Chapter-1

Introduction

1.1 Theme of Study:

Industrial development is the fulcrum and an essential catalytic requisite for rapid pace of development. Kuznets’ comparison of 50 countries has shown a marked increase of manufacturing output with rising per capita income. To him, marked increases in productivity are usually achieved in the face of population growth and rising labor force through major innovations that could be defined as ‘application of new bodies of tested knowledge to the processes of economic production’\(^1\). Chenery\(^2\) traced a statistically significant relationship between per capita income and degree of industrialization [Also Kaur Kulwinder -Structure of Industries in India\(^3\)]. All these studies stressed that without industrial development, economy cannot have progress; and will touch a low and/or a limited frontier of development. Development is to be noticed in growth of manufacturing industry resulting from opening up of new markets and new processes of deepening and widening of capital. Productivity growth in manufacturing industry is the major and sustainable propeller to economic growth and for structural transformation of now developed economies\(^4\).

\(^3\)Kaur Kulwinder in “*Structure of Industries in India: Pattern, Framework, Disparities*” also writes that that level of per capita income has been found to be correlated with degree of industrialization- Deep and Deep Publications, 1983- Ch-1, pp-18.
The current study absorbed the genesis of results of the above and similar studies that led to trace causal inter-relations between Industries’ Growth, Partial and Total Factor Productivities, Regional Dispersal and Development of Industries in India. The theme of the study is titled “Productivity, Growth and Regional Dispersal of All-India Industries-1956-1995”. The analysis relates to twenty industry groups at 2-digit level of aggregation on the basis of National Industrial Classification (NIC), 1987, that corresponds to International Standard Industrial Classification (ISIC). The Time Series Analysis of the study has been carried out over time periods of 4 decades, separately for each decade, and for the long period of 1956-95, together, wherever needed, for temporal comparison of results. Productivity, growth and dispersal measures of individual industries at national and regional levels are analyzed for distinct size measures of industry. Regional dispersal analysis of size measures for each of the twenty two-digit industries has been carried out using states level data from 1959 on-wards, because states level data for the years 1956-1958 were not available.

While earlier authors and researchers have studied productivity, growth relations and regional dispersal of Industries separately, hardly any studies on regional dispersal of industries due to causal links with productivity and growth are noticed. This study is a contribution to knowledge of economic science and practice in attempting to find the causal links between productivity, growth and regional dispersal of industries.

1.2 Objectives of the study:

1- To analyze partial productivity ratios of factors; and Measurements of Total Factor Productivity of industry groups; and output elasticities of those factors as to infer returns to scale and to trace causal linkages between these measurements.
2- To analyze temporal shifts in industrial growth of the industry groups in India and to trace the causal relations with other variables, as in (1) above.
3- To trace the extent of industrial dispersal across states over time periods for (i) small states and Union Territories (UT), (ii) large states, separately and for (iii) All States and all UT taken together. Then to trace causal relationships of the dispersal measures of NVA and Employment at sub-national levels with the TFP, Partial Productivity of each Factor and Capital Intensity for each of the industry groups in the short-run and the long periods.
4- To draw policy guidelines based on Causal inter-relations analyzed temporally for productivity, growth and dispersal indices of Indian industries.

1.3 Hypotheses and Research Questions:

a- Whether Total Factor Productivity (TFP) manifesting Hicksian neutral technological progress and Partial Factor Productivities, influences and is influenced by Growth; and Whether Elasticities and Returns to Scale in Indian Industries leads to identification of Temporal Shifts in Scale Economies; and Whether Ranking of Industries in terms of the respective variables throws light on that variables’ contribution to industries growth;

b- Whether higher capital intensities in individual industries are reflected in higher growth rates of TFP and therefore Output growth of those industries;

c- Whether industries at 2-digit level of aggregation having higher growth rates in output and employment have higher regional dispersal rates, revealed by both Herfindahl and Coefficient of Variation indices of regional dispersal of each industry group; and

d- Whether Growth in Size Variables and Structural Ratios of Industries led to regional dispersal over time; and whether it implies testing Self-Perpetuation Hypothesis or Williamson Hypothesis of Industrial Development that can reveal nature of Industrial Development in India as one of leading to Concentration initially and Diversification and Development ultimately over time; and whether all these results of analysis can be tested by Grossack’s instruments of analysis to cause to infer evenness or unevenness of regional shares of Indian Industries’ leading to further regional dispersal or concentration.

1.4 Importance and Relevance of the Study:

More than 50 years of planning for development in India saw considerable increase in industrial base, diversification, structural changes, and changes in growth rates and short spells of stagnation/slow growth of industry. But much less is known regarding causal factors for regional dispersal of industries, extent of response to each of those causal factors, linkage measures of regional diversification and growth rate differential of distinct industries. Hence this study probes into the economic mechanism of causation to explain inter-relations of Regional Dispersal Measures and Growth Measures and also particularly of Returns to Scale,
Capital Intensity, Partial and Total Factor Productivity Measures, linkages with each Regional Dispersal Measure. The three decades till mid-1980s onwards to date and particularly mid-1990s underwent Import Liberalization, Privatization, Globalization and Economic Reforms of all Major Sectors including Monetary, Financial, Fiscal, Trade and Infrastructural Services in India. This accordingly needed an integrated approach to industrial planning that underwent structural adjustment and stabilization policies or New Economic Policies for balanced regional growth of Indian industries. This in turn needed integration of productivity approach and regional equity approach; both to be fully supported by development of capital and human investment. This enables fulfillment of people’s aspirations and participation of acquired skill base of local population and of skill mobility of labor force and ultimately convergence and divergence across states towards development of rural and backward regions and decentralized rural and urban industrial sector for balanced regional development. This analysis of dispersal measures associated with productivity and growth measures is a new addition to knowledge and would enable us to draw policy guidelines not merely for allocation of scarce resources but also to enable weaker sections to reap the benefits and to improve industrial skill spread quantitatively and qualitatively in rural areas.

Total Factor Productivity/ measurement of technical change led to growth leading to cause for regional equity or imbalances otherwise in the long-run. Further, industrial employment and growth dichotomy that depends not only on the pace of technological change but also on social adjustments to exploit new products and processes and learning effects. All such hypotheses provide an adequate base for further research studies of industrialization, competitiveness and causal factors thereof. Analytical results of this current study lead to further researches thus envisaged.
1.5 Review of Literature and Research Gaps:

A brief review of a few major studies on productivity, growth but a few on regional dispersal of industries as carried out making use of both time series and cross section data led to find out the research gaps for the purposes of our study.

Ahluwalia’s ‘Industrial Growth in India- Stagnation since the mid-sixties’ (1987) 5 analyzed long-term trends in industrial growth, focussing on causes of industrial stagnation in mid-sixties due to poor growth performance and dismal productivity achievements in industrial sector, resulting from slow growth in agricultural incomes, poor management and low investment in infrastructure sectors.

Goldar in his ‘Productivity Growth in Indian Industry’ (1986) 6 analyzed trends in Partial Productivities, TFP and K-intensity at the aggregate level. He found a significant rising trend in L-productivity, K-intensity and a significant falling trend in K productivity. TFP growth rate of 1.3% is low in relation to rate of growth in industrial output but a strong positive relationship between output growth and productivity growth is noticed. His study results for India are similar to findings in other countries’ studies. The TFP growth in ‘traditional’ industries was marked positive but was not so for many ‘modern’ industries due to (i) incomplete ‘learning effect’ (ii) sharp fall in growth rate of fixed capital from 12.3% p. a. in 1959-65 to 5.8% p.a. in 1965-79 and (iii) fall in growth rates in real value added and labor. There was a reversal of the declining trend in K-productivity but K-deepening slowed down after 1970.

Goldar study did not address regional dispersal measures or to regional policies assessment but only to efficiency measures of national industries linkages.

Isher Judge Ahluwalia’s ‘Productivity and Growth in Indian Manufacturing’ (1987)\(^7\) pursues the issue of productivity growth in organized manufacturing over longer period (1959-86) and in detail. It found time series and pooled series estimates of statistically insignificant growth in TFP through estimation of Translog production function similar to earlier studies’ estimates of TFPG during 1959-1983 but a reverse trend towards significant TFPG after 1982-3 for market use based industrial sectors, particularly high growth in productivity of consumer durables and capital goods sectors but not of intermediate goods sector unlike other countries’ TFPG. Negative effect between higher capital intensity and productivity growth was due to policy distortions resulting into fragmentation of firms. Thus neither of the studies of I. J. Ahluwalia addressed to measures of regional dispersal of industries, leaving it as a Research gap.

Dhananjayan R.S. and N. Sasikala Devi (1998)\(^8\) worked on objectives of estimating TFPG for 2-digit manufacturing and analyzed the behavioral characteristics. TFP growth yielded low magnitudes but a spurt in TFP was noticed in mid 70s, late 80s and early 90s. The Study inferred that ad-hocism in policy programs needed to be toned down and long-term policy directions devised and adhered to. Their study did not address to regional dispersal.

Oulton and Mahoney’s study (1994)\(^9\) of UK manufacturing for 1954-86 at three digit level of industrial aggregation to analyze Jorgenson’s\(^10\) growth of gross output dealt with evidence of increasing returns at industry level. It also tested Fabricant’s law and whether capital was special in Romerian\(^11\) sense of raising externalities. It did not trace regional dispersal of industries abroad.

\(^7\) Ahluwalia’ Isher Judge -‘Productivity and Growth in Indian Manufacturing’-Oxford University Press-Delhi (1987).
Mehta S.S. (1974) 12 studied technological change in large-scale Indian industries from 1953-70 based on ASI census data. Till 1965, Indian industry expanded at a very high rate. The annual growth rates rose per annum. Industries studied by him also showed high rates of 6-7%. But the main source of output growth was due to increased physical inputs and the role of technical change was minimal. Regional dispersal of Indian Industries was not analyzed.

. Somayajulu V. V. N. studies on ‘Industrial Development of Andhra Pradesh: 1956-80 (1994) 13 examined the structural parameters of Partial and Total Factor Productivity for industrial development. It analyzed at length the regional dispersal of industries at sub-regional district wise level and probed intensively the institutional constraints and how to overcome them for a more effective and comprehensive industrial development at all levels: national level and at a sub-national level of AP State economy. But causal linkages between dispersal and growth, TFP, etc. were not established.

There are many other studies [as in the Major comprehensive Review in Chapter2] but regional dispersal measures, issues and Policy direction for the best regionally balanced industrial development were hardly analyzed as to trace causal link relations with growth, productivity (TFP and Partial), Returns to Scale, factor intensity, etc.

1.6 Problem-Setting for the Current Study:

Studies relating to productivity and growth of Indian industries did not pin down causal and verifiable factors for economic weaknesses of industrial stagnation, recovery, growth, sluggishness and vicissitudes that manifested from time to time. No studies have been addressed to bring out an integrated industrial strategy, approach and policy across national, and inter-regional sectors and industrial development leading to regional dispersal of industrial growth in all states/UT of All India. The cited research gaps (Section 1.5) motivated to measure and relate growth, returns to scale, partial productivity measures, TFP measures and regional dispersal at national and state levels and trace causal relations between them in a framework of inter-relations between productivity, growth and dispersal measures as to test results and deduce policy guidelines as distinct contributions to industrial development studies in India. This current study also distinguished small states and UT from large states vis-a-vis All India industries in the regional dispersal analysis.

Industrial growth and dispersal measures at 10-year and 40-year periods coverage reflecting different stages of industrial development of India had not been attempted in earlier studies. This study contributed to explain the causal factors for distinct periods analysis and tests whether size of states yielded distinct results of regional dispersal of industries caused by the relevant factors over time 1959-95. Such an integrated study of industrial development could provide new policy perspectives and future directions of research.

1.7 Data:

Data classification problems, have been considered for adjustments on classification or coverage of units (wherever needed to) as to make comparable data from different sources, viz, CMI 1956-57, SSMI-1958, Statistical Abstracts from 1956-1971, ASI 1959 onwards and classification of 1970 NIC, 1987 NIC and 1998 NIC and then finally (Chapter3) bringing out 3-digit and 4-digit ASI or NIC data in CMI and SSMI industries in a NIC-1987 framework. However, state level data was not available for 1956-58 at 2-digit level of aggregation and not considered.
1.8 Chapterization:

The First Chapter deals with Introduction to the Thesis, Objectives, Hypotheses, Research Questions, Research Gaps, Importance and Relevance of the Study that contributed to knowledge.

The Second Chapter deals with Literature Review revealing Research Gaps traced for the purposes of fulfillment of the Thesis’ objectives.

The Third Chapter deals with Analytical Framework, Methodology of Analysis including Sources of Data and Adjustments.

The Fourth Chapter deals with Productivity Analysis of TFP Growth, Measures of Kendrick, Domar and Solow. Further, regressions of TFPs on K/L to measure contributions of capital-intensity to TFP growth are done. Analysis of size variables and structural ratios, their growth, partial and total factor productivities along-with Cobb Douglas production function estimates of output elasticities of L and K for each industry, factor-intensity, etc. for 2-digit (NIC-87) industries over 4 decades were carried out. Whether growth, partial and total factor productivity measures move in tandem or in opposite directions were assessed as to reveal the causation mechanisms and linkages between productivity, factor intensity and growth in each industry.

The Fifth Chapter deals with Measures of Regional Dispersal of Indian Industries in All states and union territories together and separately for each of (i) large states and (ii) smaller states and UT as to assess their distinct region size effects on industrial development analysis. Barring Assam, all Northeastern states and Delhi were put in the third category. Sikkim, Arunachal Pradesh were omitted in the analysis for want of data. Herfindahl-Hirshman Index and Coefficient of Variation measures were used to analyze regional dispersal of size variables and structural ratios of industries to assess the extent and depth of industrialization and regional dispersal in India and to provide inputs for regional policy thereof.

The Sixth Chapter attempts a Graphical Presentation of Long-term Trends of regional dispersal measures for each of the 5 Variables and Structural Ratios of the 2-digit Industries to find out which Industries’ satisfy Williamson Hypothesis.
The Seventh Chapter deals with the Causal Links between productivity, growth and dispersal over 40 and 10 year time periods. This is to assess whether Total Factor Productivity, Partial factor Productivities have been causal factors for growth and whether K/L contributes to productivity and in turn to regional dispersal of industries.

The Eighth Chapter deals with the Major Findings and Policy Guidelines.