities, to gain an impression of the people, and to check on intangible factors such as the progressiveness of the community, the labor climate, the quality of local government services, and, in general, to gather information upon which community comparisons may be based.

The community must sell itself to the firm. The final location decision often depends upon what the community does or does not do. The real selling job often takes the form of a personal presentation by local development leaders. Companies often rely heavily upon local presentations as a basis for evaluating potential communities and in eliminating less desirable ones. The presentation should be well-organized, factual and relatively brief. It is important to remember that the representative of the firm is often trying to learn more about the people of the community, among other things. The presentation should be made by a small group of key development leaders who have the know-how and authority to bargain with the firm and to make definite community commitments. If the people really want the firm to locate its new plant in their community, then they should take positive action to show their interest and willingness to cooperate.

It is important that local developers are aware of the fact that firms know all communities have problems. Although problem areas should not be emphasized by community development leaders, an objective, business-like approach to the location problem will tend to be well-received and appreciated by the representative of the firm. Honesty is important to prospective firms. In addition, local development groups often know very little about the real needs and priorities of prospective firms. If the community development leaders emphasize the factors they believe to be important, the real important considerations may not even be discussed. Each firm has its own unique way of viewing the local situation and of ranking the location factors. If an honest, objective policy is not

followed by local developers in their discussions with prospective firms, the wrong factors may be emphasized. In addition, the firm representative may be repelled by what he observes to be a misrepresentation of the facts.

Many, if not most, location factors can not be affected by individual communities. In addition, some of the factors subject to local control may be unimportant to prospective firms. One very important consideration over which the community has a considerable degree of control is existing industry-community relations. The community should be careful to take care of its present industry. Prospective firms often want to talk to the manager of existing plants regarding local support and cooperation. If the community has shown strong interest in, and full cooperation to, the industry it already has, and if community promises have been kept, then the existing managers may be the best salesmen the community could possibly have. If existing industries and people are happy, others will be attracted.

The availability of developed industrial sites is important to many locating firms. It is important that communities be able to give a complete estimate of the land, road and utility development costs associated with available sites. Many firms need to act quickly, therefore estimates of construction time are also important. It is not generally advisable for communities to build speculative buildings. The community outlay is relatively large, the availability of the empty building may weaken the community's bargaining position relative to that of the prospective firm, and the building is unlikely to be well suited to particular plant requirements. In most cases, the advantages of having

an available building are probably not worth the cost.

A seemingly obvious, but often overlooked, aspect of industrialization efforts involves checking into the financial strength and stability of prospective firms. Without being overly inquisitive, community development leaders should attempt to ensure that only sound, stable operations are attracted by their development efforts. Community industrialization efforts can be set back for years by new plants that result in more additional community costs than benefits. It is also suggested that communities generally refrain from extensive subsidization of industries. Industries attracted by such considerations are often marginal or weak companies that, in the long run, are not likely to contribute to local economic growth. Also, community development leaders should keep in mind the possibility that some firms may want to exploit the local situation.

Communities should work at being progressive and at projecting a progressive attitude with respect to industrial development. These efforts should include sound community planning, with the involvement of local government officials as well as development groups. The community should be developed as a good place to live and work. Local people should be made aware of both benefits and costs associated with industrialization. The progressive nature and the quality of living in the community can be of major importance to prospective firms, particularly in the latter stages of the decision process. The competitive position of many rural Iowa communities is so similar that these factors may well make the difference in the efforts of particular communities to attract industry.

Most manufacturing plants continue to be found in metropolitan areas. However, there is a substantial demand for rural plant locations. This indicates that, for many types of manufacturing operations, the advantages of rural locations outweigh the disadvantages. It seems that industrial firms most likely to benefit from rural plant locations would be those which (1) require low labor costs per unit of output in order to compete; (2) do not require large numbers of professional or highly skilled labor; (3) utilize purchased inputs with high unit value relative to transportation costs; (4) produce products of high unit value relative to transportation costs; (5) can afford to train most of their workers; and (6) are repelled by problems associated with metropolitan area locations.

The rural communities which are most likely to be successful in attracting industry will probably be those which have (1) a large supply of trainable labor; (2) no large, dominant industry; (3) access to a good highway system; (4) a large supply of fuel and power; (5) relatively little organized labor activity; (6) developed industrial sites; (7) efficient public services financed by reasonable tax rates; and (8) strong, active industrial development organizations.

Labor considerations probably represent the most significant locational advantages enjoyed by rural communities. Proven availability of a large supply of trainable labor is a critical factor to many locating firms. The functional literacy rate in Iowa is very high. In addition, farm background rural workers generally have good work habits, have mechanical experience, and tend to be well-equipped for mastering manufacturing skills. Rural Iowa workers also tend to be emotionally stable,

honest and loyal. Rural areas have important labor related advantages, but they also have some disadvantages. In some areas, for example, there is a shortage of needed skills and of manufacturing experience.

Cost of labor is often mentioned by firms as an important location factor. It seems that what they usually want is low labor costs per unit of output. In other words, labor productivity is of substantial importance, as is the hourly wage rate. The value added per Iowa worker is significantly higher than the national and Midwest averages. The lack of significant organized labor activity found in many rural communities is an additional labor-related factor that many firms believe to be of importance in their location decisions. Firms prefer making their own decisions without being limited by fixed labor-management procedures. Good labor-management relations tend to add to the income and utility of locating firms.

Access to a good highway system is important to most locating firms. Many firms prefer to locate near an interstate highway, but of more general importance is access to both a good north-south and good east-west highways.

The availability of a large supply of fuel and power is critical to many firms, particularly those which require very large quantities of power in their production processes. This factor is expected to be increasingly important as fuel and power shortages continue.

The availability of reasonably priced, developed industrial sites is an important location factor to many firms. This does not mean a full-scale industrial park, but rather a site not subject to flooding, with utility connections to the boundary, and ready for construction with a

minimum of grading required. Many companies require a water line large enough to furnish sufficient water to operate a sprinkler system. Such a system significantly reduces fire insurance rates.

The quality of public services relative to the existing tax structure is often an important locational consideration. Local tax rates are generally not a critical location factor, but the level of taxation and the rate structure may be viewed by firms as an indication of community attitudes toward new industry. An equitable distribution of the tax load represents an expression to locating firms that the community wants neither to gouge, nor to subsidize, local industry.

In general, rural Iowa communities enjoy a number of advantages in the competitive struggle for new industry, but they have their problems as well. Communities would benefit by taking a hard, objective look at their particular problem areas, and by careful planning and implementation of programs to alleviate them.

The existence of a strong, active industrial development organization often means the difference between success and failure in attracting new industrial plants. New industry can substantially increase local income and employment, and expand the tax base. However, new industry will not always provide an easy solution to community problems. A new plant may well provide substantial benefits to the community, but it will also involve additional costs. If the additional tax revenue generated by a new plant is not sufficient to pay for required expansions of public services, the additional burden must fall upon some element of the community. The tax structure should be adjusted such that the people or

groups benefiting the most from the increased business activity are required to bear the greatest additional burden. The costs and benefits associated with industrialization should be carefully measured and equitably distributed. Industrial development must be an important element in most rural community development programs, but industrial development at any cost is not the answer to rural community problems.

Many rural Iowa communities are likely to grow and prosper through successful industrial development efforts, but success will not come to all. There will probably continue to be an excess supply of rural plant locations. This means that locating firms will enjoy a buyer's market in their search for new plant locations. Not all rural Iowa communities will succeed in attracting the desired amount and types of new industry. The net benefits of community growth and development are likely to accrue to those with the most efficient industrialization programs. It is not only how hard the community works, how lavishly it spends, or how eager it is, but also how well the community is run, how well all businesses and people are served, and how appropriately the leaders inform potential industry of the profitability of locating in their particular rural Iowa community.

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