I. INTRODUCTION

The global manufacturing sector has undergone a tumultuous decade. Large developing economies leaped into the first tier of manufacturing nations, a severe recession choked off demand and manufacturing employment fell at an accelerated rate in advanced economies. Still, manufacturing remains critically important to both the developing and the advanced world. In the former, it continues to provide a pathway from subsistence agriculture to rising incomes and living standards. In the latter, it remains a vital source of innovation and competitiveness, making outsized contributions to research and development, exports and productivity growth. But the manufacturing sector has changed – bringing both opportunities and challenges and neither business leaders nor policy makers can rely on old responses in the new manufacturing environment. The way it contributes to the economy shifts as nations nature: in today's advanced economies; manufacturing promotes innovation, productivity and trade more than growth and employment. In these countries, manufacturing also has begun to consume more services and to rely more heavily on them to operate. Manufacturing is not monolithic. It is a diverse sector with distinct groups of industries, each with specific drivers of success. Manufacturing is entering a dynamic new phase. As a new global consuming class emerges in developing nations, and innovations spark additional demand, global manufacturers will have substantial new opportunities. The structural transformation of a traditional economy dominated by primary activities into a modern economy where high-productivity activities in manufacturing assume an important role remains a defining feature of economic development.

Manufacturing sector is the backbone of any economy. In India it fuels growth, productivity, employment and strengthens agriculture and service sectors. Astronomical growth in worldwide distribution systems and IT, coupled with the opening of trade barriers, has led to stupendous growth of global manufacturing networks, designed to take advantage of low-waged yet efficient Indian work force. Though agriculture has been the main pre-occupation of the Indian population, the founding fathers saw India becoming a prosperous and modern state with a good industrial base. Programs were formulated to build an adequate infrastructure for rapid industrialization. India is fast emerging as a global manufacturing hub. Be it automobiles or computer hardware, consumer durables or engineering products, all are being manufactured by multi-nationals in India. India's cheap, skilled manpower is

attracting a number of companies, planning diverse industries, making India a global manufacturing powerhouse (Adhikary Maniklal and Ritwik Mazumder, 2009).

As a reaction to the colonial past, India's development strategy focused on self-reliance. In pursuit of the same, it placed a heavy emphasis on the creation of a well-diversified industrial base to realize the dream of industry-led development. Though this strategy assigned the prime responsibility of developing heavy industries to the public sector, private sector was also approved to play a supplemental role. Almost until the beginning of the eighties, a myriad of measures to control the private sector, such as, licensing requirement for installation of capacities, quantitative and tariff restrictions on imported inputs, regulation of monopolies and trade practices, foreign exchange regulation, nationalization of commercial banks and price controls, constituted an integral part of India's industrial policy. The socialistic fervour in the minds of policy makers got reflected in the policy measure, such as, reservation of labour-intensive manufacturing products for the Small - Scale Industries (SSIs), preferential treatment to the SSIs and stringent labour laws against firing of labour in large firms. The industrial policy was primarily designed to protect the 'infant' industries from external competition. Unfortunately, it inhibited internal competition as well. By the end of seventies, Indian manufacturing suffered from high costs of production, sub-standard quality of products and lack of competitiveness of its exports. It is no surprise that the regulatory framework of the pre-1980s, inter alia, has been held responsible for low growth rate of output and productivity of India's manufacturing sector (Pushpa Trivedi et al. 2011).

The period of eighties was centred primarily on industrial and fiscal sectors, whereas, the reforms initiated in the early nineties were more in the nature of comprehensive macro- economic reforms. Stabilization and structural adjustment process constituted the core of reforms in the nineties and these were deemed to be pre-requisites for the pursuit of growth and viable balance of payment. In brief, the reforms in the nineties differed in their characteristics from those of the eighties. The reforms in the eighties have been branded as 'pro-business', whereas, the latter as 'pro-market'. It has been argued by Ahluwalia (1991) that the reforms of the eighties resulted in an upward shift in growth rate and productivity of the Indian economy and in particular that of industrial/manufacturing sector. The comprehensive reforms of the nineties gained wide publicity as these pulled the economy from a crisis situation and succeeded in alleviating foreign exchange controlling inflation.

As substantial liberalisation in terms of tariff reductions and removal of quantity restrictions on imported inputs (needed for growth of manufacturing sector) took place during the nineties, it was expected that these reforms would also enable the economy to follow growth and productivity paths higher than those witnessed during the eighties. However, no such structural break in either growth or productivity was evident after the initiation of reform process of the nineties. Perhaps, the reforms of nineties targeted primarily the external and financial sectors, which have impacted the real sector indirectly.

The literature on the sources of aggregate productivity growth is vast and important. With sustained economic growth being the pillar on which societies' welfare is built, it is only to be expected that productivity takes the centre piece of attention for policy makers. In trying to understand how to increase productivity growth, it is not only important to identify where such growth has its roots, but equally important to learn about the determinants of productivity change (Anders Isaksson, 2010).

A higher growth path on account of higher productivity is considered to be a preferable alternative as compared to that of increased application of inputs. The latter is deemed to be unsustainable due to supply constraints and also due to the phenomenon of diminishing returns. However, this can be a contentious issue, if it pertains to application of labour input, especially in the context of a labour abundant economy like India. If increased productivity is attained by downsizing employment, it may not bode well for the social fabric and it ought to be a cause of concern to the policy makers.

As the basic objective underlying the argument for increasing productivity is to increase social welfare, a situation of rising productivity coupled with shrinking employment may be neither socially desirable nor politically sustainable. A higher growth path, enabled by productivity growth and combined with 'employment generation' ought to be considered as an ideal trajectory from the point of view of sustainable growth of an economy. The link between productivity and social welfare (poverty alleviation) can best operate through employment generation. The importance of productivity in poverty reduction via employment generation has been duly emphasized in the World Employment Report 2004-05.

Estimating productivity level and growth rate as well as analysing productivity determinants gained a renewed interest both among growth economists and trade economists.

With the introduction of economic reforms in 1991, Indian industries have been witnessing profound changes in the basic parameters governing its structure and functioning. Relaxing of licensing rule, reduction in tariff rates, removal of restriction on import of raw materials and technology, price decontrol, rationalization of customs and excise duty, enhancement of the limit of foreign equity participation etc. are among those which have been introduced at early 90s. One major objective of trade liberalisation in India has been to enhance industrial productivity and input-use efficiently. This has been made possible with the greater and cheaper access to imported knowhow, capital goods, intermediate goods and global capital, relaxing constraints on various input use and technology choices, increased domestic and international competitive pressures by bringing in technological dynamism in industries and permitting more efficient firms to grow and competing out inefficient ones. With the introduction of economic policy reforms, Indian industries have been undergoing structural reforms and facing hard competition from external markets.

Total Factor Productivity (TFP) is a key and major factor in the success of any socio-economic system because of its direct relationship with economic welfare. The liberalisation, privatisation and globalisation (LPG) policies that started in early 1980s in India, and strengthened in the 1990s, opened the Indian manufacturing sector to greater competition from within as well as from outside. One of the major components of the economic reforms package has been the deregulation and delicensing in the manufacturing sector. The justification provided for this often centres on the reason of encouraging competition, which, in turn, is expected to enhance the efficiency and productivity performance of the manufacturing sector.

Also the need for studying productivity growth arises due to the intimate link between productivity growth and economic growth. Economic growth has implications for resource use in general. Productivity growth is the basis of efficient economic growth. Economic growth has been defined as the process of a sustained increase in the production of goods and services with the aim of making available a progressively diversified basket of consumption goods to population. Scarcity of resources, which includes physical, financial and human resources, has been recognized as a limiting factor on the process of economic growth. While output expansion based on increased use of resources is feasible, it is not sustainable. Productivity growth, therefore, is critical for ensuring sustained increase in the production of goods and services.

The measurement of efficiency of an industry is important for both the economic theorist and economic policy maker. If economic planning is to concern itself with particular industries, it is important to know how far a given industry can be expected to increase its output by simply increasing its efficiency, without absorbing further resources. In developing economies like India, efficiency is a very important factor of productivity growth especially where resources are scarce and opportunities for developing and adopting better technology have lately started dwindling. Such economies can benefit a great deal from inefficiency studies. Past studies showed that productivity can be raised by improving efficiency, which usually is a neglected source of productivity, without increasing the resource base or without developing new technologies.

Technical efficiency is the effectiveness with which a given set of inputs is used to produce an output. A firm is said to be technically efficient if a firm is producing the maximum output from the minimum quantity of inputs, such as labour, capital and technology. For example, a firm would be technically inefficient if a firm employed too many workers than was necessary or used outdated capital. The concept of technical efficiency is related to productive efficiency. Productive efficiency is concerned with producing at the lowest point on the short run average cost curve. Thus, productive efficiency requires technical efficiency. The concept of technical efficiency is also related to X-inefficiency. Technical efficiency is necessary for allocative efficiency to be achieved. However, allocative efficiency also requires the optimal allocation of resources. Cost Efficiency of a productive enterprise is an important indicator of its performance. The cost efficiency of a firm is defined by the ratio of minimum costs to actual costs for a given output vector is computed by measuring the distance of its observed (cost) point from an idealized cost frontier. Scale efficiency refers to output at a scale that maximises profits for a firm and, capital and infrastructure can be set to their profit-maximising levels. On the basis of the above points, this analysis had been undertaken with objective, measuring different types of efficiency by applying DEA approach.

There are a number of reasons why associations may exist between real wages, inflation and productivity. It is almost standard in the theoretical literature to envisage that inflation and productivity growth are negatively related as workers purchasing power affects motivation and effort, but also inflation affects firms' investment plans, influences capital depreciation rates and induces changes in the choices of production techniques. Some posit

that real wages and productivity are positively related (Wakeford, 2004). Two main arguments are relevant here. First, higher real wages increase the opportunity cost of job loss, which can stimulate greater work effort to avoid redundancy (an efficiency-wage type hypothesis). Second, an increase in real wages will result in an increase in the unit cost of labour and cause firms to substitute capital for labour, which will be reflected in an increase in the marginal productivity of labour (Gordon, 1987) highlights that substitution from labour to capital in response to inexorable increases in real wages has been at the heart of the economic growth process for centuries. Of course, inflation and real wages are also related and (Hendry, 2001) shows succinctly that inflation responds to excess demands in many parts of an economy including labour costs within the labour market. Recognition and strong evidence of real wages, inflation and productivity interrelationships can help shape policy formation for productivity enhancement, inflation control or consumption stimulation. From the macroeconomic perspective, changes in productivity have been associated with movements in real wages and inflation in the theoretical and empirical literature. In this framework, an analysis of the interrelationships among productivity, real wages and inflation is critical for authorities who plan structural reforms to enhance productivity and for policy makers who aim to control inflation. There are many studies analysing the relationship between productivity and real wages. Similarly, several studies have analysed the linkage between productivity and inflation. However, there are a few studies that examine the interrelationships among productivity, real wages and inflation.

The performance of the supply side of an economy is often identified with the growth rate of potential output. Potential output is not observed in reality, it has to be approximated. The use of the production function method for the measurement of potential output growth takes into account different sources of an economy's productive capacity. Using the production function, one can discuss changes in the supply-side performance on the basis of the observed simultaneous developments in the quantity of labour, capital and total factor productivity. For instance, an increase in the rate of capital growth accompanied by a rise in total factor productivity may signal some improvement in the supply-side performance. Observing an increase in the rate of the capital growth while total factor productivity stagnates, one can, in contrast, deduce that the supply side is functioning ineffectively. The production function thus represents a useful and powerful tool for the macro-economic analysis and evaluation of the governmental structural policies. The production function is purely a technical relation, which connects factor inputs and outputs. It describes the laws of

proportion, i.e., the transformation of factor inputs into outputs at any particular time period. The production function represents the technology of a firm or an industry, or the economy as a whole, and it includes all the technically efficient methods of production. Cobb-Douglas Production Function is one of the most widely used production function in management research also.

The regional variation in industrial development has been a matter of concern to the policy makers in India since the commencement of planning in 1950-51. The industrialisation process in India during the colonial period was highly uneven; as a result, regional disparity in industrial development was quite glaring at the time of independence. Faced with widespread disparity, the policymakers have advocated the strategy of 'balanced regional development' right in the first five-year plan and it has been carried forward in all the subsequent plans. To this direction, a series of policy measures were adopted to guide the regional industrialisation process with many industries reserved for the public sector and more preference given to the less developed states in distribution of these industries. Policies such as industrial licensing policy, industrial location policy, freight equalisation policy, etc. were designed and various fiscal and financial incentives were introduced during the planning period to influence location of industries away from the large cities and towards the backward areas for a review of these regional policies (Dilip Saikia, 2014).

The economy of southern region plays a significant role in achieving higher GSDP growth rate of the country. They are emerging as the major destinations for industrialization. Further the southern states are galloping much ahead of the poorest states with higher economic growth rates. Following the change in the policy regime there has been a growing concern among the policymakers and researchers about the performance before and after economic reforms on regional industrialisation in India while the supporters of the market reform argued for the positive role of the liberalised policies in reducing inter-regional disparity. Against this backdrop, this study aims to analyse the inter-state variation in the manufacturing sector of southern states before and after reform period with the following objective.

Objectives

The major objectives of the study are:

1. To measure technical, scale, cost and allocative efficiency in the manufacturing sector of southern states of India before and after reform period.

2. To analyse productivity change and decomposing the productivity change into technical efficiency change and technological change in the manufacturing sector of southern states of India before and after reform period.

3. To examine causal relationship among labour productivity, real wage and inflation in the manufacturing sector of southern states of India before and after reform period.

4. To estimate the contribution of labour, capital and technology in the manufacturing sector of southern states of India before and after reform period.

Hypothesis

The null hypothesis tested in the study includes the following:

1. There is no significant difference in the technical, scale, cost and allocative efficiency level in the manufacturing sector of southern states of India before and after reform period.

2. The growth of total factor productivity is not influenced by the sources of technical efficiency change and technological change in the manufacturing sector of the southern states of India before and after reform period.

3. The theoretical causal relationship existing among labour productivity, real wage and inflation are not proved in the manufacturing sector of southern states of India before and after reform period.

4. Significant differences are not observed in the growth of marginal productivity of labour, capital and marginal rate of technical substitution of labour for capital in the manufacturing sector of southern states of India before and after reform period.

It is hoped that the outcome of the present investigation will be of immense importance to evolve, develop and implement the policies relating to manufacturing sector by academicians and policy makers to decide the strategies which will lead to overall development of manufacturing sector of southern states of India based on the suggestions and conclusions.