HUMAN BEHAVIOUR COMPLEXITY AND THEORIES OF INDUSTRIAL LOCATION: AN INSIGHT INTO MAXIMIZATION CUM OPTIMIZATION ECONOMIC INCLINATION

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Abstract

The paper examined the behavioural influence on locational pattern of economic activities as against the theoretical approach commonly emphasized as the basis for locating a business. The maxmaization cum optimization economic inclination has been rightly controlling the locational pattern of industries due to complexity of human behaviour. Data were collected from the secondary source of data through extensive literature search. Different locational theories and models were reviewed. Most of them place importance on assumptions which could not be applied in the real business world. They were only developed to gain general understanding of location factors and patterns but could not test theories. It was revealed that the application of locational theories and models would require extensive data collection which might not be easy to gather. The actual locational patterns could not be adequately replicated and completely explained by any theory due to human behaviour complexity. The paper put up a recommendation that in this ageof globalization more and meaningful data should be collected to strengthen intuitive knowledge on how industrial prosperity could be sustained.

Keywords: *Economic activities, Human behaviour, Locational patterns, Optimization, Theories.*

Introduction

In the first instance, a theory is an explanation of uniformities that involves two or more generalizations but which even though widely held, require empirical validation for comfirmation. A theory offers at one and the same time less certainty and greater explanatory power. Finally, a theory has the potential to a basis for thinking about more complicated relationships. Thus a theory can be used as a base from which to explore a given territory for more intricate variation (Harvey, 1974).
The term location theory is often used to refer to those approaches in understanding the economic landscape that focus on different sectoral landscapes and which share a common set of principles of distance and movement. Location theory involves building and applying in an avowedly deductive way to agricultural, merchantile

and industrial landscapes. Location theory, however, has become an important part of economic geography. It is regarded as the intellectual kernel of the field of regional science. It has been the major way in which the positivist conception of explanation has been brought to bear in economic geography (Szymanski and Agnew, 1981).

Industrial location is seen as a distinct field within which spatial economic analysis is partly an outcome of this topical specialization. The study of industrial location is clearly one of the most important branches of economic geography, with many practical implications for public policy as well as offering enormous scope for academic research. Hence, industrial location analysis may thus be defined as the study of the spatial arrangement of industrial activities. The term industrial location analysis is preferred to be more conventional expression of industrial geography. This is not limited to the analysis of areal distribution pattern and individual location locational decisions but also very much concerned with the areal variations in industrial character which arise from the different spatial forms adopted by different activities.

Moreso, in the analysis of industrial location, the process of explanation is concerned with the elucidation of specific locations and distribution patterns empirically observed, and with the creation of a theoretical framework relating to this particular aspect of man's economic behavior. Any attempt to explain a specific industrial location or pattern implies some knowledge of locations are arrived at in general. At the most sophisticated level, this knowledge may comprise an interconnected set of precisely formulated principles concerning the nature of and relationship between the various factors affecting plant location. This is considered a preoccupation through which a number of locational models were reviewed (Barnes 2003). At its elementary level, it may be no more than vague general knowledge which forms a conscious or unconscious basis for intuitive judgment in the absence of a more rigorous theoretical framework. Whatever their nature, theory helps to direct inquiry: "Without a theory, however provisionally or loosely formulated, there is only a miscellany of observations, having no significance either in themselves or over against the plenum of fact from which they have been arbitrarily or accidentally selected" (Kaplan, 1964). In that wise, theory in geographic research is inevitable. It is a systematically organized knowledge applicable in a relatively wide variety of circumstances, devised to analyze, predict, or otherwise explain the nature or behavior of a specified set of phenomena (Van Ryn and Heaney 1992).

To be explicit enough in our explanation, some of the major industrial location theories are explained below. These theories are grouped into:

(a) Classical theories;
(b) Neo-Classical theories, and
(c) Behavioural theory.

The classical theorists are: Alfred Weber, Hotellings, Palander, Robert Losch, Edger Hoover, GreenHot. The neo-classical theorist is signified by Smith while the behavioural perspective is that of Pred. In the work of Weber (1909), he put up some assumptions in order to bring out his location theory. These assumptions are as follow:

(i) He assumes uniformity of area where uniform population exists , purchasing power is also uniform;

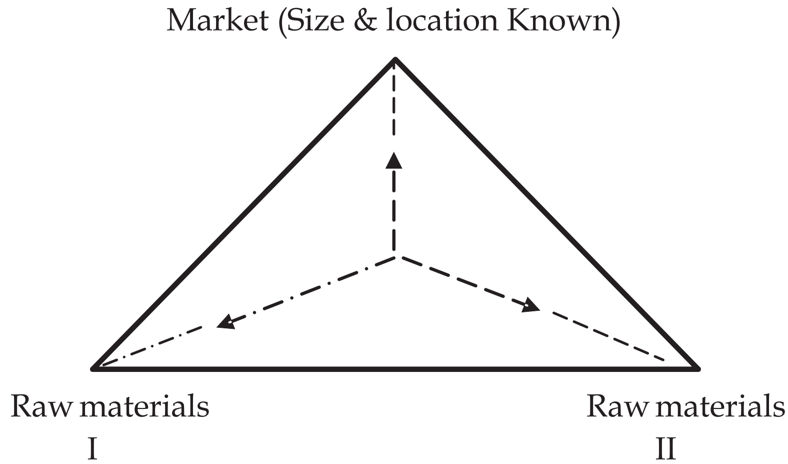
(ii) He assumes that market is a point in space, its location and size are well known The size determines the quality of goods to be produced;

(iii) The quantity and location of labour are known and labour is not mobile and for a given wage rate, the supply of it unlimited;

(iv) Transportation is measured in terms of the materials to be moved;

(v) Interest rate and taxation are not important. These are institutional factors.

After the above assumptions, he then explains how an industrialist chooses to locate. He uses locational triangle.



Each of these raw materials exerts some pull towards itself and the market is also pulling the location to itself. All these creating an equilibrium position where an industrialist can locate. It is the weight of a given product such as 100kg, 200kg and 500kg, that would determine industrial location. Out of these, 500kg would exert strong pull. He goes further that an industry could be raw material oriented or market oriented. In determining these orientations, he puts up material index. Then what is material index? It is the weight of raw material divides by the weight of the finished products. Some raw materials lose their weight during transformation, for example, 1000kg of raw material divides by 500kg of finished product equals 2kg. With the value of 2kg, the industry would be located nearer to raw material source, that is, Rawmaterial Oriented. In case of 500kg of raw material when it is divided by 1000kg of finished product would be 1/2kg. This industry would be located nearer to the market, that is, Market Oriented. But in a situation whereby the weight of raw material is 1000kg and that of finished product is 1000kg, the industry can be located at anywhere within the triangle. Material Index has cost of transportation as its basic factor in relation to distance. After this simplistic presentation, he goes on to the situation whereby industry would be attracted by labour or agglomeration factor. The agglomeration factor covers three distinct situations:

The first is in the case of simple enlargement of plant and increment in production and physical area of plant thus bringing into existence the advantages of large scale production.

The second is the case of local association of several industries presumably in the same industry, that is, related industries where the semi finished product of one may be the raw material of other, for example, Hard soap and Detergent.

The third is the case of unrelated industries concentrated in a particular area may be grouped under agglomeration, for example, Industrial Estates.

According to Hotelling (1929), his own explanation is on the market because he believes that the most important consideration in plant location is the market under which dual market is emphasized He assumes the two plants provide the same article and price is also the same. Plant A in order to get more of the market shifts its location close to the market and then has its market boundary shifted further. If Plant B then moves more than that of A, he would have his market boundary shifted further. And as they continue to move in order to capture more market area, there would come a point when Plants A and B would not move further. It is at this point that market stabilizes.

Duopoly of Market

Two ice cream industries competing for a market

A A& B B

T1

Initial Limit of A is T1

Initial Limit of B is T1

Competition would lapse until the competition continuum is balanced

T1

A I B

TordPalander, (1935) propounded on price competition. It seems similar to that of Hanold. Tord emphasized demand which is a function of price. When A reduces its price to 70kobo, demand of its products increases and when B realizes the joker, B also reduces its price to 65kobo and demand increases and vice versa in a somewhat continuous form until both of them reach the constant rate of price underwhich the market stabilizes and the equilibrium rate is met when the customers of A deal with A and that of B deal with B. According to Marn and Rosiello (1992), it is observed that the fastest and most effective way for a company to realize its maximum profit is to get its pricing right. The right price can boost profit faster than increasing volume will, the wrong price can shrink it just as quickly.

August Losch,(1954) based his work on assumptions underwhich demand was of interest as a central point to the location of an industry. His assumptions are:

I. That we have a plane that is homogenous;

II. That there is even spread of raw materials in that homogenous plane;

III. That we have agricultural population that is evenly distributed ;

IV. All individuals in that plane have identical tastes;

V. That all have the same economic opportunities, and

VI. That all have the same technical pattern.

In terms of transport cost, he assumed that it is uniform in all directions. For example, if you move 10km east, north, west and south, it is #10 each. He then went further to consider a situation where spatial equilibrium would be attained where farmers start to produce surplus. According to him, competition between farmers for market would continue until an equilibrium situation where the market area becomes hexagonal in shape. One of his very basic postulates is that there are some order or reasons in economic world, That the economic world is not chaotic, that is to some extent ordered.

In Edger Hoover's, (1937) theory of industrial location, he made some assumptions which could be used by any industrialist to make his locational choice. The assumptions are:

I. That there is perfect competition among producers;

II. There is perfect mobility of factors of production. But in real sense, land and capital are not mobile;

III. That transport costs are determined by location. This is also extended to production or extraction costs. He also tried to determine the market area of firms based on delivered price. This is considered as an important aspect of his analysis so that firm would attempt to locate such that price would be minimal.(Isotin).

The market boundary between two producers would be where the delivered price of the first producer would be the same as that of second producer He introduced some complexes in his analysis such as the Law of Diminishing Return. He says that as the market area increases, production must also increase and vice versa until where the per unit cost of production increases then the producer stops producing and less production becomes static. Then at a point, it starts to rise again and then stops. He would not produce more than that unit, then the market expansion would also stop.

According to Melvin Green Hot, (1956) transport cost is considered as the most important determinant of industrial location. That it is this that determines whether the industry would be raw material oriented or not. He said if the goods are perishable and also where the cost of transporting raw material is greater than the finished product, the industry would be raw material oriented. Apart from this, the usual location is the market. That it is the market that exerts the greatest pull. He then analyzed the situation of the dispersal of firms, for example, where transportation cost is very high. Dispersion is also encouraged where the demand of the firm product is very elastic.

In the analysis of Taylor, (1970), a retiree from an Industrial plant would like to locate his own industry near or at the former industrial plant where he has a strong personal relation. He would be able to get everything at cheap rate but where he could not get something like market and market is existing in another area, he could locate his own at or near the market area where the cost to be incurred would be less when compared to long distant location of industry to market in terms of transport cost; and it is also viewed by Kuroiwa 2010. Taylor said that where money saved is greater than the total cost per product,, the industry should be located but where money saved is less than the total cost per product, the location of industry in such an area should be avoided.

In neo-classical sense according to Smith (1981), the point of his analysis is more of economic and behavioural. His theory is usually called the Spatial Limit or the Spatial Margin Model. His formulation is that the producer is happy over a given area of location where satisfactory income is made. This is in line with what Jared Prazen (2017) said that we can safely assume that most businesses would like to achieve a maximal level of profit. On the basis of this, he made a number of assumptions

I. That all producers are in business to make profit. He then makes locational choices to make his profit;

II. That the producers are aware that the cost of production and profit vary over space;

III. That the sources of factors of production are fixed and that at this fixed point, their supply is unlimited;

IV. That substitution between factors of production is not possible. But in developing countries, capital can be substituted for labour;

That demand and price are all constant in space
He put up other assumptions about demand and price that:

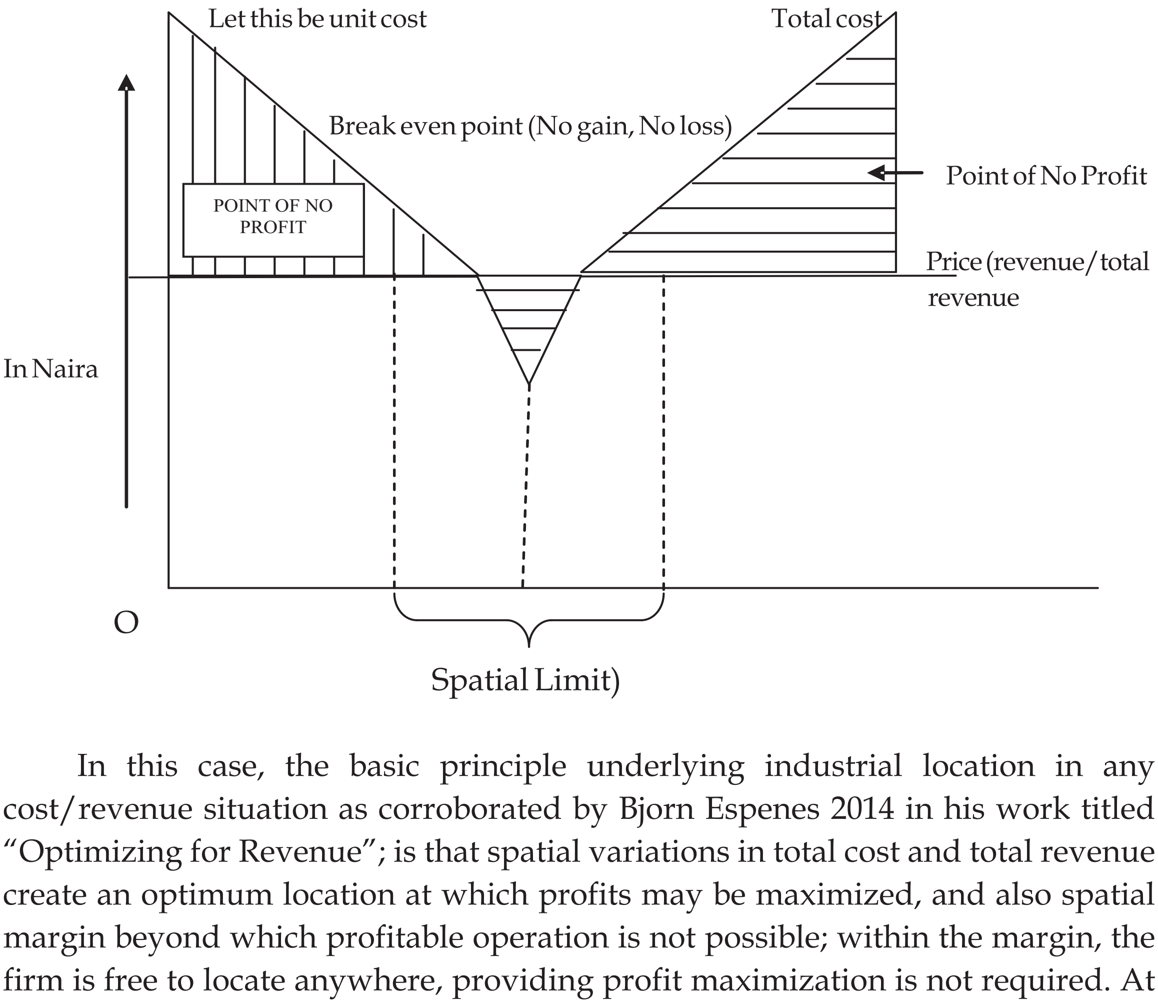
I. There is constant return to scale, that is, no firm can take advantage of economy of scale;

II. There are no advantages from agglomeration;

III. All entrepreneurs have the same skill;

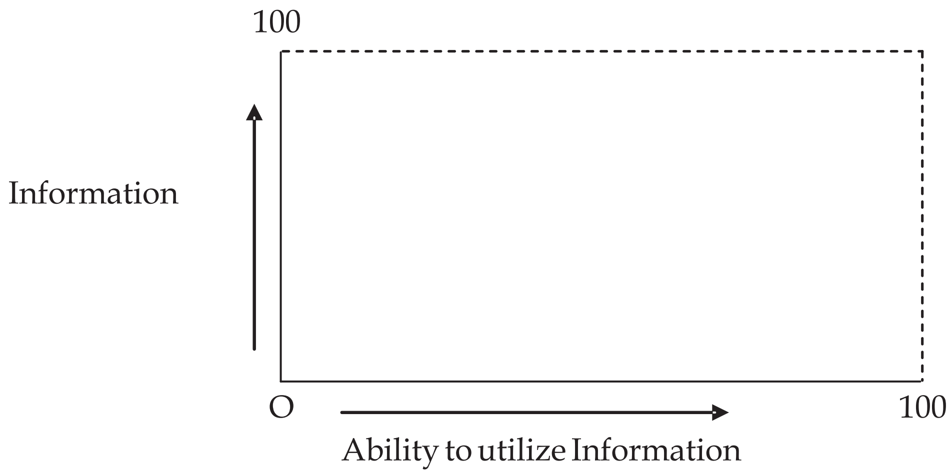
IV. No location is subsidized.

After all these assumptions, he then went to demonstrate the spatial limit, that is, where an industrialist would locate.



In this case, the basic principle underlying industrial location in any cost/revenue situation as corroborated by Bjorn Espenes 2014 in his work titled "Optimizing for Revenue"; is that spatial variations in total cost and total revenue create an optimum location at which profits may be maximized, and also spatial margin beyond which profitable operation is not possible; within the margin, the firm is free to locate anywhere, providing profit maximization is not required. At this point, if the above assumptions put up by Least Cost Approach, Market Area Approach, and Spatial Margin Approach are summed up they are critically examined, there has been a reluctant effort to generalize or theorize about industrial location because of the apparently fortuitous nature of many real-world locational decisions as a function of the complexity of human behaviours. The perfectly informed, rational, and optimizing "economic man" assumed in much economic analysis, including location theory, does not exist in practice; instead, men act with imperfect knowledge, and often in pursuit of partially nonmaterial ends.

Allan Pred (1967,1969) says that man is seen as possessing both limited knowledge and limited power to use it: "Every locational decision is viewed as occuring under conditions of varying information and ability, ranging, at least theoretically, from null to perfect knowledge of all alternatives, and as being governed by the varying abilities (as well as objectives) of the decision-maker(s)" He emphasized the Behavioural Matrix. That is, information and the ability to use the information.



For example, if the behavioural matrix of a man is 100 percent information as against 0 percent ability to use information, his locational decisions are likely to be wrong. But in a case where the information at hand is 100 percent and the ability to use it is 100 percent, the locational decisions would be good enough. The behavioural matrix is put forward as an interpretative device to assist in the understanding of real-world deviations from location patterns produced by deterministic models based on the assumption of economic man. Variations in the information available to individual decision makers and in their ability to use it help to explain the simultaneous presence of random and nonrandom elements in spatial distributions. The choice of satisfactory locations by some firms with information or ability-to-use handicaps emphasizes the failure of the matrix position to predict exactly how good a choice would be made. The general message conveyed by this illustration is that "the apparently chaotic qualities of the spatial distribution of most manufacturing production at any one date is ascribable to the fact that the real-world is populated by a broad spectrum of bounded rational, satisficing locational actors and not by undifferentiated profit maximizers".

According to Pred, entrepreneurial skill alone can build a successful business in apoor location chosen in ignorance of the prevailing spatial cost/revenue situation. Pred (1967) has taken issues with the original version of the interpretation of the personal factor. His point is that the argument is dependent on the entrepreneur being able to identify the economic optimum, which requires perfect knowledge and is highly unlikely if not impossible in practice. This of course true, just as it is true that without a highly quality of knowledge he would not be able to judge accurately whether a suboptimal locational decision is within his own margin to profitability. But the argument does not necessarily depend on perfect knowledge. If the entrepreneur has an inaccurate perception of the best location from an economic point of view, he should still proceed as described above, weighing what he thinks he would gain personally from an alternative location against what he thinks he would lose financially by not being at what he believes to be the economic optimum, and making his decision on the basis of the results of this psychic arithmetic. If he is a skillful entrepreneur, with good perception of economic advantage, he would be in a better position to judge the psychic and pecuniary payoffs of alternative locations than would be his less skilled counterpart. In addition, he would have wider spatial margins within which to indulge his personal whims.

Many of the industrial location theories have limited success in explaining spatial organization simply because the concept of spatial efficiency is not actually followed. This can be seen in the view of the satisfizers who locate industries where they could make reasonable level of income. For example, location of industry in rural areas particularly Odutola industry in Ijebu-Ode. Moreso, location of some industries in Nigeria such as Osogbo Steel Rolling Mill around iron ore cannot be got except this is transported from any remote location; and the Refinery located at Kaduna while crude oil to be refined is being transported from Niger Delta area of Nigeria. These locations negate the economists' view point of industrial location theories due to government policies. The point is even supported by Losch (1954) when he recognized that an individual entrepreneur may choose a location other than the economic optimum because he is concerned with the greatest total utility rather than with money profit alone.

Also, there is obviously a close connection between the personal nature of entrepreneur, or the decision- making group, and the locational decision. This involves not only the level of business skill that they possess but also the goals that motivate the individual or corporation and the presence or absence of such traits as a gambling instinct, a need for security or the wish to create some particular public image (Galbraith 1967) These matters, which are receiving increasing attention in the study of industrial location, are very difficult to deal with theoretically. An inductive approach based on the search for empirical regularities in actual locational behavior may be a better way to attempt to understand the personal factor than further extension of the essentially deductive framework.

Conclusion

By and large, it must be conceded at the outset that very little progress has yet been made in the direct application of industrial location theories to real- world situations. As Stevens and Brackett (1967) remark in their survey of the literature: "A large number of empirical studies have been carried out in the last twenty years, but most have been for the purpose of gaining general understanding of location factors and patterns rather than of testing theory. This theoretical framework if it is to do anything more than strengthening intuitive judgment, its application requires a large volume of data, much of which is difficult to compile. Although the introduction of the concept of spatial margins to profitability appears to facilitate the general interpretation of real-world patterns and their evolution, the formulation of predictive models of industrial location is an entirely different matter. This theoretical approach implies patterns that have a certain general resemblance to some of those actually found, with a tendency towards agglomeration around favoured localities but with random dispersal within spatial limits, but it is impossible to predict the precise spatial arrangement of plants within the margin. The truth is that industrial location, like many other forms of human behavior, is very difficult to understand, and no theory would ever produce models that can perfectly replicate and completely explain actual patterns of plant location.

Recommendations.

1. Much data are needed for the actual application of industrial location theories. The data should be adequately and urgently gathered for their roles not to be limited to only strengthening intuitive judgement.
2. A practically oriented pattern of industrial location should be followed rather than using only theories to site industries.
3. Emphasis should be placed on industrial location analysis due to its practical implications for public policy and other academic studies and for it to be entrenched into different economic activities.
4. There should be room for the interplay of other factors of industrial location in order to see how human behavior has actually influenced the establishment of different economic activities as a product of human perception within the economic landscape. This is attributable to total utility factors and / or money profit factor.
5. The policies of government should be adequately and economically formulated so as not to truncate the expected outcomes which could be derived from the concept of spatial efficiency. That is, policies of government should be devoid of political influence to allow practical location of industries.

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