Chapter 5
Summary and Conclusion

By the mid-1970s, India's trade regime had evolved into one of the most complex in the world. The laws and duties were very intricate. One had to make great effort to be able to understand them. The import and exchange rate regime that Indian policy-makers followed since independence was aimed at the comprehensive, direct control over foreign exchange utilization, with an excessive reliance on quotas rather than tariffs. What the policy makers aimed at was the fixed earning and restrictions in the form of quotas. This was done to confine the affluent ones from reckless import of commodities, capital and raw material or intermediate goods for manufacturing. From the late 1970s onwards, there were incremental attempts to reform the trade regime, with more significant attempts to do so, first in 1985 and then more comprehensively in 1991.

It was not too late before the policy makers realized that reorganization of trade policies is a must. Most of the reforms occurred in the intermediate and capital goods sectors, and, in 1991, almost all quotas on capital and intermediate goods were removed, and there was a reduction in peak tariff rates as well. There was less progress with trade reforms in the consumer goods sector. An important aspect of trade policy in India was that the level of protection till the 1980s and the pace of reforms subsequently differed significantly within sectors – whether these were the capital, intermediate or consumer goods sectors. Remarkably, labour-intensive industries such as textile, clothing and footwear industries gradually contracted from the mid-1970s to the late 1990s in production and employment.

The Indian economy had been growing at a slow pace after in late 1970s. In early phases of development of the industrial sector, the performance of Indian manufacturing sector was inadequate by the Government policies, e.g., prohibiting Indian industry's ability to compete in international market, high customs tariff distorting resource allocation, the reservation of production - a large amount of production items for small-scale sector, closing down of industries

in response to average competitive market forces and various types of domestic trade taxes and excise duties (Biswas and Ghose, 2012). All these skewed policies hampered the speed of the development of the industrial sector. It progressed but at a speed that was too slow for the competitive world. Interestingly, for the purpose of accelerating growth in the Indian economy, it was the more conservative trade policy reforms of 1985 that seemed to have a stronger impact than the more radical reforms of 1991.

However, since 1991, the situation gradually changed due to the introduction of liberalization policies. Liberalization made positive as well as negative impact on the trade sector and industrial sector of India. It was soon comprehended by the policy makers that advancing the industrial development is a precious chance they had for overall development. A number of actions were undertaken by the Government of India for boosting-up industrial productivity and efficiency. One of the core aims of economic reform through trade-liberalization was to make stronger competition among firms of different industries. Competition, if healthy can do wonders to industrial productivity rates and hence result into the hence sought after development. A significant contribution of factor to the growth acceleration that occurred in the Indian economy in the 1980s and 1990s is of the trade reforms. The sharp increase in private equipment investment in 1990s and 2000s due to the fall in the relative price of equipment, the high growth rates observed in this period, which had a significantly more growth-enhancing effect than public equipment investment. This may be due to the nature of trade policy changes and the manner in which these changes impacted on total factor productivity. The Indian Economic Reform, initiated in the wake of a severe foreign exchange crisis in 1991, and its impact on manufacturing productivity have been an important area of research among empirical analysts.

India has had a strong positive impact on total factor productivity due to trade reforms. More prominently, the access to specialized capital and intermediate goods from the rest of the world led to a productivity boost to Indian manufacturing firms. This was possible as the quotas on the importation of these goods were gradually removed. This removal policy proved to be a driving factor for this productivity boost. The trade reforms may have led to a reduction in X-inefficiency in the manufacturing sector; workers and managers both increased their efforts following the pro-competitive effects of the reforms. Such mechanisms by which trade policy impacts productivity

have been extensively discussed in the endogenous growth literature and evidence from the present study suggests that these mechanisms were responsible for the way trade policy impacted on performance in Indian manufacturing. Our evidence suggests that the 1991 reforms seemed to have a stronger effect on economic growth, both directly, by boosting productivity growth of Indian manufacturing firms, and indirectly, by increasing investment in machinery and equipment by the private sector, as real equipment prices fell both due to the productivity increases and greater external competition faced by Indian capital goods producers.

India, during the first four decades after independence, followed an inward-looking approach, heavy industrialization policy with the goal of becoming self-sufficient. If viewed positively, strategy facilitated development of a huge and varied industrial and manufacturing sector. During the course of time, industrial sector also amassed remarkable technological competence. It was due to absence of healthy competition and restraint on imports that development came with extensive technological holdups and short falls. Many policy-induced constraints were also faced by this industrial sector. It was after 1991 that the growth of manufacturing sector gained vital significant in achieving all round growth.

During the last decade, a massive, budding literature has come into view on productivity in the Indian manufacturing sector, concerning mostly to the organized sector division. Many of these studies have studied the trends in productivity at the industry or at the aggregate level or at both levels. Various studies have separated changes in TFP into the variations in technical changes and technical efficiency. Major part of the research has been aimed at perceiving the determinants of industrial productivity. It aims particularly at the way in which the reforms have affected productivity. This view has added to a superior understanding of the factors that shape the productivity in Indian industrial sector.

As regards, the TFPG in the organized manufacturing sector is concerned, this study finds that the post-reform period has witnessed acceleration in TFPG in all the industries (except tobacco products, office, accounting and computing, wearing apparel, coke & petroleum, radio-television communication equipments, medical-precision & optical industries). However, Virmani and Hashim (2009), interpret it as an evidence of ‘J-curve’ effect of the reforms. Growth rate of

productivity in some industries has shown poor performance during the post-reforms period, it does not mean that this has been caused by reforms. Certainly, the dynamics of the domestic and global markets have played a crucial role in influencing the industry and regional performance. We also have demonstrated with empirical evidence that some of the components of policy reforms, such as, reduction in trade barriers have led to improvement in productivity growth. Further, the impact of other determinants of TFPG at industry cannot be ruled out even if we are unable to link them at aggregate levels. Though reforms may have provided the broad liberalized policy framework, the reforms dealing with micro-foundations for each industry are yet to be formulated and implemented.

India's trade liberalization raised several questions at the micro as well as macro level regarding economic performance of the country. Generally, growth rate has shown a trend to increase in the last three decade or so, reflecting the effects of domestic and external policy changes in the 1980's, 1990's and 2000's. Likewise there have been variations in the findings of studies on other key macro-economic variables like total factor productivity, employment, exchange rate, real wage rate, growth rate of output, direction and composition of foreign trade and so on. This observation raises the central question; whether trade liberalization in India has led to greater economic performance or is it necessary to complement the trade reforms with other domestic policy reforms to capture the positive effects of trade liberalization and to embark in a sustainable path of growth as well as development?

India initiated a radical change in India's trade policies in 1991. However, a thorough assessment of India's trade reforms sheds light into India's unhurried attempts at liberalization of import-substitution trade regime since the 1980's. This study has identified two distinct phases i.e. form 1975-76 to 1990-91 and form 1991-92 to 2011-12. Period 1975-76 to 1990-91, the phase when the viewpoint of the Indian policy makers started to change on the complex trade rules that the country pursued leading to ad hoc attempts at reforms. This was the principal indicator of efforts at liberalization of imports of capital and intermediate goods. 1991-92 represents the period when India brought about a drastic liberalization of not only trade controls but other macro-economic rigidities. This was because of a subsequent severe balance-of-payments crisis that started in 1990. India made continuous attempts at rationalizing the tariff structure, eliminating any non-tariff

barriers and making things simpler and easier. The government announced that average tariffs should be reduced to around 15 percent by 2004 and effective rate of protection also be reduced to less than 10%. Today, the maximum rate of excise is 16%, except for a few items, which attract 24%. There may ultimately be a single Central Value Added Tax of 16% on all commodities, except for a few luxury consumer products on which additional excise duties may be levied.

During the earlier times of planned economic development of India, prominence was given to economic growth. All efforts were primarily aimed at increasing the level of output. The Sixth Plan stated that industrial production of India had gone up by around 5 times in this duration (Pendse and Baghel, 2008). The sixth Plan highlighted maximum utilization of accessible capacities and upgrading productivity. Expanding productivity is the key to sustain and progress the competitiveness faced in the manufacturing sector. Expansion in productivity would make goods available at reduced costs enhancing the purchasing power of the people. Wholesome economic growth, economic development and higher standard of living can be achieved by increase in productivity.

There was a creditable growth of export in the post-liberalization era, Indian merchandise export has shot up from around 0.5% of world export in 1991-92 to more than 1% in 2005-06. To become a major player in world economy, India has to increase its merchandise exports. This is of vital importance. In 2013-14, export of goods and services contributed 23.6% of GDP, which is still less compared to other developing nations. The growth rate of industrial production was 2.7 per cent in 2001-02, 5.7 per cent in 2002-03 and picked up considerably to 7.0 per cent in 2003-04, 8.4 per cent in 2004-05, 8.2 per cent in 2005-06 and to as high as 11.6 per cent in 2006-07. The rate of growth of industrial production in 2007-08 slowed down as compared with 2006-07. The year 2008-09 observed noticeable slowdown due to global recession and the rate of growth of industrial production in this year fell to just 2.8 per cent. Deceleration in industrial growth was seen across most sectors of industrial activity. However, a revival of industrial growth at 10.3 per cent was recorded in 2009-10 and 8.2 per cent in 2010-11 (Sharma, 2014).

How does trade liberalization on productivity growth affect the manufacturing sectors of developing countries is a topic of constant debate. Traditionally, it was believed that trade

liberalization has a very positive impact on the productivity growth. But this point of view is often challenged by the new theories of endogenous growth. As said by Chand and Sen (1996), it is considered by these new growth theories that trade reforms may bring about a change that is steady in nature in productivity growth. But, the hypothetical text gives an ambiguous prediction on the direction in which this change occurs. Due to this ambiguity, the level till which these trade policies affect productivity growth is eventually an experimental question.

In traditional models, exchange rate depreciations lift imports and export-competing output. Dynamics scale economies and increased capacity utilization of fixed inputs would results in positive productivity consequences of short run output effects. In many macro models of the New-Keynesian variety with nominal inflexibilities, a positive demand shock can increase measured productivity growth through learning-by-doing effects, increased factor utilization or increasing returns to scale. Real exchange rate depreciation, while increasing the demand for tradable goods, is likely to exhibit parallel effects in that sector.

There are different schools of thought regarding growth models of economics. Around 1980s, economists in disagreement of the Neo-classical theory, formed an endogenous growth model also known as the New-growth theory. While the economists for former theory endorse a positive relationship between trade and growth; the ones for the latter theory argue the opposite. In the researching 'orientation of trade policies and economic growth', economists advocate for 'trade led growth' or 'growth led trade' and this old debate still continues.

The role of international trade in the economic growth and development of an economy has always been a topic of debate and controversy. However, empirical evidence in the recent times has failed to unanimously support it as an ideal growth strategy for the newly developing countries. On the one hand, real appreciation decreases the relative cost of imported capital goods and then induces a rise of the capital-labour ratio. It is possible that this rise supports technical progress but simultaneously induces a lesser efficiency due to the drawbacks in the management of more capitalistic and sophisticated technologies. On the other hand a real appreciation means an increase in the real labour remuneration which may induce an improvement of workers' productivity

particularly in a country where the wages of unskilled workers are still very low. Real exchange rate appreciation exerts a negative impact on exports.

A series of persuasive theoretical arguments for us to consider a positive effect of exchange rate depreciation on the productivity in the industrial sector, but various theories have yielded varying results. Some say the effect is positive while others say the effect is adverse. The need for studying productivity growth arises due to intimate link between productivity growth and exchange rate. A large appreciation of the currency has induced the acceleration of industrial productivity growth (Paul Krugman, 1989) whereas, some authors are argued that exchange rate depreciation might contribute to increase productivity (Porter, 1990, Richard, 2001, Sen 2009). Richard (2001) focuses on the idea that the major source of productivity is output growth or increases in market shares. To the extent that both of these are driven by price competition, theory predicts that exchange rate depreciation contributes to an increase in "international price competitiveness," which increases output growth and improves productivity. The empirical evidence on the relationship between exchange rate and industrial productivity in developing countries is mixed and no specific conclusion can be closed upon.

The trade reforms have played a significant part in increasing productivity of Indian industries. While, there is verification that the pro-competitive effects of the tariffs direct the firms to become more proficient, the bigger impact seems to be due to increased entrée to foreign inputs. So we can say that India's freedom from import substitution policies exposed these firms to competitive pressures. It also waived off the technological restriction on production. This factor has important policy repercussions as governments often endorse policies to shield domestic manufacturers. The outcomes here imply that such endeavors tend to ignore remunerations personified in access to more and higher quality foreign inputs, especially in the case of developing countries (Porter, 1990).

This study, in an attempt to asses India's manufacturing sector performance at the backdrop of trade liberalization, therefore focused manufacturing sector performance in three aspects.

1. It addresses the question: “has trade liberalization affected the productivity growth of the manufacturing sector in India?” Trade liberalization is expected to remove tariff and non-tariff barriers in the country to realize its actual competitive advantage and this increases the total factor productivity growth rate of manufacturing sector.

2. The study focuses on the question: “has exchange rate depreciation led to an increase in productivity growth rate?” Post 1991 India adopted the flexible exchange rate system and due to trade liberalization, exports and imports play an important role in international trade. The real exchange rate is one of the most important prices in an open-economy macroeconomic framework. Rodrik (2008) provides a provocative analysis that links this key variable to the all-important issue of economic growth. From a theoretical point of view, exchange rate depreciation increases the productivity growth of a country. This study attempts to prove such a link empirically.

3. The study analyzes “how real effective exchange rate affects productivity growth at a disaggregate level?” This is also significant given that the very justification of exchange rate depreciation is greater industrial performance in terms of rise in productivity growth rate and output growth rate.

The last 20 years brought about a surge in the manufacturing sector. Present study endeavors to observe if trade liberalization plays a remarkable role in the area of international trade or not. Boosting industrial productivity was the main agenda of trade liberalization. Hence it is apt to inquire that how far trade liberalization has added to the superior productivity performance of Indian production industry in the post-reform period. Present study will deal with this issue.

In order to empirically test the above discussed propositions, the study focuses on the organized manufacturing sector in India. Manufacturing sector has previously received a good amount of attention from empirical researchers. This study attempts to assess some of the existing gaps by reviewing the literature and thus contributes to arrive at practical conclusions. In principle, the study departs from the techniques which are applied in other studies and views the liberalization process as continuous phases, instead of using dummy variables to separate the 1990's as the post

liberalization period compared to the 1980's as the pre-liberalization period. Another important distinction of this study is its attempt to investigate the effects of trade liberalization on aspects of economic performance by considering explicit trade policy indicators in the form of effective rate of protection (ERF), import coverage ratio (ICR) and import penetration rate (IPR). The present study used data from Annual Survey of Industries to find out the total factor productivity growth. Data of real effective exchange rate are obtained from Reserve Bank of India website while, import and export data are taken from Economic and Political Weekly Research Foundation.

Measurement and analysis of productivity is being researched more and more along with growth due to increased application of factor inputs, within the foundation pioneered by Solow (1957). Once this framework was laid, much research was submitted to emphasize the importance of productivity in the growth process which also included studies stressing viewpoint of developing countries. Regarding the sustainability of growth of manufacturing sector, two factors seem to be the causes for concern. First is the high resource intensity manufacturing sector and the second is the intra-sectoral disparity, between organized and unorganized segments of the manufacturing sector, which seems to be widening. On the whole, it is the supply constraint, in the form of technological upgradation, organizational and institutional constraints that seem to be the problem with the Indian manufacturing sector rather than the demand constraint emanating from low growth of agricultural sector, especially for organized manufacturing sector. Atomistic markets, such as, food industry, leather, chemical and textiles are in need of institutional mechanisms, which will provide them with key inputs including technology for their improved performance.

As regards, the empirical evidence emerging from the use of disaggregate level data, study would like to exercise much caution in interpretation of the results emanating from the ASI unit level data, due to the problems associated with compilation of series on capital stock for each of these units. The empirical results, therefore, need to be interpreted with much caution in light of data and methodological limitations.

A large number of studies, such as, Ahluwalia (1991), Balakrishnan & Pushpangadan (1994), Dholakia & Dholakia (1994), Rao (1996), Pradhan & Barik (1998), Mitra (1999), Goldar and Kumari (2002), Chand and Sen (2002), Goldar and Kumari (2003), Das (2003), Ray (2002), Tata

Services Ltd (2003), Trivedi et al (2000), Unel (2003), Goldar (2004), Banga & Goldar (2007), Das and Kalita (2009), Ghose and Biswas (2009), Datta (2014) among others, have used the ASI data. The studies which have dealt with the industry/state level issues related to productivity have used disaggregated data up to two or three digit level National Industrial Classification (NIC) for the various states or for India as a whole.

The present study explores productivity trends in India's organized manufacturing sectors during the period from 1975-76 to 2011-12 onwards. It also investigates the relative contributions of factor accumulation and productivity growth in the various sectors of the economy of our nation. The present study makes use of growth accounting approach for estimation of productivity growth. The Translog Index of Total Factor Productivity (TFP) is a discrete approximation to the Divisia Index of Technical Change. Translog Index Number is symmetric in data of different time periods and also satisfies the factor reversal test approximately. The Tornqvist index of TFP has been used for the TFP estimates presented in the study, as done earlier by Alhuwalia (1991), Rao (1996), Pradhan and Barik (1998) Das (2003), Goldar and Kumari (2003), Goldar (2004), Das and Kalita (2009) Das et.al. (2010) and Virmani & Hashim (2011). The Translog production function of TFP has been used for the measurement of TFP and the methodology assume perfect competition and constant returns to scale, further, the revenue share of the factor inputs sum to unity. This study concentrates on individual industry productivity rather than aggregate productivity.

5.1 Key Findings

Total factor productivity growth showed a declining trend in 1970s but in 1980s it showed an increasing trend. Despite the fluctuation in TFP growth after the post liberalization period, per annum growth rate of TFP growth accelerated. The present study analyses TFP growth movements across industry in the framework of pre and post- reform period. High fluctuation in growth rate is found in tobacco, leather, coke and petroleum, other non-metallic mineral and furniture industries. Performance of wood industry, in both the phases, shows a negative productivity growth. Food and beverages, wood and wood products, paper and paper products, publishing, printing and reproduction of recorded media, chemicals and products, other non-metallic mineral products, basic metals, fabricated metal products, machinery and equipments, electrical machinery

and apparatus, radio, motor vehicles, other transport, furniture industries show a high growth rate during post-liberalization period as compared with the pre-liberalization period.

The growth rate of tobacco products, office, accounting and computing, wearing apparel, coke and petroleum, radio, television and communication equipments, medical, precision and optical industries show lower TFP growth during post liberalization than pre-liberalization period. The growth rate of textiles, leather, rubber and plastic products industries have a constant TFP growth in both the periods. The study finds that in 15 out of 22 industries, productivity has increased in the post liberalization period.

The study also analyses the causality between growth rate of output, total factor productivity and exchange rate using Granger causality test. To run Granger Causality Test, the first step is to examine the time-series property of stationarity. For stationarity, the Augmented Dickey-Fuller (1979) unit-root test is used with the null hypothesis of non-stationarity. In the augmented Dickey-Fuller test it is assumed that the error terms (εt) are correlated and the main principle of the test is that it is conducted by augmenting the Dickey-Fuller test using k lags of the dependable variable. When testing for unit roots it is necessary to have a testing strategy. In this study the Elder and Kennedy strategy was employed. To analyze whether aspects of the relationships between real effective exchange rate influence in any way the total factor productivity and growth rate of output of manufacturing industry, the multi-variate Vector Autoregressive (VAR) model is used. To examine if there is autocorrelation, the Breusch-Godfrey serial correlation Lagrange multiplier test is used. In order to see if the residuals are normally distributed, the Jarque-Bera normality test is employed. Finally to test the direction of the causality the Granger causality test is used.

Analysis shows that there was no unidirectional or bidirectional causality between growth rate of output, total factor productivity or real effective exchange rate in the pre-liberalization period. During the post-liberalization period, there was no unidirectional or bidirectional causality running from GRO and TFP or REER and TFP or other way around. But in post liberalization the present study finds unidirectional causality form REER to GRO. For the period of 1975-75 to 2011-12, unidirectional causality is found from REER to TFP. It is concluded that exchange rate plays a significant role in growth rate of productivity in manufacturing sector.

Multi-variate regression analysis is applied to analyze the variation in TFPG of different industry groups. Productivity Growth Rates (PGR) are computed for twenty two industry groups during 1975-76 to 2011-12 and treated as dependent variable. Further, to check the role of exchange rate on productivity, the whole period is divided into two time slots, i.e. pre-liberalization period (1975-76 to 1990-91) and post-liberalization period (1991-92 to 2011-12).

A panel regression analysis has been applied to study the effect of liberalization on industrial productivity. Growth rates of TFP computed for different years for the 22 two-digit industries are pooled. By combining time series of cross-sectional observations, panel data gives more informative data, more variability, less co-linearity among variables, more degrees of freedom and more efficiency. Panel data can better detect and measure effects that cannot be observed in pure cross-sectional or time series data. By studying the repeated cross section of observations, panel data are better suited to study the dynamics of change. Panel regression runs for the entire period from 1975-76 to 2011-12.

This study further tries to explain the intra -industrial differences in TFP growth, considering the effect of real effective exchange rate along with some other trade related variables and also some other determinants of TFP growth. The effect of real effective exchange rate on a specific industry group will mutually depend on movement of trade related variables as well as industrial characteristics of that particular industry group. Factors explaining the variation in TFP growth and also its responsiveness regarding each factor will vary across different industries.

During the period of 1975-76 to 2011-12, for industries textile, paper, chemical and electrical machinery KLR had a significant impact. CR plays an important role in wearing apparel dressing, wood, chemical, non-metallic mineral, basic metal and other transport industries. Impact of ERP on TFP growth for tobacco, wearing apparel dressing, chemical, textiles, wood and coke, refined petroleum industries is found significant. ICR has a heavy impact on textile, wearing apparel dressing and rubber & plastic industries. For industries food & beverages, wearing apparel dressing, publishing & printing and coke & petroleum where the impact of considerable. NPWPE plays a significant role in furniture industry only. Y/N has significantly impacted food &

beverages, tobacco, wearing apparel dressing, tanning & dressing, coke & petroleum, non-metallic mineral, fabricated metal, office & computing and other transport industries. REER plays a significant role in paper, publishing & printing, coke & petroleum, fabricated metal and machinery & equipment industries. Significant role of RW is found in food and beverages, tobacco, textiles, tanning & dressing of leather, paper, publishing & printing, chemical, basic metal, fabricated metal, machinery & equipment, office & computing machinery, electrical machinery, radio & communication, medical & optical, motor vehicle and furniture industries. Table 5.1 shows a comparative scenario of key findings between pre-liberalization and post-liberalization period.

Table 5.1: A Summary of Comparative Scenarios between Pre-Liberalization and Post-Liberalization Period.

<table>
<tr><th></th><th>1975-76 to 1990-91</th><th>1991-92 to 2011-12</th></tr>
<tr><td rowspan="8">Capital-Labour Ratio</td><td>Positive and Significant</td><td>Positive and Significant</td></tr>
<tr><td>Office, Accounting and Computing Machinery</td><td>Textiles</td></tr>
<tr><td></td><td>Paper and Paper Products</td></tr>
<tr><td></td><td>Fabricated Metal Product</td></tr>
<tr><td></td><td>Electrical Machinery</td></tr>
<tr><td colspan="2">Even if no fresh technology is incorporated in the capital equipment, it is possible that capital accumulation betters management and organization. However, newer technology reacts positively with capital growth. Total factor productivity growth can interact with capital formation in various ways.</td></tr>
<tr><td>Negative and Significant</td><td>Negative and Significant</td></tr>
<tr><td>Tobacco Products</td><td></td></tr>
<tr><td></td><td colspan="2">Using tobacco industry which is a labour intensive industry as an example, one can argue that Capital-Labour (K/L) ratio negatively affects TFP of tobacco industry due to higher rate of effective rate of protection and NTBs. Higher the K/L ratio, higher is the displacement of labour for capital and lower is the labour productivity. Hence capital intensity is negatively associated with TFPG through two major aspects. One being, positive influence on overcapitalization which is caused due stress on discretionary licenses and permits by the policy regime and second is ignoring other factors in the equation. The ignored factors are probably highly co-related with K/L ratio and would have a negative effect on productivity growth (Ahluwalia 1991).</td></tr>
<tr><td></td><td>Positive and Significant</td><td>Positive and Significant</td></tr>
</table>

Concent-ration Ratio	Food Products and Beverages	Other Non-Metallic Mineral Products
	Textiles	
	Paper and Paper Products	
	Publishing, Printing and Reproduction of Recorded Media	
	Chemical	
	Other Non-Metallic Mineral Products	
	Office, Accounting and Computing Machinery	
	It shows that larger firms capitalize on economies of scale which points to the fact that increase in concentration will cause production cost to decrease and efficiency will be higher. The consequence of larger firms capitalizing on economies of scale and size also means that one can expect a positive interaction to exist between productivity and concentration because the overhead cost is considerably reduced.	
	Negative and Significant	**Negative and Significant**
		Transport Equipment
	A high concentration ratio is expected to diminish competitive rivalry among industries with the likelihood of under-utilizing the production capacity of resources.	
	Positive and Significant	**Positive and Significant**
	Food Products and Beverages	
	Textiles	
	Wood	
	Coke, Refined Petroleum Products	
	Rubber and Plastic Products	
	Machinery and Equipments	
Effective rate of Protection	In regression analysis, there seems to be a positive interaction between ERP and TFPG even though in the pre-reform period, ERP is higher which should lead to lower TFP growth. Across countries, economic growth and import tariffs show a positive association (Clements and Williamsons 2001). Studies show that emerging sectors where characterized by learning effects. Foreign competition would reduce because higher rate of ERP provides greater protection and secure market to domestic industries. Increased productivity growth would be a consequence of increase in domestic demand through higher production over time. Hence countries experienced accelerating growth in terms of protection associated growth.	
	Negative and Significant	**Negative and Significant**
	Tobacco Products	Textiles

	Wearing Apparel Dressing and Dyeing	Rubber and Plastic Products
	Chemical	Electrical Machinery
	When TFP growth in Indian manufacturing industries is considered, econometric analysis has shown that import substitution policy has a hostile effect on productivity growth (Goldar 1986, Alhuwalia 1991). Lower ERP increases foreign competition for domestic firms and this leads to an increase in efficiency of domestic industries as a precaution to shut-down. Existing capacity is utilized to the maximum in a competitive scenario which finally increases production. Increase in efficiency will also cause maximum utilization of technological resources. Better and sophisticated technology leads to increase in TFP. This points out to a negative co-relation between ERP and TFP as reduction ERP causes TFP to increase.	
Import Coverage Ratio	**Positive and Significant**	**Positive and Significant**
	Machinery and Equipments	Textiles
		Medical, Precision and Optical
	Due to a chain of positive interactions, productivity growth also increases as a result of increase in Import Coverage Ratio (ICR). Protection for domestic firms becomes largely better with a surge in ICR which leads to greater protection in market power and if other factors remain constant, domestic prices.	
	Negative and Significant	**Negative and Significant**
	Radio, Television & Communication	
	Many studies have claimed that import coverage ratios as a measure of reduction in non-tariff barriers causes rise in total factor productivity (Das 2003). Over the period of 1960-1980, import substitution in the Indian manufacturing sector and productivity growth also show a negative association (Ahluwalia 1991). Thus one can hypothesize that improvement in productivity growth follows a decline in import substitution orientation. More sophisticated and capitalistic technology causes boosting-up effect on imports when non-tariff barriers are lowered. This is signified through negative and significant coefficient of ICR.	
Import Penetration Ratio	**Positive and Significant**	**Positive and Significant**
	Paper and Paper Products	Food Products and Beverages
	Rubber and Plastic Products	Publishing, Printing and Reproduction of Recorded Media
	Office, Accounting and Computing Machinery	Coke, Refined Petroleum Products
		Medical, Precision and Optical

	While emphasizing on competition, several pipelines have been explored that lead to increase in productivity growth. For example a purely theoretical aspect may elucidate that there is a positive effect of trade and trade liberalization on productivity growth. Some claims have even been made that when foreign intermediate inputs of higher quality or lower price is made readily available, it had a positive effect on technological innovations, through scale economies and selection effects, leads to grater market size. When competition in the market grows, less productive firms will go out of business and leave market and influence other firms to reduce their x-inefficiencies leading to higher productivity growth.	
	Negative and Significant	**Negative and Significant**
	Wearing Apparel Dressing and Dyeing	
	Leather	
	Electrical Machinery	
	Motor Vehicles	
	If quantitative restrictions on imports are decreased, it will lead to increase in competitive burden and as a consequence cost cuts result or productivity growth increases in capital goods industries. This view is also steady with the interaction between change in import penetration ratio and productivity growth being a negative, but a significant one.	
Non-Production worker to Production Employees	**Positive and Significant**	**Positive and Significant**
		Food Products and Beverages
		Radio, Television & Communication
	NPWPE helps to increase in TFPG of the industry group because the combination of non -production employees and production worker is effective to foster TFPG.	
	Negative and Significant	**Negative and Significant**
	Tobacco Products	Furniture
	Medical, Precision and Optical	
	Ruling parties want to promise and provide employment to its party forces and this projects political pressure, mostly leading to recruitment of non-production employees. This shows high level of bureaucratic control and this will not only obstruct but delay productivity of any industry especially when number of non-production employee per worker, is high.	
Output per Factory	**Positive and Significant**	**Positive and Significant**
	Food Products and Beverages	Food Products and Beverages
	Tobacco Products	Tobacco Products
	Wearing Apparel Dressing and Dyeing	Wearing Apparel Dressing and Dyeing
	Leather	Leather

	Wood	Wood
	Paper and Paper Products	Paper and Paper Products
	Coke, Refined Petroleum Products	Coke, Refined Petroleum Products
	Basic Metals	Chemical
	Electrical Machinery	Rubber and Plastic Products
	Motor Vehicles	Basic Metals
	Transport Equipment	Fabricated Metal Product
		Electrical Machinery
		Radio, Television & Communication
		Medical, Precision and Optical
		Motor Vehicles
		Furniture
	In the Indian manufacturing scenario, it seems as if encouraging the relationship of productivity growth with differential technological progress and scale economies is much stronger compared to that between output growth through cost cuts and prices and productivity growth. Compared to smaller firms, a larger one can look into capacity diversification and capital utilization in order to use economies of scale to their advantage in terms of generating higher TFPG.	
	Negative and Significant	**Negative and Significant**
	Positive and Significant	**Positive and Significant**
		Leather
		Publishing, Printing and Reproduction of Recorded Media
		Coke, Refined Petroleum Products
		Chemical
		Fabricated Metal Product
		Machinery and Equipments
Real Effective Exchange Rate		Furniture
	Focusing a competitiveness tactic, there are certain scenarios which will make productivity growth faster during real rate exchange depreciations through lift in imports and export-competing output. Productivity results of short run output effects will be positive through actively flexible scale economies and higher capacity utilization of fixed inputs. Various aspects like learning-by-doing effects, higher returns to scale or factor utilization have been explored as a measure of increase in productivity growth during positive demand shock, provided that the concerned macro model of New-Keynasian variety claims nominal inflexibilities. During real exchange rate depreciation, the demand for trade related commodities is higher and similar effects can be expected in such depreciation.	
	Negative and Significant	**Negative and Significant**

	Textiles	Wearing Apparel Dressing and Dyeing
	Paper and Paper Products	
	Coke, Refined Petroleum Products	
	Machinery and Equipments	
	Medical, Precision and Optical	
	A change in exchange rate has inversely proportional association with domestic price level as well as import demand. Hence when there is constant real exchange depreciation, the supply side consequences claim; that it adds to a comparatively huge productivity gap and a decrease in productivity growth between the prominent countries and the depreciating country, becomes more plausible.	
Real Wages	**Positive and Significant**	**Positive and Significant**
	Tobacco Products	Food Products and Beverages
	Wearing Apparel Dressing and Dyeing	Tobacco Products
	Publishing, Printing and Reproduction of Recorded Media	Textiles
	Rubber and Plastic Products	Paper and Paper Products
	Fabricated Metal Product	Publishing, Printing and Reproduction of Recorded Media
	Machinery and Equipments	Fabricated Metal Product
	Office, Accounting and Computing Machinery	Machinery and Equipments
	Motor Vehicles	Office, Accounting and Computing Machinery
	Furniture	Medical, Precision and Optical
		Motor Vehicles
		Transport Equipment
		Furniture
	It is clear that any industry group if wage rate is adequately high, skilled workers will automatically be more prone towards that industry. If we take skill as a positive determinant of TFGP, one can easily claim that real wage is increasing through addition of skilled workers in the process of production which leads to increase in productivity. Hence, in terms of value addition by a firm and process of substitution between labour and capital, there is a positive association between wages and productivity.	
	Negative and Significant	**Negative and Significant**
	Other Non-Metallic Mineral Products	

Sources: Author's calculation

The entire analysis demonstrates that there is enormous diversity in industrial efficiency presentation as well as its determinants amongst all the groups of industries. The relationship is different because of sign conditions and also with respect to the extent to which the factors can impact the TFPG at disaggregates level. These impacts are found to be specific industry wise. Consequently, the requirement for planning specific industry-wise policies for improving TFPG of industrialized sectors of India is taken into light.

When the relationship between real effective exchange rate with other trade-related variables and TFPG is analyzed, it has been accounted that depreciation in real effective exchange rate, NTBs, decreasing tariff and moving of products from constrained list to OGL category may have caused a positive impact on TFPG. The result of trade-related variables, on TFPG in varied industries is certainly felt and the influence of trade-liberalization does not point out any significant unfavorable effect on growth of productivity in Indian manufacturing sector. Real wage rate as well as output per factory both are significant factors which positively affect the TFP of most of the industries.

Regarding the effect of trade liberalization on TFPG of different industries, the impacts of trade-related factors like effective rate of protection, import coverage ratio and import penetration ratio on TFPG are very much industry specific. Negative coefficient of ERP implies lowering of the protection rate has favourable effect on TFPG. There has been no significant impact of ICR on TFPG during the post-liberalization period, Ghose and Biswas (2009) found similar kind of result in his study. In case of IPR is positive as well as negative and significantly affect the TFPG of some industries during the pre-liberalization period, whereas during the post-liberalization period, the IPR is positive and significantly affect the TFPG.

As per panel analysis, import penetration ratio, output per factory, real effective exchange rate and real wage rate play a significant impacted total factor productivity growth in pre-liberalization era. Whereas, capital labour ration, import penetration ratio, output per factory, real effective exchange rate and real wage rate significantly affect the growth rate of productivity of manufacturing sector in post-liberalization period. For the entire period, capital labour ration, import penetration ratio, output per factory, real effective exchange rate and real wage rate impacted total factor

productivity growth. During the pre-liberalization period, the coefficient of real effective exchange rate was negative but this turns into positive in post-liberalization period, we concluded that exchange rate play an important role post-liberalization. The analysis also reveals that depreciation in real effective exchange rate has a significant positively impact on productivity growth as is expected. It is indicative that depreciation in real effective exchange rate should increase the demand for traded industries 'output by stimulating export via-a vis enhance TFP growth.

5.2 Policy Implication:

The relationship between trade policy and economic performance is one of the oldest controversies in economic development. The phase of industrialization starting after Indian Government's 1991 policy of trade liberalization; has changed the situation, slowly boosting productivity. In order to make the Indian industrial sector a strong competitor in the international market, various positive alterations have been made in technology-import policy and foreign direct investment policy.

As a consequence of rapid growth in Indian economy, the industrial development has become a matter of serious concern for planners and policy makers. Industrialization plays a vital role in the development of countries because they can solve their problems of low production, low productivity, general poverty, unemployment, low standard of living and backwardness etc. It is equally important for developed countries as it helps them not only to maintain their existing growth but also to enjoy still higher standards of living to avoid cyclic fluctuations. Therefore, rapid industrial growth has been a major objective of planning in India.

Productivity growth is important for development and structural transformation and also a crucial factor to measure long-run economic performance as per neo classical growth model. Policy makers and economic analysts have given Total Factor Productivity (TFP) a higher acknowledgement, for theoretical relevance as well its distinct status. In the long-run TFP growth enhances output growth unlike continuous input growth which shows diminishing returns for input use. Efficient and coherent use of limited resources of the firm decides its growth. Sustainability of the firm depends on the actual output or productivity of the parameters of production. TFP

growth reflects the potential for growth and its measure is now equal to long-term growth for continued output growth.

It is well acknowledged that economic growth depends both on the use of factors of production, efficient use of resources and technical progress. This efficiency in resource use is often referred to as productivity. It has been noted by many researchers that growth in productivity is the only plausible route to increase the standard of living (see for example: Balakrishnan and Pushpangadan, 1998) which is taken as a measure of welfare (Krugman, 1990). The relevance of economic growth is less meaningful if it has not affected productivity growth and hence the standard of living. This improvement in productivity can be caused by several factors including investment in human capital, infrastructure, research and development (R&D), and a healthy business environment.

The analysis at the industry-level has shown a wide disparity across industries in productivity growth and its mechanism, technical transformation and efficiency amendments. For equitability in production of all industries; the policy makers must go for policies that are specific industry-wise or product-wise. The vibrant industry groups should be treated with certain thrusting policies that aim at escalating their connection with the overall organized sector. Policies that shall support them with marketing support and promote their marketable procedures. Along with this, work should be done to advance the productivity and efficiency levels in the industries that fall into the low-performing category. This dual strategy that looks after the employment of proper technology would accomplish the resource needs for improvement of productivity and encourage formal–informal association.

A reinforcement of manufacturing sector mainly in labour-oriented and small scale production sector in rural areas – is very much necessary for accomplishing the aim of fair development in India. If we consider the intention of manufacturing growth revival, vital policy consideration is needed in India, especially in the section of technology upgrading, infrastructure developing and credit establishment of small industries.

Any nation's economy cannot industrialize only because of liberalization. It has to make efforts on its own. A few efforts include learning by doing, using local resources to set up different resources, developing the social overhead capital and other economic overhead capital like health and hygiene, transportation-public and private, sanitation, education, empowerment, employment generation and the likes. Construction and expansion of superior infrastructural facilities in the terms of electricity, roads, and telecommunication services is the utmost necessity. The prime concern for the policy makers remains to elevate the effectiveness of factor capacity utilization. The individual state economies must expand original technological potential and impart technical education and skills to its working class. These are important steps that have to be taken. To achieve this, the policy makers have to plan more investment for developing and working on these areas. Furthermore, firm policy procedures should be applied to persuade the firms to impart technical knowledge to its workers. This results in efficient utilization of both cost and production areas that follow the reforms.

Real exchange rate will appreciate in countries where productivity growth is faster compared to the rest of the world (Balassa, 1964 and Samuelson, 1964). However for developing countries one cannot generalize the hypothesis that a real appreciation of one currency will positively impact productivity. An overvaluation of currency, according to most authors, will negatively affect productivity growth by reducing the competitiveness of tradable goods sectors. Since the past two decades, the productivity issue has become central to the debate in India on the causes and consequences of the significant real depreciation of the Indian Rupee after the post-liberalization period.

Open market competition creates challenges for different domestic firms in terms of their endurance. Hence, in order to achieve growth in production, a producing unit has to operate competently. It will thus be interesting to analyze the effect of policy changes on efficiencies of different industries. The economic reform policies adopted by the Government, since 1991, became less friendly to the less efficient industries.

Growth in productivity has a direct relationship with development of each and every section. Productivity growth is a direct reflection of the standard of living of a country. A nation where

productivity growth is rising rapidly is believed to have employed, well-fed, well-clothed and well-educated citizens. The quality of life goes hand in hand with productivity growth rates. So public policy makers consider productivity growth rates to be a mirror of the society of that nation. Education, environment, means of sustainability, medical care, supporting cultural and sports activities are directly or indirectly related to productivity and its performance. Moreover, problems like unemployment and poverty can also be tackled effectively if productivity performance is positive. Wholesome well-being of the society depends on its well-being and the facilities they are provided with. For this purpose, optimum release and utilization of resources is necessary. Therefore increase in output, production and income is inevitably the result of productivity growth. Failure of productivity to grow leads to the downfall in the income level such that the desired quality of life cannot be attained.

Although there exists voluminous empirical research work regarding nexus between trade liberalization and factor productivity growth, overviews on the link between liberalization and TFPG find inadequate evidence on this issue, it is as yet a controversial issue and debate is still unsettled. The controversy on the impact of liberalization on TFPG and diverse conclusions resulting from empirical investigations are probably due to differing interpretations of liberalization and openness. These varied empirical results need further investigation into the links between liberalization and productivity growth of Indian industry.

5.3 Limitations of the Present Study and Issues for Future Research

This study presents industry level evidence regarding the connection between trade liberalization and indicators of economic performance in the organized manufacturing sector in India. It contributes to the existing literature in several respects.

1. It is the first attempt to calculate productivity growth rate using translog production function approach for the period of 1975-76 to 2011-12.

2. It is the first attempt to use Granger Causality test between exchange rate, growth rate of output and total factor productivity growth over 1975-76 to 2011-12.

3. It is the first attempt to capture the effects of reduction in tariffs and NTB separately for the period of 1975-76 to 2011-12.

4. It is the first attempt to examine effect of trade liberalization in two disaggregated phases of pre-liberalization and post-liberalization. The study also considers trade liberalization in India as a continuous process, rather than a discontinuous process for pre and post liberalization periods.

5. The present study is one of only a handful of studies capturing the effects of trade liberalization on industry productivity growth rate of manufacturing sector in India by using dynamic regression analysis on panel data from 1975-76 to 2011-12.

6. The study expands its coverage of industries to 22 2-digit industrial group.

A major drawback of this study is that it captures the trade liberalization effect only on organized manufacture sector and acknowledges its inability to capture the trade liberalization effect on the unorganized sector. The unorganized sector in India is a large sector considering that four-fifths of the non-farm workers and all of farm workers are in the informal sector (Sakthivel and Joddar, 2006) and therefore its exclusion is questionable. It is exceptionally difficult to create measures of trade policy indicators based exclusively on informal sector trade due to paucity of information on both consistent basis and continuous time points. This constrains the present study from comparing the role of trade liberalization in the unorganized sector. In the same way, lack of explicit data on industrial indicators constrains the present to exclude them from the econometric models. It might be a good idea to address any endogeniety issues in the econometric analysis undertaken in this study that may arise due to the dynamic nature of the panel data used in this study. These issues form the core of future research.