Chapter-8

Major Findings and Policy Guidelines

Industrialization is a “process in which changes in a series of strategical production functions are taking place” involving mechanization of an enterprise, building up of a new industry, opening up of a new market and/or exploitation of a new territory involving a process of deepening and widening of capital. Towards this, an integrated approach to Industrial Development in India over 1956-95 was sought for, making use of the estimated parameters, viz. Partial Productivity of Labor and of Capital, Capital Intensity, Output Elasticities of Factors of Production and Returns to Scale, to trace Causal Linkage Relationships among these measurements. This helped to assess the economic mechanisms for growth in industries’ output caused by TFP Growth or otherwise, in either case, due to other factors; and to what extent. Further, analysis of Regional Dispersal of each industry group in terms of size variables and structural relationships among Small States and UT and Large States for comparative knowledge of the effects of size of regions on specificity of industries’ was undertaken. The extent of Industrial Dispersal was traced across States and Union Territories over different time periods of each successive decade and of a total of 40 years, 1956-95. This provided to understand causal effects over time as to test Self-Perpetuation vis-vis Williamson Hypothesis. The influence of Total factor Productivity (TFP), Capital Intensity (K/L), Capital Productivity and Labor Productivity, each on Regional Dispersal Measures of Net Value Added (NVA) and Employment (NW) of each industry group was analyzed to establish Causal Relationships. This was cross-checked by tools of Grossack’s² study framework to substantiate the extent of contributions by each of the explanatory variables to Regional Dispersal of NVA and Employment in each of the 2-digit industries under study. All those analytical tools of study provided the extent of contributions
of the common set of explanatory variables to growth and to regional dispersal of each Industry Group in India.


The Study was benefited by Review of International Studies versus Indian Industry covering the issues of Returns to Scale, Capital Intensity, Total Factor Productivity (TFP), Partial Productivities, Output Growth and Employment Growth as to assess the importance of factors that contributed to industrial growth.

An analysis of Growth Rates of Factories made clear that Food Industry (IN21) grew at a maximum of 33.1%p.a. to meet the consumption of a densely populated nation indicating growth and spread of food industries. Then followed the Intermediate Input Based Industries succeeded by Capital Goods Industries.

Food Products (IN21) Industry provides vital linkages and synergization with agriculture and industry. This has been identified as a thrust area and is covered as priority area. Most food processing industries have been exempted from industrial licensing except beer alcohol and those reserved under SSI. For many processed food items automatic approval for even 100% equity in form of FDI is available. Some of the structural problems that stymie growth are low value addition to raw produce, High wastage, low level of processing, highly fragmented processing capacities, limited access to technology, poor marketing network, unusually long supply chain, multiplicity of regulations, lack of infrastructures. However this industry provides an opportunity for fostering public private partnership. All these can increase returns to scale and act as base for meeting consumption needs of industrial workers and bring about higher returns.

*Chapter 4* analysis of Growth Rates of Factories revealed Food Products Industry (IN21) growing at a maximum growth rate of 33.1%, followed by User and intermediates Industries. The Comparative Study of Industries’ growth rates of Factories brought out
possible weak forward and backward linkages and lack of implementation in terms of numbers corresponding to planning goals.

Net Value Added (NVA) growth rate was the highest in Electricity, Gas and Steam (EGS) at 18.1% followed by growth rate on Textile Products (IN26), with lowest growth rate being recorded by Textiles (IN25), indicating lack of appropriate production planning and weak linkages.

Low growth rates in employment in number of workers in most of the industries except Food Products Industry (IN21) confirmed that most industries in India are low labor intensive ones. Low employment growth rate figures in Beverages (2.2%), Textiles (2.3%) and OMI (1.8%) pointed to lacunae in employment planning and thereby hinted at greater employment absorption capacity.

NVA Growth being the highest for EGS at 18.1%, followed by Textile Products (IN26) at 17.2%, Food (IN21) at 12.6% and Textiles (IN25) at 10.1% indicated priority to non-durable consumption. Employment growth rates revealed lower magnitudes in most industries except Food (IN21) due to low Labor Intensive-ness in large, medium and small industries. NW/FACT was the lowest in Textile Products (IN26). FC growth rate was the highest in EGS (IN41) at 14.4% contributing to high NVA growth rate in EGS. FC growth rate was high also in Metal and Mineral Industries that led to their high NVA and GVA growth rates. Growth rates in FC/Fact however showed low growth rates as Factory growth rates was better than FC growth rates since FC was facing shackles due to increasing prices and uncertain license –permit regime. Capital Intensity (KI2=FC/NW) growth rates were higher in Textile (IN25), followed by Basic Metals (IN33) and Chemicals (IN30), all being Intermediates, which indicate high linkages, both backward and forward, that reveals potential to act as leading industries for overall growth and development of the industries in the economy. However, Other Manufacturing Industries (IN38) had low growth of KI2 that could be due to clustering, assembly line production and further decentralization and low Labor Intensity, if globalization is to lead to broad based industrial growth in the country.

In analyzing growth rates of GVA/FACT (O1F) and NVA/FACT (O2F), the ordering of industries are similar. In both measures, EGS (IN41) led followed by Textile Products (IN26) at 9.8% and in O1F OMI (IN38) showed 9.1% growth. The lowest growth rate in these measures were in Beverages (IN22), Non-Metallic Mineral Products (IN32), Wood (IN27) and Textiles (IN25). But growth rates in factories being higher and O2F and O1F being lower
reveals fragmentation of industries like Beverages (IN22), Textiles (IN25), Wood (IN27) in the long term and even if dispersed, commensurate outputs would be low. Thus there is need for strengthening surveillance mechanism and follow-up of credit delivery off-take by FIs to these industries.

Growth Rate in Fixed Capital (FC) was the highest in Electricity, Gas and Steam (IN41) that is also inferred to be the cause of recording highest NVA growth rate in EGS (IN41). But Intermediates showed low FC growth rate and bolstering FC in these with proper Regional Input Output Planning can alter the overall investment climate.

The highest growth in Capital Intensity was shown in Textiles (IN25) and Capital productivity Growth Rate in Textile Products (IN26) influenced positively its NVA and GVA growth rates. Higher Labor Productivity growth rates in many industries (OMI recorded the highest) contributed to work force growth and in turn to labor intensity, hinting at scale operation leading to both factor intensification and factor productivities and that in turn to NVA and GVA growth. All these results envisaged greater role for Total Factor Productivity (TFP).

Partial Productivity measures of Capital like K1P (GVA/FC) and K2P (NVA/FC) gave similar results in respect of growth rate and ordering of industries, though differing marginally. In case of all industries, Capital Productivity influenced positively its NVA and GVA growth rates. This finding signifies role of FC, K-productivity, Capital Intensity, in all registered large, medium and small- scale industries. However, increasing the scale of operation might influence positively each other’s capital intensity, Labor productivity and capital productivity.

The analysis of TFP was undertaken in the framework of Hicksian neutral technological progress. Neutrality implies neither of the Factors’ Partial Productivities have influence to raise technical progress to indicate that no single factor of production is responsible to cause Technical Progress (TP). Hence, the measure of Total Factor Productivity (TFP) is a residual over and above those factors’ contribution to NVA or GVA Growth or TFP as a ratio measure of TFP to be more than unity. Whether capital intensity (K/L) is reflected in higher growth of output and employment or Partial Productivities of Labor and Capital or TFPG in individual industries caused for higher growth was discussed.

Analysis of Total Factor Productivity of individual industries by Kendrick, Domar and Solow showed that Wood (IN27) Industry had Maximum TFP due to Kendrick ratio and
Domar Residual methods. The lowest TFP was noticed in Chemicals (IN30) and Textiles (IN25). Chemicals was a sunrise industry in 1970s and 1980s to which further Technical Progress and Capital were needed to be injected to take advantage of it. Textiles also needed further injection of capital, modernization, upgradation to the latest technologies to get a boost in efficiency. This being a Labor Intensive industry showed capital intensity growth rate sharply.

In Solow, Labor intensive industries like Paper (IN28), Beverages (IN22), Food (IN21) showed little TFP growth, with low index. TFP growth in Wood (IN27) was high.

TFPG was the maximum in Wood Industry (IN27) and with Chemicals (IN30), Textiles (IN25) and Basic Metals (IN33) also showing higher growth rates, meant Smaller States can grow faster.

Ranking revealed that Food and EGS ranked high in Factories and NW growth rates. Textiles showed remarkable consistency in both Labor Productivity and Employment growth rates. Leather and Beverage, though Labor Intensive, had high FC growth rate that contributed to high output growth.

Food (IN21) topped with respect to Factories’ growth rate vis-avis All India Industries but 12th in ranking with respect to FC growth rate and 14th in NVA and GVA growth rates. EGS (IN41) tops in FC, NVA and GVA growth rates but 13th in Factories’ and 12th in Employment growth rates.

The lower ranks in some Intermediates and Consumer Goods Industries than All India growth rates were due to Low factor productivities and Low TFPG. There is need for both Capital, skilled and unskilled Labor intensification in all industries of all states and UT to minimize unemployment, underemployment and regional disparities in industrial development and growth.

The highest TFPG due to K/L was in Wood (IN27), Beverages (IN22) and Textile Products (IN26). Lower influence of K/L on TFP was found in Basic Metals (IN33), EGS (IN41), Transport (IN37), Paper (IN28) and Electrical and Non-Electrical Machinery other than Transport (IN36) which were contrary to the usual notion that higher K/L causally influences higher TFPG in Capital Intensive Industry. OMI (IN38) showed higher influences of K/L growth on TFP than in many Capital Goods and Intermediate Goods Industries.
EGS showed maximum influence of TFPG on NVA growth followed by Textiles (IN25), Machinery other than Transport (IN36), Basic Metals (IN33) and Rubber, Petroleum and Coal (IN31). However, lower influences of TFPG on NVA were found in Textile Products (IN26), Wood (IN27) and Leather (IN29). Influence of TFPG on GVA was similar, though highest influence was in Metal Products (IN34), a Capital Intensive Intermediate, followed by Beverage, OMI and Leather.

Employment Growth showed the highest influence of TFPG as noted in Metal Products (IN34), followed by Machinery other than Transport (IN36) and Beverages (IN22). Employment growth in Basic Metals (IN33), Textiles (IN25), Paper (IN28) showed imperviousness to TFPG growth. However, TFPG influence to raise employment growth is imperative to employment growth both in Capital intensive and Labor-intensive Industries.

Influence of K-Productivity on output measures show higher influence in Beverages, Food, Leather and Paper. NmMP and RPC also show same influence of Capital Productivity on either GVA or in NVA. On Employment growth, K-productivity is strongest in Leather, followed by Beverages, RPC and Food. These results show the need to have policy to increase Capital Productivity in L-productivity industries. Lower influences in EGS (IN41) and Transport (IN37) show that probably K/L and/ or TFPG in these K-Intensive Industries needs to be increased, L-Productivity influence on NVA in them being already higher.

Regression of Labor Productivity on output measures, especially on NVA show higher influence in Textile Products (IN26), Beverages (IN22) and OMI (IN38). Lowest influence is seen in Chemicals (IN30). L-productivity influence on GVA was higher in OMI (IN38), EGS (IN41) and Transport (IN37), all Capital Intensive Industries. Labor productivity influence was least in Food (IN21) whose SSIs do not employ highly skilled Labor as productivity is not a major concern for units selling in the local market. Rubber, Petroleum and Coal (IN31)
showed the least influence. Similarly, influence of Labor productivity on employment growth, show maximum influence in Textile Products (IN26), Rubber, Petroleum and Coal (IN31) and Textile Products (IN26) but lowest in Textiles (IN25). Though Labor productivity growth was the highest in Textiles (IN25) both in L1P and L2P, it did not influence Employment growth. In Rubber Petroleum and Coal (IN31) while Labor Productivity showed low influence on output growth, its contribution to employment growth was high.

Analyzing Returns to scale, the maximum returns is noticed in Textiles (IN25) followed by Chemicals (IN30), Non-Mineral Mineral Products (IN32) and Electrical and Non Electrical Machinery other than Transport (IN36).

Temporal Shifts is noticed in Textiles (IN25) and recession did not dampen scale economies. In 1966-75, most industries showed IRS but Transport showed CRS. But in last decade, all industries showed CRS except Beverages (IRS).

Some Industries show perennially low returns such as Basic Metals and Alloys (IN33), Rubber Petroleum and Coal (IN31), Beverages (IN22) and OMI (IN38). While onslaught of economic reforms left Basic Metals, an Intermediate high and dry, OMI needs special attention as it is capable of quick decentralization and act as catalyst for raising Capital Intensiveness and machine efficiency in many Capital Goods and Consumption goods Industries. OMI is amenable to SSI production and requires medium scale investment needs where Commercial Banks can play a large role as lender to potentially efficient entrepreneurs. The problems facing this industry is fragmentation of the market, low awareness of demand potential, design marketing and lack of liasoning with international producers in East Asia. It can quickly reach out to rural areas and create demand there.

A Causal Analysis showed highest TFPG due to K/L was in Beverages, but lowest in Basic Metals, contrary to common understanding. Influence of TFPG on NVA showed
maximum influence in EGS (IN41), followed by Textiles (IN25) and Machinery other than Transport (IN36). On GVA growth, maximum influence of TFPG was in Metal Products (IN34), followed by Beverages (IN22) and OMI (IN38). Similarly, TFP influence on Employment growth rate showed maximum effect on Metal Products (IN34), followed by Machinery other than Transport (IN36) and Beverages (IN22). Thus TFPG influence was seen in both Labor Intensive and Capital Intensive Industries. Lowest TFPG influence in Output (GVA) and employment growth rates was noticed in Wood (IN27).

Influence of Capital Productivity on GVA was the highest in NmMP (IN32), followed by Paper (IN28), Beverages (IN22) and Leather (IN29). Influence of Capital Productivity on NVA was the maximum in Beverages (IN22), followed by Leather and RPC (IN31). Influence of Capital Productivity on employment was highest in Leather (IN29), followed by Beverages (IN22) and RPC (IN31). So improvement in Capital Productivity may be the key to raising the Labor Intensive-ness of Industries.

Labor Productivity is high in generally those industries were Capital Productivity was low. But highest Labor Productivity influence on NVA was in Transport Equipment (IN37) followed by RPC (IN31). Highest Labor productivity influence on GVA growth was in OMI (IN38) followed by transport Equipment (IN37) and then by EGS (IN41). On Employment, highest influence of Labor Productivity was in Leather (IN29), though Textile Products (IN26) and RPC (IN31) also ranked higher, though it recorded lower figures.

Thus despite high growth in Units, to reap scale economies, a proper agricultural environment and high expectations need to be maintained and nurtured which slackened during the decade of New Economic reforms period. Transport is another industry that showed inconsistent scale economies largely due to inadequate planning. Also, higher growth rate in units does not necessarily bring about scale economies. To improve scale economies, an enabling environment, innovative marketing techniques, development of support infrastructure are necessary. These are conspicuous by their absence in a developing economy due to inadequacy of resources for balanced development of industries and of regions/states/districts; rural vs urban diversity and forward vs backward states/regions. Hence, the following Chapters address to regional dispersal of industries, measures and causal factors for regional dispersal vs. growth, TFPG, Capital Intensity, Factor Productivities, Returns to Scale of Industries, etc. Increasing returns to scale in many industries was noted independent of TFPG. This could be due to higher factor productivities, accrued in turn from
output elasticities to those factors/inputs, which was again independent of factor intensities and growth rates of Industries concerned. It may be further concluded that TFPG and output growth and factor productivities caused for increasing returns to scale in many and constant returns to scale in a few.; but the converse necessarily hold good in the sense that returns to scale may remain independent of TFPG of disembodied (Neutral TP) and embodied type.

In the next Chapter 5, results of Dispersal Analysis of Indian Industries over Smaller Sized States, Larger Sized States and all States and Union Territories taken together was presented. Small States and UT can show how industrial progress can be size cum location specific. Large States and UT provide greater scope for large-scale highly capital intensive industries to develop. All States and UT taken together can provide a more comprehensive view of industrial dispersal irrespective of size of regions.

As regards the Small States Category, in 1959-65, Food (IN21), Textiles (IN25), Metal Products (IN34) and Transport (IN37) provided consistent and continuous data to yield results for analytic interpretation. Food (IN21) is highly dispersed. This industry, being a User-Based, Consumption Goods Industry with characteristics of non-durability of commodity, Capital Malleability, L-intensiveness and output growth being a possible outcome of low investment. All these characteristics suit small States Category at initial stages of Industrialization.

The later decades saw some changes and improvement. In 1966-75, Food (IN21) maintained high dispersal, though Machinery other than Transport (IN37) and Other Manufacturing Industries (IN38) did not lag behind. This was a good sign for building up bases for future industrial and economic development in smaller States and union territories that are predominantly agricultural, feudalistic social structure and lesser accessibility to capital. However, other User-Based Industries did not do well and recession further reduced incentives for expansion and dispersal.

The decade 1976-85 saw Food (IN21) still maintaining high dispersal trend. But other L-intensive and Capital Goods industries also showed dispersal like Leather (IN29) and EGS (IN41). Capital Goods and Intermediate Industries like Transport (IN37), Rubber, Petroleum and Coal (IN31) and Basic Metals and Alloys (IN33) also showed dispersal. So Indian Economy and Industries were showing signs of maturing after having withstood recession, inflation, war, etc. But lack of forward and backward linkage planning could not provide
sound infrastructure base as revealed by relative lower dispersal in Transport (IN37), that was a cause of lower growth in 1980s, 1990s and 2000s.

The last decade of our analysis 1986-95 saw user based and Intermediate Industries like Textile Products (IN26) showing high dispersal. This was a sign of great vitality for Indian Industry and Economy. Indian Industry not only showed sense of great cost effectiveness as Labor was relatively cheaper, this industry showed high market sense being aware of the need to be location specific, nearer to areas of market demand. EGS (IN41) did well showing relevance of proposal for greater decentralization of power reforms. But Industries showing mean values nearer to lowest CV and HH values imply that goal of balanced regional development is till distant.

In case of Large States and UT category, data availability in the initial years was a distinct advantage over Smaller States and UT and it also showed the viability of larger regions to provide supportive infrastructure for industries to flourish.

The first decade 1959-65 saw Wood (IN27), Metal Products (IN34), Transport (IN37) showing higher dispersal. This is different from results in case of Smaller States where apart from the less number of industries, Food (IN21) being a User Based Industry showed maximum dispersal. Thus Large States Category has more economic space to develop for Intermediate Goods Industries to develop to provide a basis for deeper linkage and more integrated planning for more balanced industrial and economic development than small regions.

The next decade 1966-75, despite being recession stricken, showed dispersal in more User Based and Intermediate Industries, a feature that got manifested in 1976-85 in case of Smaller States and UT category. But capital Intensive Industries like Other Manufacturing Industry (IN38), EGS (IN41), Chemicals (IN31), Rubber Petroleum and Coal (IN31), Non-Metallic Mineral Products (IN32) showed mean dispersal values nearer to lowest values. Thus Capital Intensive Goods Industries did not disperse well in the recession hit second decade.

In the third decade of 1976-85, Capital Intensive Industries renewed well to disperse more. Yet while Textiles (IN25) dispersed well, Textile Products (IN26) got concentrated. This revealed how lack of proper Input Output sector specific planning can retard the goal of Balanced Regional Development.

The last decade of 1986-95 showed industries getting dispersed in some variable and not in others. This phase of experimentation showed that planning was not in tune with
market sentiments. For example in Metal Products (IN34) employment (NW) showed mean values nearer highest values but in other dispersal variables of this industry, mean value was nearer the lowest value. So while entrepreneurial initiative went on to create more employment dispersal, PK, NVA, Units showed concentration. This was a policy lacunae as PK injection could have brought about more growth and helped this Intermediate Industry to develop as a ‘leading’ Industry in the liberalized, globalized era.

In the third category, All States and UT are taken together and dispersal results found out for both the long term of 40 years and 4 decadal periods of 1959-65, 1966-75, 1976-85 and 1986-95.

In the long-term 40-year period, in Food (IN21), dispersal in Productive capital was high but not so in other variables. This showed that though capital injection has been forthcoming, much of it was eaten away by conspicuous consumption. This backwardness of agriculture and high population growth may have the other causes of lower than expected dispersal of employment, units, NVA, K/L in this Industry.

In Beverages (IN22) though employment dispersal was high, it pointed to disguised employment. In Intermediates and Capital Goods Industry showed relatively less dispersal in long term when All States and UT were taken together. In Paper (IN28) employment was concentrated but other variables showed dispersal. Industries that needed big push are Non Metallic Mineral Products (IN32), EGS (IN41), Basic Metals and Alloys (IN33), Paper (IN28), Machinery other than Transport (IN36) and OMI (IN38) for decentralization.

In the Period Wise analysis, the first decade of 1959-65 recorded highest dispersal in Beverages (IN22), Leather (IN29), Chemicals (IN31) and Basic Metals and Alloys (IN33). NVA in Metal Products (IN34) was more concentrated. So also in Transport (IN37) where all dispersal values were nearer the mean values. In the second decade of 1966-75, Beverages (IN22), Leather (IN29), OMI (IN38) showed high dispersal. In the third decade in 1976-85, EGS (IN41), Beverages (IN22) along with Chemicals (IN30) and RPC (IN31) showed higher dispersal. In the fourth decade of 1986-95, Leather (IN29) EGS (IN41) showed higher dispersal. But employment dispersal in Food (IN21) in this decade of liberalization measures showed lowest dispersal. Wood (IN27) revealed high concentration. K/L measure of dispersal revealed concentration in most industries. Thus liberalization is less oriented towards rural areas, consumption User Based Industries and less capital injection through planning.
mechanism is taking place. Low K/L dispersal is seen in Machinery other than Transport (IN36), Metal Products (IN34) and Transport (IN37).

**Conclusion and Policy Inferences- Period Wise:**

**1959-65:**
Metal Products (IN34) showed more relative concentration in case of Small states Group and All States in India. But this industry did disperse well in 1986-95,

**1966-75:**
In both large states and small states separately in each group, capital intensive industries did not show dispersal. But in case of All states and UT being taken together, Except for three Industry groups, viz; Electricity Gas and Steam (IN41), Basic Metals and Alloys (IN33) and Machinery other than transport (IN36), most other Capital Intensive industries like Chemicals (IN30), Transport Equipment (IN37), Rubber-Petroleum-Coal (IN31), Other Manufacturing Industries (IN38) showed mean values nearer to the lowest dispersal values.

While Leather, Paper, Wood, Beverages showed high dispersal, Textile, Textile Products, Food showed mean dispersal values nearer to lowest values of the variables.

**1976-85:**
Transport (IN37), Textile Products (IN26) in both Small and Large States and Chemicals (IN30) in Small States showed less dispersal. Textiles showed greater dispersal in both Small States and Large States but Textiles Products showed less dispersal

**1986-95:**
Metal Products (IN34) showed regional dispersal in All States and Union Territories (UT).

Smaller states and UT failed in many fronts except in Textile Products, Machinery other than Transport and Transport Equipment where high dispersal is noted. But in Large States, NVA in Beverages (IN22), but Non Metallic Mineral Products (IN32) and CV of OMI (IN38) showed more concentration. In All States, Food, Wood emp, showed less dispersal. Food employment may be temporary once a long term planning of this industry comes into operation. But K/L dispersal being low in capital goods industry like Electrical and Non electrical machinery (IN36) and transport (IN37) show employment dispersal in these industries as not spreading out.
**Industry Specific Policy Recommendation:**

In the recent two decades of policy initiatives of increasing trade, macro economic stabilization and industrial liberalization, Food and Wood are the two are exceptions being directly land based.

In All States and long term 40-year case, Beverages Industry showed higher dispersal in employment but less so in the other four variables. Improvement of labor productivity and greater marketing innovation need to be devised to help in Beverages Industry dispersal.

For the 40 year All States and Union Territories, Wood (IN27), Paper (IN28), Non-Metallic Mineral Products (IN32), Basic Metals and Alloys (IN33), Machinery other than transport, Electricity, Gas and Steam (IN41) having mean values of variables and Structural ratios nearer the lowest values, implied that these industries were relatively less dispersed over the long term.

So policy directions should enable capital goods and intermediates industries to be more decentralized/ regionally dispersed. Intermediate goods Industries must be dispersed after a careful study of linkages, both backward and forward, and institutional set up and behavior of the Indian economy. Paper and Wood Industries, being L intensive industries, have greater potential for employment absorption. Employment planning in these industries should be based on regional resource linkages.

Wood (IN27) also did well in Small states category in the first and third decades but showed more concentration in second ‘recession’ decade. But Wood (IN27) showed more concentration in each of the five variables in the All States-40year long- term category and in 1986-95 period in All States Category. This Intermediate provides inputs to Paper, Ship-Building, Housing, Transport (Trucks’ body), Sports Goods, etc. and so market demand surveys, developing marketing channels for its products, intensive agroforestry programmes, reduction of illegal felling of trees with a greater role for decentralized political authority, etc will help make this industry getting more dispersed and raising its value addition potential and make greater contribution to national income.

Food Products (IN21), a key industry linking agriculture and industry, showed less dispersal in most variables (except PK in 1959-95 in All States category) in the long term. This was supported by Food Industry (IN21) getting concentrated in 1959-95 for Large States Category. More regional Planning in an Input –Output Frame outlining its Intermediate Input
Coefficient for regional skill based Industries will cause for greater dispersal in Food Industry.

Non-Metallic Mineral Products, EGS, Basic Metals and Alloys, Machinery other than Transport, being the industries that showed more relative concentration over long term in All States and UT Category implied that Greater Regional Planning in these in an Input-Output frame will bring out their growth potential that will cause for dispersal. EGS can revitalize and enhance power availability and provide much needed lateral boost to industrialization, Machinery other than transport (IN36) must be made amenable to decentralization, this being a key capital goods industry. Probably greater R&D will enable MotTr (IN36) industry to be more dispersed over the regions in the future.

The next Chapter saw a diagrammatic representation of results of dispersal of all variables of each of the industries over the long term of 40-year period. Long-term analysis has the advantage of revealing the nature and perspectival background of industrial dispersal in India. Long term trends subsume short term ones.

Food (IN21) showed spurt in public Investment in 1974 and mid-60s recession affected this industry’s dispersal of NVA. Low dispersal since 1977 was the real cause of poverty and high food prices in 1980s and later. But the year 1994 saw spurt in PK dispersal due to liberalization and capital flows.

Beverages (IN22) did not expand due to political and economic vicissitudes. But PK dispersal increased during recession of 1965-66. However, employment showed consistent dispersal even though the pre-1963 rise could not be sustained since this is a Labor-intensive industry and requires constant nurturing. But K/L got progressively concentrated implying any further boost to growth could come from higher K injection or increase in Labor productivity, capital productivity and TFP.

Textiles (IN25) showed progressive concentration due to lack of adequate government efforts to disperse this industry. This is reinforced by lack of employment dispersal along with PK concentration. But CV NVA stability around 2 may be due to innate resilience of this industry to do well despite opposition. So strong policy recommendation top boost employment and NVA in this crucial Labor intensive industry is needed.

Textile Products (IN26) showed high dispersal in Units, PK, employment. But Textiles (IN25) was concentrated showing lack of input–output planning region specific
demand surveys in this industry. Perhaps lack of planning for technological obsolescence and
innovation was cause of disorientation in output trends.

Wood (IN27) showed concentration. But PK dispersal was higher showing much
optimism for growth in Wood Industry as this is a User and Intermediate Industry for
infrastructure sector. But employment in this industry got concentrated and this was a cause
for concern though NVA was dispersing. K/L is low, revealing high corruption and high
unaccounted for commission culture.

Paper (IN28) showed long term concentration in all its variables and structural ratios.
But being a Labor-intensive industry, great potential exists for growth. Leather (IN29) is more
dispersed but there is scope for further employment dispersal along with need for greater
capital infusion.

Chemicals (IN30) is more concentrated and needs more of institutional cum
technological decentralization along with big push for this potentially leading industry due to
scope for expansion in pharmaceuticals, fertilizers, etc.

RPC (IN31) is more concentrated though dispersal in NVA is high. NmMP (IN32) is
concentrated but needs employment planning and more capital infusion. In Basic Metals
(IN33) liberalization overlooked the industry’s potential. Metal Products (IN34), Machinery
other than transport (IN36), Transport (IN37) are concentrated in long run.

In OMI (IN38) NVA is dispersed but other variables show concentration. Same results
in EGS (IN41).

Finally, whether industrial growth leads to Perpetuation or Williamson and in which
periods and in which industries therein, is brought out tentatively. Perpetuation is one where
industrial growth leads to concentration in those periods, but later dispersal. Here growth
leads to concentration and does not imply causation or growth causing dispersal. Williamson
hypothesis implies initial growth with disparity but later concentration.

Thus study of long run dispersal of Indian Industries justified Perpetuation Hypothesis
in case of inputs dispersal/concentration and since there is more concentration in Intermediate
and Capital Goods Industries. This seemed inevitable because Indian economy is a capital
scarce economy and K-allocation followed Heavy Industry model. But regional disparities
manifested in 1970s, efforts to tackle this meant capital investment had to suffer.
Thus, while Consumer and User and Intermediates show greater dispersal, Capital Goods and Capital goods Intermediate are more concentrated in long term Indian Industrialization.

Beverages, Leather, Metal Products and EGS in each of the respective Groups show a contrary trend vis a vis trends in variables and structural ratios of their respective groups. More clear-cut policy formulations await Chemicals, Electrical and Non electrical Machinery, Textile Products for each of these to act as leading sectors of growth.

Williamson hypothesis of Growth leading to dispersal in long- run is proved in Food Products (IN21), Textiles (IN25), Metal Products (IN34). Wood (IN27), Textile Products (IN26), Transport Equipment (IN37) and Electrical and electronic machinery (IN36) prove Self-Perpetuation hypothesis. However, concentration comes about due to low growth and industry-specific and region specific policy packages to boost their key factor use to raise efficiency will help in greater dispersal of Indian Industry.

In Chapter 7, the effect of various factors like TFP by Solow, K/L, K-productivity, L-productivity on each of the measures of dispersal, HH and CV, for each of the industries was studies and results inferred. Grossack’s (b /r)² was computed to cross check influence of explanatory variables on each of the regional dispersal measures for each of the 2-digit industries.

Regression of TFP on regional dispersal measures of NVA for the short decadal period of 1959-65 yielded results that showed Textile Products (IN26), Textiles (IN25), Non-Metallic Mineral Products (IN32) bearing higher influence of TFP on NVA dispersal. When TFP was regressed on each of measures of regional dispersal of employment (HHN and CVNW), greater influence was recorded in Textiles (IN25), Textile Products (IN26), Basic Metals and Alloys (IN33), Beverages (IN22), Rubber, Petroleum and Coal (IN31). But Food (IN21), OMI (IN38) and EGS (IN41), in this first decade, did not show TFP influence on employment dispersal. When K/L was regressed on employment (NW), Textiles (IN25), OMI (IN38) etc. showed larger influence of K/L on employment dispersal. But Leather (IN29) showed low K/L influence on Employment dispersal. Higher K/L influence was seen in Textiles (IN25), NmMP (IN32) and Metal Products (IN34). This is a useful result that showed K/L influences Intermediate Industries more to bring about dispersal. When K-productivity
was regressed on employment measures of dispersal, its influence was seen to be high in Textiles (IN25), Chemicals (IN30), Beverages (IN22) and Paper (IN28).

Labor Productivity was regressed on employment dispersal measure (HHNW and CVNW), it showed high influence on Paper (IN28), NmMP (IN32), Machinery other than Transport (IN36), EGS (IN41). It showed weak influence on Wood (IN27) and RPC (IN30). But when L-productivity was regressed on NVA dispersal, higher influence was noticed in NmMP (IN32), RPC (IN30), Textiles (IN25), OMI (IN38) and Metal Products (IN34).

In 1966-75, TFP regressed on NVA dispersal measures showed higher influence in Textiles (IN25), EGS (IN41), RPC (IN31) and Chemicals (IN30) dispersal. TFP influence on employment dispersal was maximum in Food (IN21), Textiles (IN25), Chemicals (IN30), RPC (IN31) and EGS (IN41). When K/L was regressed on NVA in this recession period, higher influence was seen in Food (IN21), Textile Products (IN26), Beverages (IN22), Metal Products (IN34) and Basic Metals and Alloys (IN33). When K/L was regressed on employment, higher K/L influence was seen in Textiles (IN25), Machinery other than Transport (IN36) and EGS (IN41).

In 1966-75, the decadal period of recession, Non-metallic Mineral Products (IN32), Basic Metals and Alloys (IN33), Metal Prodcuts (IN34) and Machinery other than Transport (IN36) showed higher \( (b/r)^2 \) implying that in Capital Goods Industry and Intermediates with higher capital intensiveness, recession was a cause for low TFPG influence and not so high Employment Dispersal. Food was more concentrated and so high K/L influence could not bring about NVA dispersal in Food Industry. Thus recession affected not only the machine goods industry but also the main agro-industry in India. K/L growth did not influence NVA dispersal in Textiles (IN25) and Machinery other than Transport (IN36) but it did influence employment dispersal in these industries despite recession. NVA of Intermediates like Leather (IN29), Chemicals (IN30) and Rubber (IN31) dispersed due to Capital Productivity influence. While \( (b/r)^2 \) was relatively high, influence of Labor Productivity in this period of 1966-75, did not bring about dispersal in Food Industry. Similarly, \( (b/r)^2 \) in Hhemp is relatively high in RPC (IN31) and despite low influence of Labor Productivity on employment dispersal in terms of \( b^\gamma \), L-productivity should be increased, as dispersal is due to influence of L-productivity, as revealed by high \( b/r \).

When K-productivity was regressed on NVA, higher influence was seen in RPC, Leather, Beverages. Its influence on Employment dispersal was higher in RPC (IN31),
Leather (IN29), EGS (IN41) and larger size could retain its share of employment. When L-productivity was regressed on NVA, high influence industries were EGS, Wood. L-productivity influence on employment saw high influence on Food and EGS. So influence of partial productivity of factors was high in User Based industries. EGS showing high influence of partial productivity of factor on growth variables showed this industry despite being K-intensive still showed characteristics of clay as much as putty and therefore amenable to greater decentralization. But as seen above, K/L influence on growth variables in EGS remains negligible.

In 1976-85, TFP influence on NVA dispersal was higher in Beverages (IN22), RPC (IN31), BM &A (IN33) and large regions retaining their hold. Similar dispersal occurred in employment in RPC (IN31), MotTr (IN36), Chemicals (IN30) and Textile products (IN26). K/L showed higher influence on NVA dispersal in RPC (IN31), Food (IN21), Metal Products (IN34), Paper (IN28) Wood (IN27) and BM & A (IN33) but dispersal occurred. Influence of K/L on employment dispersal was higher in Textiles (IN25), Leather (IN29), Food (IN21), EGS (IN41) and BM & A (IN33). But least influence of K/L on NVA was in EGS (IN41).

K-Productivity’s influence on NVA is higher in OMI (IN38), RPC (IN31), BM &A (IN33) and Textile Products (IN26) showed concentration. Transport (IN37) showed least influence but showed the way to infrastructure development. On Employment dispersal, K-productivity showed high influence on Employment (NW) dispersal measures in Food (IN21), EGS (IN41), Paper (IN28) though Paper (IN28) showed more concentration in this period. Food (IN21) and Paper (IN28) benefited irrespective of regions. High influence of L-productivity on Employment (NW) dispersal noticed in Leather (IN29), and EGS (IN41).

In the final decade of our analysis i.e. in 1986-95, TFP showed higher influence on NVA dispersal of Metal Products (IN34), Transport (IN37), EGS (IN41) and Non Metallic Mineral Products (IN32) retaining their spread of NVA. TFP influence on Employment dispersal was higher in Non Metallic Mineral Products (IN33), Mot Tr (IN36), Food (IN21) and Leather (IN29). K/L influence on NVA dispersal in NmMP was high. Similar was the case in OMI (IN38) and RPC (IN31). Higher influence of K/L on employment was also seen in NmMP (IN32) and also in Food, Beverages, Wood and Textile Products (IN26). Wood showed concentration.

K-Productivity showed higher influences on NVA dispersal in EGS (IN41), OMI (IN38), Leather (IN29) and Chemicals (IN30). It was also encouraging that Leather (IN29), a
L-intensive industry showed higher Capital Productivity influence on dispersal of output growth in this period of liberalization. K-Productivity’s Influence on Employment was higher in EGS (IN41), Chemicals (IN30) and Transport (IN37).

L-Productivity’s influence on dispersal of NVA is higher in EGS, MotTR, Chemical (IN30) and RPC (IN31). L-Productivity influence on employment was higher in EGS (IN41), Wood (IN27), BM&A (IN33), Transport (IN37). High influence on EGS showed feasibility of decentralized power reforms. But high \((b/r)^2\) could not bring about much NVA dispersal in this last decade of analysis in Basci Metals and Alloys (IN33).

In the long-term period of 40 years, TFP influence on employment dispersal and NVA dispersal was higher in NmMP, Metal Products, Textiles (IN25) and Leather (IN29), though mean values were nearer the lowest values in IN32 and IN34, though relatively, across industries, IN32 and IN34 gained better dispersal. Thus relatively, Intermediates did well but its values being nearer to lower dispersal values meant cause of lower dispersal is to be found in its growth and productivity figures as well as in lower influence in Lproductivity, Kproductivity, K/L, TFP on disperal measures. K/L influence is higher in Food (IN21), Leather (IN29), NmmP (IN32), BM &A (IN33), Paper (IN28) and Textile Products (IN26). In Chemicals (IN30), smaller regions benefited. K/L influence on employment dispersal was high on EGS (IN41), OMI (IN38), Leather (IN29), NmMP (IN32).

Capital Productivity influenced dispersal of NVA in Leather (IN29), EGS (IN41), OMI (IN38) and Beverages (IN22). Labor Productivity influence on NVA was higher in Leather (IN29), EGS (IN41), OMI (IN38) and Beverages (IN22).

Food, Wood, Paper, Textile Products and EGS need greater attention for more balanced regional dispersal of Indian Industries and economic growth. EGS showing great amenability to L-productivity influence, despite being a K-intensive industry and the rest being more L-intensive, it augurs well for Indian Industry and Economy if labor gets more disciplined, there is less of labor turnover and greater political trust along with incentives like productivity linked wage reforms and higher R&D output and productivity with highly dispersed institutional cum technological development.

Policy recommendations will be that if K/L or PK or FC importance is more and more in decades or long term, then more skill will be needed. So investment and focus must be towards more investment in R&D in industries, education, knowledge economy must be quickly brought to focus, with Electronics, software, hardware ICT and its spread to rural
areas. Primary education especially in rural areas or for people below certain income level rather than reservations, must be an essential component of policy orientation change and implementation.

Wood (IN27) comes out as an industry needing attention at least for purposes of employment planning and to boost employment in this wood industry. This will boost rural entrepreneur-ship and rural employment and being L-intensive and can be used massively for poverty alleviation programme. Adequate marketing can boost tourism in service, housing and improve infrastructure and provide a base for industrial growth and trade.

In 1966-75, the decadal period of recession, Non-Metallic Mineral Products (IN32), Basic Metals and Alloys (IN33), Metal Products (IN34), Machinery other than Transport (IN36) showed \( \frac{b}{r} \) higher implying even in capital goods industry and intermediates with higher capital intensive-ness, recession was a cause for low TFPG influence and not so high Employment dispersal. Food was more concentrated and so high K/L influence could not bring about NVA dispersal of Food Industry. Thus recession not only affected the machine oriented goods industry, it also affected the main agro-industry in India too. K/L growth did not influence NVA dispersal in Textiles (IN25) and Machinery other than Transport (IN36) but it did influence employment dispersal in these industries despite recession. NVA of Intermediates like Leather (IN29) Chemicals (IN30) and Rubber (IN31) dispersed due to capital productivity influence. While \( \frac{b}{r} \) higher, influence of Labor productivity in this period of 1966-75, did not bring about dispersal in Food Industry, a point that reinforces the inference presented in this paragraph before. Similarly, \( \frac{b}{r} \) higher in Rubber-petroleum and Coal (IN31) and despite low influence of Labor productivity on employment dispersal in terms of \( b^\gamma \), policy recommendation is in terms of raising Labor Productivity, as dispersal is due to influence of Labor productivity. Labor productivity influence did not bring about employment dispersal in this Food (IN21), a fact that can be again attributed to recession.

Textile Products (26), Chemicals (IN30), Rubber-Petroleum-Coal (IN31) and Machinery other than Transport (IN36) with high b/r did not bring about high employment dispersal in this period of 1976-85.

In Rubber, Chemicals and Basic Metals, that are traditional highly capital intensive did show higher dispersal in this period of 1976-85 but it was again not due to influence of K/L.
In 1986-95, Food Industry still showed concentration. Dispersal being higher in Chemicals, high \( (b /r)^2 \) showed influence of Labor Productivity on NVA dispersal in this decade. In Basic Metals, high \( b /r \) could not bring about much NVA dispersal in this decade. Thus Intermediates have not shown dispersal despite its potential. Leather showed dispersal in last decade both in NVA and in employment due to influence of capital productivity.

The long run analysis of 40 years from 1956-95 revealed certain interesting results. High NVA dispersal and high \( (b /r)^2 \) in Chemicals (IN30) means that low TFPG influence as revealed in \( b^\wedge \), itself is a factor for dispersal in this industry. Chemicals Industry (IN30) to sustain itself as a leading industry for balanced industrial development will have to find ways to improve its TFPG.

Basic Metals and Alloys (IN33) and Metal products (IN34), both being capital intensive Intermediates showed high TFPG influencing dispersal, while NmMP (IN32) being of similar nature as IN33 and IN34 showed concentration or non-dispersal with little TFPG influence on employment dispersal. Thus employment dispersal in these intermediates having shown themselves amenable to higher TFPG, it is necessary that a more detailed input-output planning exercises involving Intermediates is called for. The Economic Reforms of 1990s has not taken Intermediates Planning into account that would have a factor for regional equity and growth in Indian economy.

**The Salient points to conclude:**

In Chapter 4, an Analysis of Returns to Scale over a long period of 40 years, saw Increasing Returns to scale (IRS) in many industries like IN25, IN21, IN27, In28, IN30, IN32, IN34, IN36, IN37. But scale economies did not necessarily reflect growth in NVA, GVA or Employment. Scale Economies does get reflected in Factories Growth Rate and therefore are a cause of entry and exit of firms to industry. Factories showed higher dispersal in IKI group of Industries in Chapter 6, but less dispersal in other variables.

Wood (IN27) showed highest TFP in Domar and also showed higher Capital Productivity in both K1P and K2P (measures of capital productivity) and yet remained problematic with low GVA, NVA, Emp, FC, dispersal and in scale. Thus employment and investment and planning for regional spread of Wood (IN27) is needed.

Capital Productivity needed to be improved generally in IKI industries and Kgoods industries as also in Food (IN21).
In Food (IN21), Textiles (IN25) and Wood (IN27), NVA and GVA growth rates are low and to boost these industries, FC growth seems necessary.

Metal Products Industry (IN34) did well to raise its K-Productivity, but FC growth being low, capital injection needed to boost dispersal. Similar prescription is seen in Textiles Products (IN26). Factory growth rate in IN26 being low and also NW/Fact in IN26 being low, employment planning in an inter-regional framework is needed. FC boost needed in Wood (IN27) and Paper (IN28) too.

Capital Intensity is low in Wood (IN27), Beverages (IN22), Leather (IN29), RPC (IN31), Metal Products (IN34) and OMI (IN38). K/L growth is high in Textiel Prodcuts (IN26), Food (IN21), Textiles (IN25), EGS (IN41), Chemicals (IN30), NmMP (IN32), Basic Metals and Alloys (IN33), Machinery other than Transport (IN36) and Transport Equipment (IN37).

Capital Intensity influenced TFP the most in Beverages (IN22), Textile Products (IN26) and Wood (IN27).

TFPG influenced NVA most in EGS (IN41), Textiles (IN25), MotTr (IN36), BM&A (IN33), Food (IN21). RPC, Metal Products and Leather, Transport showed high TFP influence on GVA. TFP influence on employment highest in IN34, IN36, IN22, IN30 and IN31.

Capital Productivity showed high influence on GVA in NmMP, Paper, Beverage, Leather, Food, Chemicals, RPC and OMI in that descending order. Kproductivity higher influence on NVA growth in IN22, IN29 and IN31. Kproductivity influence on employment higher in IN29, IN22, IN31 and IN21.

As regards dispersal as seen in Chapter5, in long term of 40 years, 1956-95, higher dispersal was in Beverages (IN22), Textiles (IN25) and Other Manufacturing Industries (IN38) as mean values are nearer higher dispersal values.

The Capital Intensive Intermediates of Chemicals (IN30), Rubber, Petroleum and Coal (IN31), Non-Metallic Mineral Products (IN32), Basic Metal and Alloys (IN33) and Metal Products (IN34) need greater planning and integration with Capital Goods Industry, especially in OMI (IN38) and Electrical and Non Electrical Machinery other than Transport (IN36), if industrial sector is to contribute more to GDP and enable it to increase its employment absorption capacity that could lead to greater regional equity in Indian Industry and act as a
major and sustainable instrument for poverty alleviation to raise standard of living of rural and urban economy.