There is a host of locational theories attributing different factors for the clustering of economic and industrial activities at selected centres. As the present study basically attempts to evaluate industrial policy for the development of backward regions, it is beyond its scope to include a large dose of locational theory. However, for understanding and appreciating the regional economic trends in a developing economy like India, it is necessary to examine the basic elements of some of these theories.

At the micro level, the basic contribution of these theories lies in disseminating the information on the factors influencing the individual location decisions. Since the industrial policy for the development of backward regions is basically designed to influence these individual decisions, greater knowledge of the preference functions enables the selection of policy instruments to be more precise and scientific. While on the one hand the regional location theories at the micro-level have been evolved without barriers of regional boundaries and look at individual location decisions in terms of a continuous space variable, on the other, regional growth theories assume some regional framework to which macro theories of growth and development could be applied. These theories along with the allied issues like the need and role of Government intervention in the allocation of factors of production,
regional planning techniques etc. will be analysed in this chapter in so far as it promotes better understanding of the growth process of backward areas in the context of the Indian economy.

It need hardly be stressed that these references are highly selective rather than comprehensive, since the objective is quite modest, which is to provide minimum of understanding in order to appreciate what is happening at the regional level.

2.1 LOCATION THEORIES

A critical view of the pattern of growth of locational theories reveals that initially transport, labour and such costs were considered to be catalytic factors in the locational decisions of entrepreneurs. Subsequently, demand, institutional, personal and a host of other factors were incorporated in the framework of the theory so as to make it compatible with general equilibrium framework. These theories may also be categorised into four groups, according to the motivation attributed to the decision making entrepreneurs. These are: (a) minimising costs, (b) maximising revenue, (c) maximising profit, and (d) satisficing.

2.1.1 Minimising Costs:

Amongst the first group, Weberian theory is at the forefront and is predominantly a transport oriented theory. According to this theory, optimum location is determined at the site that minimised transport costs. The theory states that the minimum transport costs are determined either at the source of raw material.
or at the place of consumption. In addition to the transport cost, the other factors embodied in his theory were labour cost and agglomeration economies. Weber was the first to emphasise explicitly agglomeration economies emerging from the location concentration of several plants in the same industry. However, these are neither dealt in depth nor do they play any significant role in his theory.

Weberian analysis, especially transport orientation aspects was further improved and restructured by Isard. In his model also the optimum location of industries is achieved at the place of minimum transport cost. However, it is an improvement over Weberian analysis as it is capable of incorporating more realistic transport structures. Isard has been able to accommodate in his model the zonal character of many transport structures, high terminal costs due to break at transport junctions, in addition to dealing with non-proportional transport rates. He has been able to demonstrate that the transport cost itself can be regarded as an input in the productive process and consequently the choice by a firm about the location becomes similar to the choice of factor combinations. This has brought necessary flexibility in his approach.

Weberian theory, along with Isard's refinement over it, was essentially a least cost theory of plant location based upon the minimisation of transport cost and was put to criticism on many counts. Later it was realised that besides transport costs, there are many other costs like cost of raw material, wages, site costs etc. other than freight charges on them, which varied substantially
on different locational points. This inspired development of those theories which emphasised the minimisation of the total cost. In this connection the contribution of Edger Hoover merits attention. In Hoover's model all the costs have been classified under transportation and production costs, and further the importance of transportation costs has been demonstrated under the conditions of constant returns to scale. However, these theories had limited applicability because they failed to incorporate demand and revenue aspects in their analysis.

2.1.2 Maximisation of Revenue:

As a counterattack on minimum cost theories, there was evolution of such theories which primarily focussed attention on maximisation of revenue as a major factor responsible for spatial variation of economic activities. This constitutes the basic ground for the second group of theories. The earliest contribution to these theories was made by Hotelling and Smithies. They start with the assumption that the location determines revenue rather than cost. Under the assumptions of the spatially distributed market, the primary factor affecting the selection of the site is the location of the competitive firms. Consequently, the firms move away from minimum cost locations, more so because of incentives to agglomeration. According to the locational inter-dependence model, agglomeration may be achieved even in the absence of internal and external economies of scale, substantial spatial differences in production cost and marked variations in demand. The problems of locational inter-dependence have been analysed under the following restrictive
assumptions: two or three firm models, linear rather than areal markets, and costless and instantaneous relocation. The duopoly case, as analysed by Hotteling, shows that duopolist will have tendency to agglomerate around linear markets, even though the site may not ensure minimum cost. The site may be even that of maximum transport cost. The obvious reason is that only with agglomeration, there will be no tendency on the part of one firm to intrude over the protected market of the other firm.

Further developments in this field, as outlined by Learner and Singer, with three firms have shown that there would be complete instability in location, and the application of game theory appears a potential fruitful means of handling these situations. With more than three firms, there will either be dispersal or clustering of pairs of firms depending upon the prevailing location pattern at the time of the entry of new firms. The locational interdependence cases under the above group have shown that location of the firm will be non-optimal although the extent of non-optimality will be less as the number of the firms increases.

The implementation of the revenue maximising objective of location will differ between space and spaceless economy. In a spaceless economy the firm, predominated by the consideration of short run revenue maximisation, will produce to the level where the total revenue is maximum, i.e. when marginal revenue is zero. Normally, the pursuit of this objective will be subject to a profit constraint and in that case the identification of the total
costs becomes necessary. However, the sales maximisation output will still ensure the maximum of revenue, if the difference between the total revenue and costs is not less than the minimum profit level.

On the other hand, in a space economy, both location and output are variables and it calls for estimation of both total revenue and costs at all the levels of output and site. More so, in the context of a location decision, as the relocation costs are very high due to the time horizon, the relevant objective will be long run rather than short run sales maximisation. As the firm with the sole objective of sales maximisation always intends to expand, the calculation of total revenue and total costs, at each location of plants larger than one intended to be established initially, becomes inevitable. It is, therefore, clear that under the conditions in which both location and output are variables, it becomes increasingly difficult for the firm to correctly estimate total revenue and total costs and the degree of error always increases. As a result most of the location decisions taken by the firms motivated by the revenue maximisation objective are taken on ad-hoc basis owing to the complications and intricacies of precise calculations of total revenue and costs.

2.1.3 Maximisation of Profit:

The third group of theories attempts to investigate the effect of location on both revenue and cost. Such theorisation
was comprehensively attempted by Greenhut 6 with refinements made by Moses and Churchill 7. Under the conditions of cost and demand variations, Greenhut has developed a model of locational equilibrium for those firms which aim at profit maximisation. The formal condition of equilibrium with this objective is that each firm will select a location from which it is able to supply its product to the buyers (whose purchases are needed for maximum profit) at the minimum total cost. The entry of a new firm alters both the cost and relative demand of the firm. Ultimately, the search for locating the firm at the site of maximum profit will reduce the market area of the firm to the extent that the excess profit are eliminated via the tangency of average revenue and average cost.

The contribution of Losch 8, which lies somewhere in between the second and third group of theories merits special attention. Based upon the assumptions of uniformity and ubiquity of cost in respect of space, population densities, income and tastes, and such other variables, Losch has constructed a model in which hexagonal market area emerged around a production cone, which ensured optimality to the location of an individual plant of a commodity. In the absence of the economies of scale of production, the model implied both revenue and profit maximisation. Loschian approach came under severe criticisms for its unrealistic assumptions by Isard, Richardson and Greenhut 9.

2.1.4 Satisficing Behaviour:

The fourth group of locational theories – related to satisficing
behaviour - have emerged mainly out of the theoretical and empirical shortcomings of the revenue and profit maximising theories. It is worth examining some of these criticisms at this juncture. It is difficult to pursue the profit maximisation objective if the firm cannot anticipate its competitors reaction to its own decisions. The search for profit maximising site of optimal location is weakened due to the unpredictability of the future changes in the spatial cost and revenue and the difficulties in measuring the external economies. Locational inertia is often an obstacle to relocation to a higher profit site. Besides, as the discount rates and risk premiums differ from firm to firm, the profit maximising site of one firm may not necessarily maximise profit of another firm’s plant of the same size. Thus, even if profit maximisation governs the behaviour of the firm, inherently it is subjective rather than objective and the ex-ante prediction of the best site becomes very difficult.

Empirical studies also do not support maximising behaviour on the part of the firm. Profit maximising criteria requires the detailed investigation of the cost and revenue at the large number of sites scattered over several regions, while empirical findings suggest that location decisions are made very quickly after considering very few sites, usually limited to one area. Townroe has suggested that the location decision is only one element in the broader set of decisions regarding the investment project and its management. The chance and early start were given due importance in the locational behaviour of the firm, but the recent studies of
Law, Loasby, Needleman and Scott have highlighted the following features:

(a) The location decisions are taken at the point of emergency and under compulsions. Consequently, it is a speedy decision without profit motive and is considered to be better than ideal decision.

(b) There is rarely any systematic and precise calculation of cost and revenue at alternative sites.

(c) In majority of the cases the firms seek for such location sites which are nearby and easily obtainable. The search is made out of easily accessible sites and amongst them the satisfactory site is accepted. The underlying assumption is that the firm considers the already searched out location as the optimum one.

As outlined earlier, these criticisms led the foundation stone for the emergence of 'satisficing' theories of location. It is propounded by the exponents of these theories that the business firms instead of seeking to maximise profit or revenue may seek to achieve the minimum objective of the long run viability of the firm and the earning of a reasonable level of profit. The implicit behaviour behind the above objective is called 'satisficing'. The firms guided by the satisficing behaviour tend to locate the firm near the centres of agglomeration, and to the sites where future costs are not supposed to rise indiscriminately. They avoid risky locations in non-indus-
trialised areas as well as in areas of high congestion cost. The theories in this group also take cognisance of the 'psychic' income emanating from the exercise of locational preferences and other personal factors. These include the desire to save time and efforts in the site search, the general facilities around the site, the uncertainty about rival firms' behaviour, the shape of labour relations around the site and host of subjective considerations. As highly congested sites are ruled out, the selection of the location site is generally guided by the environmental and personal factors. There is, of course, indeterminacy in the satisficing locational choice but it has got the advantage of taking into account the 'psychic' income and is capable of explaining the reasons behind the selection of a particular site despite the existence of other profitable sites. The theory is in tune with the modern organisation theory which states that the decisions are evolved out of group processes and do not directly reflect the stable objective function. The theory is more realistic but its predictive power gets considerably reduced.

2.2 LOCATIONAL THEORIES AND POLICY IMPLICATIONS

The evolution of location theories as discussed in the preceding section has certain important policy implications for the regional policy designed to develop the backward regions. In general, as demonstrated by the satisficing theories, business behaviour is rarely governed by the comprehensive cost, revenue and profit
calculations in the selection of site for plant location. This widens the scope for the conscious direction of policy to change the location site and preference function of the individual producers. Individual location decision becomes amenable to the external policy changes.

The social costs of selecting alternative locations are never taken into account by the least cost theories of location. These social costs may get incorporated in the private costs through specific policies on the part of the Government by means of taxes, subsidies, compensating payments, etc. The process may help in changing the location site to the desired social goals. These theories also require perfect knowledge about variations in costs at different location sites on the part of the decision maker. Lack of complete knowledge of such cost variations results into non-optimal locational equilibrium sites.

In the maximum revenue theories of location also, social cost is not considered. Besides, due to the locational interdependence, there is a systematic tendency to the selection of those sites which may not prove to be optimal. These theories also assume perfect knowledge about locational alternatives which may be unrealistic in the real situations.

The major policy implications emerging from the profit maximising theories are that through taxes and incentives, the profit maximising location may be made synonymous with the social
optimum. Further, the Government may assist the location decision makers to perfect their knowledge about costs and revenues at alternative sites.

The satisficing theories of location, which do not subscribe to the maximising behaviour of the firm, have very important bearings on the nature and pattern of the regional policy. Since the firms do not seek to maximise anything and do not set before themselves certain minimum standards of achievements, the individual decisions may easily be influenced by the policy directives without the loss of private efficiency. Interference in the location decisions may not necessarily result into efficiency loss since it is uncertain as to whether the freely selected site will be less or more productive than the site directed by the Government. The framing of the regional policy for locational shift may not necessarily be done in terms of externalities of locational choice. Under certain conditions, the firm may respond more effectively to cruder measures like administrative regulations and facilities than the modern devices of monetary incentives. Another policy implication stemming from these theories is that the policy for the growth of backward regions should be simple and persuasive rather than rigid and sophisticated for the receptivity of the former will be more amongst entrepreneurs.

2.3 REGIONAL GROWTH THEORIES

Regional growth theories and models differ from national growth theories in so far as there is greater possibility of factor
movements, especially labour and capital, in the former than the latter. Even with the given stock of national resources, the relative growth rate between different regions and between the whole nation and a region may sharply differ due to the mobility of capital and labour between the regions. In a dynamic setting, where the stock of national resources continuously changes, there is still greater possibility of regional growth differentials. This section aims at briefly examining these regional growth theories, i.e., as to how and why a region develops, and their implications in designing the regional policy.

2.3.1 Convergence Model:

Although there are many regional growth theories, these may conveniently be grouped into two groups. First group is comprised of those theories which predict that inter-regional growth process is basically equilibrating and ultimately there is convergence of inter-regional per capita income differentials. This is basically the neo-classical model, which derives its framework from its economic theory. The model has been extended by Borts and Stein, and Romans to the problems of regional growth. In its simplest and crudest form, it yields neat and precise predictions. The chain of causation runs as follows:

Under the assumptions of full employment, perfect competition, single homogeneous commodity, zero transport costs, regionally identical production functions exhibiting constant returns to scale,
a fixed supply of labour and static technical progress, the marginal product of labour (wages) is the direct function of the capital-labour ratio, while the marginal product of capital (return to capital) is an inverse function of the capital-labour ratio. Under the assumption of identical production functions, this would imply the movement of labour from low to high wage regions and that of capital in the opposite direction (since low returns to capital imply high wages, and high returns are obtained in low wage regions). The process of outflows and inflows continue until factor returns are equalised. From another angle, the process will result into inter-regional equilibrium and identity of factors prices with their respective marginal productivities. The natural outcome of these flows is the trend of convergence in regional per capita incomes. This, however, does not necessarily mean absolute equalisation of regional per capita incomes. To ensure this trend, further assumptions that there are no geographical differences in the distribution of income and other unearned incomes and that the labour participation rate is universally fixed amongst regions, will have to be made.

The model could safely be extended to encompass the intra-regional growth characteristics. On the assumption of uniform population growth in different areas of a region, the rate of growth will be fastest in those regions where misallocation of resources is corrected by the flow of factors from below average return areas to above average return areas. Historically this has been associated with the movement of resources from primary sector to secondary and
tertiary sectors. In general this would produce convergence in the relative prosperity of different areas. The depressed areas will experience fastest growth rate since they offer maximum scope for resource reallocation.

2.3.2 Divergence Model:

As contrast to the neo-classical approach, Myrdal-Kaldor models predict divergence in the regional per capita incomes on the assumption that the inter-regional growth is basically circular and cumulative. These models demonstrate that once the industrial centres have already grown owing to initial advantages (e.g. a natural resource base, a transport facility etc.), the process becomes self sustaining and cumulative because of the internal and external economies at the centres of agglomeration, and the inability of the businessmen to conceive the economic opportunities in the periphery. The process of cumulative causation produces the spread and backward effects in respect of backward regions. The spread effects are always to the advantage of backward regions as it leads to the increase in the demand for primary products on the one hand, and innovation diffusion in these areas on the other hand. The backwash or unfavourable effects are detrimental to the lagging regions as there is outflow of labour, capital, and goods and service from these regions to the developed industrial centres. According to the model, the backwash effects outweigh the spread effects and consequently the inter-regional growth is disequilibrating in nature. Per capita income differentials are widened and backward regions
ultimately become the primary producing satellites of the prosperous regions.

Similar to the cumulative causation model, Friedman\textsuperscript{15} introduced core-periphery model to analyse the regional development trends in Latin America. It has provided quantitative and empirical support to Mydral-Kaldor models in two respects. First, because the use of 'core' implies one major developed region, usually the metropolitan region, and second because the model implies a distance differential between the core and periphery with respect to major markets.

In between these two extremes fall many hybrid approaches. For instance Williamson\textsuperscript{16} argued that inter-regional growth tendencies are a function of the level of development, with the prediction that spatial disequilibrium is the characteristic pattern in the industrial 'take-off' period, but the equalisation trends tend to predominate at later, more mature, phases of development. Others suggest a need for a single model equally capable of predicting convergence or divergence according to the values of its main parameters.

In addition to the convergence and divergence approaches to the regional growth theories, some of these models examine the problem from the point of view of the factors which are strategic in the regional growth. In this respect it will be worthwhile that the export base and Harrod-Domar models are briefly examined.
2.3.3 Export Base Model

According to North and Tiebout, one of the propulsive factors for regional growth is the 'export base' of the region. These models have shown that in the short run, the expansion of the export accelerates regional income both directly as well indirectly through the increase in the demand of its product and services. In the long run, increased export brings about structural changes in the regional economic structure through the capital and labour movements and these changes tend to reinforce the process of regional growth. It is easy to restructure the model by identifying particular types of export expansion which will have largest growth effects, but even then the theory retains crudities which limit its value. Richardson, thus has shown the long list of the shortcomings of the model, particularly those stemming from its neglect of autonomous variables other than exports, particularly in a dynamic context, the neglect of technical change and autonomous investment, and the assumption that exports are exogenously determined whereas in inter-regional trade the level of exports is determined by the import functions of other regions. In a closed system all the regions cannot have export surplus and the model fails to predict as to whether the poor regions have the potentiality to raise the level of exports or not. The relationship between the level of income and the rate of growth of export is also not clear in these models. Nevertheless, despite these weaknesses of the model, the capacity of regions to develop industrial structures conducive to the development of exports is widely held to be an important
determinant of their growth prospects.

2.3.4 Harrod - Domar Model:

Another major approach to the problems of regional growth is through the application of national growth models, particularly Harrod-Domar model. Richardson has successfully attempted to apply Harrod-Domar model in the regional settings. The model considers the regional growth from supply side and regards it as a function of capital accumulation, labour supply and technical progress. Migratory flows are regarded as the major source of supply of these variables. In this model, if regional growth rates depart from an equilibrium both, the divergence is likely to become wider in the absence of equilibrating factor flows. These flows do not form an equilibrating mechanism within the model itself. Some of the other important inferences to be drawn from the model are that the regions with higher propensities to save, lower capital-output ratios, net import surpluses and net immigration will grow faster than others.

2.3.5 Policy Implications:

Regional growth theories have varied policy implications for the development of backward regions. The neo-classical model, which is basically a convergence model would require the Government to precipitate the process of equalisation through framing and implementing such policies which are conducive to the process of
resource mobility. At inter-regional level, the policies should be
directed at increasing the mobility of factors geographically, while
at the intra-regional level the attention should be focussed on
increasing the mobility of factors as between different sectors
within a region. The difficulties in drawing policy implications
from Kaldor-Mydral model are that the policies themselves are seen
as offshoots of the process of cumulative causation. The political
system in developing countries is still not motivated towards
egalitarian policies and is still dominated by the built-in federal
structure. Consequently, neither there is a will to reduce economic
disparities nor the policy instruments have evolved to cater to the
situation. Paucity of central resources to bear the redistributive
cost is another constraint in these nations.

However, presuming that the Governments of these countries
are seriously inclined towards mitigating these regional economic
disparities, the following policy implications emerge from the model.

First, the Government should develop the growth centres with
fully equipped economic and social infrastructures for counterweighing
the pull of existing developed centres. Second, the nature and
pattern of spread and 'backwash' effects should be thoroughly
investigated by the Government with the objective of encouraging the
former and curtailing the latter. As hinted by Friedman, the
entrepreneurs may fail to 'perceive peripheral investment opportu-
nities. More so, the relative attraction of periphery to secondary
industry may be increased by policies designed to effect decentrali-
sation of tertiary services. For dissuading the firms to choose congested areas, they may be required to pay the cost of external diseconomies of these areas. Some of these policy instruments will substantially aid in reducing regional income differences, but the model proclaims that only prosperous countries are capable of evolving and implementing equalisation measures.

The policy implications of export base model are quite clear and precise. The stimulation of exports of the backward regions becomes the principal policy instrument for promoting regional economic equality. The impetus to the growth of these regions is provided by the policies designed to expand their exports through the fall in the input prices by offering export subsidies or labour and capital subsidies. The problem, of course, arises in the case of those regions whose products face inelastic demand in the market. Primary producing areas usually fall in this category. The Government's responsibility in the case of such areas will be first, to actively help in transforming the industrial structures of these regions, and second to initiate the measures for accelerating their exports once their industrial structure is changed.

The implications for regional policy emanating from Harrod-Domar model mainly relate to the level of investment and technical progress in the backward regions. If the growth path diverges from the equilibrium path, it becomes the responsibility of the authorities to restore the equilibrium path. According to the model the backward regions with slow growth are generally those whose rate of growth of investment falls short of the rate of growth of capacity. The
obvious alternative is to accelerate the regional investment which could be accomplished in two ways. First, the Government may embark upon its own investment programmes, and second, it may encourage private investment through various incentives to go to the backward regions. The rate of technical progress in the growth process has been vigrously emphasised in this model. While at the national level, the rate of technical progress is important in determining the growth of capacity, at the regional level it's importance lies in determining the relative growth of a region in comparison with other regions. The Government's action in this respect lies in diffusing the technology in the backward regions through various policy measures.

2.4 NEED FOR GOVERNMENT INTERVENTION

The need for Government intervention in the development of backward regions stems mainly from the failure of free market mechanism to ensure equitable distribution of economic resources amongst different regions of the country. Growth models, as observed in the preceding sections, widely differ in their predictions about the possibility of convergence in regional incomes and growth.

The proponents of laissez-faire policy in regional affairs predominantly rely upon the market forces in optimally allocating the factors of production to ensure maximum efficiency. Price mechanism is supposed to take care of resource misallocations.
The argument runs as follows:

The price of factors of production will rise in the areas experiencing the scarcity of these resources. As a result, there will be rise in the supply and fall in the demand for these resources. On the contrary, in those areas where factors of production are surplus and are under-utilised, the prices of factors of production will fall leading to expansion of demand and reduced supplies. The process continues unless equilibrium is achieved.

This is essentially an approach in consonance with the neo-classical model. The labour is presumed to move from low to high wage regions, while on the assumption that the return to capital is inversely correlated with the wage level, the capital moves in the opposite direction. The obvious outcome of such factor movements is the faster growth rate in the low wage regions.

Another source of convergence is the factor flows within regions from low productivity sectors (like agriculture) to the high productivity sectors, thereby accelerating the growth of per capita income. Such sectoral shifts have been the usual phenomenon in the growth process of developing countries. It has also been asserted that the rising trend of growth is automatically arrested, once a region attains and experiences sufficiently high level of development. However, the actual experience of growth in the developing economies may be quite contradictory and tendencies towards divergence are more predominant.
The Government intervention at the regional level is also opposed on various other grounds. It is argued that the spatial cost, price and income are very minute, sharp and sensitive and the Government policy is incapable of incorporating them in its framework. Opponents to the Government intervention in the space economy also rest their arguments on the plea that in case the decision making is scattered amongst various individuals, instead of being centralised, the forecasting errors will not be of large magnitude. Empirical evidences, especially the trend of convergence in the United States, where there was no Government intervention is also sighted as a test of efficiency of market mechanism and is used as an argument in keeping the State away from muddling in the affairs of the space economy.

However, the market mechanism may not prove to be as efficient and meticulous as portrayed by its supporters. Due to the market imperfections, the factor prices do not reflect the relative scarcities of these factors of production. For instance, due to the process of wage bargaining, the wage level may rise even in those areas where labour is relatively in excess supply. This may be an effect of successful wage bargains in the regions where similar type of labour is scarce and its transmission from the surplus labour regions is not possible. There may be personal and psychological barriers to the migration. The workers, especially the old one, may be hesitant to move to the high wage regions due to the heavy cost involved in moving to new jobs and residences. Consequently, the number of migrants may be less than what may be required to reduce inter-regional wage differentials.
Under certain conditions in-migration may actually prove to be disequilibrating. The inflow of workers in a region changes the levels of consumption and investment in social capital and consequently produces continuous additional demand for labour. Quite often, such increased demand may not be met by the supplies from the in-migrants.

Like labour, there are equally powerful forces preventing the flow of capital from the prosperous to the depressed regions. The theory of market mechanism is based upon the assumptions of comparative statics, while the regional growth is essentially a dynamic process. The assumptions of perfect competition and marginalism, upon which the efficiency of the market as an allocator of resources is built up, are idle conditions and rarely present in the context of space economy. The spatial market forms are basically in the nature of oligopoly and monopoly. Locational decisions and shifts are usually conditioned by either "high jumps" or "no jumps" at all. They are rarely marginal in nature. Under the dynamic conditions, the spatial growth experiences technical progress and innovational changes. Such changes are disproportionately concentrated in the prosperous regions to the disadvantage of backward regions. These changes are usually a function of expenditure on research which tend to favour high income regions. The high income regions are also favoured with agglomeration economies, which in the long run, tend to be self perpetuating. The highly skilled technicians and managers, who are instrumental in transforming technical innovations
into investment projects have a tendency to prefer highly developed regions and hesitate to move to the backward regions due to the lack of the preferred social and cultural environs. The requirements of high level of investment and industry mix for introducing technical progress may be another factor inhibiting the diffusion of technical progress in the backward regions. Technical progress and geographical concentration of technical managers may, therefore, prevent the movement of capital from less to high developed regions.

In addition to the technical progress, the equilibrating capital flows may be obstructed by other reasons also. The new investment is attracted to the highly developed metropolitan centres because they reap external economies and have well nourished markets for input supplies and output demand. The expansion of national income goes in favour of these centres as they produce goods and services with high income elasticity of demand. Further, the imperfections in the market may obstruct the flow of capital to the prosperous regions. Granting that the returns to capital are low in prosperous regions, there may be preference to invest these savings in areas of the origin due to the factors like the derivation of 'psychic income', overestimation of agglomeration economies, and the presumed risks involved in investing in backward regions.

As is evident from the above analysis, there will be very effective and strong tendencies working contrary to the equilibrating trends if the assumptions of comparative static model are relaxed and dynamic conditions are allowed to intervene. However, it is interesting to note that even under the conditions of comparative
static, the regional growth may not be equilibrating if we remove the assumptions of identical production functions and single commodity. In that case the nature of production functions in high income regions may be such as to yield increasing returns to scale and rising marginal product of labour. Besides, high capital-labour ratio will be associated with the higher output and wages per worker. Introduction of more than two commodities implies that the relative levels of income per worker will rise in those regions which specialise in the production of commodities having high income elasticity of demand.

The inferences which can be drawn from the above arguments are that the economic system generates such conditions as would obstruct the equalisation of returns to factors of production between different regions. It is interesting to note in this connection that even if the factors flows favour a strong convergence trend, inter-regional per capita incomes may not be equalised due to the following reasons.

First, returns to homogeneous factors may be equalised but the wage differentials may persist due to the heterogeneity in the factors of production. The heterogeneity stems from differences in the skill, occupational patterns, proportion of skills to total workers, employment structure, industrial composition and degree of urbanisation. Second, income differences may be due to differences in the labour force participation rates amongst different regions. Third, per capita income between different regions may differ due
to the heavy concentration of property and unearned income in certain regions.

Finally, the Government intervention may be desirable even if there is long run tendency for per capita income to converge, because the interim period of adjustment may be unnecessarily painful. Market mechanism may involve sharp divergences between social and private costs and returns. Neither social costs of congestion in metropolitan centres nor social returns of creating income and employment opportunities in backward regions are considered in the private calculations. Politically also, the policy of non-intervention in regional economic affairs is rejected, if it perpetuates regional income differences.

Empirical evidences in case of Indian economy as borne out in the first chapter, are pointer to the increasing concentration of economic and industrial activities in few limited States of Maharashtra, West Bengal, Tamil Nadu and Gujarat. These trends are suggestive of strong applicability of the cumulative causation model and dominance of the forces of divergence. Within the developed States also, economic activities have clustered around metropolitan centres like Bombay, Calcutta, Madras and Ahmedabad. The Government intervention in the spatial problems, especially in the economic upliftment of the backward regions, in a developing economy like India becomes a necessity both on theoretical and empirical grounds.
2.5 REGIONAL PLANNING TECHNIQUES

Once it is established that the regional problems cannot be left to the free play of market forces, and that Government intervention is indispensable, it is worth examining some of the widely discussed techniques in the sphere of regional planning. Planning for the development of backward regions basically differs from the national planning in so far as these regions are more open economies than the latter. As a result, regional policy instruments prove less effective due to the 'spill over' effects outside the regional boundaries. The inter-regional data on economic relations is also inadequate and superfluous. In a centrally planned economy it is easier to reconcile the conflicting national, sectoral, spatial and other goals and integrate them into one model, but it is difficult in a system based upon indicative planning. In the indicative type of planning, the sectoral targets are given primary importance and regional dimensions become subjected to the sectoral requirements. The sectoral targets are set in the national planning framework whose time span generally spreads from four to seven years while the regional targets are always set in the long run time horizon of spatial planning ranging from ten to fifteen years. Regional development strategies produce effective results only if they are based upon the long run spatial planning rather than upon short run sectoral planning.

Tinbergen"^{21}(Appendix 2.1) has developed a model which spells out the techniques of allocating resources amongst sectors and regions.
But the practical importance of the model is limited to the planners due to its highly theoretical and mathematical structure and its large data requirements. It is doubted as to whether the model can be of greater use than providing very broad and crude guidelines in the planning decisions.

In the regional model, the number of exogeneous variables outside the control of planners are always more than the national model and it seriously limits the scope for manipulating policy instruments to achieve the regional targets.

Most of the techniques used in the regional planning are the same as used in the national planning models. However, there are severe limitations in extensively applying these techniques in the regional set up. Some of these techniques are discussed below.

2.5.1 Input-output Model:

In the simplest form, input-output technique, developed by Leointef; demonstrates that the output of one industry is either used as an intermediate input in another industry or is consumed directly. Given the quantities of available resources and the state of technology, the analysis seeks to determine what can be produced and the quantities of each intermediate product which must be used up in the productive process. Input-output analysis has been used in national economic planning in various ways, particularly in predicting future production requirements.
While applying the technique to the problems of regional planning and development of backward regions, one encounters manifold difficulties. As regional economies are vulnerable to many exogeneous variables, the aggregate regional model may not deliver the desired results. Disaggregation of regional income would be required at two levels: first, the income has to be disaggregated industry or sectorwise for preparing inter-industry matrix, and second, the disaggregation has to be done for estimating inter-regional flows and for recording the effects of exogeneous variables. The inadequate data, especially pertaining to inter-regional flows in most of the developing countries severely limits the scope for applying this technique in the sphere of regional planning. The data on inter-regional flows of income could be obtained only through the industrial surveys, which may prove to be very costly in view of the limited resources of these countries.

In addition to very unrealistic assumptions of input-output model, like linear input functions, no external economies, no multi-product industries and neglect of capital formation, certain additional assumptions like stable trade coefficients and fixed supply areas have to be made while extending this technique to the regional problems. In turn, these assumptions would further imply the stable relative prices and non-competitiveness between different regions. Another limitation of the technique in the context of regional affairs is that while the technique is static in character, the regional growth is essentially dynamic in nature and content.
However, the usefulness of this technique in future will largely depend upon the results of the investigations about the constancy of input-output coefficients.

2.5.2 Linear Programming:

Linear programming is a technique which seeks to maximise or minimise certain functions (commonly referred to as objective function) subject to certain constraints (referred to as linear inequalities). The technique has been applied both at micro and macro levels.

In the sphere of regional development, the technique may be used in several ways, particularly in maximising the regional output subject to the constraint imposed by resource scarcity or capacity limitations. Similarly, it may be used in the national planning which aims at maximising the national growth rate subject to the constraint that the regional inequality does not increase beyond a minimum limit.

In the regional set up, the application of the technique is limited due to its basic assumption of linear production function. Linearity assumption is inconsistent with some of the fundamental characteristics of regional growth like external, agglomeration, and scale economies. Non-quantifiable variables, which usually appear in regional development, also fall outside this programming technique. Some of these shortcomings reduce the scope for application of this model in regional analysis; nevertheless its
usefulness may be enhanced provided its operational size is trimmed to the locational requirements.

2.5.3 Cost-Benefit Analysis:

The use of cost-benefit technique in regional analysis primarily rests upon the possibility of a dichotomisation between the private and social costs and benefits. It implies that for locational purposes, the public investment projects should take into account cost and benefit and should not merely be guided by the narrow investment criterion. The technique states that the social benefits accruing from an area should be the guiding force particularly in the location of those projects which have identical costs at different locational sites. As the regional planning involves large scale public investment and subsidies to private investors, the technique has got wide scope.

However, the actual application of the technique in the planning of backward regions is associated with various difficulties. While on the one hand, there are conceptual difficulties regarding the items to be included in the benefits, on the other, it may be a very complicated exercise to actually evaluate these benefits under market imperfections. It will also be a complex exercise with reference to the problem of assigning prices to collective goods. Further, there are associated issues like quantifying abstract benefits and costs, choosing appropriate discount rate, analysing the problems associated with uncertainty, and incorporating those projects which are large enough to change the relative prices
of output.

The technique may be more useful in comparing the public projects in the same field rather than in deciding their locations amongst different regions of the economy. The technique has wider applicability in smaller projects and public utility investment. Despite these limitations, the cost benefit analysis may be used in the regional context in selecting a suitable location for a project, provided there are large differences in costs and benefits at different locational points.

2.5.4 Industrial Complex Analysis:

Industrial complex analysis has been expounded by Isard, Schooler and Victorisz, according to which a set of activities take place at a given location as a result of industrial relationships in terms of production, marketing and other linkages. Steel or petro-chemical complexes may be cited as examples in which the entire production is either based on single raw material or the entire set of activities are carried out at a single place.

The technique has the advantage of taking into account the inter-industry relationships without resorting to the sophisticated input-output model. The technique can also effectively deal with the problems associated with locational and external economies and with price variations resulting from factor substitution.
The technique may be immensely helpful to the regional planners in programming the development of backward regions provided it is supplemented with other techniques and is not used in isolation. Technically, its weakness lies in failing to take account of those external economies of location which are not easily quantifiable.

2.5.5 Technique of Area Planning:

The technique of area planning has been recently evolved and it basically relies upon the mutual relationship between different industries. As against the input-output model, in this technique there is no need for the large and comprehensive data collection. The local or regional economy is divided into two sectors - major and minor - and the information only about the major sector, defined on the basis of size or rate of growth, is required in the technique. Inter-industry transactions in the minor sector are recorded at the household level.

The technique heavily relies on economic base analysis as the export transactions are regarded to be the main variable in the final demand, but unlike base analysis aggregations are not required in this technique. The technique may widely be used either for prediction or for evaluating alternative policies in terms of their impact over a region in generating income and employment.

Like others, this technique has also its limitations in the sphere of regional planning. In this technique it is difficult
to record the impact of those policies which are designed to achieve broader national objectives. Similarly it is more effective in evaluating the policies in the small areas within the region as compared to the large and widely differentiated areas.

2.5.6 Comparative Cost Analysis:

On the basis of a given geographical distribution of factors of production and the marketing pattern of the final product, this technique attempts to match industries with different regions of the country. Within the framework of this technique, only those industries should be developed in a region in which comparative cost of production and distribution is the minimum. It is argued that the data requirements in applying this technique to regional affairs may be considerably less, if initially few regions are selected for development on the basis of certain general criterion. Afterwards comparative cost studies are made within those regions, if these have marked disparities in production and marketing costs.

The major source of weakness of this technique is that it is static in character, while in locational theory, the relative cost of production may undergo sharp and quick changes due to the changes in the technology, production techniques, and discovery of new sources of raw material and new markets. Besides, there may be other than cost constraints like worker's indiscipline, strikes etc., which may prevent the movement of entrepreneurs to certain areas. The technique is more useful in the case of private
projects rather than public projects, because it compares only private cost and completely ignores the social cost. The analysis is also deficient in so far as the relative prices between regions are assumed to be fixed, which itself may change due to the location of industrial projects in a region. Recently attempts have been made by Isard to supplement this analysis with scaling or latent structure technique so that it may take cognisance of those locational advantages and disadvantages for which it is difficult to ascribe monetary values. This has met with limited success.

In this section, we have briefly examined some of those techniques, which have been deployed as tools of analysis by the regional planners. Most of these techniques were evolved in the context of the macro models and planning and afterwards the sporadic attempts have been made to widen their scope so as to encompass the problems of regional growth and planning. No technique in itself is thorough and comprehensive enough to claim universal applicability in all the regions and areas of the economy. Each sub-region and area within a region are faced with specific and diversified problems of their own. There is, therefore, need for selecting suitable techniques after careful investigation about the problems of each region. It may be more fruitful if a few of these techniques are supplemented with each other while planning for the development of the backward regions.

As the Indian planning is aggregative and sectoral in character, the growth models do not exclusively take into account the regional dimensions of economic variables. However, isolated attempts have been made, through other methods, to apply
these techniques in the development of backward regions. The paucity of data at the regional and sub-regional level constitutes one of the major bottlenecks in applying these techniques in planning for backward areas. Industrial complex analysis has also been attempted by the Central Government without much success.

2.6 CONCLUSIONS

In this chapter, we have briefly examined the locational theories, both at the micro and macro level, and their impact on the evaluation of policies for the growth of backward regions. It is borne out by these locational theories that there is no rigidity in the individual locational decisions and these could easily be influenced through proper policy directives without the loss of economic efficiency. The newly emerging 'satisficing' theories have the far reaching implications in respect of regional planning.

The theoretical arguments and empirical findings support, to a greater extent, the dominance of the forces of 'divergence' rather than 'convergence' in the growth of regional per capita incomes, especially in developing economies like India. The need for the Government intervention in the development of the backward regions emanates from the inability of the market forces in equitably distributing the growth amongst the different regions of the country. Left to the free play of market mechanism, there will be gradual and self-sustained growth of advanced States and metropolitan cities at the cost of the poor and backward regions.
Equalisation trends are obstructed by the market imperfections and such other distortions in the economic variables. Industrial policy is one of the major instruments in the hands of the Government to create growth inertia in the backward regions. Various regional planning techniques have been evolved which may be incorporated in the industrial policy designed to promote growth of backward regions. But the scope for the extensive use of these techniques is restricted due to the nature of the Indian planning, inadequacy of data and the unrealistic assumptions of these models.

The problem of framing suitable objectives and strategy of industrial policy for the development of backward regions, its evolution during the planning period in India and major instruments of such industrial policy have been examined in the next chapter.
APPENDIX 2.1

The Tinbergen Development Planning Model may be summarised as follows.

A system is assumed in which there are \( R \) regions and \( N \) sectors. The sectors are classified into regional sectors (1,2----\( N_1 \)), national sectors (\( N_1+1, N_1+2, \ldots, N_1+N_2 \)) and international sectors (\( N_1+N_2+1, N_1+N_2+2, \ldots, N_1+N_2+N_3 \)). The objective function to be minimised is:

\[
Z = \min \sum_{r=1}^{R} \sum_{n=1}^{N} \gamma^r_n \psi^r_n \tag{1}
\]

subject to :

\[\gamma^r_n = a^r_n \gamma^r \quad (n=1, \ldots, N_1) \tag{2}\]

\[\sum_{r=1}^{R} \gamma^r_n = a_n \gamma_n = \gamma_n \quad (n=N_1+1, \ldots, N_1+N_2) \tag{3}\]

\[\sum_{n=1}^{N} \gamma^r_n = \gamma^r \tag{4}\]

\[\gamma^r_n \geq 0 \tag{5}\]

where

\[\gamma^r_n = \text{marginal capital/output coefficient of sector } n \text{ in region } r \text{ in value added terms},\]

\[\gamma^r_n = \text{increase in value added of sector } n \text{ in region } r,\]
\( a^r_n \) = increase in total demand (value added) for product \( n \) in region \( r \) per unit increase of region's income,

\( Y^r \) = increase in income of region \( r \).

\( a_n \) = increase in total demand (value added) for product \( n \) in the country per unit increase of national income,

\( Y \) = increase in national income

\( Y_n \) = increase in value added of sector \( n \) in the nation as a whole.

Equations (2) are the regional sector supply and demand balance equations, while equations (3) are the balance equations for national sectors. For international sectors, there are no balance equations and exports and imports for these sectors may be calculated ones the optimal solution has been found. Equations (4) state that the sum of expansion of sectoral income must equal income target in each region. Equations (5) show the inequalities and indicate that it is inefficient in a growing economy for any sector in any region to reduce its output.
REFERENCES

1. Alfred Weber's Theory of the location of industries was translated in English by Carl J. Fredrich in 1929.


11. Law D., 'Industrial Movement and Locational Advantage', Manchester School, May, 1964, PP: 131-54. The report contains information on a small sample of firms establishing factories in Northern Ireland. It establishes that there are very strong negative factors to moving to certain locations; Loasby B.J., 'Making Location Policy Work', Lloyds Bank Review January, 1967, PP: 34-47. The report is based upon the information collected from 200 firms moving out of Birmingham to development areas. It points out that the location decisions are taken mostly in response to crisis situations. Needlemen L. and Scott B., 'Regional Problems
and the Policy of Attracting Industry to Peripheral Regions of Britain*. The Lothians Regional Survey and Plan (H.M.S.O., Edinburgh, 1966). The article strongly makes out the case for moving workers to work. It has also been established that the firms hardly undertake the exercise of calculating details cost at alternative sites.


The trend of divergence has also been strongly supported by Hirchman in his book, *The strategy of Economic Development*. Hirchman argues in favour of such divergence as a source of economic development. 'Whatever the reason, there can be little doubt that an economy, to lift itself to higher income levels, must and will first develop within itself one or several regional centres of economic strength. This means that international and inter-regional inequality of growth is an inevitable concomitant and condition of growth itself." P.105.


