Chapter 1

Introduction and the Relevance of the study

1.1 Introduction

Industry acts as an engine of economic growth for any country. The manufacturing sector plays a vital role in industrial growth. Steady industrial growth helps to sustain economic development.

Among the different manufacturing industries, Indian Textile industry (ITI) is one of the ancient in the country. It has now emerged as the major source of low-cost, quality products in the global market. It is the second largest textile industry in the world after China [Confederation of Indian Textile Industry (CITI), Annual Report 2016)]. India's textiles industry contributed seven percent of the industry output (in value terms) and 15 percent of the country's export earnings (Annual Report 2017-18, Ministry of Textiles, Government of India).

Several policies have been taken for this industry. During mid-1960s to the 1980s the demand for textile products were almost stagnated [Chandrasekhar (1984), Goswami (1990)] and after the early 1990s, the trend reversed when consumption per capita of textiles products as well as exports increased substantially [Oberoi (2017)]. Early 1990s witnessed the delicensing of the textile industry, thereby abolishing the prior government requirement of approval to set up textile units. In 1999, a Technology Upgradation Fund Scheme was launched to facilitate the textile units to take up modernisation schemes by giving interest subsidy on loans. The Government of India announced the National Textile Policy (2000), with the objective of helping

the industry to reach and endure a pre-eminent global standing in both manufacturing as well as export of textile and clothing, to increase the contribution for employment and economic growth of country. International trade in the textile and clothing industry has long been directed by the Multi-Fibre Agreement (MFA), which fixed national quotas for export of textiles from developing countries to developed countries. With the arrival of the World Trade Organization in 1995, MFA was supplanted by the Agreement on Textile and Clothing (ATC), under which phasing out of the quota restrictions progressively in four stages within 10-years (1995-2004) period was agreed. These four stages are 1995 to 1997 (Phase I), 1998 to 2001(Phase II), 2002 to 2004 (Phase III) and in January 1, 2005 (Phase IV). Export quota was removed for Textile and Clothing for the four scheduled groups viz. yarn, fabrics, made-ups and cloth/apparels at 16 %, 17%, 18% and 49% respectively [Verma (2000), Manoj and Muraleedharan (2016)]. The dismantling of the quota regime of MFA is encouraging with new investment flowing and several initiatives taken by the government. Given the changed scenario of ITI, the performance of the Indian Textile industry needs to be examined.

ITI is a complex industry covering several types of fibres for example cotton, silk, synthetic and regenerated man-made fibres i.e. wool and jute. The process of converting these fibres into yarns and fabrics are spinning and weaving. Spinning process produces yarn and weaving process produces fabrics [Rao (1989), Bedi (2003), Devaraja (2011), IBEF Report (February, 2018)]. Yarn and Fabrics are two textile intermediates [Dikshit, Basa, Vagrecha (2015)]. Yarn is a long uninterrupted length of interlocked fibers (cotton, silk, synthetic and regenerated man-made fibres, wool and jute), produced by spinning, which is appropriately used in the manufacture

of textiles, sewing, crocheting, knitting, embroidery, or rope making. Whereas Fabric is produced by weaving together cotton, silk, synthetic and regenerated man-made fibres, wool and jute, or other threads. Fabrics are used for making things such as clothes, curtains, and sheets.

Percentage share of Yarn and Fabrics production in ITI is about 70% (calculated from Annual Survey of Industries data). Productivity of yarn and fabrics taken together serves as a barometer for assessing the productivity performance of the Indian textile industry as a whole [Rao (1989)]. Thus the present thesis is concerned with yarn and fabrics producing sector to evaluate the performance of ITI.

Since, ITI consists of different firms; each firm has its own special characteristics that persuade the growth and performance of textile industry in several counts. Also the production in different firms varies. Hence the growth and performance of textile industry in different firms do not always move in the same track. For appropriate policies towards improvement of ITI, knowledge about the growth performance of employment of different firms is very much needed.

India has a natural competitive advantage of abundant cheap skilled labour. With direct linkages to the rural economy and the agriculture sector, textile industry provides source of livelihood to large segment of rural population. It has made a significant employment generation both directly and indirectly in the national economy. It is the next largest employment provider after agriculture. It contributed 2.3 percent to the GDP of India and employed more than 45 million people in 2017-18 (Annual Report 2017-18, Ministry of Textiles, Government of India). **Given this background, a study on the growth of employment of ITI viz. in the Yarn producing sector and Fabrics producing sector is important.**

Enhanced efficiency and productivity are essential to meet the emerging challenge of global competition. The health of this industry depends upon the availability of quality raw materials at reasonable prices and on the price offered for its goods by the market forces, both of which are dependent upon the government policies that are formulated from time to time [Rao (1989)]. Since provision of textile goods at an affordable price is a major concern, increase in efficiency of this sector is very important. Further, Indian industrial policies are less friendly to less efficient firms after 1991, thus increase in efficiency is also important for the mere survival of the firms itself. **Thus the measurement of efficiency and productivity of ITI viz. the Yarn producing sector and Fabrics producing sector is essential given the changed scenario of this industry.**

The objectives of the present thesis stem from the above observations regarding the movement of textile sectors, more specifically the sectors producing Yarn and Fabrics during 1991 to 2015.

1.2 Objectives of the Present Thesis

The first objective relates to analysis of growth of employment at the sectoral level.

The perusal of the empirical literature studying growth suggests some limitations.

In general, most of the growth analyses relied upon the assumption of deterministic trend and thus used classical method of analysis assuming that the means and variances are well defined constants and are independent of time and hence they are devoid of testing for difference or trend stationarity using unit root of modern time

series approach. But research over the last three decades or so pointed out that those assumptions are not always valid as the series may be non stationary in nature. So for getting a valid result it is necessary to check the stationarity of the series. Thus a proper econometric analysis would be to test for deterministic or stochastic (variable) trend i.e. whether the underlying series follows Trend Stationary Process (TSP) or Difference Stationary Process (DSP). This can be done by using Unit Root test. One problem is that in presence of structural break, the standard Unit Root test is not consistent against TSP (Perron, 1989). Perron (1989) has suggested a process appropriate for testing Unit Root in presence of one-time exogenous structural break in the series. However, there are some problems with Perron's approach as pointed out in their path-breaking paper by Zivot and Andrews (1992). They argued that Perron's procedure is based mainly on graphical examination of the data and is not an appropriate method. They further argued that the break point should be endogenously determined (rather than exogenously determined Perron (1989)). However Sen (2003) pointed out that the power of Zivot and Andrews (1992) test statistic is low and he suggested some methods to improve the power of the test.

Most of the previous studies on growth literature relating to Indian industry has not applied this recent methodology based on time series techniques.

The first problem of the present thesis is interested in examining the true nature of the employment series of Indian textile industry viz. Yarn and Fabrics producing sectors and consequently test whether the growth process converges to a path having trend preserving properties and also in testing the presence of structural breaks (that can emerge due to changes in economic regime over time) using Zivot and Andrews (1992) approach as well as Sen (2003) approach of

endogenous structural break from 1991 to 2015. As different sectors perform differently and show considerable variation in growth of employment, it is imperative to find out the causes behind the variation in growth of employment.

To identify the major factors affecting growth of employment, explanatory variables like Output Growth (Y), Net Export Intensity (NXI), Firm Size (FS), Capital-Sales Ratio (C/S), Raw material Intensity (RI) and Profitability Ratio (PR) are considered as possible determinants. All the variables are taken in growth term.

The justification for inclusion of the above mentioned variables are as follows:

An increase in output growth requires more of inputs and as employment is one of the indispensable inputs of production, so output growth may lead to employment growth. So a positive association between the two is expected. Increase in Firm Size is mainly due to increase in output and this expansion of output may be a cause of increase in employment. So it may be that there exists positive relation among Firm Size and employment growth. It is also motivating to test the hypothesis that more the firm is capital intensive higher may be employment growth. The role of capital-sales Ratio is very crucial for explaining employment growth of ITI. Higher degree of C/S may deter employment growth of an industry by using advanced and sophisticated technology into the production process. So increase in C/S may promote or deter the growth of employment. Raw material is a primary input of production. Increase in Raw material intensity may increase the output growth and increase in output growth may increase growth of employment. So it is an important determinant of growth of employment and a positive relation is expected. Profitability ratio played a vital role while determining the factors explaining employment growth of ITI. The relationship between profitability ratio and employment growth may be positive or negative.

Both exports and imports may promote employment growth. Increase in export may spur the demand for goods in international market. So firms may produce more to meet up this demand and increase in output may increase employment. Also import of quality raw material, machineries and technology may improve growth of employment. Evidence also suggests that import intensity has a positive and significant effect on employment growth and import of technology in an industry is labour utilizing (Paul, 2014) and imported raw materials do not slowdown employment growth (Goldar and Ghosh, 2015). Thus both the role of export as well as import are important while determining the factors explaining growth of employment of ITI. But different studies are unable to separate the impact of exports and imports. Some focuses on the one and neglect the other. Some of the studies used total trade (sum of export and import) as measure of openness (Frank and Romer, 1999 and Harision, 1996). The limitation of total trade measure is that it embodies an underlying assumption that export and import contribute equally to the promotion of economic growth. Also it assumes import intensity of export to be zero. Whereas Zhang, Ondrich and Richardson (2003), while evaluating how cross country differences in export and import openness in 1990 affected the level of real per capita income, used net export (export minus import), which imply distinct export and import effects. Their results support the conjecture that income is associated with net trade. In tune with Zhang, Ondrich and Richardson (2003), the present thesis uses (export minus import) to find the net effect of exports over imports. Thus Net Export Intensity (NXI) have been used to determine the relative role of exports vis á vis imports in explaining growth of employment. Net Export Intensity is obtained for each sector by the ratio of Export minus import to sales.

To capture the effect of dismantling of the quota regime of Multi-Fibre Agreement (MFA) on growth of employment, a Dummy variable (D) is included.

A common problem may be that there may exists simultaneity between Growth of employment and Net export Intensity (NXI). To take this fact into account a simultaneous panel model has been framed considering Growth of employment and Net export Intensity as dependent variables.

While estimating the model, the identification problem and cross section heteroscedasticity as well as contemporaneous correlation has been taken into account. For each sector various alternatives of the structural equations are tried out and the model with better result are taken. The statistical significance of the variables having nonlinear relationship with endogenous variable has been tested by performing Wald test. The identification problem has been checked and turned out to be overidentified.

The analysis of structural break in the employment series using Zivot and Andrews (1992) approach as well as Sen (2003) approach and estimation of simultaneous panel model is not much available in the literature.

The Second objective is linked to Efficiency of different sectors**.**

Efficiency can be discussed under two heads such as Technical Efficiency (TE) and Allocative Efficiency (AE). Farrell (1957) distinguished between TE and AE. TE can be categorized into Output oriented and input oriented type. According to Farrell, a comparison can be made either between the observed inputs and the minimum possible inputs required to produce a given level of output (input oriented TE) or between observed output and the maximum potential output obtainable from the given

inputs (output oriented TE). AE is defined as the capability of a producing unit to combine inputs and outputs in optimal proportions, given the relevant prices and production technology. The present study is concerned with Output oriented TE.

The Second problem of the present thesis is interested in measuring Output oriented Technical Efficiency (OTE) employing Data Envelopment Analysis (DEA) approach for both the sectors producing yarn and fabrics separately using the single output and multi-input framework and finding out its determinants employing panel regression over the period 1991 to 2015.

There is a need of estimation of TE of any industry since the long run competitive ability of any industry would depend on how much efficiency the sector has achieved over time. Increase in efficiency of different sectors of ITI will be helpful for providing textile goods at an affordable price. Industrial policies are becoming less friendly to less efficient firms, so increase in efficiency is also important.

The literature suggests different ways of estimating TE -Parametric (Stochastic Frontier Production Function Approach) [Bhandari & Maiti (2007) among others] or by Non parametric approaches (Data Envelopment Analysis) [Bhandari & Ray (2012), Goyal, Kaur & Aggarwal (2017), De and Ghose (2020) among others]. But Studies relating to estimation of TE of ITI using Data Envelopment Analysis (DEA) approach using firm level panel data are very few in the literature. At the same time it is also necessary to explain the factors behind the variation in TE.

TE is estimated on the basis of a computer program DEAP Version 2.1, developed by Tim Coelli.

To obtain the major factors affecting technical efficiency, explanatory variables like Firm Size (FS), Firm Age (FA), Net Export Intensity (NXI), Research and Development Intensity (RDI), Advertising Intensity (ADV), Marketing Intensity (MEI) are considered as possible determinants. The inclusion of these explanatory variables can be justified as follows:

It is interesting to test whether Firm Size has any influence in promoting technical efficiency of the firm. It can be hypothesized that large size firms will be more efficient because of the presence of threshold limit in production, scale economies, imperfection in capital market (Kumar, 2003). However, beyond a certain limit higher market power may also plague the firm with X-inefficiency (Leibenstein, 1976) which may lead to lesser efficiency. Some of the studies found positive linkage among Firm Size and efficiency while some of the studies postulated a negative relation. There also exists a debate between firm age and firm efficiency in the existing literature. A positive relationship between firm age and efficiency can be found as older firms become more experienced and display superior performance. They have the advantage of learning before and do not experience the hazards that the newcomers usually face (Stinchcombe, 1965). Counter argument suggests that older firms are prone to inertia and lack sufficient flexibility to adapt quickly to the changing economic circumstances which the younger firms can do much more quickly and efficiently (Marshall, 1920). The role of Research and Development is relevant while determining the factors explaining Technical efficiency of ITI as research and development on one hand generates new technologies and, on the other hand, it enhances a firm's ability to exploit existing technology. Advertising plays a vital role to explaining technical efficiency. Advertisement helps to introduce a new product in

the market easily, increases sales, fights market competition, enhances good-will with consumer and educates the consumers (Shashikanth, Mamatha and Rao(2018), Samad and Sabeerdeen (2016), Mohan (1989)). Thus a positive association amongst Advertisement and Technical efficiency is expected. Marketing intensity can found as a proxy for product differentiation and may affect efficiency.

From theoretical front, there is a broad view that international trade in general and specifically export in particular improves the efficiency of involved firms (Balassa, 1988). Endogenous growth theory believes that export plays an essential role by improving efficiency through innovation (Grossman and Helpman, 1991) and technology transfer (Barro and Sala-i-Martin, 1995). World Bank Report (1993, 1997), Mazumder et al. (2010), Goldar et al. (2004) reported a positive association amongst technical efficiency and imports. The above discussion reveals that both exports and imports may have an effect on efficiency. As both exports and imports may affect efficiency it may be interesting to determine the relative role of exports vis á vis imports in fostering efficiency. For finding the relative role of export viz import on efficiency, the present thesis considers Net Export Intensity which is obtained from the ratio of Export minus import to sales as an explanatory variable. The justification for using Net Export Intensity has already been discussed above while discussing the first objective.

To examine the effect of dismantling of the quota regime of Multi-Fibre Agreement (MFA) on TE, a Dummy variable (D) is included.

A common problem may be that there may exists simultaneity between TE and Firm Size (FS) as well as TE and Research and Development intensity (RDI).

To take this fact into account a simultaneous panel model has been framed taking technical efficiency, Firm Size and Research and Development intensity as dependent variables.

The major achievement of the second problem of the present thesis is estimation of Output oriented Technical Efficiency using DEA approach as well as finding out its determinants after making an allowance for the joint dependence between TE, Firm Size and Research and Development intensity. While estimating the model, the identification problem and cross section heteroscedasticity as well as contemporaneous correlation has been taken into account and for both the sectors various alternatives of the structural equations are tried out and model with better result are taken. The statistical significance of the variables having nonlinear relationship with endogenous variable has been checked by performing Wald test. The identification problem has been checked and turned out to be overidentified.

The Third objective is related to measurement of productivity.

In this context it can be mentioned that input specific productivities like productivity of capital and productivity of labour are partial measures of industrial productivity. One must have to consider a complete measure that relates output to all the factor inputs meant for the production process. Such a measure is known as Total Factor Productivity (Tinbergen, 1942). Total Factor Productivity Growth (TFPG) measures the amount of increase in the total output which is not accounted for the increase in total inputs and thus measures shift in the output due to the shift in the production function over time, holding all inputs constant (Abramovitz, 1956; Denison, 1962, 1967, 1985; Hayami et al, 1979).

The third objective of the present thesis is concerned with the estimation of TFPG for Yarn producing sector and Fabrics producing sector of ITI and finding out its determinants using panel regression for the period 1991 to 2015.

To achieve steady growth over time, any industry needs to enhance cost competitiveness by promoting TFPG. Naturally, the measurement of productivity changes in ITI is of great interest, both in academic sense as well as from policy viewpoint. TFPG estimation is essential, since provision of textile goods at an affordable price is a major concern. Also the evidence of Indian industries suggests that Government policies after liberalisation became less friendly to less productive firms. Thus increase in productivity of a unit and better performance of the industrial firms is required for its growth or even for its mere survival.

TFPG can be measured by i.e. (i) Growth Accounting Approach (GAA) [i.e. by constructing either Solow Index (Solow, 1957), or Kendrik Index (Kendrick, 1956, 1961, 1973) or Translog-Divisia Index (Solow, 1957; Jorgenson and Griliches, 1967; Christensen and Jorgenson, 1969, 1970)], (ii) Econometric (Parametric) Approach (i.e. by estimating production function or cost function). The example of parametric method can be found in Kumbhakar et all (1999, 2000), Kumbhakar and Lovell (2000), among others and (iii) Non-parametric Approach (i.e. Data Envelopment Analysis (DEA) (Ray, 2004).

TFPG is measured for both the sectors viz. yarn and fabric separately using nonparametric DEA approach. TFPG is obtained from Malmquist Productivity Index (MPI).

To obtain the major factors affecting Total Factor Productivity Growth, explanatory variables like Firm Size (FS), Firm Age (FA), Net Export Intensity (NXI), Research and Development Intensity (RDI), Advertising Intensity (ADV), Marketing Intensity (MEI) are considered as possible determinants. All the variables are expressed in growth term.

The inclusion of these variables may be explained as follows:

It can be argued that higher the Firm Size less is the competition. FS may capture the influence of market structure on TFPG. A negative relation between FS and TFPG may occur because as FS falls, competition increases. Others may point out the advantages of big size, secured market and expect a positive association between FS and TFPG. The association between firm age and productivity growth is not clear in the literature. Some studies argued that old firms are more productive while other studies argued young firms are more productive adopting new sophisticated technologies. Research and Development basically includes the search for various novel pathways and development of expertise which may facilitate faster product development. On one hand, it generates new technologies and, on the other hand, it enhances a firm's ability to exploit existing technology. Thus one may expect a positive linkage among productivity of firms and their Research and Development activity. There may exist a positive relationship between Advertisement and TFPG as advertisement may help to introduce a new product in the market easily, increases sales, fights market competition, enhances good-will with consumer and educates the consumers. Some literature is available supporting the role of marketing expense in promoting productivity. Marketing intensity may act as a proxy for product differentiation.

The role of export as well as import behavior plays an essential role to explain productivity of Indian Textile Firms. There are studies which showed that both exporting firms (due to Pal, Chakraborty and Ghose (2018), Mukim (2011),Loecker (2007) among others) and importing firms (due to Pal, Chakraborty and Ghose (2018), Topalova and Khandelwal (2011), Vogel and Wagner (2010), among others) are more advantageous than non-exporting and importing firms.

In theories, there are several explanations of how export expansion tend to promote productivity such as export expansion can lead to economies of scale which may result in efficiency gains for firms (Clerides et al., 1998; World Bank, 1993), international contacts are probable to raise knowledge and technology spillovers, Exports strengthen market competition in both overseas and domestic markets and also there can be spill-over effects from export-oriented industries to non-export-oriented industries, and from foreign-invested enterprises to domestic firms' (Feder, 1983; O'hUallacháin, 1984).

Also there is indication that the imported intermediary good is an important channel through which technological diffusion takes place (Tybout, 2000); which may affect productivity favourably. So it is imperative to test the impact of trade related variables on TFPG and thus NXI have been incorporated as a possible determinant of TFPG. Net Export Intensity is obtained by the ratio of Export minus import to sales as an explanatory variable. The justification for inclusion of Net Export Intensity has already been presented above while discussing the first and second objectives.

To examine the effect of removal of the quota regime of Multi-Fibre Agreement (MFA) on TFPG, a Dummy variable (D) is included.

A common problem may be that there may exists both way dependence between TFPG and Firm Size as well as TFPG and Research and Development intensity.

To take this fact into account a simultaneous panel model has been framed taking TFPG, Firm Size and Research and Development intensity as dependent variables.

The major achievement of the third problem of the present thesis is estimation of TFPG using DEA approach for both yarn and fabrics producing sectors as well as finding out its determinants after allowing for the joint dependence between TFPG, Firm Size and Research and Development intensity. While estimating the models, the identification problem and cross section heteroscedasticity as well as contemporaneous correlation has been taken into account and for each sector various alternatives of the structural equations are tried out and model with better result is taken. The statistical significance of the variables having nonlinear relationship with endogenous variable has been checked by performing Wald test. The identification problem has been checked and turned out to be overidentified.

1.3 The Structure of the Present Thesis

The structure of the present thesis is as follows:

Chapter 1: Introduction and the relevance of the study

Chapter 2: An Overview of the Existing Literature

Chapter3: Analysis of employment of Indian Textile Industry and identification of its determinants

Chapter 4: Analysis of Efficiency of Indian Textile Industry and the factors influencing its behaviour

Chapter 5: Analysis of Productivity of Indian Textile Industry and identification of its determinants

Chapter 6: Summary and Overall Conclusion