CHAPTER 2
REVIEW OF LITERATURE

2.1 Introduction:

The purpose of this chapter is to understand the current state of the art of regional analysis, policy and planning. This will provide a critical review of the relevance and usefulness of the existing concepts and methods for resource management and area planning. The study of literature is not confined to the study of management science literature alone. An attempt has been made to review various other models on Economic, Regional Science, Sociological and Decision Support Systems with a special emphasis on the 'spread effects' and models of 'regional planning'.

2.2 Review of literature:

Since the 1950's 'diffusion' or 'spread' has become an important research topic. At present there exists a vast amount of literature by geographers, planners and the regional economists. Friedmann [64] argues that planners who would like to interfere in regional development must understand the process by which it is generated; but little is known about how economic growth in one area is transmitted to other areas (the way the aggregate of local activities produces growth in national income). According to him there does not exist any theory or a set of theories which adequately explains the complex process of regional growth and development. Although in recent years the subject is flooded with many articles 'the base of discussion on economic development studies has shifted from process of development to the location
of underdevelopment. Space and location have become the new rallying points for theories and strategies of economic development but not produced an acceleration of development in the third World [Stuckey 187].

The geographers have partly succeeded in explaining the spatial diffusion and migration processes by using mathematical models. The basic problem in most of the spatial diffusion studies is to account for the locations of a phenomenon in next time period (t+1), given the location initially at time period (t) and relevant characteristics of each element of spatial diffusion.

One explicit or implicit purpose of many diffusion studies has been to determine methods by which diffusion can be hastened [Brown 21; Rogers 172]. If we can predict this spatial spread of economic activities then the policy decision of locating the activities (network of activities) can be done effectively.

Research in this type of quantitative studies in India is in an infant stage. Only two studies have been listed in this area. Both of them use the Hagerstrand's innovation diffusion model and related to spread of agricultural innovation in rural India [ICSSR 94]:

(1) Spatial spread of agricultural co-operative societies in Mysore district.

(2) Heuristic simulation of the spread of irrigation pumps in the Coimbatore plateau.
The purpose of economic development is to increase the standard of living of the majority of people in low income groups. To attain this our national income should grow faster than the birth rate and also there is a need to distribute the benefits of income growth equitably. But economic growth never occurs homogeneously. It differs from region to region, may be due to the potentialities in terms of resources, convenience or political reasons. Therefore, to reduce regional disparities it is necessary to phase the investment process over a sequence of regions. It requires phased growth at varying rates in different regions/areas over time so as to have a regional balance and to attain the predetermined targets.

Therefore, it is felt that there is a need for a theory which would explain systematic interrelations between development and space of the development process in its spatial and temporal dimensions.

Although there are many attempts to identify the patterns of spread by many empirical studies we do not as yet know the patterns of spread for an economic activity over the surrounding geographical area of its location. Many specific models have been developed and tested in different countries but still it is very difficult to predict the resultant spatial patterns and their intensity or rate of spread over time.

Whether it will be concentric circles or a wave like phenomenon? We can rule out the possibility of concentric circles because it is most unlikely as has been tested by Gaile [69,70] in 'Milwaukee area'. The spread of development appears to be a
diffusion in space-time outwards from a few advanced centers
where activities are initiated. Morril [122, 123] differentiated
between two kinds of diffusion phenomenon i.e. (1) Wave like in
which there is a purposeful spread and in which the achieve edge
of change moves outwards from the origin. (2) quasi-
diffusionary really interactional - with similar resultant
patterns produced, not by a wave but by a gradual intensification
over time of a rather constant pattern of individual contacts all
from a single origin. The idea of the diffusion phenomenon to be
wave like is not only interesting, but may be useful also. In a
complex diffusion process the next stage is dependent on the
previous stage as the origin of the activity itself is dynamic
over space. Moreover it is a cumulative process as the effects of
the diffusion in earlier periods can act as a catalyst in later
stages or may well give a feedback.

One can think of developing a Dynamic Programming model for this
purpose. Morril considered the spatial diffusion to be symmetric
for space and time which may not be true. As usual he starts on
the assumption that in the initial stages the degree of
acceptance is slow but accelerates until it reaches the
saturation point. However, we do not yet know when it will become
saturated or how to make the acceptance faster.

The basic equation of the Morril model was

\[ a_i = A_o e^{-bd \frac{d^t}{t!}} \]

\[ a_i = f(A_o, d, t, b) \]
Where $a_i$ = The amplitude or vertical displacement
$A_0$ = The initial amplitude
$b$ = The coefficient of friction
d = Distance
t = Time.

**Stages of spatial diffusion:**

Both this model and Hagerstrand's [82] model of propagation of innovation waves, assumes the interpersonal communication as the basis of the process. Hagerstrand suggested three sequential stages of spatial diffusion e.g. primary stage, diffusion stage and condensing or saturated stage. In an article, Hanham and Brown [84] identified the existence of these stages of spatial diffusion. They started with Casetti and Demko's model of diffusion of fertility decline in,

$$A(s) = \exp \left( \alpha + \beta s \right)$$

Where $A$ -> proportion of population of potential adopters located at distance 'S' from the diffusion centre (adopted innovation).

$\alpha, \beta$ -> quadratic function of time t.

So,

$$A(s,t) = \exp \left( \alpha_0 + \alpha_1 t + \alpha_2 t^2 + \beta_0 s + \beta_1 st + \beta_2 st^2 \right)$$

Now if spatial diffusion has taken place from the centre and proceeded outward in a wave like fashion then

$$\frac{\partial A}{\partial t} > 0 \text{ & } \frac{\partial^2 A}{\partial s^2} < 0$$

Primary stage -> $\frac{\partial^2 A}{\partial s \partial t} < 0$

Diffusion stage -> $\frac{\partial^2 A}{\partial s \partial t} > 0$

This model of single diffusion centre was modified to take care of several centres.

E.g. $A(s_1, s_2, \ldots, s_n) = \exp \left( \alpha + \sum_{i=1}^{n} \beta_i s_i \right)$
Where \( s_1 \) = distance from location in which adoption is taking place to diffusion centre \( i \).

So that if spatial diffusion has taken place from centre \( i \) then \( \frac{\partial u}{\partial t} > 0 \) and \( \frac{\partial^2 u}{\partial s_1^2} < 0 \)

\[ \frac{\partial^2 u}{\partial s_1^2} \frac{\partial t}{\partial t} < 0 \rightarrow \text{primary stage.} \]

\[ \frac{\partial^2 u}{\partial s_1^2} \frac{\partial t}{\partial t} > 0 \rightarrow \text{diffusion stage.} \]

\[ \frac{\partial^2 u}{\partial s_1^2} \frac{\partial t}{\partial t} \neq 0 \rightarrow \text{one stage followed by another.} \]

This was empirically verified for the diffusion of artificial insemination of cattle by farmers in Sweden [84].

Although diffusion theory is in its infancy, it should be able to help in understanding how innovations originate and spread [i.e. understanding processes of and deriving policy related to regional economic development].

In this context the use of Epidemiological models [190] and the gravity models as described in the banking sector by Eilon and Fowkes [53] are worth mentioning.

Economic models:

Economic models can be described as an organised set of relationships that describe the functioning of an economic entity under a set of simplifying assumptions. i.e. simplified description of reality which stresses the crucial variables.

Model building has become a key element in economic analysis (both conceptually and for planning). Though there are other approaches but building, testing and application of growth models
(conceptual/ historical/ mathematical) has a very important part for the study of economic development.

Hoselitz (1955) [92] has stressed the need for economic growth models to be based on the history of already developed countries. But for different economies—environment, culture etc. are different, so one model which is applicable for one country may not be useful for other countries. Moreover the historical trend analysis can be discarded because in that an underdeveloped country whose rate of growth is very low, will never be developed. From past history we can learn many things but we should not use it, as it underrates the role of human intelligence. If a country has to develop from its past stagnant conditions it has to do something so as to break the past trend.

In this respect ROSTOW’s ([173], 1960) ‘Stage Theory’ of economic growth has attracted remarkable attraction. He developed 5 stages of economic growth which will be applicable to all countries—though growth pattern varies from country to country (due to population, resources, environment and socio-political-cultural factors) [see Figure 2.1]. However, Rostow did not consider the spatial changes inherent in economic growth which is a very important aspect in the study of economic development (since world war II).

Further, it is very difficult to distinguish between the stages (2) and (3); (4) and (5); and to find a link between different stages (Cairncross [23] and other economists criticised the model). But Rostow’s model is an useful one for future research.
FIGURE 2.1

ROSTOW'S STAGES OF ECONOMIC GROWTH

STAGE I
THE TRADITIONAL SOCIETY

STAGE II
THE PRECONDITION FOR TAKE-OFF

STAGE III
TAKE-OFF

STAGE V
THE AGE OF HIGH MASS CONSUMPTION

STAGE IV
THE DRIVE TO MATURITY
Regional income inequality models:

It is a well known fact that economic development is not evenly spread over the whole nation but rather concentrated at certain places. In this regard Hirschman [90] and Myrdal [126] provided the guideline for a new approach to this problem. Myrdal's (1957) process of *cumulative causation* has a lot of potentialities. It says that 'Once a particular region have some initial advantage to move ahead of others, new increments of activity and growth will tend to be concentrated in the already expanding region because of their derived advantages rather than in the remaining areas of the country'. This means that there will be spatial interaction between the growing and stagnating regions as labour, capital and goods will flow from other regions to the growing areas causing centrifugal *spread effects* (see Figure 2.2).

This gives rise to the controversy between 'spread effects' and 'backwash effects'. The flow of labour, capital and goods from hinterlands to the growing regions may cause 'backwash effect' as the potentialities of those hinterlands not only remains unexplored but pushed backwards by shifting the resources from the backward to the growing regions. The 'spread' and 'backwash' controversy originated from the seminal works of Hoselitz [92], 1955; Myrdal [126], 1957; Hirschman [90], 1958 and Perroux [144], 1955 almost simultaneously (seemingly independently) during the 1955-58 period.
The 'generative and parasitic cities' of Hoselitz; the 'circular and cumulative causation', 'centripetal spread effects', 'centrifugal backwash effects' of Myrdal; the 'trickling down' and 'polarisation' of Hirschman and the 'growth pole/ growth centre' concepts of Perroux are quite synonymous and represent the positive and negative effects. Later on Friedman [64], (1966) introduced his now famous 'core-periphery' concept to add to the similar concepts representing 'North' and the 'South'.

In India capital from underdeveloped rural areas is being utilized for more improvements of the growing areas (metropolitan and urban) causing backwash effects. But expansion of growing regions may initiate economic growth in the hinterlands by 'trickle down', 'polarisation' or 'spread effects'. If the impact is strong enough to overcome the local 'backwash effects' then a process of cumulative concentration may begin leading to the development of new centres. It has been seen that the spread effects are strongest in highly developed economies since this is accompanied by improved transportation and communications systems and high levels of education. Stronger spread effects will boost the economic growth of the country as a whole by utilising properly the resources of stagnant regions. In this context the size of the country is also an important factor. Williamson [200] and Kuznets [103] observed that the developed small countries have succeeded in spreading economic growth more widely than larger states.
2.3 Growth Pole/ Growth Centre Theory:

Since 1955, after Perroux developed the Growth Pole Theory (GPT) it became the centre of attraction to many spatial scientists and researchers. GPT states that, 'the pole generates growth and development in its economic space through inter-industry linkages'. With this theory one can analyse the nature and significance of induced growth centres as contrasted with spontaneous growth centres. The survey of the empirical studies on growth centre theory does not give the evidence that induced growth centres generate significant spread effects on the surrounding backward regions. Although there are certain limitations to this theory, it is definitely an advancement over the static location theory, balanced growth and steady growth approaches. A good survey of literature on location theory can be found elsewhere (Meyer [119]; Kuklinski [102] and Isard [97]). The survey of literature on GPT/GCT can be found in Darwent [37] (1969); Lasuen [105] (1972); Klassen [99] (1972); Parr [139] (1973); Conroy [34] (1973); Moseley [124, 125] (1974); Richardson [166]; Richardson and Richardson [167] (1975); Gaile [69] (1978); Higgins [89] (1978); Hansen [85,86,87] (1972, 1975, 1981) and many others.

Location theory is concerned with optimum location of a firm. It takes into consideration the point locations rather than the regional (or spatial) systems. It ignores the time factor. Many theories like GPT, regional growth theory etc. has been developed from location theory.
The main problems with the growth pole theory or the growth centre theory are about the precise definitions and nomenclatures. Many of the controversies arise because of the difference in these two aspects. There is a need to define the terms more precisely and to make consistent use of the concepts.

François Perroux in his original presentation of the concept of 'growth pole' or 'poles de croissance' remarked that growth is not spread uniformly among sectors of an economy and growth is concentrated in certain places / sectors. Some of the leading sectors have spread effects raising income and employment in some larger region. These leading enterprises are called 'enterprise motrices' or 'propulsive industries'. And the aggregation of these propulsive industries constitutes a 'growth pole'.

An industry \( P \) is **propulsive** with respect to industry \( A \) if

\[
I_A = f(I_P) \quad \text{and} \quad \frac{\Delta I_A}{\Delta I_P} > 0
\]

or

\[
I_A = \alpha I_P \quad \text{and} \quad \frac{\Delta I_A}{\Delta I_P} = \alpha
\]

where \( I_A \) is investment in industry \( A \) and \( I_P \) is investment in industry \( P \).

(Here it is assumed that the regional income and employment will rise with the rise in investment; however, in reality the investment, income, employment, population, technology and welfare all should be considered rather than investment alone).

With '\( t \) as time, if \( \alpha > 1 \), then \( \frac{dI_P}{dt} > \frac{dI_A}{dt} \)
Let us assume that a region $R$ is composed of an urban centre $u$ and a peripheral rural region $r$. Then $R = u + r$.

We will say that ‘$u$’ is a growth pole, if

$$I_r = I_u (I_u) \text{ and } \frac{\Delta I_r/I_r}{\Delta I_u/I_u} = \frac{I_u \Delta I_r}{I_r \Delta I_u} > 0$$

or $I_u \Delta I_r = \kappa I_r \Delta I_u$

i.e.; investment in pole will generate growth in the entire peripheral region.

If $\kappa > 1$ then the growth pole ‘$u$’ is dominant, and

if $0 < \kappa < 1$ then the growth pole ‘$u$’ is subdominant.

If the pole is not dominant it will become a ‘centre of attraction’ while it will become a ‘centre of diffusion’ or a real growth pole if the pole is dominant. In many of the LDCs the ‘growth poles’ are the ‘centres of attraction’ in the absence of required transmission lines. In addition to the growth generators we need the ‘transmission lines’ (or infrastructure) and the ‘reactors’ to translate the economic energy into further new economic activities. In the absence of proper transmission infrastructure the initiation of growth poles may result in ‘development of poles’ and not true ‘development poles’.

The growth centre approach is primarily concerned with induced growth centres i.e. in which public policy is meant for promoting growth. Most of the geographers attention focuses on ‘where’ of the economic activity to be initiated (regional policy). But we are also interested to know about what type and size of the
economic activity to be started. In this aspect the importance of location can never be ignored. If we predict the likely effects of a particular size and type of economic activity in a particular location and in the surrounding geographical areas then there is little left to be done to promote the growth in that area (both spatial and temporal).

The application of GCT in this respect is less promising. The basic problems and prospects of GPT can be found in the article of Lasuen [105].

The geographical aspect of GPT as elaborated by Boudeville [20] has led to the popularity among regional planners of the policy of creating growth poles. More than thirty countries have tried this (e.g. in Beit Shemesh [179], East Anglia [125] and many others Asian [110] and Latin American regions). However, the knowledge on the various concepts and definitions of GPT are most inadequate which led to the failure of the theory.

According to BJL Berry [16] "continued urban industrial expansion in major central places should lead to catalytic impacts on surrounding regions and growth impulses and economic advancement should ‘trickle down’ to small places and ultimately infuse dynamism in even the most tradition bound peripheries". But this is not happening in India, some parts of Italy, France and many other developing economies including Nigeria and Brazil (Corragio [35], 1974; Moseley [124]; Gaile [69]; Robinson and Salih [170]; Lo and Salih [110]; Gilbert [73]).
It is quite clear that the GPT/ GCT do not provide the required framework for the complex process of regional development in the developing countries. However, the concept of GPT is important and should be suitably adapted and complemented with other approaches to design an alternative framework. The following aspects need to be considered for complementing the theory to an useful strategy in the context of development of the developing countries:

a) growth and distribution;
b) role of small scale and medium scale industries;
c) rural/urban efficiency and agricultural/industrial linkages;
d) peoples participation/ self-reliance/ employment;
e) efficient resource use/ technology choice (labour vs. capital intensive);
f) creation of transmission lines (rural infrastructure).

2.4 Other strategies:

More recently alternative approaches to development strategies have been suggested such as ‘basic needs’ [Ghai, 71] and ‘redistribution with growth’ [Chenery et. al. 28]. Baran [11], Frank [61-63], Prebisch [162] and Amin [3] advocates of ‘dependency theory’ are critical of the present strategies but have not been able to provide an acceptable strategic framework. Similar is the case for the promoters of other alternative strategies like ‘another development’ and ‘agropolitan development’ [65]. Although the suggested approaches are quite innovative, they lack in necessary integrative systemic approach
required to tackle the total development of a self-sustaining type in a region.

The failure of the growth centre and the industrialisation strategies in the LDCs led to the development of 'agropolitan development' by Friedman and Douglass [65]. The strategy of accelerated rural development includes the following policy elements:

i) limited and specific human needs should replace unlimited, generalised wants as the fundamental criterion of successful development;

ii) agriculture should be regarded as a leading or propulsive sector of the economy;

iii) attaining self-sufficiency in domestic food production should be regarded as a high priority objective;

iv) existing inequalities of income and living conditions between social classes and between urban and rural areas should be reduced;

v) measures to increase production of wage goods for domestic consumption should be given a high priority;

vi) a policy of planned industrial dualism should be adopted whereby small scale production of the domestic market is protected against competition from large scale capital intensive enterprise.

The inclusion of the policy elements has improved the quality of the strategy, but nothing transitive has been achieved by the theory. Many of these ideas are integrated in the suggested alternative in Chapter 4.
2.5 Conclusions:

The brief review of the literature show that there do not exist any comprehensive strategy for the development of the depressed and backward regions. An integrative outlook based on the principles of management science and systems analysis is required to evolve a framework for backward area development. The empirical experience of the strategies followed in some of the selected developing countries are further analysed in Chapter 3.

On the basis of the findings of this review and the empirical evidence given in Chapter 3, the design of an alternative framework for local area management and planning will be attempted in Chapter 4.