

EXAMINING AND COMPARING STRUCTURAL CHANGES ACROSS DIFFERENT INDUSTRIES IN INDIA: EVIDENCE FROM THE ANNUAL SURVEY OF INDUSTRIES

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Introduction

Structural change and adjustment are pivotal in fostering economic growth and enhancing living standards. In essence, structural change refers to modifications in the size and composition of an economy, involving the redistribution of activities and resources among firms, industries, and regions. Industries play a critical role in the economic advancement of nations by attracting significant capital investments, employing modern technologies, and enabling large-scale operations. This leads to heightened productivity and increased national income, consequently boosting per capita income levels. Industrialization creates ample employment opportunities, thereby alleviating issues of unemployment and underemployment. It also helps absorb surplus labour, addressing disguised unemployment prevalent in rural areas. Furthermore, industrialization can stimulate the development of cottage and small-scale industries in rural settings. It promotes agricultural growth by fostering demand for agro-based products such as sugarcane, raw cotton, jute, and tobacco, thereby supporting agricultural development. Moreover, industrialization contributes to the expansion of the tertiary sector, encompassing trade, transportation, communication, banking, and insurance. By fostering balanced growth across agriculture, industry, and the tertiary sector, industries play a crucial role in driving overall economic progress. They facilitate the growth of existing industrial hubs and the emergence of new industrial zones, thereby enhancing income levels and purchasing power among the populace.

Industrial development is pivotal for the economic advancement of any nation, playing a crucial role in overall economic growth. Industries form the backbone of the economy, indispensable for sustaining and driving economic development. A well-balanced industrial sector is fundamental to fostering productivity growth and enhancing national development. A robust industrial base mitigates economic planning risks and enhances effectiveness. In developing economies like India, industries are imperative for growth and comprehensive development. India possesses abundant resources favourable for industrial expansion,

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including minerals, forests, and fisheries. Minerals are essential for heavy industry, while commercial crops such as sugarcane, raw cotton, jute, tobacco, and oilseeds support the growth of agro-based industries. The country is endowed with substantial energy resources such as coal, hydroelectricity, and atomic energy, essential for powering industrial operations. India also boasts a rich pool of human resources, including a large and skilled labour force crucial for industrial development. With a vast population and expansive market, India provides fertile ground for the growth and expansion of industries across various sectors.

LITERATURE REVIEW

This section presents a brief review of some of the research works on the various studies on structural transformation in an economy. Alagh (1987) explores Indian industrial policy in the context of comprehensive economic planning and policies. The paper discusses the advancements in economic growth and structural changes to delineate the framework governing industrial policy. Noting some structural shifts in the industry, Alagh acknowledges the current emphasis on exports but contends that implementing industrial policies will create employment, foster a more regionally balanced economy, and enhance technological dynamism. Ballance et al. (1982) examined how trade strategies influence industrial development. Their study assesses the external sector's role in reshaping the global industry and its implications for investment and employment in developing countries. They highlight long-term employment trends, showing a decrease in the manufacturing sector's share in many Western nations. This is contrasted with earlier employment shifts, such as the transition from agriculture to industry or changes within the industrial sector itself. Chaudhari (2002) explores the effects of India's economic reforms on industrial structure and productivity. He observes that the overall performance in terms of output growth and employment has been disappointing. Chaudhari recommends enhancing demand to boost production, increase employment, and reduce poverty. Karshenas and Pesaran (1995) examine the critical aspects of intersectoral resource allocation in the structural transformation of developing countries, including India. They conclude that, over the long term, productivity improvements achieved through more effective resource use within sectors may have a greater impact than the efficient distribution of resources between different sectors. Krishnan and Roeller (1993) assert that the globalization of the world economy and the politics of the new economic world order have significantly reshaped the vision and dynamics of change in developing countries. In India, the primary focus is on the nature and results of the structural adjustment programs implemented in the economy. They specifically address the issues and challenges of India's economic development, emphasizing the crucial role of agricultural reform and the ongoing financial system crisis. Mellor (1995) explores the

connections between the agricultural and non-agricultural sectors in developing economies, using Taiwan as a case study. In the 1950s, Taiwan's agriculture contributed 33% to the Gross Domestic Product (GDP), 56% to employment, and 92% to exports. However, three decades later, the sector's contributions had diminished to 6% of GDP, 14% of employment, and 6% of exports. Mellor concludes that agricultural growth alone is insufficient to significantly reduce poverty. The expansion of the non-agricultural sector can either be concentrated within major urban centers or more uniformly dispersed throughout rural areas, influenced by factors such as asset distribution in agriculture, growth in agricultural income, import substitution policies, and the strategic placement of infrastructure investments. Investments in rural infrastructure—such as roads, energy, communication, and education—are crucial for fostering growth, development, and rural employment opportunities. Nuthara (2008) explores the link between structural change and economic growth in Japan by analyzing monthly sectoral data. Nuthara finds that in the short term, the relationship between structural change and economic growth is not clear. However, in the long run, there is a positive correlation between structural changes and economic growth. The short-term behavior aligns with neoclassical theories of balanced growth, while the long-term relationship supports Schumpeterian theories, which suggest that the entry of new firms drives sustained economic growth. Taymaz & Yilmaz (2006) examine the relationship between the structure of manufacturing industries and industrial development, testing for structural convergence, or whether the industrial structures of developed and developing countries become similar over time. They contend that structural change reveals a significant correlation between industrial structure and economic growth. Although the industrial structures in both developing and developed countries undergo evolution, they do not exhibit convergence. Wallack (2003) notes that while the reforms of the 1980s contributed to India's overall growth rate, there is limited evidence of their impact on crucial sectors such as agriculture, manufacturing, and services. The growth primarily resulted from a shift in the GDP composition. He also explores the potential benefits of the 1992 reforms in trade, transport, storage, and communication, suggesting they are promising. However, assessing the full impact of the more recent reforms in the 1990s requires further time and study.

OBJECTIVE

Based on a broad overview of the industrial growth in India and the various industrial policies that have been implemented over the years led to the formulation of the following objective:

Is to examine and compare structural changes across different industries in India.

DATA SOURCES

The present work entitled "Examining and comparing structural changes across different industries in India" is an empirical investigation focusing on structural transformation in the industrial composition in India. To assess the structural changes in the industrial economy, secondary data from various periods were gathered from the Annual Survey of Industries, as published by the Central Statistical Organization. Even though the Annual Survey of Industries is the chief source of this study, other sources such as published articles, books, government reports, and other internet sources are also used in this study. The summary result of the Annual Survey of Industries covered twenty variables, out of these twenty variables, this study considered only five variables viz., number of industries, productive capital, number of persons employed, value of input, and value of output. Because previous studies such as Balakrishnan(2004), Balakrishnan and Babu(2003), Chandrasekar(2004), and Thangamuthu & Sankaran(2004) used this variable to estimate industrial development in general and structural transformation in particular.

METHODOLOGY

A simple percentage share has been used to document the structural transformation. The methodology used for comparison and analysis mainly comprises percentage tables. Further, causes and consequences are highlighted in the interpretation.

RESULTS

This section contains the empirical exercise undertaken in the present study. It broadly overviews the data of major industries of India in the years 2006-07 and 2013-14. These industries include basic metals, chemicals and chemical products, food products, textiles, machinery and equipment, rubber and plastic products, tobacco products, paper and paper products, leather and leather-related products, and wood & wood products. We have analyzed these industries based on the number of factories they have established in India, their productive capital, the total number of workers employed, input costs, and the total value of output produced. Further, we have also done a comparative analysis of these industries with similar parameters in 2006-07 and 2013-14.

Table 1: Composition of top ten industries regarding the number of factories in India in 2006-07 and 2013-14

Type of Industries	Factories		Percentage Share	
	2006-07	2013-14	2006-07	2013-14
Basic Metals	7795	11788	8.7	9.86
Chemicals & Chemical Products	11065	11465	12.3	9.5
Food Products	25759	35346	28.7	29.3
Textiles	15035	18645	16.8	15.4
Machinery & Equipment	9574	11731	10.7	9.7
Rubber & Plastic Products	7798	13147	8.7	10.9
Tobacco Products	3226	3294	3.6	2.7
Paper & Paper Products	3868	6810	4.3	5.6
Leather & Related Product	2400	4225	2.7	3.5
Wood & Wood Products	3074	4269	3.4	3.5
Total	89595	120720	100	100

Table 1 presents the number of factories across various industries in India for the years 2006-07 and 2013-14. A factory, or manufacturing plant, is typically an industrial site comprising buildings and machinery, often as part of a larger complex, where workers produce goods or operate machines to transform one product into another. The data indicates that the number of manufacturing units in India was significantly lower during the pre-reform period compared to the post-reform period. The table also infers that food-producing units form 28% of the total industry base while leather units are just 2.7% for the year 2006-07. Many other industries such as textile, chemicals, and machinery do form a significant number. With the total factories around 16%, 12%, and 10% each respectively in the Indian economy in 2006-07.

Table 1 takes into account the number of factories in the industry in the year 2013-14. As we can see food products form the maximum share and tobacco forms the least in the year 2013-14. From table 1, we can infer that no. of industries that produce food products form the maximum which accounts for 30% of the total industry in India while tobacco products form the least just 2.7% of the total industry. Many other industries such as textile, rubber, basic metals, and chemicals do form a significant number with the total factories around 15%, 11%, 10%, and 10% each respectively in the Indian economy. From table 1, we can see that food products industries predominate in the Indian economy with nearly 35000 factories of food products in India. This indicates that India's food product industries experienced a significant surge in their share during the post-reform period compared to the pre-reform era. As we can see the total percentage share of food products which form the maximum share in our study has shown an upward trend of around 1% from

2006-07 to 2013-14. Industries such as basic metals, rubber & plastic products, paper & paper products, leather & related products, and wood & wood products have shown a surge in the total percentage share from 2006-07 to 2013-14 and we can even see that percentage share in chemicals and chemicals products have fallen around 3%, textiles around 1%, machinery around 1% and tobacco products around 1% in the subsequent years of our study.

Table 2: Composition of top ten industries regarding the number of Productive Capital in India in 2006-07 and 2013-14

Type of Industries	Productive Capital		Percentage Share	
	2006-07	2013-14	2006-07	2013-14
Basic Metals	19658488	64559449	30.7	39.6
Chemicals & Chemical Products	16002745	21932157	25.0	13.4
Food Products	7951559	21988117	12.4	13.5
Textiles	10389582	24834627	16.3	15.2
Machinery & Equipment	3770183	10673152	5.9	6.5
Rubber & Plastic Products	2748710	10079179	4.3	6.2
Tobacco Products	457789	1310800	0.7	0.8
Paper & Paper Products	2084540	5415903	3.3	3.3
Leather & Related Product	552624	1349570	0.8	0.8
Wood & Wood Products	256406	891952	0.4	0.5
Total	63872629	163034906	100	100

Table 2 shows the total percentage share of productive capital used for production activities in 2006-07 and 2013-14 in Indian industries. Table 2 encompasses an analysis of productive capital, defined as all goods and services utilized within a production cycle, including raw materials, energy, supplies, and services essential for each stage of production. Typically, capital refers to the assets possessed by a company. Since capital is a flow concept, it is not intended to be static and undergoes annual changes. We can see that productive capital is very low compared to the post-reform period in general. This shows that India used much less productive capital for the production process as compared to its state after the post-reform period. Basic metals form the highest share of 30% in productive capital share followed by chemicals which were around 25% while textiles lagged behind chemicals by just 9%. Wood and wooden products, leather, and related products industries had the least productive capital share in 2006-07.

As we can see in table 2, basic metals form the highest share of 39% in productive capital share followed by textiles which were around 15% while chemicals lagged behind textiles by just 2%. Wood and wooden products, leather, and related products industries had the least productive capital share in 2013-14. As we see basic metals as a capital-intensive industry use maximum capital with nearly 64559449 units of capital used. It is

evident from table 2 that the total percentage share of basic metals which form the maximum share in our study has shown an upward trend of around 9% during 2006-07 to 2013-14. Industries such as food products, machinery, rubber & plastic products, tobacco products, paper & paper products, and wood & wood products have shown a surge in the total percentage share from 2006-07 to 2013-14, and we can even see that percentage share in chemicals and chemicals products have fallen drastically around 12% and textiles around 1% in the subsequent years of our study.

Table 3: Composition of top ten industries regarding the number of Workers (Labour) in India in 2006-07 and 2013-14

Type of Industries	Workers		Percentage Share	
	2006-07	2013-14	2006-07	2013-14
Basic Metals	590095	74923	11.7	1.5
Chemicals & Chemical Products	593264	494253	11.7	10.0
Food Products	1142956	1232921	22.7	25.0
Textiles	1317785	1267670	26.1	25.7
Machinery & Equipment	362098	441733	7.2	8.9
Rubber & Plastic Products	264338	466790	5.2	9.5
Tobacco Products	420895	425799	8.3	8.6
Paper & Paper Products	150712	193026	2.9	3.9
Leather & Related Product	148575	266153	2.9	5.4
Wood & Wood Products	46721	60034	0.9	1.2
Total	5037444	4923302	100	100

Table 3 shows the total percentage of labour in industries used for production activities in 2006-07 and 2013-14 in Indian industries. Workers or labour form the soul of the factories. Labour in India generally refers to employment in the economy of India. India being abundant in labour uses mostly labour-intensive techniques, especially in the pre-reform period as India highly had in capital shortage. Textile and food had the maximum worker's share in 2006-07 in Indian industries. Textile share is around 26% while food accounts for 22%. Chemicals and chemicals products and basic industries account for the total worker's share of around 12% while industries such as tobacco, rubber, and leather also account for a high labour share of around 8%, 5%, and 2% respectively. Basic metals have the least workers share which shows the industry's capital-intensive nature.

From table 3, we find that textile and food products had the maximum worker share in 2013-14 in Indian industries. Textile share is around 26% while food accounts for 25%. Chemicals and chemicals products account for the total worker's share of around 10% while industries such as rubber, tobacco, and leather also account for a high labour share

of around 9.5%, 8%, and 5% respectively. Basic metals have the least workers share which shows the industry's capital-intensive nature. It is evident from table 3 that the total worker's share of textiles which forms the maximum share in our study has shown an inward trend of around 1% while food products have shown a total increment of around 3% from 2006-07 to 2013-14. Industries such as machinery, rubber & plastic products, tobacco products, paper & paper products, leather & related products, and wood & wood products have shown a surge in the total workers share from 2006-07 to 2013-14, and we can even see that workers share in basic metals have fallen drastically from 11.7% to 1.5% in the subsequent years of our study. Chemicals and chemicals products showed a cut in the input used by around 2% from 2006-07 to 2013-14.

Table 4: The composition of the top ten industries regarding the Inputs used in India in 2006-07 and 2013-14

Type of Industries	Inputs		Percentage Share	
	2006-07	2013-14	2006-07	2013-14
Basic Metals	27775977	71694503	26.1	22.5
Chemicals & Chemical Products	21028679	42068617	19.7	13.2
Food Products	24459229	70208438	22.9	22.0
Textiles	13791391	31431702	12.9	9.8
Machinery & Equipment	8706425	18074970	8.2	5.6
Rubber & Plastic Products	5638388	70240240	5.3	22.0
Tobacco Products	855771	2223464	0.8	0.6
Paper & Paper Products	2164050	6974739	2.0	2.1
Leather & Related Product	1452459	3907622	1.4	1.2
Wood & Wood Products	506738	1831617	0.5	0.5
Total	106379115	318655912	100	100

Table 4 share shows the total percentage of inputs industries used for production activities in the years 2006-07 and 2013-14. The total output is the function of the Inputs used in the production process hence a most important requirement for any industrial productivity. From the above table, it is evident that the inputs used in the post-liberalization were far more than the ones used before the adoption of the new economic policy. Fewer inputs further impacted the total output produced. Less output production impacted the investment, and hence the cycle continues leading to greater unemployment and impacting the whole economic cycle. Industries such as basic metals, food products, and chemicals used the maximum inputs for production activity while textile, machinery, and rubber too used a significant number of total inputs in 2006-07. In the year 2013-14, industries such as basic metals, food products, and rubber used the maximum inputs for production activity

while chemicals and chemicals products lagged behind rubber by just 9% of the total inputs share.

It is evident from table 4 that the total input share of basic metals which form the maximum share in our study has shown an inward trend of around 4% while rubber and plastic products have shown a total increment of around 17% from 2006-07 to 2013-14. Industries such as paper & paper products and wood & wood products have shown a surge in the total inputs used from 2006-07 to 2013-14, and we can even see those chemical and chemical products, textiles, and machinery industries have used inputs for production activity, have fallen in the subsequent years of our study. Chemicals and chemicals products showed a cut in the input used by around 6% from 2006-07 to 2013-14.

Table 5: Composition of top ten industries regarding the number of Outputs in India in 2006-07 and 2013-14

Type of Industries	Outputs		Percentage Share	
	2006-07	2013-14	2006-07	2013-14
Basic Metals	35077978	86683903	26.5	27.3
Chemicals & Chemical Products	27537479	51387969	20.8	16.2
Food Products	28431320	77475023	21.5	24.4
Textiles	16800921	37686371	12.7	11.8
Machinery & Equipment	11200489	23570660	8.47	7.4
Rubber & Plastic Products	6625500	21551214	5.0	6.7
Tobacco Products	1492795	3485102	1.1	1.2
Paper & Paper Products	2766359	8421688	2.1	2.6
Leather & Related Product	1720475	4763959	1.3	1.5
Wood & Wood Products	573136	2120901	0.4	0.6
Total	132226461	317146790	100	100

Table 5 shows the total percentage of output produced by industries in 2006-07 and 2013-14. The final products that come out after the production process are known as output. Gross Domestic Product (GDP) is widely regarded as the primary measure of national output. Ideally, GDP should reflect the total value of all goods and services produced within a country. However, accurately capturing this value presents a challenge due to the repeated counting of the same output at various stages of production. Output produced by basic metals stands for around 27% of the total output share in India in 2006-07 which shows that capital-intensive industries contribute the maximum when compared to labour intensive such as wood & wood products industries which have output produces less than 1% in 2006-07.

In this table, we observe that output produced by basic metals stands for around 27% of the total output share in India in 2013-14 which shows that capital-intensive industries

contribute the maximum when compared to labour intensive such as wood & wood products industries which have output produces less than 1% in 2013-14. The data presented in Table 5 clearly indicates that the total output share of basic metals is far more than any other industry. The share even increases by 1% by the year 2013-14. The wood and wooden products have shown a total increment of around 0.2% during the study periods while chemicals and chemicals products showed a cut in the output produced. Industries such as paper & paper products and rubber & plastic have shown a surge in the total output produced from 2006-07 to 2013-14, and we can even see that textiles and machinery industries have performed badly as their output production has fallen in the subsequent years of our study. From this table, we can infer that due to India's adoption of the LPG policy, industries such as basic metals and food products have benefited the most as most of these industries highly benefitted due to the foreign direct investment which mainly focused on these industries but our traditional industries such as textiles faced a backward shift due to lack of attention in these particular industries. Hence, we can infer those labor-intensive industries that used to employ more labour are reducing output and due to lack of proper investments, the employment level is reducing which shows that our textile industries are in huge danger if the government does not take appropriate steps to save it.

DISCUSSION

According to renowned economists such as Kuznets (1972), Chenery (1975), and Syrquin (1988), structural change represents a distinctive characteristic of an economy. From the economic history of this world, it is very clear that some developed countries have attained the structural shifts but the developing countries are trying to attain. Over time, the Indian economy has transitioned from being predominantly agro-based to increasingly service-oriented. This structural transformation has occurred in phases, influenced by factors such as rising demand for services, industrialization, economic reforms, and technological advancements. Since independence, the Indian economy has experienced structural changes that typically accompany long-term economic development. The acceleration in growth rates during the 1980s further propelled these changes, which have progressed more rapidly in the post-reform period. The present study finds that the industrial sector's contribution to India's GDP has stagnated over the past few decades. The number of industries that are producing food products has increased over the years accounting for 29% for the year 2006-07 and 30% for the year 2013-14 of the total industry in India while tobacco products form the least by just 2.5% of total industry. For the year 2006-07, Basic metals form the highest share of 30% in the productive capital while for the year 2013-14, they form the highest share of 39% in productive capital. So basic metal's contribution

to the economy has increased continuously over the years regarding productive capital. In the year 2006-07, the percentage contribution of basic metals in the total economy was 11%. But year after year, it has been decreasing and accounted for 1% in 2013-14. Textile has the maximum worker's share in 2006-07 in Indian industries. Textile share is around 26% while for the year 2013-14, it is 25%. The total percentage of industries inputs used for production activities in 2006-07. Industries such as basic metals use the maximum inputs for production activity is 26% while it is 22% for the year 2013-14. Textile, machinery, and rubber use a significant number of total inputs. Output produced by basic metals stands for around 27% of the total output share in India in 2006-07 which shows that capital-intensive industries contribute the maximum. The favorable outcome in India's industrial growth can be attributed to the adoption of the New Economic Policy (1991) and the New Industrial Policy (1991).

CONCLUSION

India adopted the New Economic Policy (NEP) in 1991 and carried out various reforms. These reforms show that India's post-reform has outperformed its pre-reformed era regarding the output produced, greater investments, more productivity, more labour force, and more producing houses. This paper wanted to study the impact of the structural changes on the major ten industries in India and to compare them using various factors such as inputs, outputs, productive capital, number of factories etc. The study shows that the NEP was favorable for the industrial sector in India. The paper from years of trying to give the impression that NEP has led to huge reforms in the industrial sectors and the many fears of Infant- the industry argument has not affected the Indian producing units.

ABBREVIATIONS

NEP	New Economic Policy
NIP	New Industrial Policy
GDP	Gross Domestic Product
LPG	Liberalization, Privatization and Globalization
ASI	Annual Survey of Industries

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Availability of data

Data used in this work are freely available on the Annual Survey of Industries, India website.

Ethics approval

This study was based on secondary data; hence, no ethical clearance was required. The author conducted the study as part of his M.Sc. project work in the Department of Economics at Pondicherry Central University, Puducherry

Competing Interests

The author declares no competing interests.

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