Economic activity is neither spread evenly nor in a continuous fashion over space. Generally, economic activity tends to be concentrated in a comparatively few urbanised regions. This gives birth to regional inequality. Though these kinds of regional disparities are found both in developed as well as in developing countries they are usually more prominent in the latter. In case of developing countries, historical factors, combined with an attempt to achieve rapid growth through industrialisation, have led to a few isolated pockets of development at the cost of continuing, and often increasing poverty of the vast hinterland.

Locational theorists beginning with Weber and continuing with Hoover and Isard have emphasised the relative importance of external economies associated with industrial linkages as possible causes of agglomeration and the uneven geographic distribution of economic activities. It is often asserted that industries locate near their principal markets or sources of materials because high initial transport rates usually discourage intermediate locations. Also advantages in
communications encourage important buyers and sellers to locate in geographic proximity of one another. However, due to lack of data and the difficulty of separating out the influence of linkage effect on industrial location, very few studies have effectively measured the importance that industrial linkage may have on geographic association between industries. The present researcher agrees with Lösch that "The real duty of economist is not to explain our sorry reality but to improve it". But attempts to improve our sorry reality, for example through regional policy, may be better founded if we can first explain the reality. Regional planners often complain of the paucity of concrete suggestions from economic researchers. They like to know how important economic linkages between industries are as a locational force. Even more concretely they would like to know as to which industrial combine should be attracted by regional policies, including public investment in complementary infrastructure, in order to improve the economic structure of distressed areas. The basic purpose of the present investigation is the extension of empirically validated knowledge of the determinants of location of economic activity. The theoretical conceptualisation of this research is based on the classical or Weberian industrial location theory.

1 August Lösch, The Economics of Location, Yale University Press, New Haven, 1954, p. 4
Location in this study is considered primarily in terms of geographic association between economic activities, i.e., simultaneous occurrence of different economic activities in the same geographical region. From a policy point of view such associations are particularly important because at any point of time, the set of economic activities in each region is fixed and policies that affect location, affect the geographic association of these activities. Thus an understanding of the determinants of geographic association can be helpful to policy makers.

1.1 Disaggregated Manufacturing Activity: Exclusive Subject of the Study

All economic activity may be subdivided or categorised in various ways. One division often used in introductory economics courses places activities either in household or firms. This study limits itself only to the activities undertaken by firms and generally aggregates the firms into industries. All the activities in the economy can then be categorised as belonging to one of the three main industry groups which may be called 1. Primary resource extractors, 2. Manufacturing and 3. Services (including financial institutions).

Following are the main reasons for making manufacturing industries the exclusive subject of this study:
First, these industries account for a very large proportion of industrial activity in India and analysis of manufacturing therefore provides information about a key sector of Indian industry. While the economic principles of location are generalisable to economic activity in any industrial sector, there may be some advantage in examining a particular sector whose common characteristics permits a more specific analysis that is also possibly more useful for policy purposes.

Second, manufacturing has been considered by many economists to be the most important of 'basic' activities of the regions and to the extent that regional growth and development depend upon such 'basic' activities, knowledge of factors determining the location of manufacturing establishments is essential. The merits of export base theory of regional growth have been and continue to be debated. But the viability of export base theory lies primarily in the fact that there is an undeniable element of truth in the idea that exports produce expanded regional income. Though recently the possibility of services being an 'export' industry has been recognised, and primary resources have traditionally been exported but those interested in consciously altering the export base of
underdeveloped regions have continued to concentrate their attention on attracting manufacturing to their areas. This is largely because firms in manufacturing industries have more freedom in choosing their location than do firms in other sectors of economic activity. Firms in sectors such as agriculture, livestock, forestry and fishing products, mining have considerably less choice in locating than most manufacturing firms have. The former are generally tied to natural resources to a considerable degree and would thus be less likely to locate in response to other economic factors such as agglomeration economies. Location for extractive firms is a matter of choosing which resource sites to exploit. In so far as service sector, firms are very largely dependent upon where the manufacturing activity already exists. They are usually closely tied to large population and large markets and are less likely to illustrate the type of locational behaviour which is of interest in this study. Intra-regional locations for these industries may be a more relevant consideration than inter-regional locations. While it is true that locations of both manufacturing and services industries are determined primarily by the location of population, other markets, or by the location of essential resources and by the location
of important agglomeration economies. But the two groups in aggregate, are significantly different in their locational behaviour.

Manufacturing industries can and many a time do choose non-urban and even completely undeveloped locations. Service industries are almost always dependent upon the prior existence of a market for their products.

There are no doubt exceptions to the above generalisation in all sectors. But on balance the manufacturing firms would seem to take their locational decisions more in response to factors such as the agglomeration economies than would the firms in other sectors. This study recognises that ties to firms in resource extractive and service sectors may also be important locational forces for many manufacturing industries. These are dealt in an aggregative way as resource and market orientations and provide the basis for a further subdivision of manufacturing sector into primary resource users, primary suppliers of final demand and those intermediate between these two classes.

Additional factors contributing to the choice of manufacturing industries include a desire to limit the scope of the study, keeping in view the time and resources available to researcher. The other factor contributing to limiting the choice
to manufacturing industries is the availability of requisite data for the study, only in case of manufacturing industries.

1.2 Emphasis On Economic Factors Of Location For Location Of Economic Activity

The factors, which influence the locational decisions of firms can be generally divided into two, those non economic in nature and those primarily economic in nature. The non economic factors include political pressure, the social, cultural and physical amenities of various locations, the personal preferences of decision makers and all other factors which vary from one geographic location to another but do not affect the costs of production or distribution of firms product. The importance of such factors in determining location of firms cannot be denied. But it is difficult to subject the effect of these non economic factors on locational decisions to precise, quantitative analysis. Therefore, these will not be dealt with explicitly in this study. This does not mean that non economic factors cannot be used in locational analysis because they are difficult to quantify. In fact some factors such as mean temperature, rainfall and number of students in university can be subjected to precise measurement. Other, such as presence or absence of a seashore or airport can be introduced through a variety of techniques, including attribute scaling and dummy
variables in regression analysis. But in the present study such factors are omitted because of the aggregative nature of the analysis. They can be more readily incorporated into analysis of individual regions or individual industries.

The particular geographic dispersion of individual firms observed at any point of time may be viewed as a product of the historical process, which in turn may have been economically determined to a considerable extent. As the economic forces which dictated present industrial locations may no longer be operative, only inertia and present cost of relocating can explain why many firms remain non-optimally located. Present locations are thus many a time not the product of existing economic factors, but of non economic factors and interplay of historical forces.

In order to perform a meaningful analysis based on economic factors alone and without historical data, it must be assumed that a significant proportion of firms are presently located as they are because of economic factors still in effect. This assumption seems justified so long as the economy is not changing radically at a rapid rate. According to accepted theory, firms whose locations are not economically 'best' and which are consequently less profitable than they might be, will,
in the long run, relocate or cease to operate. At any given time in a slowly changing economy the preponderance of observed firms can be assumed to be, in some sense, located primarily in accordance with economic principles. For the above reasons it will be assumed for the remainder of this study that current economic factors are of sufficient importance to substantially affect present locations.

1.3 The Factor Orientation Approach to Location

Takayama and Judge have tried to explain the location of economic activities in space from a general equilibrium point of view with decisions regarding prices, outputs, inputs, production and location interacting to produce an optimal solution. However, the implementation of such an analysis for the entire economy is not feasible with available data and methodology. Fortunately, the sequential nature of the location decisions and their irreversible nature in the short run as discussed earlier, permit a useful analysis of the locational decisions of individual firms, with the location of all other activities considered to be fixed.

The basic approach of this study is to examine data regarding industrial locations in the form of geographic associations at a specific point of time in such a way that probable factors influencing those associations can be deduced. It is assumed throughout that firms seek maximum profit location and that such locations can be found only with knowledge of spatial variations in revenues and costs of each firm. The present study does not consider cost or revenue functions explicitly, but rather uses empirical data to categorise firms in various industries as having found maximum profit locations which correspond to certain 'locational factors'.

List of potential locational factors vary considerably both in number and type of factors. But all these factors can be fitted into a simplified scheme. The categorisation used in this study is based on Isard's modern Weberian framework. Weber originally emphasised transport costs as the most important locational factor and pointed out labour costs and agglomeration economies as other major industrial locational factors. Isard, expanded Weber's framework to add certain other factor classification in theory of industrial location. The modern Weberian framework retains transport cost as the major determinant of location. For any firm different locations entail a differential in transport costs: (1) on inputs, including raw
materials and (2) on outputs, including those sold to final consumers. Some inputs such as unique benefits available in one urban area are not transportable and thus can be considered to have infinitely high transport costs. As for example the location of Bombay near sea-shore helps the industry located in that city to lower the transportation cost on imported raw materials used for production. In this way the agglomeration economies can be considered as a form of transport cost economies. Similarly, when large regions are considered, the inter-regional transportation cost for labour inputs is extremely high in the short run and thus labour costs as a factor of location can also be considered to incorporate some element of transport cost. Even though all factors can be reduced to a form of transport cost it is useful to distinguish certain types of transport costs as important locational factors and to identify industries for which one factor dominates all others as being 'oriented' to that factor.

This notion of orientation of industries to various factors has persisted since the earliest discussions of industrial location. While the discussants have usually recognised that firms are, at least theoretically, maximum profit seekers. Continued discussion of industrial orientation has been encouraged by the empirical fact that the maximum profit
location for many firms coincides with that which would be dictated by consideration of only a single factor. Lösch has reminded us that production orientation or transport orientation merely describe a location; they do not explain it. Klassen has also pointed out that concepts such as labour orientation imply that substitution possibilities among inputs are not great. In fact many discussions of orientation implicitly assume fixed input proportion in production. While this is unjustifiable, for many industries in the short run, firms may regard productive technologies as severely limited. In addition, if revenues and all other costs are roughly equal spatially, lower costs for any single input will make the low cost sites more attractive even if substitution possibilities are great. Thus the concept of orientation remains useful and meaningful in describing the locational behaviour of firms.

In the present study, market, material and agglomeration orientation are considered. Any other factor, influencing either the production or distribution of a product could be singled out for consideration as well, but those chosen are among the ones most commonly considered.

3 August Lösch, op. cit. p. 377.
When the need to reduce transport cost for raw materials obtained from primary resource extractors dominates all other considerations, a firm locating near these resource extractors may be identified as material oriented. Location near final demand (consumers of a firm's final product) in order to reduce transportation costs for distribution may be identified as a market oriented one.

Location near input suppliers other than primary resource extractors or near output purchasers other than final consumers may be identified as agglomeration orientation. Industries for which labour cost differentials are the dominant locational factor, may be identified as labour oriented.

1.4 Agglomeration Economies as Location Factor

The category of agglomeration economies as a locational factor has been considerably refined and expanded since Weber's time. Agglomeration economies almost always arise from external economies of areal concentration. In order to produce areal concentration, the external economies must be geographically immobile in the sense that they must be available only to firm in geographic proximity to their source. Latham has subdivided these economies into four groups:

(1) Those internal to the firm,

(2) Those external to the firm but internal to the industry (also known as localisation economies),

(3) Those external to the industry but which cannot be geographically transferred, for example, industry A locating in a metropolis by the side of industries B, C, D.... These have been named as generalised agglomeration economies in the present study.

(4) Those external to the industry but which can be transferred geographically, for example industries A, B, C, D....locating together in a cluster anywhere in the national space and using one anothers output as their inputs. These have been named as agglomeration economies in the present study.

The fourth group includes reduction in transport costs from the spatial juxtaposition of firms in different industries. When these cost reductions are on inputs from primary resource extractors they produce material orientation. When the reduced transport costs are on output sold to final demand they produce market orientation as mentioned earlier. It is the reduction in transport costs on the inputs and outputs traded between manufacturing industries by spatial juxtaposition of firms in
these industries that are the specific economies referred to in this study as agglomeration economies. The term would be equally applicable to economies arising from spatial juxtaposition of a manufacturing firm and a service firm.

The present study has tried to measure these economies and has then tried to explore their impact on geographic association of industries. A basic reason for concentrating on these agglomeration economies is because the first three groups identified above are clearly related to size or scale within the firm, industry or collection of industries, while the agglomeration economies of the fourth group are not. The researcher agrees with Chinitz that "we have been too prone to associate external economies and diseconomies with size".6

The third group of economies can also produce spatial juxtapositions but they are not primarily to achieve transport cost reductions. These economies are referred to as generalised agglomeration economies and their effects have also been explored in this study.

1.5 The Hypothesis and Objectives

The basic hypothesis of this investigation is that classical factors of location (market, resources, labour and

agglomeration economies) are important in explaining the geographic associations of economic activities. This hypothesis can also be put in another way: The location of firms in an industry, as measured by their geographic association with firms in other industries, is a function of the degree to which the industry is material, market, labour or agglomeration economy oriented.

Following are the main objectives of the present investigation:

(1) The first objective of this study is to test the proposition that a significant proportion of manufacturing firms in India has located systematically and therefore is not ‘footloose’.

(2) The second objective of this work is to divide the location of different manufacturing industries in India on the basis of different factor orientation.

(3) The third objective is to explore the extent to which firms tend to associate themselves systematically with one another geographically.

(4) The last but the most important objective of the present investigation and which forms the core of the analysis
undertaken in the present study, is to quantify the extent to which the generalised agglomeration economies and agglomeration economies which arises due to inter-industry linkages, have influenced the locational pattern of manufacturing industries in India, after allowing for the effects of other factors of location.

1.6 Data Base

The present study is a cross-sectional study, most of the data for which have been obtained from secondary sources:

(i) Selection of Region

While deciding about the regions to be used for the spatial analysis of this study, it was kept in mind that the regions should cover the whole of India omitting no areas. The ideal situation would have been to choose economic regions but as the data based on economic regions are not available districts have been taken as the basic spatial unit. In this study almost all the districts and union territories which existed in the year of study have been included.

(ii) Locational Data

As indicated earlier, an objective of the study is to measure the determinants of location of firms in manufacturing industries. The problem of choosing an appropriate measure of
location of each individual industry therefore confronts the researcher. Ideally, the volume of output in physical units or value added, for each industry in each region should have been used as a measure of the presence of an industry in each region. But since these type of data were not available, employment for each industry in each region is the measure which has been used in the study. This choice is further justified on the basis that a very high correlation exists between employment and value added data of manufacturing industries in India. The data for employment in each industry, at district level have been obtained from, All India Directory of Industrial establishments, an annual publication of Labour Bureau of India. The latest year for which these data are available is 1978-79. The latest industrial linkage data are also available up to 1978-79 only. Therefore this study has selected 1978-79 as the year of investigation.

Additional locational data required to carry out this study pertains to population of each region. The population census has been utilised for this purpose. The district wise population figures of 1971 and 1981 have been taken from 1971 and 1981

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census and on the basis of that the population of 1978 has been obtained.\(^8\)

The data of wages, value added and raw materials used in each industry are also required for this study. All of these have been obtained from Annual Survey of Industries 1978-79. In the present study, the Factory sector data of ASI have been utilised, since the same have been utilised by CSO to make Input-output transaction table of 1978-79, which has been used in this study as industrial linkage data. The factory sector of ASI defines factory as those units which employ (a) 20 or more workers without the aid of power and (b) 10 or more workers with the aid of power, whether they belong to the public sector or private sector.

(iii) Industrial Linkage Data

To identify potential agglomeration economies, data on flows of goods are required. Ideally flows in physical units would have been used, but since these are not available, the study utilises value of flows.

Data used in this study to identify industrial linkages have been derived from 115 sector Input-output Transaction Table

\(^8\) Since in Assam the Census was not conducted in 1981, the 1971 and 1991 data have been utilised to get 1978 population.
of 1978-79 made available by CSO on computer floppy. This table divides entire Indian economy into 115 sectors, out of which sectors 033 to 099 i.e. 66 sectors are related to manufacturing industries in India. This part of the table has been utilised in the present study. This corresponds to 3-digit level of National industrial classification (NIC) 1970. Therefore this study is limited to 66 manufacturing industries in India, the data for which are available in this table.

1.7 Framework of the Study

Since Weber's theory of location forms the theoretical basis of the present investigation, chapter two attempts to survey the different theories of location, which have been proposed from time to time, the continuing relevance of Weber's theory provides the backdrop to this discussion. A survey of the Industrial complex analysis and Growth pole theory has also been undertaken in this chapter.

In chapter three, it has been tried to see empirically whether the Indian manufacturing industries are systematically located or are footloose.

In chapter four, methods of identifying each type of orientation are detailed and then industries have been
categorised according to different factor orientation. In this chapter the inter-industry linkage pattern has also been traced on the basis of input-output data.

Chapter five, explores the means of measuring agglomeration or spatial juxtaposition of industries.

Chapter six, examines the impact which agglomeration economies have on spatial juxtaposition of Indian manufacturing industries. Bilateral relationships between industries are examined with the aid of multiple regression models.

And the final chapter summarises the results of the study, states some conclusions that might reasonably be drawn from these results and indicates some future avenues of research in this area.