Chapter-II

REVIEW OF THEORY AND EMPIRICS
ON STRUCTURAL CHANGE

As already said, the main objective of the work is to explore the pattern of structural change and its dynamics in Indian economy. The direction and magnitude of such a change is useful for any kind of economic planning and policy formulations, both at micro and macro levels. The present chapter briefly reviews the available economic literature on structural change, in general, and its dynamics, in particular. Best way to understand the dynamics of structural change is to have a synoptic review of international country specific case studies, followed by review of some regional experiences. In the light of this argument, the chapter has been divided into four sections. First section, gives a synoptic review of country specific case studies. Second section, reviews some prominent studies on Indian economy and the next section covers some regional studies on structural change. Last section, finally, sums up the chapter.

I Structural Change: Country Specific Case Studies

Productivity growth in developed countries mainly relies on technological innovation. For developing countries, however, growth and development are much less about pushing the technology frontier and much more about changing the structure of production towards activities with higher levels of productivity. This kind of structural change can be achieved largely by adopting and adapting existing
technologies, substituting imports and entering into world markets for manufacturing goods and services, and through rapid accumulation of physical and human capital. A few developing countries have been able to undertake original research and development in some fields, but technological innovation continues to be highly concentrated in the industrialized world. Following sections covers country specific case studies on structural change.

Aying, L. and David, S. (1999) examined the sources of structural changes in output growth of South Africa’s economy over 1975-93, using a decomposition method within the input output (IO) framework. There are two main objectives of the paper. First is to analyse inter-temporal variations in technical structures. This will give detailed information on the structural characteristics of the economy, which are analytically useful, but not apparent from the established time series data of industrial output and national income. Secondly, by decomposing output demand into six elements, this study intends to reveal the sources and magnitudes of factors responsible for output changes, and hence, insights into South Africa’s poor apartheid era economic development. The paper is organised as follows. Section I deals with introduction. Section II describes the methodology and the data. Section III compares the changes in the IO models over the sample period. Section IV discusses the results of a decomposition analysis of the sources of output growth. Section V compares the results with those from previous studies on other economies. The analyses lead to some important conclusions and policy implications in Section VI.
The model uses four comparable IO tables for the years 1975, 1981, 1988, and 1993 (released by Central Statistical Services), as the main data sources and accounts for output changes from a demand side perspective. It decomposes output growth into private consumption, government consumption, investment and export components and also measures the impact of import substitution and changes in intermediate input use. It is found that before 1981, overall output growth was multi-components driven with all the above components contributing positively to economic growth. However, the collapse of investment demand is by far the single largest factor contributing to the economic stagnation that categorizes the post 1981 period. Whilst the efficiency of factor utilization remains an issue for further research, a significant rise in the IO coefficient share during the entire 1975-93 periods indicates a deepening of interdependence between industrial sectors over this period.

It is found that before 1981, overall output growth was multi-components driven with all the components contributing positively to economic growth. However, the collapse of investment demand is by far the single largest factor contributing to the economic stagnation that categorises the post 1981 period. Whilst the efficiency of factor utilisation remains an issue for further research, a significant rise in the IO coefficient share during the entire 1975-93 period indicates a deepening interdependence between industrial sectors over this period. However, analysis by sub-periods suggests that after 1981, both the mining and manufacturing sectors failed to sustain their role as engines of economic growth.
Berni, D. A. (2000) described the structural change faced by Brazil between 1959 and 2000, employing input-output matrices for these years and for 1970, 1980 and 1990. The 2000 matrix was obtained through a combination of the Delphi and RAS methods. Delphi methodology has been applied in order to obtain final demand, gross output, value added, non-competitive imports and employment data for year 2000. Applying the RAS method over this set of data, eight sectors input-output matrix for this year has been obtained. National Accounts Statistics have been used for the data.

The analysis showed striking results both along sectors and the set of selected variables. First, the share of agriculture in total employment was reduced from two thirds in 1959 to just 20 percent in 2000. Second, the services sector employment showed an opposite pattern, evolving from 15 percent in 1959 to 57 percent in 2000. Thirdly, the symmetry between these two features of employment is dated to the period between 1970 and 1980, the remaining years just reinforcing the enormous breakthrough of the decade. Further, there was a remarkable shift in manufacturing: the production of non-durables, which was dominant in 1959, and the epicentre of the import substitution industrialization fell steadily during the whole period. To sum up, the dimension of economic change in Brazil along the last 40 years was very impressive. In particular, during the 1990s, an abrupt process of opening the economy created a number of opportunities, but also a host of difficulties to a number of domestic and multinational firms, but also and undoubtedly to the Brazilian working class.
The paper deals with reliable data to describe this change. However, in particular the comparisons of the structure of the economy in 1990 with 1992-3 and with the official input-output tables for 1998 and 1999 may help to achieve new results. Dealing with alternative input-output methodologies, particularly devoted to compare domestic with imported production and absorption, the causes of the model changes occurred in the 1990s will be grasped. In particular, this proposed type of study can help to answer how a deliberate trade policy can affect both the dynamism and the egalitarianism of the Brazilian economy.

Fontela E., López A. and Pulido A (2000) compare Input-output Tables. Comparison of input-output tables for one country over time, for several countries, or across regions of a given country, has attracted attention, mainly in order to identify patterns of changes of these tables. In this paper the problem of comparisons is envisaged with different approaches, some quantitative and some qualitative. Several methods are applied to a set of 11 tables of regions of Spain.

For comparing input-output tables, two lines of enquiry are possible. The first, uses the technical coefficients or the flow tables, as such, and leads to comparisons of quantitative structures, or quantitative comparisons; of particular interest in this area is Soofi (1992) in which structural comparisons are made between Egypt, Morocco and Zambia. The second line of enquiry uses only the binary information related to the existence or non-existence of certain types of relations, and leads therefore to comparisons of qualitative structures, or qualitative comparisons; of particular interest in this area is
Holub, Schnabl (1985). Among the different possibilities existing for quantitative comparisons, they have opted for three procedures, the first related to the matrix of direct technical coefficients, and the others to the inverse matrix of direct and indirect coefficients. When comparing I/O tables in time or in space, increasing use is made of binary structural qualitative tables in which only the existence (1) or nonexistence (0) of coefficients or flows, are recorded. In general, some of the relations are excluded from the computations according to criteria that may be related to the size of the coefficient or flow or to the importance of the coefficient in terms of possible impact on outputs. This paper has presented a number of initial methodologies and results of a larger project on the patterns of regional structural change in Spain. These results point to some aggregated characteristics of the Spanish regional economy and are encouraging for more in depth studies of the relation between quantitative and qualitative analysis.

Jiemin, G. and Mark, A. (2000) has analysed structural changes in the U.S. economy and the role of international trade on those changes. For this analysis, they use a set of six input-output tables prepared over the 1972 to 1996 period. Structural change is measured using the “Multiplier Product Matrix” (MPM). The MPM provides a measure of an industry’s linkages, that is, the impacts of an industry on other industries that can be compared with those of other industries or with itself at different points in time. These linkages represent the interactions by an industry with other industries both as a producer of output and a consumer of inputs and without regard to national
boundaries. To evaluate the effects of trade on these linkages, a separate set of MPM’s were created to show linkages for only domestic production. By separating domestic from total linkages, the analysis identifies, as a residual, the linkages between the U.S. economy and the rest of the world and the influence of trade on the structure of the U.S. economy. The results of analysis are as follows: Changes to the industry linkages that define the structure of the U.S. economy have been incremental over the 1972 to 1996 period. These changes have altered the structure of the domestic economy and where it draws impetus for economic growth. In 1972, the strongest influence on the U.S. economic activity was concentrated in manufacturing. In the quarter century since then, manufacturing’s influence has gradually decreased. Over the 1972 to 1996 period, much of the decline in manufacturing’s influence on the domestic economy is explained by leakages from U.S. imports. Over the same period, non-manufacturing industries – particularly construction, real estate, and fast growing services – have gained in influence on the U.S. domestic economy. The decline in manufacturing’s influence was greatest for slow and average growth industries. However, manufacturing industries with fast growth also showed a decline over the period.

The study shows that the relative impact of manufacturing on the economy has declined in the United States from 1972 to 1996 and that import penetration has been a major factor in this decline. The role of non-manufacturing industries in U.S. economy becomes stronger, with fast growing rate and increasing industry linkages.
Jung Ho Chung & Chong Gui Kim (2000) described the sources of growth for the Korean economy, for the period 1975-1995, using linked input-output tables. The objective of the study is to analyse the sources of economic growth and structural change. The methodology of decomposing sources of the growth based on Syrquin’s model is used. The growth of gross domestic output has been decomposed into four different sources, i.e., domestic final demand expansion, export expansion, import substitution and technological change. The results of the decomposition are as follows; first, the domestic final demand expansion and export expansion made far greater contributions to the economic development of Korea. Secondly, import substitution and technological change showed a negative effect inducing a decrease in gross domestic output from the early nineties. Thirdly, the growth of manufacturing in the Korean economy showed a high dependence on exports.

Using Chinese input-output tables study by Baiding, H. and McAleer, M. (2000) has investigated industry structure and inter-industry relationship and the relationship of both to economic growth. The analysis revealed that final demand growth was the predominant force for output growth in all industries in China for the five year period from 1992-1997. In most cases, the technological changes (input-output coefficient changes) appeared to be unimportant in boosting industry output growth during the period. This supported the view that whenever there is high economic growth, there is also very high growth in final consumption. Further, the study found that, the agriculture contributed less and less to its own growth, whereas, industry behaved in a reverse
manner. For services, internal contribution was found to be significant during all periods. The major source behind the services output growth was final demand growth within services for services. The analyses also showed that industry and construction count for more than 50 percent of transportation, post and telecommunication output growth, indicating that greater final demand in industry and construction can lead to greater output in transportation, post and telecommunication.

Guo, J. and Planting, M. A. (2000) using Sonis’ techniques of displaying structural change, evaluated changes in the U.S. economy over the 1972 to 1996 period, focusing on inter-industry linkages and the effect of international trade on those linkages. The study showed that the relative impact of manufacturing on the economy has declined in the United States from 1972 to 1996 and that import penetration has been a major factor in this decline. The graphical presentation of inter-industry relationships through the “Multiplier Product Matrix” (MPM) and its associated “economic landscape” provides a visualization of the U.S. economic structure for selected years and how it has changed over time.

The paper by Guy, R. W. and Richard, P. C. B. (2003) analysed structural change in the Taiwanese economy over the period, 1976-1994, using a series of input-output tables. Unlike other studies of structural change, the study investigates the evolving internal complexity of inter-sectoral inter-dependencies using ‘key sector analysis’, which gauges the strength of forward and backward linkages and the
recently developed method of ‘minimal flow analysis’, which gauges the degree of connectivity of the system. This analysis indicates that there has been a “hollowing-out” of the Taiwanese economy as the density of inter-sectoral linkages has declined since the early 1980s, similar to what has been observed of the US and Japanese economies at a much later stage of their development.

Mesnard, L. D. (2001) analyses the dual dimension: first, how the structure has changed over time; and second, what are the differences between two structures, e.g., two countries for the same time. This can be performed by directed methods based on the computation of technical (or column) coefficients what removes the effect of differences between the two structures for their column margins; same thing can be done with row coefficients. This predetermines the direction of the economy, demand or supply driven, and both results are not comparable. However, the comparison of the two matrices can be performed by removing simultaneously the differences between the column margins and the row margins of the two matrices. The paper surveys all ways to perform this: the methods based on additive method (minimization of differences, minimization of square differences, etc.) and the methods based on multiplicative methods bi-proportional.

Okuyama et al. (2002) applied the Temporal Leontief Inverse Analysis, to a set of annual input-output tables for the Chicago metropolitan economy during the period of 1980-97. The results are compared to the earlier analysis (Hewings et al., 1998, Okuyama et al., 2002a, and Okuyama et al.
to examine the method and to investigate further the structural changes of the Chicago economy. The results in this paper indicate that the evidence of different types of contribution from temporal change exists. In this regard, the findings in this paper confirm the conclusions of previous studies, while the previous studies use actual transaction volume (Hewings et al., 1998); yearly analysis of Leontief inverse matrix using the fields of influence technique (Okuyama et al. 2002a); and the time series (econometric) analysis of direct input coefficient matrices (Okuyama et al. 2002b) over the similar period of time. What complement the results in this paper can offer is an analysis of temporal inverse by which relative changes in system-wide structure of an economy can be traced. It is obvious that each method and technique can analyse the different side of one phenomenon. Careful examination and comparison of the findings may provide further depth in understanding the structural change of an economy. Over all, the analysis in this paper confirms the presence of a hollowing-out process in the Chicago economy. The manufacturing sectors have experienced sizable structural changes during the period of 1980-1997, while the service sectors have been rather stable and increasing relative significance in inter-industry relationship.

Okuyama, et al. (2002), applied the Temporal Leontief Inverse Analysis, to a set of annual input-output tables for the Chicago metropolitan economy during the period of 1980-97. This paper utilizes a new approach for investigating the structural changes in the Chicago economy over the period of 1980–1997. The analytical tool employed is the Temporal
Leontief Inverse, developed by Sonis and Hewings (1998). One of the advantages of the temporal Leontief inverse is the ability to implement and investigate the role of structural changes in a time series of input-output tables. Another important feature of this technique is its ability to provide a set of techniques to explore the nature of these time series and to assist in the extraction of important insights about the nature of technological change and/or of the changes in trading patterns (in the case of regional and interregional systems). Employing this tool, impacts and differences of the hollowing-out effect across sectors are displayed and analysed. The study comprises of five sections. Introduction is given in Section I. In the next section, the concept of temporal Leontief inverse is presented and discussed with other dynamic formulations of Leontief inverse. Section 3 briefly describes the derivation of Chicago input-output tables using the Chicago Region Econometric Input-Output Model (CREIM) and summarized the previous studies mentioned above. The fourth section presents an analysis of the Chicago economy over the period of 1980–1997.

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Claus, I. (2003) investigates changes in the production structure of the New Zealand economy using input-output data. The analysis was undertaken at the 25 sector level
using inter-industry transaction tables for 1971-72, 1977-78, 1981-82, 1986-87, 1990-91 and 1994-95. Changes in the composition of gross output and value added have been examined. Backward and forward linkages, indices of industry inter-connectedness, a value added production multiplier, a cumulated primary input coefficient for compensation of employees and a measure of import content of final demand output have been calculated, taking into account both direct and indirect transactions.

The purpose of the paper is to examine how New Zealand’s production structure has changed using input output analysis. Input output data contain detailed information about the process of production, the use of goods and services (products) and the income generated in that production (United Nations 1993). They can be used to assess the composition of industries’ gross output, value added, the degree of specialisation of industries and the contribution of primary inputs in the production of the economy.

The results show a shift away from manufacturing towards services industries. In particular, a rise in the gross output of finance, insurance etc., community, social services etc, local government services, and private non-profit services has had an increasing effect on compensation of employees for the economy as a whole.

Finally, the examination of import content of exports, gross fixed capital formation and consumption goods, as measured by the relative cost of imports, showed an increase in 1990-91 and 1994-95, all contributing to the widening of the current account deficit in the mid-1990s. The import
content of gross fixed capital formation increased in each of the six years examined. This possibly indicates an increasing acquisition and diffusion of foreign technology, which is thought to be an important factor contributing to innovation and growth in New Zealand.

The results suggest that some industries have been subject to large structural change and that a shift in New Zealand’s pattern of industrial activity has occurred. These changes may affect the transmission and propagation of shocks in the economy. The investigation of the dynamic effects of the structural change is left for future work.

**West, R. and Brown, P. (2003)** analyse structural change in the Taiwanese economy over the period 1976-1994 using a series of input-output tables. Unlike other studies of structural change this analysis investigates the evolving internal complexity of inter-sectoral inter-dependencies using key sector analysis which gauges the strength of forward and backward linkages, and the recently developed method of minimal flow analysis which gauges the degree of connectivity of the system. The analysis indicates that there has been a “hollowing-out” of the Taiwanese economy as the density of inter-sectoral linkages has declined since the early 1980s, similar to what has been observed of the US and Japanese economies at a much later stage of their development.

The paper uses a series of input-output tables to study the structural and inter-sectoral changes which have occurred in the Taiwanese economy over the period 1976 to 1994. The input-output tables were constructed by the Directorate General of Budget, Accounting and Statistics

In some applications, the tables are aggregated to 8 sectors. However, unlike other studies that rely exclusively on traditional input-output analysis, this study also employs Minimal Flow Analysis (MFA) which is essentially an extended version of qualitative input-output analysis (QIOA) developed by Schnabl [32] to analyse changes in inter-sectoral complexity. The paper is structured as follows. The first section provides an overview of how conventional input-output analysis is used to examine structural change and evolving inter-industry linkages, with particular reference to Taiwan over the period 1976 to 1994. This provides a backdrop to a more detailed analysis of changes in inter-sectoral interrelationships and inter-dependencies using techniques derived from linkage analysis, Key Sector Analysis and Minimal Flow Analysis. The final section then attempts to draw together all the information into a succinct picture of the evolutionary and structural changes which have occurred in the Taiwanese economy over the 19-year period.

The analysis confirms that there has been a shift in economic structure of the Taiwanese economy. Firstly, there has been a pronounced shift in emphasis from primary activities to secondary and tertiary activities. This has resulted in a more dichotomous structure emerging in the sense that sectors can be identified as belonging predominately to either a source or sink category. Secondly, it can be clearly seen from both the key sector analysis and minimal flow analysis that the Taiwan economy reached a
peak in terms of inter-sectoral complexity in 1981 before going into decline. This may be a direct consequence of the shifts in sectoral emphasis noted above, as service industries require less physical inputs. This phenomenon is not unique and may be associated with the movement of more labour intensive, intermediate industries to low-wage countries, especially China, as part of the globalisation process.

As trade barriers fall and ‘microeconomic’ reform policies bite, there is increased specialisation and both vertical and horizontal integration of industry structures. Government agencies no longer feel the need to support inefficient industries, with consequent shifts in economic structure towards perceived industries with comparative advantage and increased import reliance for other commodities.

In his paper, Jacob, J. (2003) explored the long term features of structural change in a newly industrializing country from South East Asia, Indonesia. Structural change over a period of quarter of a century has been examined using two input-output based decomposition frameworks. The two frameworks capture, among other variables, some dimensions of the economic consequences of the policy of import substitution led growth pursued till the mid eighties, and the adoption of market oriented economic policies thereafter. Important differences have been seen, both between sectors and over time, in the factors contributing to growth. Authors observe that, the demand side forces, set about by the liberal initiatives, helped the relatively smooth transition to a non-oil based growth in general, and a
manufacturing based growth, in particular. The effectiveness of the liberal regime comes to the fore again when one notices the emergence of within sector dynamics as the single most important component of the group level labour productivity growth.


The paper is divided in five sections. Section I gives introduction. In next section, they discuss the salient features of the policy-transition in Indonesia, followed by an evaluation of the changes in the economic structure in terms of the changes in sectoral shares in value added and exports, from 1975 to 2000. Following section discusses the IO decomposition techniques, derives the decomposition formula and proposes hypotheses for empirical examination. In next section, authors describe the data and sectoral classification. The results of the analysis are discussed and explained in last but one section. The final section sums up the main findings and policy implications.

The results reveal that between the inward- and outward-oriented phases, the key source of manufacturing growth shifted from import-substitution to export-expansion. During the final phase of crisis and recovery, value added
growth stemmed almost entirely from exports. Between the first two phases, although the influence of macro consumption and investment demand on sectoral growth did not change much, their reallocation effect showed marked differences. Results on the impact of other factors, such as value-addition effect and technical change, also provide important insights into the process of structural change and late industrialisation.

By using a newly constructed interregional input-output model, Bonet, J. (2005) analysed the regional and interregional structure and structural changes in Columbia. The purpose of the paper is twofold. First, a comparative analysis of inter-industry interactions within and between regions is undertaken. Secondly, the impacts of regional structural changes and sectoral interactions on the regional income polarization process are explored.

The results suggested that the key sectors have moved from primary and secondary sectors to tertiary sectors, which is a movement observed in the economic development process. However, it can be argued that the regional economies do not have any exactly the same linkage structures. These differences are the result of discrepancies in the dominant sectors in each economy. The interregional linkages reveal a country with self sufficient sectors in the most of the regions, which supports the idea of a country with relatively poor interregional dependences, results that were also found in previous studies. The fact that the powerful backward and forward linkages are identified in the most prosperous
regions instead of the lagged ones implies that the regional
inequalities are likely to be sustained.

Hayashi, M. (2005) analyzed structural changes in the
Indonesian economy before and after the 1997–98 crisis and
looks at the political transformation from the perspective of
the country’s industrial and trade performance. For this
purpose, the study takes into account not only the industrial
structure as a whole but also focuses on the manufacturing
industry as a driving force for economic development. The
objective of the study is to identify the current stage of
industrial development in Indonesia and to know what the
challenges are for further industrialization.

For analysis of industrial and trade structures, input-
output tables have been used. For studying, the Indonesian
input-output table of 2000 which was released at the end of
2003 has been used together with three earlier editions (1985,
1990, and 1995) in order to analyze changes in the industrial
and trade structure between 1995 and 2000 and to identify
what level of industrialization Indonesia reached. The study
comprises of four sections. Section I looks at the trajectory of
Indonesian economic development from the mid-1960s; when
the Soeharto administration started through the high growth
period, the 1997–98 economic crisis, and the post-Soeharto
period. Using skyline charts and measuring industrial linkage
effects, Section II describes structural changes in Indonesian
industry and trade in the period of the economic crisis and
the collapse of the Soeharto regime. The growth factor
decomposition method has been employed in Section III to
identify sources of change in the Indonesian economy. Finally,
Section IV provides clarification about the stage of industrialization Indonesia has reached and shows what challenges the country is facing, in order to achieve further industrialization. The study is intended to provide the new Indonesian government with suggestions about, how the current industrialization stage should be appraised and recommendation regarding what industrialization strategies and supportive institutions may be required from now onwards.

After tracing the history of economic development in Indonesia, changes in industry and trade between 1995 and 2000 have been viewed using skyline chart analysis, industrial linkage analysis, and growth factor decomposition analysis. Results indicate that from 1995 to 2000, the manufacturing industry expanded its share of production, strengthened export orientation, and lowered import dependency. However, these phenomena appear to have resulted primarily from slumps in growth factors other than export demand as well as sharp declines in the value of the rupiah. This study shows that the current decrease of investment is a bottleneck in industrialization and indicates an urgent need for Indonesia to improve the investment environment, particularly for foreign investors.

Hioki, S., Hewings, G. and Okamoto, N. (2005) identify the structural changes in China’s interregional input-output linkages over the period 1987-1997 using the Minimal Flow Analysis (MFA) introduced by Schnabl (1994, 2001). MFA clearly reveals that some major changes in the structure of China’s interregional linkages took place along with the
increasing self-sufficiency of many regions. Although many interregional linkages between manufacturing industries within coastal areas have decreased their relative importance, some new linkages with other industries and with other regions have gradually become more important over the same time period, leading us to conclude that China is now reorganizing the structure of economic interdependencies between its spatial units.

The objective of the study is to identify the structural changes of China’s spatial input-output linkages using a qualitative input-output analysis, the Minimal Flow Analysis. At first, among all the intra-regional and inter-regional input-output linkages of productive activities, some important linkages have been extracted and the structures constituted by those linkages are identified by a simple graph theoretical method. The analysis has been applied to two time points after the economic reform, namely 1987 and 1997. The inter-temporal comparison of the results is expected to provide new insights into the changes of China’s spatial linkages.

The study is organized as follows: Section, first explains introduction; section two briefly explains the basic data, that is, China’s interregional input-output tables and the methodology use in this research; section three presents and discusses the main empirical results; and last section presents concluding remarks.

The analysis reveals that the interdependencies between regions have decreased, that is, the self-sufficiency of each regional economy has increased on average. This fact-finding seems to favour the view that China’s decentralized
and gradual reform strategy has had negative impacts on the spatial integration of its economy; however the implications of this fact-finding should be reconsidered by further research using other data and/or analytical methods. The interpretation of results depends on the way to aggregate spatial units in our analysis. More important fact-findings of the analysis are that some major changes have emerged in the structure of interregional linkages behind the tendency toward regional autarky. The Northeast, which used to have several important interregional linkages emanating from its heavy industry, has changed to become an economy that is rather isolated from other regions. The same is true in the Central Coast, that is, both regions have decreased their importance as suppliers of intermediate goods to other regions. However, the Central Coast has strengthened intermediate supplies to the South Coast instead and has continued to be a stable source of spill-over effects to surrounding regions such as Central China. The South Coast has gradually become another growth centre that receives several important linkages of some industries in other regions. North China and Central China have become self-sufficient especially in manufacturing industries and furthermore they became important in supplying heavy-industrial and mining products to the Central Coast and the South Coast. All of these findings lead us to conclude that China is now experiencing the structural changes of economic interdependencies between its spatial units.

which is a well-established research method in this kind of analyses. A new, and in this case more appropriate total flow (TF) approach, has been applied. The TF-approach enables to trace the multiplier effects of an industry’s total production in an economy which in this case is the primary source of interest. The standard Leontief approach would deal only with the final demand part of an industry’s production. The main objective of the study is to know how agriculture on the one hand or food manufacturing on the other hand alone or with multiplier effects contributes to the economy’s value-added and employment.

The paper concentrates on food manufacturing; multiplier effects in the food sector during the period, 1995-2002, are studied from the food manufacturing’s viewpoint. The main interest in this paper is to find out what kind of changes have taken place in food manufacturing and input-related industries’ production, value-added, employment as well as inputs imported in the period of 1995 to 2002. The analysis is based on Statistic Finland’s input-output data which are standard part of National Accounts. The analysis based data on value-added, employment and imported inputs can be used in explaining the overall trends in food manufacturing’s input performance in the 1995-2002 period.

The Finnish food sector was expected to face a strong structural change, when entering the EU and common markets in 1995. Ten years in the EU have passed and structural changes in the food sector have indeed taken place. A common opinion, however, is that the food sector, as a whole, has managed even better than expected. The input-
output analysis reveals the development of the food industry’s input structure. The results are interpreted from food manufacturing’s point of view, agriculture remaining only one input industry, although one of the largest, among others.

Akita, T. and Hau, C. (2006) examine the sources of output growth in Vietnam during 1996-2000 using the national input-output (I-O) tables. It employs an extended growth-factor decomposition method, which is an extension of the standard growth-factor decomposition method, in which all industries are classified into the primary, secondary and tertiary sectors. It also conducts a comparative analysis of Vietnam, Indonesia and Malaysia. The major source of Vietnam’s output growth was the expansion of exports. The secondary sector played a key role in Vietnam’s output growth, as its demand effects induced more than half of total output growth, contributing not only to the output growth of the sector itself but also of the other two sectors through inter-industry linkages. Malaysia’s growth pattern was similar to Vietnam’s, in which export expansion was the main driver of growth and the secondary sector led output growth. However, heavy industries played a more important role than light industries in Malaysia. Indonesia exhibits a markedly different growth pattern than Vietnam and Malaysia, as its tertiary sector was a more important driver of economic growth.

The paper consists of six sections. First section covers introduction. Second section, provides an overview of Vietnam’s economic development and policy direction from

Analysis reveals that within only four years from 1996 to 2000, Vietnam had achieved substantial progress towards industrialization in the following ways: (a) the structure of production shifted away from agricultural towards non-agricultural activities; and (b) the secondary sector expanded substantially. As the secondary sector continues to expand during the industrialization process, it will lead to higher economic growth rates. Finally, as a sign of growing international competitiveness and the success of the open door policy, export expansion became the major source of output growth. As the Vietnamese government continues its policy of rapid modernization and industrialization, policymakers should continue to strengthen export expansion through a more explicit export-oriented industrialization strategy and further diversification of the export structure to include more manufactured exports, particularly labor-intensive products. Given the importance of inter-sectoral interdependence in output growth, linkages between the three sectors of the economy should be strengthened so as to accelerate output growth and generate higher value-added.
The study by Lorentz, A. and Savona, M. (2006) is aimed at formally accounting for the empirical stylized fact of the changes in the sectoral composition of the economy which have led to the growth of services in most advanced countries over the last three decades. The study proposes a growth model with evolutionary micro-founded structural change. The model endogenises, both technical change and changes in patterns of final and intermediate demand as affecting macro-economic growth, through the structural change of the economy. This work is in line with the attempts to embracing in a unifying framework both neo-Schumpeterian and Keynesian line of thoughts in explaining economic growth. Drawing upon an input-output framework, it decomposes the sectoral output into three components: intermediate consumption, final domestic consumption and (net) foreign final consumption. The aggregate output is therefore a function of the sectoral structure of the economy, which in turn is determined by intermediate and final components of demand. The contribution of the study is as follows. First, it provides fresh empirical evidence on the relative role of changes in final and intermediate demand as affecting the changes in the sectoral structure of advanced economies. Secondly, it carries out the simulation exercise on the basis of the actual I-O coefficients at the first time-step. The results of both the simulation exercise and the empirical validation of the model tested both the hypotheses with particular emphasis on the determinants of the structural change leading to the growth of service sectors over the last decades in most advanced countries.
Bayramoglu, Z. (2008) analyses inter-country agro-food industry and agriculture industry’s comparative analysis have been made. For this purpose, the currently released input-output tables of 9 EU members and Turkey have been used. To simplify the analysis, the sectors of the table have been consolidated and all the countries have been transformed into economies with 17 sectors. In the new tables prepared, 8 agriculture based industries, 1 agriculture and 8 other sectors were given a place. Input-output analysis has been used for the sectoral comparison of the country’s economies. In this study, the contribution of agro-food industries in country’s economies has been evaluated by measuring the contribution quantitatively.

Besides using input output analysis as a balance model, it enables the quantitative analysis of relationships of the sectors forming the economy. To compare the place of Turkey’s agriculture and agro-food industries within the country, 9 European Union countries with agriculture potential were selected. To determine the significance of the agro-food industry in the countries’ economies and to be able to make some comparisons, input-output tables belonging to Turkey and European Union countries were given. Data used in this study have been obtained from the input-output tables released by countries at various years. These tables belong to the year 1998 for Turkey and Greece, 1999 for Portugal and 2000 for the other countries. Backward linkages have been obtained by rating the intermediate inputs used by the sectors by their total productions. This coefficient expresses the sectoral condensation. The forward linkage coefficients have been obtained by rating the portion of the
products of the sectors used by the other sectors forming the economy by total production. The economy which consists of sectors with high backward and forward coefficients is developed. The product pattern which is traded at the domestic and foreign markets is predominantly comprised of unprocessed products, whereas the products of the developed economies in the subject of trading are rather processed products.

As a result of the analysis, it was determined that, for the development of the countries’ economies, it is not possible to consider the countries independent from each other. Thus, although there is an agricultural potential, the significance of processed agricultural products is lower compared to the EU countries. This situation can be explained with the economies’ development as a whole.

Study by **Olga Memedovic O. and Apadre L. (2009)** presents a quantitative analysis of sectoral trends in the global economy. After surveying the relevant theoretical and empirical literature on structural change, they discuss the historical evolution of agriculture, industry and services in terms of their share of world value added. The analysis refers to six continental regions and covers a period of 40 years. Constant-market-shares (CMS) analysis is then used to investigate changes in the contribution of regional aggregates to world production. This is followed by an analysis of the evolution of the manufacturing industry and the intensity of structural change for a sample of 30 countries and 18 sub-sectors for which data are available in the UNIDO INDSTAT 2, 2009 database.
The purpose of this paper is to provide a starting point for more specific studies at sector, national and regional level. The paper is organised as follows. First section gives a short summary of the relevant theoretical and empirical literature on structural change. Next section describes the main structural changes that have transformed the world economy in the last four decades. The analysis is based on UN Statistics National Account data, and is conducted for seven large International Standard Industrial Classification of all Economic Activities (ISIC) sectors (agriculture, mining and utilities, manufacturing, construction, “transport storage and communications”, “wholesale and retail trade, restaurants and hotels” and “other activities”), and six continental regions (Africa, Asia, Europe, Latin America and the Caribbean, North America and Oceania). After describing the main features of long-term structural changes in the world economy and in each region, this section uses the “constant-market-share analysis” method to assess changes in regional shares of world value added in the current decade. Section 3 focuses on the transformation of the manufacturing sector in the last 40 years. The UNIDO ISIC Rev. 3 data at two digits are used to cover a wide selection of countries and to analyse national specialisation patterns and structural change intensity in the manufacturing sector1. Section 4 concludes summarizing the main trends observed.

Three main findings resulted from the analysis. First, the long-term rise in the share of services in global value added has been slowing down in the last decade. Secondly, the upward trend in the global value added share of North America and Asia seems to be partly reverted in favour of
other regions. Thirdly, after a setback during the 1980s, structural transformation in the manufacturing sector has been accelerating in the last two decades.

Study by Clopper, A. and Maurizio, G. (2010) analyses the changing structure of employment in Italy. The Inforum international system connects multi-sectoral macroeconomic models of twelve major industrial countries via a model of bilateral trade flows at the level of 120 products. For this paper, the historical data and the forecasts to 2010 for seven of the countries – Italy, France, Spain, Germany, USA, Japan, and China – have been aggregated to 34 fairly comparable industries. The shifts in the industrial structure of employment between 1980 and 1995 are compared both among the countries and with the further shifts expected between 1995 and 2010. The countries are becoming more similar in that the share of agriculture in all of them is diminishing. In the structure of non-agricultural employment, however, they appear to be diverging. After pointing out a “low-tech drift” in the structure of Italian employment and a simultaneous drop in Italy’s investment/GDP ratio, the paper asks: To what extent could Italy influence its industrial structure by increasing investment? After a condensed description of the multi-sectoral macroeconomic model and bilateral trade model used to answer this question, the results are presented. The experiment was successful in increasing exports and augmenting the shares of industries producing investment goods. The employment shares of Office machinery and Chemicals, however, were not increased. The study comprises of six sections. First section looks into the question of
similarity of structure and convergence or divergence in the broadest possible terms. With each country described by a vector of the shares of employment, they calculate the “distance” between each pair of countries in each of three years, 1980, 1995, and 2010. Authors look at the distance both with and without agriculture. Next section examines the shifts in employment patterns in the seven countries both in the past and also as projected in the base case forecast of the models. This section shows that Italy has experienced structural changes which one might characterize as low-tech drift. Third section shows that investment in Italy has been relatively weak and poses the question: Could stronger investment reduce the low-tech drift? Section six offers a very partial answer to this question on the basis of a simulation with the Inforum system in which the bilateral trade model plays a central role. Before turning to this simulation, therefore, they will, in section four, look at the structure of a fairly typical Inforum model, that for Italy. In section five, they describe the bilateral trade model, which goes into the results presented in last section.

The appearance of convergence in economic structure disappears when the reduction in the agricultural sector is removed from consideration. Increasing diversity seems to be the rule in the non-agricultural part of the economies of the seven countries considered here. Italy appears to be specializing in ‘textiles and clothing’ and ‘leather and shoes’. The loss of share in the industries more associated with high technology may be a consequence of low investment rates in Italy. An experiment in increasing investment spending uniformly leads to some strengthening of exports and some
increase the employment shares of industries associated with investment. In the undifferentiated form in which they have used it, the higher investment did not increase the share of employment in some of the high-tech sectors such as Office machinery and Chemicals.

Study by N.Mohammadi (2009), analyzes the source of output growth of particularly industrial growth from a demand side perspective; the analysis is based on Chenery’s factor decomposition approach (1960) in input-output framework. Output growth is decomposed into four sources: domestic demand expansion, export expansion, import substitution and intermediate demand expansion. The study covers the period first and second five year macroeconomic plans (1988-93 & 1993-99). For this period three input-output tables for years of 1988, 1993 and 1999 are employed. The demand side decomposition of output growth analyses the changes in the output induced by changes in domestic demand, exports, imports and intermediate input use i.e., input-output coefficients. Demand side decomposition is important as it helps in identifying the effects of government policies on growth of output of an industry and structural changes, as the individual components of demand reflect economic policies. Such an analysis is particularly important as demand pattern for different industries change with the passage of time due to changes in economy. In this study, an attempt has been made to analyze the sources of output growth in Iranian manufacturing industry for the period 1988-99. The analysis is based on demand-side decomposition of output growth within input-output framework.
This study analyzes major shifts within the economy by means of comparative static examination of the key parameters. The method also enables the structural change to be examined from different perspectives. It presents the results of decomposing the output growth of each sector output in terms of its four sources of growth: export expansion, import substitution, domestic-demand, and intermediate demand expansion. A source of growth is considered as a dominant source if its contribution to sectoral output growth is the largest among the four sources. If in a particular sector, export expansion is found to be dominant, the sector can then be labeled as an export-oriented sector. Similarly, a sector can be called an import-substituting sector when the import-substitution source appears to be the main contributor to its output growth. Enormous oil and gas sources and income obtained from export is always having impacts on following specific strategy. These sources are not only eternal, the necessity of attaining economic development, recognition of scientific and practical solution of economic growth specially country industrial production growth, become inevitable. Although for many decades, policy makers' in Iran like many other developing countries tried to follow special strategy such as import substitution or export expansion, oil incomes cause expansion of domestic demand for consumption goods and prevent reaching to stability and competitive phase at international level.

On the whole, it is concluded that the Iran domestic demand which has been developed because of the oil export income injection to country economic, was the main factor of
creating and developing industry production in country. Export development had impact on industry production growth just in conditions that domestic demand was limited.

II

**Structural Change: The Indian Experience**

Structural change in the Indian economy, especially in the past two decades, has been unique. Going against the Fisher-Clark thesis, the system has skipped the secondary sector and has directly transcended from primary to tertiary sector development. Over growth of tertiary sector and its lagging behind employment is new dimension of this structural change. Following section briefly reviews some prominent studies on Indian economy.

**K. S. Ramachandra Rao and S. L. Narayana (1987)** measures technological changes in Indian Economy using Input output analysis. The study discusses the concept of technological change and attempts to measure such change in the Indian Economy over the period 1968-69 to 1979-80 through an Input output approach. The extent of the changes in input output coefficients (Technical coefficients) are quantified and an attempt is made to segregate change in output due to changes in final demand from that due to changes in technology. The structure of the Indian economy has been changing over since the launching of first five year plan. Inter-dependence between agriculture and other sectors, and with in the industrial sector, has been increasing very rapidly. An attempt is made in this paper to present a brief account of the concept and measurement of structural change in Indian economy during 1968-69 to 1979-80,
through an input output approach. The results showed that technological change occurs in all the three sectors.

Prasad, K. (1994) assess the effects of structural reforms on distribution of income on the basis of barter and income terms of trade, with the help of the more recent input-output tables. The literature on Economics reveals that the concept of terms of trade has been developed as an analytical tool in the comparative cost theory of International trade. Over a period of time, several writers have evolved and used different concepts like gross, net, barter, commodity, single and double, factorial, real cost, utility and income terms of trade and etc.

However, during the last several years the concept of multi-sectoral terms of trade, especially between agriculture and non agriculture, have been increasingly used and analysed in the sphere of inter-sectoral trade. Such analysis has, generally, been done in terms of barter and/or income terms of trade, especially in India. From the beginning of the post-independence period, i.e., from 1952-53 to 1990-91, i.e., just prior to the introduction of structural reforms in the economy, barter terms of trade have been varying, though, largely in favour of agriculture. However, income terms of trade have been invariably in favour of agriculture, particularly during the period from 1975-76 to 1990-91. The effect of such favourable terms of trade for agriculture on inter-sectoral distribution of income too has been analysed in a number of studies in India.

The study is based on 14 sector commodity by commodity tables for 1973-74 and 1983-84 by suitably
adjusting the 60 x 60 sector tables constructed by Central Statistical Organization (CSO) under industry technology assumption and 1979-80 table as derived by Parkar (1985) by suitable combination of 14 x 14 sectors absorption and make matrices given in the Technical Note on the Sixth Plan, 1980-85 (Planning Commission, 1981) at factor cost in 1979-80 prices. Such aggregation has been done because ‘Technical Note of the Sixth Plan’ also gives corresponding gross output figures, commodity x industry, investment by destination comprising net fixed replacement and inventory figures besides percentage distribution of these investment figures in terms of construction, machinery and inventory based on capital coefficient matrix, prepared by CSO for 14 x14 sectors only. However, as there is no such study with respect to terms of trade in input-output framework, especially in India, the authors intend to make an attempt to estimate barter and income terms of trade in accordance with the methodology, enunciated by Rasmuseen (1956). As, some works have been done with regard to distribution of income between agriculture and non-agricultural sectors in Input-Output framework by various authors and specially by Ambica Ghosh (1958) for India, they therefore, intend to analyse the sensitivity of inter-sectoral distribution of income (i.e., between agriculture and non agriculture) due to movements in barter and income terms of trade specially during 1973-74 to 1988-89 in this paper. The study makes use of the available input-output tables for the 1973-74, 1979-80, and 1983-84 with suitable adjustments.

Following are the main conclusions of this work: (a) The ratio of wholesale prices of agricultural and non-agricultural
products cannot yield the realistic estimates of agriculture’s terms of trade; (b) To incorporate the pattern of trade comprehensively as many products as possible amongst those actually exchanged should be covered; (c) In the estimation of terms of trade, the relative rates of change in prices received and paid by agriculture are as important as the direction of their movements; (d) Since the bulk of the marketable surplus of agricultural produce is sold by the farmers during the harvesting period, analytically from the point of view of these farmers, farm harvest prices are better indicators for them. However, farm harvest prices will be underestimation for those producers, who sell their produce afterwards and the extent of underestimation for them will depend upon the level of non-market prices and the quantity of marketed surplus sold by them during the rest of the period. This necessitates suitable adjustment of the prices, received by these producers and the corresponding quantities of marketable surplus sold by them later on during the year after the harvesting period; and (e) The superiority of income terms of trade as compared to net barter trade is justifiable on the ground that as income terms of trade are obtained by correcting the net barter terms of trade with the volume of exports reflect the total capacity of import (due to export income alone) and are therefore more superior to net barter terms of trade.

Thus an improvement in the income terms of trade of the agricultural sector would initiate an increase in its total purchasing power. This may happen despite less favourable or even unfavourable net barter terms of trade in agriculture.
Study by **Shikanwita Guha and Debesh Chakraborty (1998)** concentrates on the sources of structural change in Indian Economy. The basic input-output framework has taken extended to make it suitable for analysis of sources of sectoral growth. The purpose of this paper is to analyse the structural change that has taken place in the Indian economy and its sources after the marked changes in relative price of oil in 1973. The period considered is 1973-74 to 1983-84. The sources of structural change are computed by comparing the open static input output model between the initial year and the terminal year. The basic data are the two input-output tables of the Indian economy for the years 1973-74 and 1983-84 prepared by C.S.O. For the exercise the input-output tables have been aggregated into 21 sectors. The two tables have been adjusted to 1973-74 price level by using deflators. The method used for the analysis of economy's growth pattern is based on two models. Model I, based on the methodology adopted by Chenery (1960) and Chenery, Shishido and Watanabe (1962), has been used for analysing structural change associated with rising income. Model II, based on slight modification of Syrquin’s (1977) extension of Model I, has been used to identify the engines of growth of various sectors.

During the period under study, the economy of India underwent significant changes in the structure of production. The domestic final demand effect has played an important role in enhancing production in almost all the manufacturing industries of the economy.
The paper concludes that the period between 1973-74 and 1983-84 was one of the relatively modest average growth in the output of goods and services of India. The economy became more open to trade. Exports gained importance. Imports grew faster than domestic output. The share of manufacturing in GNP has increased from 29 percent in 1973-74 to 33 percent in 1983-84. The share of agriculture and mining etc. clubbed under primary sector declined from 39 percent in 1973-74 to 30 percent in 1983-84. The shift away from agriculture and allied activities was accompanied by a rise in the share of service sector.

Kumari, A. (2000) analyses the effect of economic liberalisations on pattern of sources of growth of output of Indian manufacturing industry from a demand side perspective. India has experienced transformation from the regime of regulated economic development to competitive regime since the liberalisations of 1991. The main thrust of these liberalisations has been on industrial de-licensing and openness, that is, import liberalisation and removing barriers to exports for accelerating growth. The analysis has been based on Chenery’s factor decomposition approach based on input-output framework. It decomposes output growth into its four sources: domestic demand expansion, export expansion, import substitution and intermediate demand expansion due to change in input-output coefficient. The basic data used for this study has been the input-output tables for 1983-84, 1989-90 and 1997-98. The analysis has been done separately for the pre-liberalisation period, 1983-84 to 1989-90, and the post-liberalisation period, 1989-90 to 1997-98, to examine the changing pattern in the sources of
growth of output as a result of policy liberalisation and structural reforms during the 1990’s. The nominal values of the variables have been deflated.

The study found that output growth in manufacturing industry has been mainly driven by domestic demand expansion followed by contribution of export expansion during both pre-liberalisation as well as post-liberalisation period, but after liberalisation the contribution of both domestic demand expansion and export expansion has increased. Further, the contribution of both import substitution and intermediate demand expansion to output growth has become negative; that was positive before liberalisation. At disaggregated level of industries, there has been considerable similarity with some exceptions in pattern of sources growth of output.

Bathla, S. (2003) examined the nature and direction of linkages between primary, secondary and tertiary sectors and their long-run equilibrium relationship in the post independence period from 1950 to 2001. The analysis is based on National Accounts data on gross domestic product (GDP) at 1993-94 prices. In this study, a positive and significant association between manufacturing and services is hypothesized, which is anticipated to become stronger at the advanced stages of industrialization.

An attempt has been made in this paper to examine whether a significant inter-sectoral causal relationship exists in India, and if it does, what is the nature of long-run relationship between them. Since developments in the liberalization of agriculture, industry and services are
understood to have brought a structural shift, an empirical investigation of inter-sectoral growth linkages is essential to divulge meaningful directions for prioritisation of reforms across the sectors. Whole paper comprises of six sections. Section I covers introduction. It is followed by section II that deals with literature on inter-linkages between the sectors and composition of national income across major economic activities. Section III outlines hypotheses that are to be tested in the paper. Next section examines the causality between primary, secondary and services and estimates long run and short-run relationships between the sectors using co-integration and error-correction techniques. The analysis is based on National Accounts data on gross domestic product (GDP) at 1993-94 from 1950-51 to 2000-01. Implications of the findings for policy and economic reforms are discussed in section V. The last section concludes.

Results drawn from Granger causality test suggest an independent relationship between primary and secondary sectors, unidirectional causation between primary and a few specialized services and bi-directional causation between secondary and services. Co-integration carried out in a multivariate framework provides strong evidence of a positive long-run equilibrium relationship between the sectors during this period. Implications of the findings for growth and the ways by which policy and liberalized reforms can strengthen agriculture-industry linkages are explored. It appears from the analyses that Indian economy has undergone a structural shift, particularly from the early nineties when India embarked upon structural adjustment programme. A higher
rate of growth is observed in the primary, secondary and tertiary sectors over a period of five decades.

_Sastry, D., Singh, B., Bhattacharya, K. and Unnikrishnan, N. (2003)_ examine the linkage of growth among the agriculture, industry and services sectors of the economy, using both an input-output (I-O) and a simultaneous equation framework. Despite the substantial increase in the share of the services sector in GDP over the years, the I-O tables suggest that the agricultural sector still plays an important role in determining the overall growth rate of the economy through demand linkages with other sectors of the economy.

The paper attempts to analyse some of these issues by re-examining the sectoral links under alternative framework. The paper analyses the broad trends in the structural shift using an aggregated 3 × 3, I-O table consisting of agriculture, industry and services for different years. Further, to capture the dynamic links in detail, the analysis is carried out using econometric techniques. The econometric model has consciously been retained as simple so that the results based on them could be compared with the findings from the I-O tables. Finally, using the model, the paper carries out a set of policy simulations relevant to the present context.

The plan of the paper is as follows: Section I carry out the analysis in an I-O framework. Based on these results, Section II specifies and estimates a small system of simultaneous equations. Section III carries out the policy simulation experiments. An attempt is also made to evaluate the feasibility of attaining a sustainable growth rate of 8 per
cent as envisaged in the Approach Paper for the Tenth Five-Year Plan. Finally, Section IV summarises the results with some comments on policy implications.

Empirical results of the study highlight the need for a proper balancing of the ‘inward looking’ (emphasis on agriculture) and ‘outward looking’ (enhancing the scope of exports) strategy. The paper suggests that this two-pronged strategy could generate adequate demand leading to a sustainable high growth trajectory in the Indian economy. The important conclusion, which emerges from the study and which need to be re-emphasised is that though in the study period, the share of agriculture in GDP has declined, its contribution in terms of generating demand for the other sectors of the economy, especially the industrial sector, has become more pronounced as reflected through the I-O Table 1993-94. Even now, the agricultural sector accounting for approximately one-fourth of GDP supports approximately two-third of the population in the country. Thus, the policy measures, which could form part of the agenda of the second generation reforms, should be focused on stimulating demand in the agricultural sector in rural areas by way of deepening economic activities.

Study by Sharma, A. and Dietrich, M. (2004), analyses the structural change in the Indian manufacturing based export sector, based on an analysis of 143 industries / product groupings (mainly manufacturing industries). Trade indices such as Balassa’s revealed comparative advantage (RCA) index, and other variants commonly employed in the literature have been used in this analysis. Regression
analysis on the RSCA indices has been used to further analyse structural change. Thereafter, the stability of the RCA indices is examined, as well as the process of their inter-temporal evolution. Three technology categories (high technology, medium technology and low technology) have been examined individually. This paper assesses the export performance of Indian industries in the selected product-industry groupings in detail and evaluated the prospects for growth of particular Indian industrial groupings.

The results have been derived from a small sample and only nine years of the post-reform period have been studied. It may well be the case that these are transitional, short-term effects which may well change over time. It seems plausible to expect ceteris paribus, that trends towards diminishing comparative advantage would eventually coincide with some declining firms exiting from the export sector, so that comparative advantage indicators would eventually show a rise. As more time elapses and more observations become available, it would become possible to assess this process more completely, especially if steady-state equilibria are exhibited in the technology based subsets that they have examined. Finally, India's long neglected service sector industries are showing signs of massive growth (especially in the information technology sector) and as more data becomes available, it would be possible to ascertain, if an overall decline in comparative advantage in manufacturing is accompanied with an increase in the comparative advantage in the services sector.
Study by Dasgupta, P. and Chakraborty, D. (2005) explores the structure of the Indian economy with an input based scheme of classification of sectors. On the basis of the factors of production intensively used in the production process, all economic activities are classified into three broad categories - Ricardo sectors (natural resource intensive), High-Technology sectors (high-technology intensive) and Heckscher – Ohlin sectors (capital-labour intensive). In order to explore the structure of the Indian economy Input – Output technique developed by Leontief, has been used as it offers important insights into the structure of an economy. The relative strength of linkages of the three categories of sectors has been studied and the key sectors of the Indian economy are identified.

The structural relationship of an economy has been examined by using the input-output tables. The study of the sectoral linkages and the identification of the key sectors based on the input-output technique, show the nature and the degree of interdependence of an economy. Thus in order to study the structure of the Indian economy with the classification of sectors based on input usage, input-output technique is appropriate. For this purpose the authors have used the Indian ‘Input-Output Transaction Table (IOTT)’ for the year 1993-1994, sourced from Central Statistical Organization, Ministry of Statistics and Programme Implementation, Government of India. All the figures are given in Rs. (lakh). Study has aggregated the commodities and reduced the transaction matrix into a (72 x 72) one.
The study of exploring the structure of Indian economy reveals the following results. The H-T sectors are found to be strongly integrated with other sectors in terms of backward linkages but are weakly linked in terms of the forward linkages. However, the share of the H-T sectors slightly improves in the supply led model. Most of the H-O sectors have also shown strong backward linkages and weak forward linkages. Finally, most of the Ricardo sectors are found to be either strongly or weakly linked with the rest of the economy, particularly the agricultural crops and other primary sectors have shown weak linkage strength while the agro-based industries have a relatively higher linkage effects.

Dholakia, R., Agarwalla, A., Bazaz, A. and Agarwal, P. (2009) study has attempted the measurement of technical progress through estimating input coefficients (technical coefficients) across various years. Such a measurement would shed considerable light on the trends in the rate of technical progress as an important source of growth in the Indian economy and lay to rest various speculations about the role of liberalization in promoting technological progress in the Indian economy. Such an effort would also make it possible to compare the two significant phases of the Indian economy: the ‘inward-looking’ phase and the ‘outward-looking’ phase.

The paper is based on eight input–output (I-O) tables for the Indian economy available over a period of 36 years from 1968-69 to 2003-04. The technical progress (TP) in the context of the I-O tables is based on the concept of a production function defining the relationship between gross
output and material inputs as well as value added at the disaggregated sectoral level. The paper attempts to answer the following questions: (i) Was the TP substantial and continuous throughout the period?; (ii) Was the rate of TP during the inward looking and outward looking growth strategy phases of the economy the same?; and (iii) Was the rate of TP at the disaggregated sectoral level almost constant over time? In order to measure the rate of TP, the available eight national I-O tables in India are first made compatible for the number, scope and definitions of sectors as well as for prices by converting them at constant 1993-94 prices. Chenery-Watanabe coefficient is used for measuring the rate of TP for different sectors across eight IO tables.

This paper has six sections. First section gives introduction; next section briefly reviews existing literature on technical progress and measurement issues. Following section discusses the adjustments required to be made in the available eight input-output tables in India covering the period of 35 years from 1968-69 to 2003-04. Fourth section explains the methodology and the measure used for the estimation of technical progress in this paper. Fifth section presents the findings of this exercise for examining the questions considered above. Last section concludes by summarizing the findings of the paper.

Following are the conclusions drawn from analysis. Firstly, the Indian economy has experienced continuous technical change over the long period, 1968-2004. The rate of technical progress, however, was not ‘substantial’ over the entire period of 36 years. It dropped considerably during the
period of decontrol and initial liberalization (1983-84 to 1998-99), but picked up thereafter. The empirical evidence on average is not strong enough to reject the hypothesis that the rate of technical progress remained the same during the two distinct phases of import substitution (inward looking) growth strategy and export oriented (outward looking) growth strategy in the Indian economy. At the sector and sub-sector level, however, there are evidences of positive and negative impacts on the rate of technical change. On the whole, considering that international trade, in general, and export growth, in particular, is treated at par with technical change in the economy, the latter phase of outward looking growth strategy would be having positive impact on the technological change in the economy. It was found that almost 80 per cent of the sectors in the Indian economy experienced statistically constant rate of technical change over the whole period of 36 years.

Study by O. Cortuk and N. Singh (2011) examines the link between structural change and growth in India. It constructs indices of structural change, and performs a time series analysis of the data. It finds that 1988 marks a break in the time series of growth and structural change. There is one-way causality from structural change to growth in the period 1988-2007, whereas there is no evidence for this linkage before 1988. By establishing the nature of the link between structural change and growth, this analysis provides new insight into the growth process in India at the aggregate level. Growth rates are calculated from National Accounts gross domestic product (GDP) data. The data cover the period from 1951 to 2007 at 1999-2000 prices. For structural
change, two different indices are calculated, following Dietrich (2009).

The results show that India’s economy has only one structural break, which is at 1988, for the period from 1951 to 2007. This structural break allows us to identify a significant positive impact from structural change to growth, but only in the latter period. Furthermore, there we find Granger Causality from structural change to growth for this period, 1988 to 2007. However, there is no such relationship for the period 1951-1988. Therefore, one of the sources for increasing growth rates observed in the last two decades is the structural change of the Indian economy.

**Kamini Khanna (2011)** conducted a study on growth and structural changes in Punjab economy. The study covers the post Green Revolution period. The objective of the study is to examine the structural changes that have taken place in the Punjab economy since the Green Revolution. It has been observed that rapid agriculture growth, pioneered by the green revolution in Punjab in Punjab has been responsible in bringing about the total transformation due to structural changes, the share of non-agriculture action in terms of labour force has also increased. Secondary data has been used in this study. The data for Punjab has been obtained from various issues of statistical abstract of Punjab, National Account Statistics and CSD.

Main finding of the study is that the percentage share of output coming from primary sector in the state domestic product (SDP) has always more, than the national level. On the other hand, the share of secondary sector has continued
to be enough through. In case of tertiary sector, a in the year 1981, its share was more in Punjab, in 1991 and 2001 vice-versa was observed at the national level. It is observed that the percentage share of primary sector to total output has been falling through-out both in Punjab (except 2008-01) and at all India level during the period 1971 to 2008-09. The analysis revealed that whereas in Punjab, the percentage share of secondary sector has menially increased from 18.10 percent in the years 1971 to 22.72 percent in the years 2008-09, at the national level, this share has declined from 46.5 percent to 20.8 percent in SDP during the same period. Though the percentage share of tertiary sector has increased in both Punjab and at the national level, yet, this increase has been nominal in the state of Punjab as compared to the all India level.

Study advocates that In view of falling share of agriculture and manufacturing sector of the economy the increasing importance of tertiary sector cannot be taken as a healthy sign of structural transformation. However, this study shows that a fast deceleration of the rate of growth of the agriculture sector Punjab has far reaching consequence for the rest of the economy due to interdependence of the sectors and is an unprecedented nature for those who are dependent for their livelihood in agriculture. The deceleration of economic growth of Punjab economy has been essentially rooted in the irrational pattern of investment and declining development expenditure. The economy of Punjab which was the envy of the different states, needs some far reaching and effective measures to restore and just in it the level of development.
III
Structural Change: The Regional Experience

In the new policy regime, the structural change is not evenly distributed across the regions. Different states or regions have different experiences, depending on the factor endowments, macro-economic management and other regional factors. This section gives a synoptic review of some regional studies.

A pioneering work by Sucha Singh Gill (1994) analyses the economic growth and structural change in Punjab economy. Structural changes within the Punjab economy have taken place in its relation with the rest of the Indian economy. How is this relation affecting the development of Punjab economy? This has been a subject of controversy in the recent years. Structural changes, contradictions of development path and intellectual responses are produced by the development process in the state which has been conditioned by economic policy of the country and created pressure for change in it. Aggregate comparisons have been made for the census year 1971, 1981 and 1991 by using an appropriate data. Two principal commodity production sectors agriculture and industry have been studied to understand changes within each of these sectors covering the whole of post independence era of more than four decades. This is done to capture the long term trend and direction of structural changes in the economy. The main objective of the study is analysing the development issues of Punjab economy and its interaction with Indian Economy treating economic policy as an exogenous factor.
Main findings of the study are as follows. Developing economy of India has experienced uneven spatial pattern of development in the post independence period. In per capita income the Punjab was ranked at number two in 1950-51, but was pushed to third position in 1955-56 and fourth position in 1961-62. The high and sustained rate of economic growth for several years and high initial level of per-capita income has placed the state on high pedestal so far as level of development is concerned. Though overall growth rate of the state has improved between 1980-81 and 1990-91 compared to that of between 1970-71 and 1981-82, yet it has been slightly become lower than the all India average.

Sustained economic development in a particular region leads to change in the economic structure. According to Fisher-Clark hypothesis economic growth leads to rise in the share of income and employment in the secondary and tertiary sectors while that of primary sector would decline. Decline of agriculture activities is explained by stagnation in real income per hectare in the state due to exhaustion of potentials of production technology with respect to two principal crops viz. wheat and paddy. The fast rate of economic growth has brought changes in the sectoral composition of output and distribution of work force across the sectors. This has put the entire economy in the process of change and movement of population across the sectors and from rural to urban areas and the large in flow of work force from slow growing backward states of India to Punjab.

The study concludes that such a pattern of development has resulted in contradictions in the system.
There are contradictions between farming community and trading community. Farmers are suspicious of traders and consider them running exploiters and traders look at farmers as rustic, rash, uneducated and easy to cheat. In fact peasantry nourishes a grudge against urban centres where apart from traders, Government Officials reside who harass and oppress it. The second set of contradictions is between the Punjab and Centre. With capitalist development in agriculture the class, capitalist farmers have come to dominate the rural life.

**Pohit, S. (1995)** analyses income and employment effects in Mumbai Region. Since independence Mumbai has emerged as the industrial as well as financial capital of India. However with economic reforms in the 1990s, Mumbai’s position as financial capital of India has become stronger (at the cost of the manufacturing sector) as most of the newly emerging financial companies have chosen Mumbai as their centre of operation. This calls into question what will be its implication on income and employment generation in this region in the coming years. To analyse the issues, this study evaluates ex-post income and employment linkages of the various sectors of the Mumbai economy using a specially constructed input-output table of the Mumbai region. Keeping this in view, this paper addresses itself to evaluating income and employment linkages. More specifically, it attempts to examine: (a) the relative importance of direct and total (direct plus indirect) output generated by 26 major sectors of the Mumbai economy; (b) the strength of backward and forward output and employment linkages; (c) the relative importance of direct, indirect and induced or secondary effect
on income (or employment) and variation thereof across the various sectors of the Mumbai economy, more particularly of the financial sectors; (d) to indicate the extent of leakage of income from various sectors of the Mumbai economy as a result of subsequent rounds of spending out of the initial gains in income; and (e) finally, to indicate key sectors for output, income employment generation.

The paper proceeds as follows. Section I gives introduction. Next section describes the methodology of estimating income, output, and employment multipliers. It also discusses the methodology of computing backward and forward linkages. Following section outlines the procedure adopted by us to prepare an input-output model for the Mumbai economy. Fourth section analyses the empirical findings while the final section highlights the policy conclusion.

The results indicate that the banking/insurance sectors have the highest direct income multipliers. However, their position, relative to other sectors, drop considerably when one take into account indirect or induced income effects. This happens because the indirect and induced income effects do not necessarily accrue fully within MMR, they may flow to other regions as well. When they take out these flows, our estimates of the direct and indirect income multiplier for the banking sector is found to be Rs. 98,790 while the same for the insurance sector is Rs 89,992. It is important to note that the adjusted income multipliers for these two sectors are highest among all the sectors. The same trend is also observed if one looks separately at the wage component of the
adjusted income multipliers. The analysis indicate that employment of about 1.16 man-years is generated in the banking sector as a result of increase in demand by Rs. 1.00 lakh for this sector's output by the final consumers. On the other hand, the employment to the tune of 1.08 man-years is generated in the insurance sector for an equivalent increase in final demand. From employment consideration, paper finds that banking and insurance sectors rank middle among all the sectors. However, the values of the combined direct and indirect employment multipliers or direct, indirect and induced employment multipliers for the various sectors suggest that banking and insurance sectors rank low from the point of employment generation. Their relative positions improve marginally if one excludes the indirect and induced employment effects flowing out of MMR while estimating these employment multipliers.

R. K. Sharma and A. JayaKumar (1995) have analysed the structural shifts and the growth of tertiary sector in India. Analysis of structural shifts in an economy describes the pattern of development of that economy. The paper shows that the sectoral income shifts have not been matched by corresponding employment shifts as has happened in most of the developed economies of the world where the industrial sector emerged as the dominant sector. The main objective of the study is to analyse the changing sectoral share of employment and income in the Indian economy. An attempt has been made to study the structural shifts underway in the Indian economy and their implications for the tertiary sector.
The study seeks to analyse the structural change in Indian economy from 1950-51 to 1990-91. Secondary data has been used. National accounts statistics, census of India for various years, various issues of world development report and estimates of state domestic product prepared by CSO have been used for the study. The study is divided into five sections. First section attempts to analyse the changing sectoral shares of employment and income in the Indian economy since 1950-51. The question of excess growth of service sector has been examined in next section. International comparisons have been carried out in third section. Performance of the tertiary sector at the regional level has been examined in fourth section and the last section presents the broad summary of the findings.

Main findings of the study are as follows: The share of tertiary sector in the workforce was 17.2 percent in 1950-51, and has increased to 20.5 percent in 1990-91. By 1990-91 the share of the primary sector in national income declined to 34 percent and that of tertiary sector increased to 39 percent. The secondary sector's share sluggishly moved to only 26 percent. During the period 1950-51 to 1965-66 secondary sector was having higher growth than the tertiary sector. During 1966-67 to 1992-93 the tertiary sector has grown at a slightly higher rate in relation to stagnation or deceleration of the industry. During 1980-81 to 1990-91 secondary sector has grown at a faster rate. The comparison between the Indian and international experience shows that the Asian developing economies had very high contribution from the agriculture sector in the 1960's. In the case of the industrialized economies the contribution of agriculture was
the least. It has been found that the services sector has emerged as the dominant sector in both the developing and developed economies. The study further concludes that the poorer states employ higher proportion of workers in the primary sector and lowest in the secondary sector. It is tertiary sector which has expanded by 2.87 percent points during 1981-91 at the all India level. It is the tertiary sector which has become prominent at the all India level.

The study by Madhu Bala (2002) concentrates on analysing the changes in the structure of Punjab Economy. As per study the magnitude and the direction of such change is very useful for any kind of planning and policy formulation both at the macro and micro level. The main objective of the study is to analyse the changes in production structure of Punjab economy; to study employment structure in the Punjab economy and changes in it; to elaborate the input structure; and to explore overall structural change in the Punjab economy. The study is based on the secondary data obtained from different published and unpublished sources. The coverage of the study is from 1970-71 to 1997-98. The analysis has been done by using tabular technique supported by appropriate statistical techniques like averages, percentages, growth rates and backward and forward linkages.

In this study structural change has been measured by production structure, employment structure and through the study of input-output structure. Changes in product structure have been studied by analysing net state domestic product at current and constant prices. Employment
structure has been studied by analysing the number of persons usually working and number of enterprises. To analyse the input structure, agriculture sector alone has been considered. To analyse the linkage pattern input-output tables of the Punjab economy, one is by G.S. Bhalla for 1969-70 and other by M.R. Saluja for 1983-84 have been used.

Main findings of the study are as follows. The analysis of net state domestic product at current prices revealed that during the years 1970-71 to 1997-98, it has grown at the rate of 4.41 per cent per annum. In primary sector, fishing, forestry and logging have registered a growth rate of more than 6 per cent per annum. In tertiary sector, transport, storage, communication, banking, insurance, real estate and public administration have shown a high growth rate, i.e., more than 8 per cent per annum. The employment intensity in Punjab is just 87.65. It means the structure of the Punjab economy is a low employment generating structure.

Patro, B., Patra, A. K. and Acharya, N. (2005) attempted to identify the inter-sectoral interdependence in the state economy and to link it with the growth strategy adopted in the state economy. There is also an attempt to link the sectoral origin of state income to the multiplier values of the sectors to estimate the likely multiplier impact of any investment programme in the economy. The scheme of the paper is as follows, Section-I briefly presents the important features of the state economy. Section-II depicts the theoretical background of the total linkage index, defines the multiplier concept and the Hirschman Compliance Test.
Section-III presents the empirical results and section-IV concludes the paper.

The main objective of the study is to examine as to whether the sectoral growth of the Orissan economy satisfied the Hirschman Compliance Test. For this purpose the paper divides the economy into seven sectors. These are: ‘Agriculture and Animal husbandry’, ‘Forestry’, ‘Fishing’, ‘Mining’, ‘Construction’, ‘Manufacturing’ and ‘Electricity’. This division has been purposefully done to facilitate analysis in the face of acute data constraints. Data on the industrial sector of Orissa is not published sector-wise and this creates difficulty in knowing the growth of different sector. The Gross State Domestic Product (GSDP) data of Orissa have these seven sectoral divisions. The services sector data is available but the input-output table on which this work is dependent has excluded the service sector. So the effort of this paper is to estimate the growth rate of these seven sectors for which data is available and correlate it with their total linkage index. To compute the growth rate of different sectors authors have used the time series data of GSDP at current prices pertaining to seven sector classification for the period 1980-81 to 2001-02. For calculation of total linkage index, a snapshot view of Orissa economy, from the Input-output table constructed for the year 1994-95, has been done as per the same sector scheme.

The Hirschman Compliance Index, which represents the correlation between sectoral growth rates and their total linkage index, is very low in Orissa. It is only +0.311, Hirschman compliance test failed to build up a strong
correlation between the total linkage and growth of the sectors. The sector having highest total linkage (manufacturing 1.713, ranks first) is not able to grow adequately during the given time frame. On the contrary the sector having low potential of total linkage (mining 1.345, ranks fourth) performs highest growth during the period.

Singh and Singh (2011) conducted a study deals with the Regional Input Output Table for the State of Punjab. The study relates to the period 2006-07. Construction of regional input-output tables is not new in India, but generation of input-output table using non-survey methods is relatively a rare phenomenon. This work validates alternatives non-survey, location quotient methodologies and finally uses comparatively better approach to generate the forty two sector regional input-output table for the state of Punjab for 2006-07. Secondary data has been used in this study. Construction of input-output table needs an extensive amount of data. Regional input-output table has been prepared from the survey based national table, by using location quotients.

Three types of non-survey method approaches are available (a) the quotients approach (b) the commodity balance approach (c) the use of iterative procedure. In this study quotient approach, has been used which uses of location quotients to generate regional input-output table for the state of Punjab. Simple Leontief system has been used in terms of a set of simultaneous linear equation. The national sectoral shares have been computed using the GDP data from ‘National Accounts Statistics’, CSO. Sector-wise Private Final
Consumption Expenditure (PFCE) is calculated by using the monthly per capita consumption expenditure given by NSSO Surveys for 2006-07 along with rural and urban population for year 2006-07 calculated from population census statistics of year 2001. Government final consumption expenditure has been derived from ‘State Finances’ published by RBI and has been allocated at the rate of sectoral shares.

Using Flegg’s location quotients, a regional input-output table for Punjab has been generated at a 42 sector disaggregation. The first 13 sectors in the sector classification represent primary production, the next 18 sectors relate to manufacturing industries and the remaining 11 sectors deal with the tertiary activities. Tertiary activities include services like construction, electricity, water supply, railway transport, transport by other means, storage and warehousing, communication, trade, hotels and restaurants, banking, insurance, ownership of dwellings, and other services.

The final uses have been distinguished under six categories (i) Private Final Consumption Expenditure (PFCE), (ii) Government Final Consumption Expenditure (GFCE), (iii) Gross Fixed Capital Formation (GFCF), (iv) Change in Stocks (CIS), (v) Exports of goods and services (EXP) and (vi) Imports of goods and services (IMP). The table gives fairly good coverage to the basic structure of the economy. The generation of regional input-output matrices, using non-survey techniques, saves the time and resources and gives a fairly good level of accuracy. The study concludes that in
non-survey techniques, out of alternative location quotient formulations, Flegg’s method gives the best results.

The review of studies on Punjab shows that there is no comprehensive study on the services sector of the economy. Therefore, the present study is a modest attempt to fill the gap and provide in-depth study of the services sector in Punjab which is the fastest going sector in the era of liberalization.

IV

Conclusion

The review of studies is indicative of the fact that most of the studies done so far are too aggregative or even if the desegregation has been achieved the coverage is too small. Most of the studies have dealt with individual sub-sectors or the overall economy-wide aggregates and have failed to capture the underlying structure, dynamics and linkage pattern. A study, fortified with disaggregated data going rigorously into structure, dynamics and linkage pattern sectors of Indian economy, is need of the time.