

# Capital Goods Sector in India, 1990-91 to 2007-08

## 1. Introduction

Technological change is the panacea for the apparent limit—depletable stocks of natural resources—to sustain economic growth (Grossman and Helpman 1994). It is, however inhibited by the absence of a well-developed capital goods sector. Any change in process or product technologies invariably requires capital goods industries to produce new machines or equipments according to certain specifications (Fransman 1986). Secondly, capital goods sector is also essential for the successful diffusion of inventions. An infinitesimal of new inventions, new products, or new processes, once conceived, are of no economic relevance unless and until the capital goods sector has successfully solved the technical and mechanical problems or developed the new machines or equipments which the inventions require (Rosenberg 1970). Capital goods sector is, thus, regarded as the heart of the generation and diffusion of technologies in the economy (Rosenberg 1963a; Rosenberg 1963b).

Capital goods sector has an important role in the industrialization of developing economy. According to Hicks (1932) a relative scarcity of a factor of production is itself an inducement to invention and invention of a particular kind—directed to economizing the use of the factor which is relatively scarce or expensive. This is evident from the experience of American and European history where the scarcity of labour has led to the development of much-admired labour-saving innovations (Rosenberg 1963a). If this is so why then developing countries, which are capital-scarce and labour-abundant, didn't make capital-saving and labour-intensive innovations. It is because the presence of a little or no organized capital goods sector had not provided the opportunity to produce machinery and equipment efficiently or to produce capital goods at a reasonable low price<sup>1</sup> which could have accelerated the technological innovation across the economy. Technological dynamism of capital goods sector in developed economies has enabled them to efficiently produce capital goods at a reasonable price which induces investment and income of the economy.

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<sup>1</sup> Improving the efficiency in the production of capital goods or any reduction in the cost production of capital goods is in fact the capital-saving innovation to the economy (Rosenberg 1963a)

It is thus clear that capital goods sector is essential the development process of developing countries and promotion of technological innovation in capital goods sector is the major boost up for technological change in developing economies.

In the light of above discussion, the present paper has made an attempt to understand the capital goods sector in India especially during the post-liberalization period. Further, this paper intends to delineate the competitiveness and technological development in capital goods sector. The paper is divided into six sections including introduction. Next section discusses the kind of data and methodology we are have employed for the present study; the third section has discussed the classification of Indian capital goods sector; the fourth section has attempted to understand the capital goods sector in the pre-liberalization period which acts as a rudiment to the analysis of the sector in a post-liberalized India ; the fifth section has made some effort to discern structure and growth of capital goods sector in which we have basically studied the growth, competitiveness, and technological development of capital goods sector; and the final section sums up and concludes the discussion of the paper.

## 2. Data and Methodology

### 2.1. Data

To study the capital goods sector we are employing the information from National Accounts Statistics (NAS) and Annual Survey of Industries (ASI) provided by Central Statistical Organization (India), PROWESS provided by Centre for Monitoring Indian Economy (CMIE), Commodity Trade Statistics Database (COMTRADE) sourced from United Nations Statistics Division (United States) and Office of Economic Advisor, Ministry of commerce & industry (India). For the analysis of capital goods sector during the pre-liberalization period, we have used data from NAS, for study of capital goods sector during post-liberalization period we have taken the data from ASI, for deflating the variables (in particularly GVA and Output) Wholesale Price Indices have been taken from the Office of the Economic Advisor, for the study of competitiveness import and export value have been obtained from COMTRADE, and finally to study the technological development in capital goods sector we have got sales and R&D expenditures of the firms sourced from PPROWESS.

## 2.2. Methodology

The main focus of the paper is to study the trends and pattern of capital goods sector during the post-liberalization. Besides, it has also put its attention on the trends and pattern of capital goods sector during the pre-liberalization period. To analyze the trends in value added or output of capital goods sector, we have estimated semi-logarithmic time trends. Thus when  $\log Y = \alpha + \beta t$  is estimated over a specific time period, the regression coefficient  $\beta$  in each case yielded an estimate of the annual compound growth rate.<sup>2</sup>

Further, in a time period there are sub-periods, so to estimate the trends of the sub-periods we have modified the semi-logarithmic time trend to include slope as well as intercept dummies. The growth rates of the sub-periods are obtained from the estimated equation. The typical regression equation in our scheme takes the following form:

$$\log Y = \theta + \sum_{i=1}^3 \alpha_i D_i + \beta t + \sum_{i=1}^3 \delta_i z_i + \epsilon_i$$

Where  $Y$  = value added,

$t$  = time,

$D_i=1$  for sub-period 1, 0 otherwise,

$z_i = D_i t$ , and  $\alpha_i$  and  $\delta_i$  are coefficients of intercept and slope dummies respectively.

In the above framework the antilog of  $\beta$  yields the annual compound growth rate of the first sub-period while the compound growth rate for other sub-periods can be estimated from the coefficients, i.e., anti-log  $(\beta + \delta_i) - 1$ . Such a growth rate, when significantly different from zero, indicates the existence of a trend within the sub-period.

As we move across sub-periods and compared the inter-period growth rates, there may be acceleration or deceleration in growth rate. The coefficient of multiplicative dummy term, i.e.  $\delta_i$ , if it negative and statistically significant, shows that there was a deceleration

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<sup>2</sup> Let  $Y = AB^t$  where  $B = 1 + r$ , and  $r$  is the compound growth rate of  $Y$ . When the equation is estimated with  $\log Y$  as the dependent variable and  $t$  as the independent variable, we obtain an estimate  $\hat{b}$  for  $\log B$ . The antilog of  $\hat{b}$  minus 1 yields an estimate for compound growth rate, i.e.  $r$ .

in the growth rate in the subsequent sub-periods. And if it is positive and statistically significant then we can say there is acceleration of the growth rate in the subsequent sub-periods.

### 3. Classification of Capital Goods Sector India

Capital goods, in economic sense, are the means to produce consumer goods and services for an economy. They are basically mean machineries and equipments employed in the production in other sectors—agriculture, manufacturing, services, etc. Capital goods sector is very large and diverse in nature. It is divided broadly into three sub-sectors: (a) Electrical Machinery, (b) Non-Electrical Machinery, and (c) Transport Equipment. These sub-sectors have been elaborated in the schematic of presentation (see Figure 1). However, National Industrial Classification (NIC)-2004 (which is similar to International Standard Industrial Classification (ISIC) revision 3) classifies capital goods sector under five four divisions (29, 30, 31, 32, 34, and 35) and a sub-division (331)<sup>3</sup>. 31 and 32 cover up the electrical machinery, 29, 30, and 331 constitute non-electrical machinery, and 34 and 35 sum up the transport equipment.

### 4. Development of Capital Goods Sector in the Pre-Liberalization

Inadequate development of capital goods sector at the dawn of independence had induced the formulation of strategy which would remove the serious bottlenecks of a lopsided industrialization under the colonial rule. Prasanta Chandra Mahalanobis, however, constituted the strategy for Indian industrialization. He demonstrated a two sector model where the strategy was to direct a high proportion of investment to the capital goods sector which would lead in the long-run, to a higher rate of growth of

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<sup>3</sup> Division 29: (Manufacture of Machinery and Equipment N. E. C.

Division 30: Manufacture of Office, Accounting and Computing Machinery), and

Division 31: Manufacture of Electrical Machinery and Apparatus N. E. C.

Division 32: Manufacture of Radio, Television and Communication Equipments and Apparatus

Sub-division 331: Manufacture of medical appliances and instruments and appliances for measuring, checking, testing, navigating and other purposes except optical instruments.

Division 34: Manufacture of motor vehicles, Trailers and Semi-trailers

Division 35: Manufacture of Other Transport Equipment.

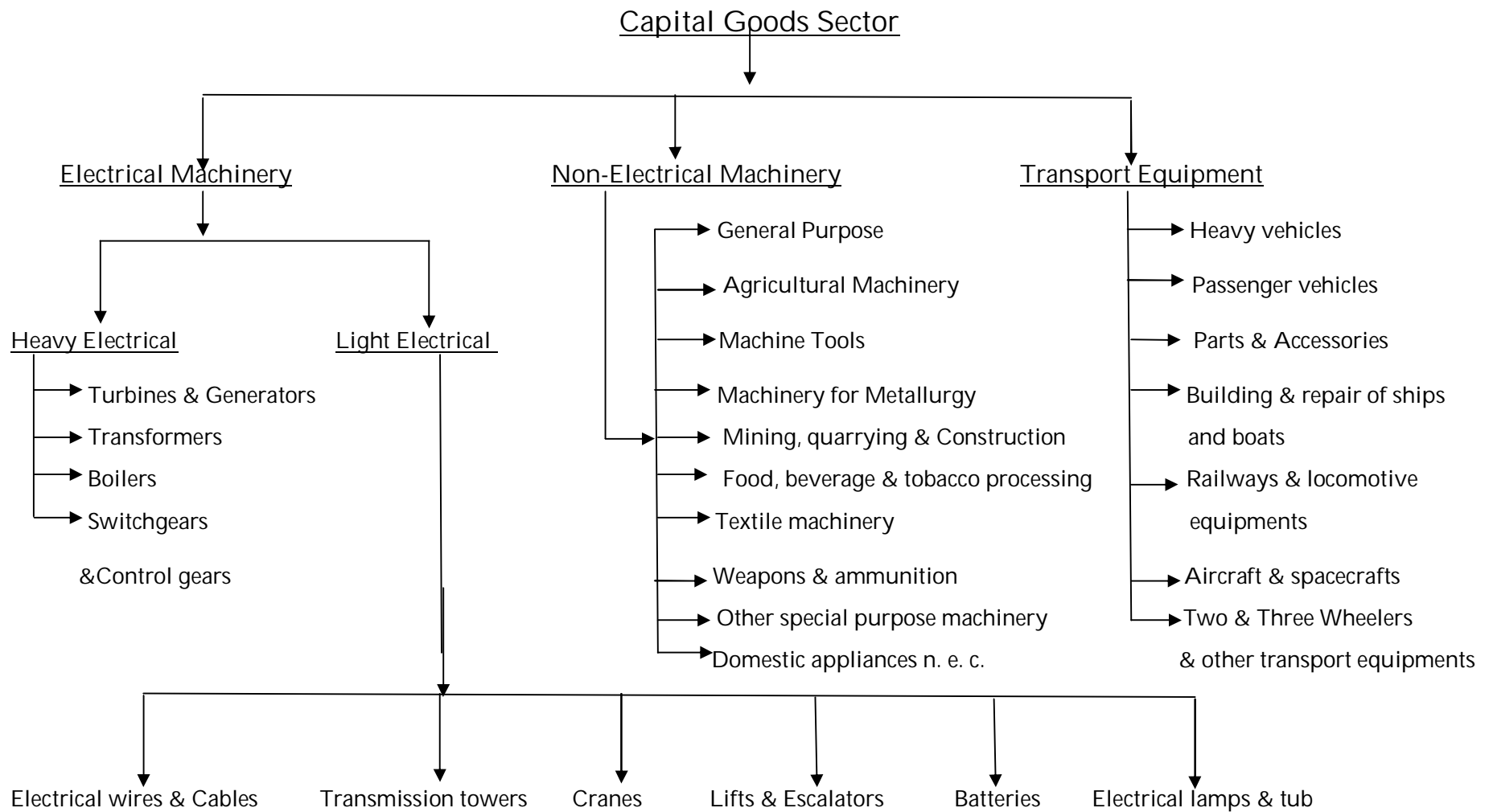


Figure 1

consumption then if a much lower proportion of investment was allocated to the capital goods sector (Mahalanobis 1955)<sup>4</sup>.

The Mahalanobis model of development strategy was in operation for almost four decade since its initiation in second Five Year Plan (1955-56). Some are of the view that the state-dominated industrialization with high protective barriers to international competition had obstructed a rapid and efficient industrialization while some other opined alternatively that there has been a significant achievement of this strategy, especially when it is compared to conditions permeated during the colonial period. Let's have a tour to understand how the capital goods sector performed during the dirigisme regime.

#### Trend of Capital Goods Sector, 1955-56 to 1989-90

The scatter diagram of value added of capital goods sector in Figure 2 shows that Mahalanobis strategy resulted in an accelerating growth during second and third Five Year Plan periods, but this increasing trend of capital goods sector led to a perceptible decline after the mid-sixties (i.e. 1965-66) till the mid-seventies and started reviving afterwards. We have, therefore, divided the entire time period, 1955-56 to 1989-90, to three sub-periods such as 1955-56 to 1965-66, 1966-67 to 1974-75, and 1975-76 to 1989-90 and these sub-periods can be described as Mahalanobis period, stagnation period and recovery period respectively. In the Table 1 we have shown the estimate of sub-period growth of value added for different sub-sectors of capital goods sector.

The estimates of sub-period growth of value added for different groups of capital goods sector are presented in Table 1. In the case of non-electrical machinery, during the sub-period 1955-56 to 1965-66, which we have called as the classical Mahalanobis period, growth was a phenomenal 23 per cent and this collapsed to a meager 2 per cent in the 1966-67 to 1974-75 which we describe as the period of stagnation. Subsequently, during

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<sup>4</sup> A high proportion of investment if diverts towards capital goods sector would lay the basis for future investment by providing a flow of machinery and equipment. The consequent increase in the productive potential of the economy through accumulation of stocks of machinery and equipment, though causing consumption to grow slowly initially, because of the low proportion of investment going to the consumer goods sector in the early stages, would eventually make possible a high rate of growth in the long-run, when the existing capacities can be used to augment the productive potential of the consumer goods sector.

1975-76 to 1989-90, which we call the period of recovery, the growth rate increased to 7 per cent.

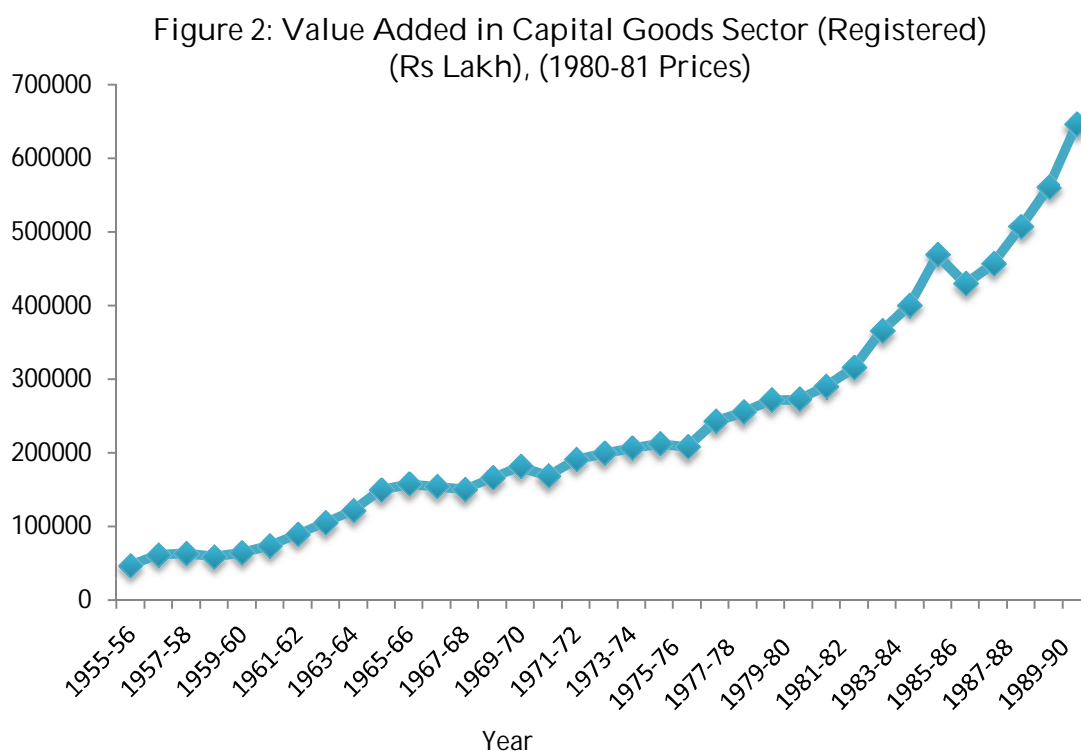


Table 1: Growth of value added of capital goods sector at 1980-81 prices  
(registered sector)

Industry Group	1955-56 to 1965-66	1966-67 to 1974-75	1975-76 to 1989-90	1955-56 to 1989-90
Non-electrical machinery	23.15	2.28	6.80	8.90
Electrical machinery	16.46	10.09	10.28	10.80
Transport equipments	8.16	3.30	6.39	4.26
Capital Goods Sector	12.47	4.49	7.80	6.98

Source: National Accounts Statistics, (various issues)

In the case of electrical machinery, again, the growth rate of over 16 per cent in the Mahalanobis period fell to about 10 per cent in the stagnation period and continued growing at the same pace during the revival period as well. Similarly, in the case of transport equipments the growth rate slipped down to 3 per cent from a reasonable 8 per cent during the classic Mahalanobis period and then in the succeeding period it increased to 6 per cent.

The case of transport equipment is somewhat different as it has a major share in capital goods sector its behavior affect the capital goods sector as a whole. This is why capital goods sector performance seems as a mimic of performance of transport equipment. Transport equipment followed a sharp deceleration from 12 per cent in the Mahalanobis period to only 4.5 per cent in the stagnation period and then a recovery to around 8 per cent in the recovery period.

Summing up the analysis of capital goods sector during the pre-liberalization period, it can be said that although there was a revival in capital goods sector and its sub-sectors still the growth rates are during revival period were significantly less than those achieved during the classical Mahalanobis period.

Following explanations can be put forward with respect to the pattern of growth displayed by the capital goods sector in India during the pre-liberalization period. There are many explanations especially with respect to the stagnation in capital goods sector after the mid-sixties and they are mostly related to demand and supply constraints. Growth of the capital goods sector strongly relies on the fixed capital investment made in various sector of the economy. It is demand for investment in plant, machinery and equipments which determines the growth of capital goods industries. This type of demand is limited by aggregate demand for production, it is reasonable to expect that the variation in aggregate demand will ultimately reflected in variation of the output of capital goods sector. Therefore, it can be said that decline in public sector investment after the mid-sixties has led to a deceleration in the growth of capital goods sector as is clear from Table 2.<sup>5 6</sup> The Table 2 shows that the growth of capital goods sector follows a similar pattern that of gross fixed capital formation (GFCF)—high doses of public investment in Mahalanobis period enabled a higher growth in capital goods sector, a decline in public investment in the subsequent period led to the stagnation in capital

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<sup>5</sup> The decline in agricultural income, due to adverse weather in 1964-65, and the two successive years of drought thereafter, affected the capital goods sector by creating a reduced demand for agricultural machinery. Further, the slow growth of agricultural incomes and their effect in limiting the demand for the industrial goods.

<sup>6</sup> Besides the demand constraints, there were problems in availability of better quality intermediate inputs, raw-materials might have contributed to the retardation of growth in capital goods sector. In particular, there was a shortage of imported machinery, components and raw materials in capital goods industries due to decline in foreign exchange reserve in 1965-66 (Pradhan 1990) which might have affected the production of capital goods sector.



goods sector and again the recovery of growth rate of public investment revived the growth of capital goods sector of the economy.

Table 2: Growth Rates (1980-81 Prices)

	GFCF	GFCF (Public)	GFCF (Private)	Capital Goods
1955-56 to 1965-66	5.9	7.1	4.9	12.47
1965-66 to 1974-75	2.8	1.3	4.0	4.49 <sup>ψ</sup>
1974-75 to 1988-89	5.1	7.9	3.5	7.80*

Notes: GFCF: Gross Fixed Capital Formation

GFCF (Public): Gross Fixed Capital Formation in Public Sector

GFCF (Private): Gross Fixed Capital Formation in Private Sector

ψ stands for Growth rate during 1966-67 to 1974-75 & \* stands for growth rate during 1975-76 to 1989-90

Source: Table I from (Mundle and Mukhopadhyay 1992)), and Table 1 (previous table).

The centralized industrialization initiated since the beginning of second Five Year Plan, however, came to an end. When the economy started moving away from the shackle of dirigisme strategy in the mid-1980s by initiating some piecemeal reforms and finally brought about a series of reforms in 1991.

## 5. Performance of Capital Goods Sector in the Post-Liberalization Period

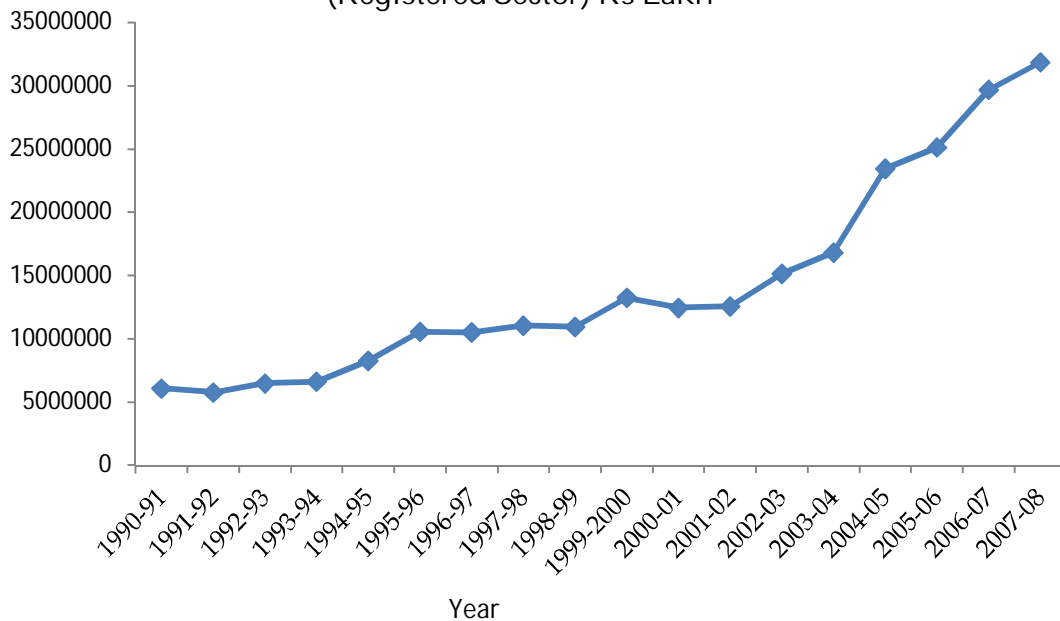
The economic reforms initiated in 1991 made a series of reforms both in internal as well as in external sector of the economy. They are as follow: abolishing the control over industry by withdrawing the licensing system, liberalizing the economy for free flow of goods and services by reducing the tariff structure to the minimum level and also allowing the economy for free flows of foreign investment (direct foreign investment and foreign portfolio investment). The goal of these reforms was basically to create a more conducive environment which will boost of investment (coming both from internal and abroad), and thereby accelerating output and employment in the economy. Let's examine how the capital goods sector has been performing in the liberalization period.

### 5.1. Growth of Capital Goods Sector

We have presented the output series of capital goods sector in Figure 3 which shows that output grew increasingly following the economic reforms till the year 1995-96, and grew at a mild pace afterwards, it however started regaining its since 2001-02. We have

accordingly divided the entire time period 1990-91 to 2007-08 into three sub-periods such as (1) 1990-91 to 1995-96, (2) 1996-97 to 2000-01, and (3) 2001-02 to 2007-08. The estimates of the sub-period growth rates of different sub-sectors of capital goods are provided in Table 3.

Figure 3: Output of Capital Goods Sector at 1993-94 Prices  
(Registered Sector) Rs Lakh



Like the capital goods sector its sub-sectors also followed a cyclical growth path. In the case of non-electrical machinery during the sub-period 1990-91 to 1995-96, growth was a 10 per cent and this declined steeply to less than 4 per cent in the period 1996-97 to 2000-01. Succeedingly, during 2001-02 to 2007-08, the growth rate increased sharply to 15 per cent and this is significantly different and higher from that of preceding periods. Like non-electrical machinery, electrical machinery has not the same growth picture. It grew at 8 per cent during 1990-91 to 1995-96, declined by 1 per cent in the subsequent sub-period and finally grew to 16 per cent during 2001-02 to 2007-08. However, again we have a pretty different story of transport equipment, compared to its staggering performance during the pre-liberalization period (see Table 1), it grew at about 17 per cent during 1990-91 to 1995-96, and unlike other two sub-sectors it fell more steeply to 5 per cent in the second period and finally accelerated to historical 20 per cent during third period. All the sub-sectors of capital goods sector had followed a cyclical pattern during the post-liberalization period.

Table 3: Growth of Output of Capital Goods Sector at 1993-94 prices  
(Registered Sector) (Rs Lakh)

Industry Group	1990-91 to 1995-96	1996-97 to 2000-01	2001-02 to 2007-08	1990-91 to 2007-08
Non-electrical machinery	9.88	3.90	15.35	7.83
Electrical machinery	8.27	6.95	16.67	9.86
Transport equipment	16.76	5.15	19.88	12.41
All capital goods	11.66	5.33	17.58	10.25

Source: Annual Survey of Industry (ASI), CSO, (various issues)

Figure 4: Gross Value Added in Capital Goods Sector  
(Registered Sector) (Rs Lakh), (1993-94 Prices)



Like the pattern of output, gross value added (GVA) of capital goods sector also followed a cyclical pattern during the post-liberalization period which is quite obvious in Figure 4. But, it declined very steeply to less than 1 per cent in the second period from 11 per cent in the first period. The estimates of growth of value added of sub-sectors of capital goods followed the same pattern as they all declined significantly during the second period (see Table 4). Further, growth of capital goods sector as a whole mimicked the growth pattern of transport equipment. Since transport equipment has a lion-share in capital goods sector its behavior strongly affects the behavior of capital goods sector as whole which is apparent from both Table 1 and 4. It can be concluded by

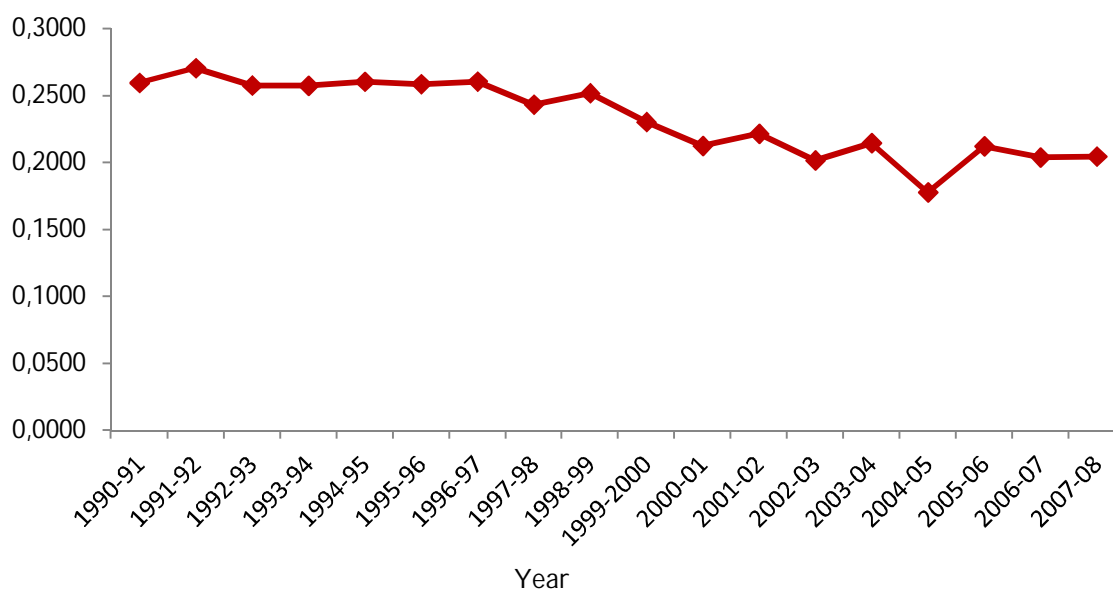
saying that there has not been any significant value addition in capital goods sector during the second sub-period, i.e. 1996-97 to 2000-01.

Table 4: Growth of Gross Value Added in Capital Goods Sector  
(Registered Sector) (1993-94 Prices)

Industry Group	1990-91 to 1995-96	1996-97 to 2000-01	2001-02 to 2007-08	1990-91 to 2007-08
Non-electrical machinery	10.23	2.16	14.04	6.39
Electrical machinery	8.62	1.85	15.64	7.21
Transport equipment	14.53	-2.54	19.52	10.19
All capital goods	11.23	0.54	16.63	8.04

Source: Annual Survey of Industry (ASI), CSO, (various issues)

Figure 5: Share of Gross Value Added in Total Output of Capital Goods Sector



From the above discussion it is clear that similar to the output, GVA of capital goods sector followed a cyclical path—increase, decrease, and increase. But, story takes a different movement when we take the share of GVA in output of capital goods sector. The annual average share of GVA in total output turns out to be 23 per cent if this number is true it can imply two things—(i) low technological change in the capital goods sector, and (ii) high import density in the production of capital goods (i.e. the sector is not sourcing most of the components, spare parts, and raw materials locally available rather it is importing them). Besides, the ratio of GVA to output, unlike the GVA

which followed a cyclical pattern during the entire time period 1990-91 to 2007-08, has rather followed a declining trend after first of half of the 1990s till the end of 2007-08 (see Figure 5). This decline movement of the share of value addition in output shows further that there might be the case for lower and lower technological change and higher and higher import density in the capital goods production in India.

## 5.2. Competitiveness of Capital Goods Sector

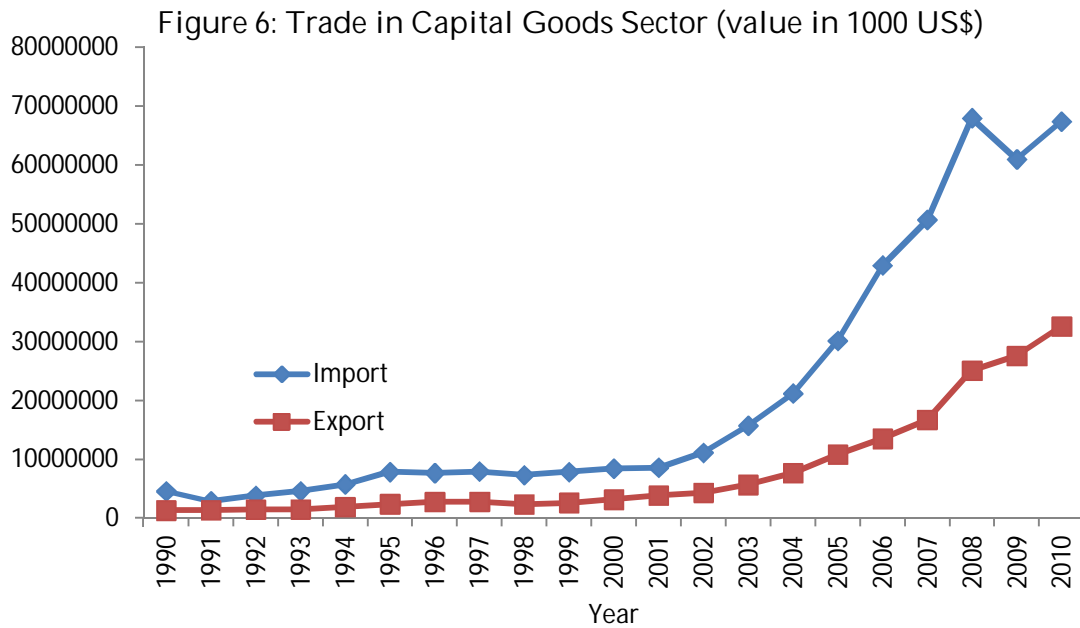
From the preceding discussion on share of value added in production of capital goods, it is inferred that there was an increasing import dependency capital goods sector. Let's have a discussion of capital goods' performance in the external sector. The following Figure 6 shows that growth of both export and import values are more or less stagnant during the period 1990 to 2000 and both started increasing afterwards. However, the striking feature is that value of import is more than two times of export value during the entire time period 1990 to 2010. The worrisome thing is that the gap between import and export has been getting wider since 2002 which is a great cause of concern for the economy as whole.

It can be followed from the above that external performance of India in capital goods sector is very poor as it imports more than what it offers to the rest of world. It can be inferred, *prima facie*, that Indian capital goods sector may not be competitive internationally. Let us see India's competitiveness<sup>7</sup> in capital goods sector. We have employed Revealed Comparative Advantage (RCA) index<sup>8</sup> to assess the international competitiveness of Indian textile machinery industry. The RCA index, developed by (Balassa 1965) (also known as Balassa Index), basically compares national export structure with the world export structure. It is defined as a ratio of the share of a particular industry (or commodity) in a country's total exports to the share of the industry exports in world's total exports.

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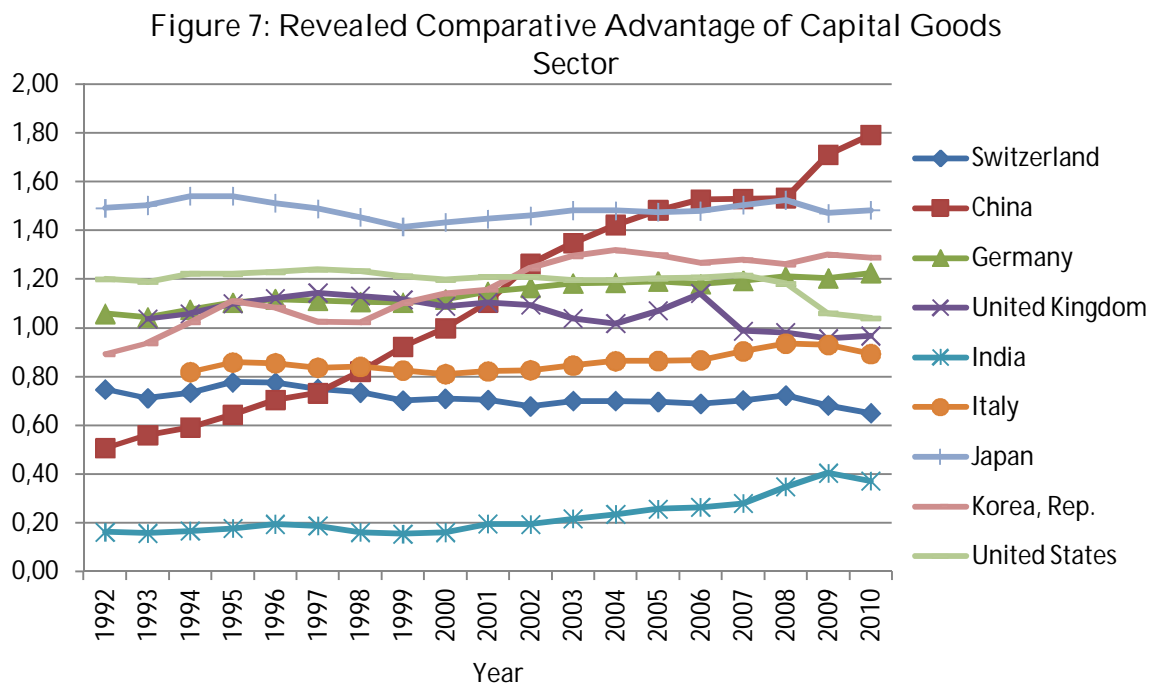
<sup>7</sup> Competitiveness is defined as "the degree to which, under free and fair market conditions, a country can produce goods and services which meet the test of foreign competition while simultaneously maintaining and expanding the real income of its people" (OECD, 1992, p. 237)

<sup>8</sup> RCA is a relatively better index to measure international competitiveness, unlike other indices it represents both price and non-price competitiveness of the country.



The Figure 7 shows that Indian capital goods sector has been uncompetitive relative to all benchmark countries (Japan, United States, Germany, and United Kingdom) as is obvious from its meager RCA value ( $<1.0$ ) for the entire time period 1992 to 2010. And it is even uncompetitive in comparison to its neighboring China. In the early 1990s both India and China were uncompetitive and China was little better position compared to India, and over the years China has improved its competitive position over India and it is clearly visible from its sharp upward RCA value which is the highest for last three years (2008 through 2010). But India could not improve its competitiveness over the long two decades since her inception of economic liberalization. Capital goods sector shares a major proportion in total manufacturing export (COMTRADE, 2011) then why India has been lagging behind in this respect. Why did not India improve its competitiveness in capital goods over the last two decades? The plausible answer lies in technological development in Indian capital goods sector. The comparative disadvantage of capital goods sector can also be attributed to the technological disadvantage. It is because the process of technological innovation, according to neo-technology theories, generates comparative advantages and influences the competitive position of countries in International markets (see Posner 1961). Economists like Katz (1984), Kaldor (1951),

Fagerberg (1988) and Lall (1990 & 2001), inter alia, have emphasized that technological competitiveness is an inevitable factor to achieve comparative advantage.<sup>9</sup>



### 5.3. Technological Development in Capital Goods Sector

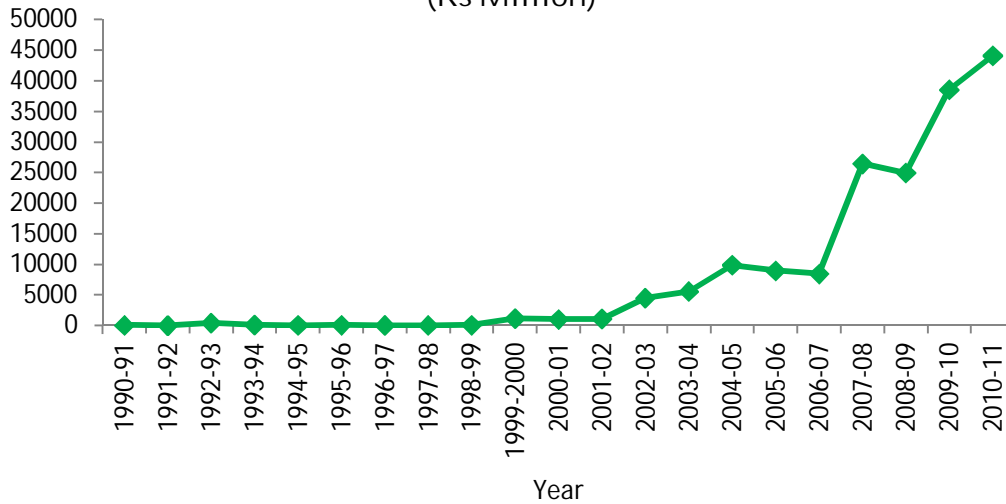
From the above discussion on value added and competitiveness of capital goods sector shows that there might be slow rate of technological development in capital goods sector in India. Technology is very difficult to quantify directly since it is an intangible goods. There are, however, indirect approaches to measure technology which are as (i) input measure (Research & Development (R&D) expenditures)<sup>10</sup>; (ii) output measure (patents); and (iii) the effect of technology (higher productivity). For the present requirement we are employing the R&D expenditures as a proxy to see the technological development in

<sup>9</sup> "Firms create competitive advantage by perceiving or discovering new and better ways to compete in industry and bring them to market, which is ultimately an act of innovation" (Porter 1990, p. 45).

<sup>10</sup> For the first time, internationally comparable information on R&D expenditures have been published by the Organization of Economic Cooperation and Development (OECD) since about 1965. A substantial amount of R&D has been taken place in relatively rich countries with a view to bring about innovations in the economy and resources spent on imitation and technology adaptation are not considered as R&D expenditures (OECD 2002).

capital goods sector.<sup>11</sup> We have used R&D expenditures and R&D intensity as the conventional measures to see the technological innovations in capital goods sector.

Figure 8: Research & Development Expenditure (Rs Million)



The plotted series of R&D expenditures in Figure 8 shows that there was hardly effort to bring about technological innovations in capital goods sector during the 1990s soon after the economic liberalization, there was some improvements in R&D spending and in particularly after 2006-07. But the share of R&D spending is very much insignificant in the output (total sales of the sector) which is clear from Figure 9 and the annual average share of R&D spending in output of capital goods sector is less than 1 per cent. This thing adds to have an idea that there has been very poor technological change in capital goods sector in the post-liberalization period.

<sup>11</sup> There is a drawback of R&D as a measure of technology since it ignores the stochastic nature of the process of innovation and the current flow of R&D expenditures is thus a noisy measure of technology improvements in that period. Many authors have constructed R&D stocks from flows using the perpetual inventory method (Griliches 1995).



Figure 9: Share of R&D Expenditure in Output of Capital Goods Sector (value in percentage term)



As is already clear from above figure that there has not been any consistent effort from the part of the producers of capital goods to make any technological development in capital goods sector, and this is the reason why we have seen the poor value additions in this sector. However, the statement derived from the above discussion is quite aggregative in nature which offers only an overview of capital goods sector. Given the wide diversity of capital goods sector and its sub-sectors there should be industry-specific study to delineate the problem more clearly.

## 6. Conclusion

The present paper is based on the discussion of capital goods sector in the post liberalization period. Basically, we have here tried to understand how the capital goods sector has performed during the last two decades. The focused its analysis on three major dimensions such as growth of output or growth of value addition, international competitiveness, and technological development. The finding of the paper is the following. Both output and GVA have followed a cyclical patter during the period 1990-91 to 2007-08. In the first sub-period 1990-91 to 1995-96, capital goods sector pursued an increasing path, then a declining path in the second period 1996-97 to 2000-01, and finally made a phenomenal growth in the last period 2001-02 to 2007-08. But, share of value addition in the production of capital goods sector has not followed the same cyclical path it rather followed a quite different path. From 1990-91 to 1996-97, it was

more or less stagnant, and took a steep declining trend after 1996-97. The declining share of value addition in capital goods sector when its output is growing implies a low technological development and import dependency of the sector.

To see where Indian capital goods sector stands in international markets we have estimated RCA of the capital goods sector which shows that there has been a persistent comparative disadvantage in capital goods sector during the post-liberalization period. This has resulted due to poor technological development in capital goods sector in India. Employing R&D expenditure which is an input measure of technological change we have seen there has been very minimal and negligent effort to bring about technological change in capital goods sector.

The drawback of our analysis is that it is very much aggregative in nature. Given the largeness and wide diversity of the capital goods sector, the aggregative analysis cannot be the proper diagnosis to make policy suggestions. Capital goods sector is the sum of three sub-groups and each of group is also not small one which can be studied easily. There entails the industry-specific study which can be able to delineate the problem proper help reaching at a definite solution.

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