This report has been prepared by Thought Arbitrage Research Institute (TARI) for ASSOCHAM.

Disclaimer
TARI has exercised due care and diligence in preparing the report. However, the information contained is of statistical nature and has been compiled or arrived at from sources believed to be reliable, but no representation or warranty is made to their accuracy, completeness or correctness and hence, TARI cannot be held responsible for omissions or errors.

This document is for information purposes and to initiate a debate or dialogue concerning matters contained in it. The information contained in this document is published for the assistance of the recipient but is not be to be relied upon as authoritative or taken in substitution for the exercise of judgment by any recipient. This document is not intended to be a substitute for professional, technical or legal advice.

No individual or any other entity, including governments or governmental representatives, should initiate actions solely on the basis of the contents of this report. TARI and ASSOCHAM disclaim all responsibility and liability (including, without limitation, for any direct or indirect or consequential costs, loss or damage or loss of profits) arising from anything done or omitted to be done by any party in reliance, whether wholly or partially, on any of the information.

Readers are encouraged to inform the project partners about any inaccuracies or to provide additional information for future editions.

TARI is a not-for-profit organisation set up under Section 25 of the Indian Companies Act, 1956, to bridge the gap between policy initiatives and common perception through evidence-based research and comprehensive data-based reasoning.

About Thought Arbitrage Research Institute (TARI)
TARI is a privately-funded, independent, non-partisan Indian think-tank and works with government, industry, civil society and other stakeholders on: 
- Corporate Governance
- Sustainability
- Economics
- Public Policy

Research Team at TARI
Principal Author
Ms Kshama V Kaushik

Research Conceptualisation
Mr Kaushik Dutta

Research Support and Contributing Authors
Dr Neveen Srivastava
Dr Mihir Bhattacharya
Ms Jyoti Khetarpal
Ms Saumya Sah
Mr Vitul Gupta
Mr Prasanna Mohanty
Acknowledgement

This study would not have been possible without the help of eminent economists and thinkers who shared their insights and guided us at various stages. We are indebted for their support, critique and counsel which have been invaluable in course of this project. We gratefully acknowledge the help and advice we received from:

(The names are in alphabetical order)

Mrs Aditi S Ray, Principal Advisor, Department of Industrial Policy and Promotion (DIPP) (GOI);
Prof Biswajit Nag of Indian Institute of Foreign Trade;
Prof BN Goldar, Institute of Economic Growth, Head of GoI’s Committee to Develop a Producers’ Price Index;
Mr CM Vasudev, former Finance secretary, GoI, and Chairman of HDFC Bank;
Dr. DK Srivastava, former Head of Madras School of Economics and member of Twelfth Finance Commission, GoI;
Prof NR Bhanumurthy, National Institute of Public Finance and Policy (NIPFP), member of Advisory Committee of National Accounts and Statistics, Ministry of Statistics, Government of India (GoI);
Mr PC Jha, former chairman, Central Board of Excise and Customs (CBEC);
Dr Pronab Sen, former member of Planning Commission of India and chief of National Statistical Commission, GoI;
Prof S Mukherjee, Department of Mechanical Engineering, IIT, Delhi and Mr Subhomoy Bhattacharjee, Deputy Editor of Indian Express.

We also acknowledge and thank ASSOCHAM and its council members for the help and encouragement extended to us.

Foreword

Today there is a sense of optimism in India economy after a period of despondency. The macroeconomic parameters like inflation, current account deficit and exchange rate have improved significantly but it still has the largest population of hungry in the world. The fine balance between economic growth and redistributive elements takes a longer term perspective but the expectation is to achieve demonstrable results in the short run.

The new government has taken many transformational initiatives to drive economic growth in the past one year. These include ‘Make in India’ to promote manufacturing, ‘Deen Dayal Upadhyay Gramin Kaushal Yojana’ to develop skills, Jan Dhan Yojana to deepen financial penetration and prevent leakages in distribution and a new set of reforms. But one of the real tests for India will be to create jobs for about 13 million youth who will be joining the workforce annually and deal with millions of others who are employed but live below the poverty line.

As many matured economies have shown, the long term challenge to provide sustainable employment and inclusive growth can be met through the growth in the manufacturing sector. In that sense, the ‘Make in India’ initiative is a paradigm shift in India’s economic reforms and strategy and is in many ways transformational.

We are happy to present the findings of this study which takes a holistic view of India’s manufacturing sector - its strength, challenges, future and relevance. The report identifies leading industries where India would maintain sustainable competitive advantage, puts forth key drivers which would provide impetus for growth, lists challenges that limit India’s growth story and recommends specific policy interventions.

We would like to thank some of the leading economists, social thinkers, government officials and businesses who have helped us in developing a roadmap for the manufacturing sector and congratulate TARI for their report, which, I am sure, will be of considerable assistance to the policy makers and planners.

Rana Kapoor
President, ASSOCHAM
India today has the right inputs to propel itself into a high growth trajectory – a young and aspirational population, growing demand for goods and services, a vibrant democracy ensuring rounded development and even a late-mover advantage to adopt the best-in-class manufacturing technologies. As the world becomes more inter-connected, ideas of sustainable growth, lean manufacturing, digital processes, automation and skilled workforce to run modern factories are idea templates of the day within which Indian manufacturing will have to find its niche.

Make in India, as a statement of vision and mission, is very important to mobilize action among all stakeholders by providing a focal point for creating an enabling environment to boost growth and development thereby delivering to citizens the means to live productive and fulfilling lives.

Lessons from international experiences show distinct patterns of development whereby economic growth and prosperity in one region spills over into contiguous areas and connect with the next region of growth – what is typically known as the ‘neighbour’s effect’ or economic linkages. To create such economic linkages in India we need several hubs of growth across the country and more importantly, mechanisms to ensure connectedness amongst each other – either geographically or via a particular engine of growth – to fully harness the ‘spill-over effect’ and reduce skewed distribution of the fruits of growth. The concept of ‘co-operative and competitive federalism’ is rapidly gaining ground in India whereby the theatre of ground-level commerce shifts to states which is expected to spark creativity and boost healthy competition to kick-start the cycle of investment, growth, job creation and prosperity.

A powerful visual depiction of this is the very mascot of ‘Make in India’ – a mechanised lion with several inter-connected wheels and cogs. Needless to say, the lion will be a strong fighting machine only when all its wheels and cogs work in tandem efficiently.

This report by Thought Arbitrage Research Institute looks at some of these wheels and cogs and critically analyses the stronger elements, where it needs refurbishing, where it is rusted and needs replacement and where new inter-connections need to be built in. In other words, the report seeks to answer what it will take to make this lion roar and carry India along the path of economic prosperity.

As befitting the complex theme of ‘Make in India’, this report took over nine months to complete and I would like to personally thank all the reviewers for their helpful and insightful comments which have immeasurably improved this report. I thank the dedicated team of researchers at Thought Arbitrage Research Institute for putting in several weeks of hard work. Last but by no means the least I thank ASSOCHAM for collaborating on this research and providing patient support through various draft versions culminating in this report which, I hope, will be a useful contribution to national dialogue on ‘Make in India’.

Kshama V Kaushik
Director, Thought Arbitrage Research Institute
### Contents

**Executive Summary**  
8

**Chapter I**  
Making in India: No longer just a policy choice  
Is a services led growth for India sustainable?  
Manufacturing and India’s GDP  
Total Factor Productivity and need to change  
Challenges of demographics and migration  
Demographic Advantage for serving future markets  
Make in India: A national imperative  
20

**Chapter II**  
What to make in India  
Key Determinants of What to Make in India - Our Approach  
Leveraging the Domestic Market Potential  
Alignment with Comparative Advantage - Labour Absorption  
High Productivity - Focus on Manufacturing Value Addition  
Total Factor Productivity (TFP) Growth Exports Competitiveness and Tradability  
Data Sources  
Findings and Analysis  
Additional Factor - Contribution of the MSME Sector  
Industries of Significant Potential for Manufacturing in India  
Textile and Apparels  
Pharmaceuticals  
Metals and Metallic Products  
Food Processing  
Automotive Industry  
Electronics and IT Hardware  
Construction Materials  
Gems and Jewellery  
Chemicals  
Wood and Furniture  
Leather Products (including footwear)  
Capital Goods  
Others: Handloom, Handicrafts, Toys and Sports Goods  
Summary  
30

**Chapter III**  
Large manufacturing units as the leaders  
MSMEs as growth drivers  
Entrepreneurship as a big leap  
Industrial Corridors as pathways to progress  
Railways as growth engine  
Defence Production as force multiplier  
Reducing import dependency for self-reliance  
Trade deficit as an access to markets  
54

**Chapter IV**  
Drivers for ‘Make in India’  
Bridging the Infrastructure Gaps  
Sufficient and Regular Power Supply  
Investment  
Technology Transfers  
Regulatory/Institutional Reforms  
Skilled and Quality Workforce  
Promoting Entrepreneurship and Competitiveness of MSMEs  
Research and Development (R&D) and Innovation  
Tax Reforms  
Protection of Intellectual Property Rights and Control on Illicit Market  
Improving Health Infrastructure  
How will the drivers work?  
64

**Chapter V**  
Proximity to Large Consumer Markets  
Value Addition in Manufacturing - Servitisation  
Sustainable Manufacturing  
Role of Technology and Innovation in Manufacturing  
Impact of Technological Advancements on Labour  
What does the future hold for India’s manufacturing?  
India Innovates and How  
76

**Chapter VI**  
Where else to look for new growth opportunities  
Drivers for ‘Make in India’  
What could be disruptive: Differentiating Factors and Role of Technological Innovations  
Proximity to Large Consumer Markets  
Value Addition in Manufacturing - Servitisation  
Sustainable Manufacturing  
Role of Technology and Innovation in Manufacturing  
Impact of Technological Advancements on Labour  
What does the future hold for India’s manufacturing?  
India Innovates and How  
84

**Conclusions and Recommendations**
Executive Summary

Making in India: No longer just a policy choice

The Demographic Cross

India faces a strange paradox riddled with conflicting choices. While on the one hand it is blessed with a huge demographic advantage – by 2020 the average age of its population at 29 years will be the youngest in the increasingly ageing world, which creates a huge domestic demand and its consequent consumption – on the other, about 13 million youth will enter the labour force annually creating a huge demographic cross in the form of providing them employment and appropriate living conditions.

More so after it went through a period of “jobless growth” when 5 million jobs were lost between 2004-5 and 2009-10 while the economy was growing at an unprecedented rate of more than 8% annually. According to the Census India data, the number of people seeking jobs grew annually at 2.23% between 2001 and 2011, but growth in actual employment during the same period was only 1.4% leaving a huge gap in the form of unemployment.

The immediate challenge that India faces is how to bridge this huge gap of unemployment and underemployment and also meet the increased aspirations of the millions of youth entering the workforce for better life. The changing demographic patterns suggest that today’s youth is better educated, is probably more skilled than the previous generation and also is highly aspirational. Failure to engage them in productive work in the short and medium terms can easily disturb the delicate socio-economic balance India has maintained so far and the fallout can be disastrous.

The World Bank data reveal that the average landholding shrunk from 0.33 hectare per capita in 1961 to 0.126 hectare per capita in 2012, increasing the burden on land and lowering productivity and income. Mechanization of agriculture, which is about 40-45% now, is also increasing and will chip away more labour from farming. The landlessness in rural areas too is increasing. According to a 2009 report of the Ministry of Rural Development, landlessness increased “phenomemally” from 40% in 1991 to 52% in 2004-5 in the rural areas.

Clearly, agriculture can’t provide future jobs. Those will have to come from the other two sectors of the economy, manufacturing and services. Experts argue that the growth of manufacturing will be the key for growth in income and employment for multiple reasons. One is the huge multiplier effect it has on the economy. For every job created in the manufacturing sector an additional three jobs are created in related activities. The other is that manufacturing in India is scalable and has higher labour absorption in comparison to services.

---

1 Economic Survey of 2014-15, Government of India
2 Ibid
3 Economic Survey of 2013-14, Government of India
4 Committee On State Agrarian Relations, and Unfinished Task of Land Reforms, MoRD, 2009
5 IBEF
in a services-driven economy, which contributed 67.3% (at constant price) to the GDP but employed only 27% of the working population in 2013-14, enough jobs will not be created to absorb the burgeoning workforce. Development economists Amartya Sen and Jean Dreze say that even if India were to take over the bulk of the world’s software industry this would still leave poor and illiterate masses untouchable. It may be much less glamorous to make simple pocket knives etc. than to design state of the art computer programmes but the former gives the Chinese poor a source of income that the latter does not provide to the Indian poor. The most advanced economies have about 60-65% share of services with a smaller workforce and the headroom of growth in services in India to create a large number of jobs is limited.

The most likely saviour for India will, therefore, be the manufacturing industry – the Make in India initiative. In 2013-14, the sector contributed 15% to the GDP and employed about the same percentage of total workforce, demonstrating that manufacturing has a better labour absorption compared to services. The informal sector, accounting for 94% of labour in the manufacturing sector, is another issue. The informal sector is very low in productivity the formal or organised sector’s productivity is about 7.2 times more than the informal.1 The consequent challenge is that such workers, though categorized as employed, work for low wages and under poor working conditions. One fourth of such workers were below the poverty line in 2011-12.2 Strict labour laws, low technology, poor infrastructure, including intermittent availability of electricity, water etc., and limited access to capital have not only driven manufacturing to the informal sector but have made manufacturing highly capital and technology intensive.

The OECD Economic Surveys on India in 2014 compares the level of capital per worker in the manufacturing sector for different countries. In all the major industries, India has less than $ 50,000 (PPP) of capital per worker as compared to $ 20,000-30,000 (PPP) for China. Thus, India has been creating lesser jobs but uses more capital. This may result in over capacity, low labour absorption and compared to China may use higher capital at more expensive rates. All this would adversely affect India’s ability to be globally competitive.

In 2012-14, manufacturing’s contribution to GDP and total employment both stood at 15% demonstrating that compared to services manufacturing has a better contribution to employment and it is the only sector that can be the multiplier for Indian economy in the medium term.

Winds of change

Skill development is a major challenge as only 2% of the total workforce has formal and 8% informal vocational training. Besides, 38% of the total workforce is illiterate.

The Ministry of Skill Development released an NSDC study in April 2015 which estimates the skill gap for the possible jobs at about 44 million in 2022 for the 14 key manufacturing sectors identified by TARI where India has definitive competitive advantage. The latest NSDI data on employment (which points to a low job creation in manufacturing during the past decade) casts doubt over our ability to create skills and then gainfully employ them.

Skillling of workforce requires capacity building, identification of relevant future technologies, manufacturing processes and normally such large-scale of skills has to be financed significantly through public finance. In order to make skillling effective and absorbed by industries, India needs to make detailed mapping of incremental increase in manufacturing capacity, including the regions or locations where such capacity will be created, define type of skills and align these with overall skilling plans and initiatives.

All these challenges will have to be met in order to give a kick-start to manufacturing. Given the urgency of creating jobs for the millions, the manufacturing sector should get the top priority in the government’s policy initiatives.

Skilling of workforce requires capacity building, identification of relevant future technologies, manufacturing processes and normally such large-scale of skills has to be financed significantly through public finance. In order to make skillling effective and absorbed by industries, India needs to make detailed mapping of incremental increase in manufacturing capacity, including the regions or locations where such capacity will be created, define type of skills and align these with overall skilling plans and initiatives.

All these challenges will have to be met in order to give a kick-start to manufacturing. Given the urgency of creating jobs for the millions, the manufacturing sector should get the top priority in the government’s policy initiatives.

The government has taken some initiatives to increase the share of manufacturing like implementing GST, expanding scope of FDI and correcting the inverted duty structure. However, it will take more than just investment to boost the job growth in manufacturing if India were to lift the demographic cross and emerge successful in its endeavour.

In infrastructure area, which has been recognized as a key area of development, the government has taken a number of initiatives. The Union budget has increased the outlay for investment by over Rs 70,000 crore in the 2015-16 as compared to 2014-15. Further, a proposed National Investment and Infrastructure Fund (NIF) with annual flow of Rs 20,000 crore will be available to support infrastructure finance companies. Other measures include possible issue of tax-free infrastructure bonds and revitalization of PPP mode.

The government has some initiatives to increase the share of manufacturing like implementing GST, expanding scope of FDI and correcting the inverted duty structure. However, it will take more than just investment to boost the job growth in manufacturing if India were to lift the demographic cross and emerge successful in its endeavour.

In infrastructure area, which has been recognized as a key area of development, the government has taken a number of initiatives. The Union budget has increased the outlay for investment by over Rs 70,000 crore in the 2015-16 as compared to 2014-15. Further, a proposed National Investment and Infrastructure Fund (NIF) with annual flow of Rs 20,000 crore will be available to support infrastructure finance companies. Other measures include possible issue of tax-free infrastructure bonds and revitalization of PPP mode.

However, it will take more than just investment to boost the job growth in manufacturing if India were to lift the demographic cross and emerge successful in its endeavour.

Manufacturing is beset with several problems which include inadequate infrastructure, lack of skilled labour, inefficient rules and regulations, high capital costs and low share in world exports. Additional factors include low total factor productivity (TFP) – which measures the level of technological change and innovation in the economy and is separate from capital and labour productivity.

India figures in the bottom half of the countries in TFP ranking. The growth rate in TFP increased from 0.5% per year during 1990s to around 2.5% during 2000-05. Though the literature on TFP growth in manufacturing is vast and not unambiguous, most of them show a positive trend in the post-reform period. A higher TFP can be achieved through sustained efforts but currently India is significantly disadvantaged in terms of productivity when compared to competing countries in the world trade.

Amartya Sen and Jean Dreze say that even if India were to take over the bulk of the world’s software industry this would still leave poor and illiterate masses untouchable. It may be much less glamorous to make simple pocket knives etc. than to design state of the art computer programmes but the former gives the Chinese poor a source of income that the latter does not provide to the Indian poor. The most advanced economies have about 60-65% share of services with a smaller workforce and the headroom of growth in services in India to create a large number of jobs is limited.

Challenges for manufacturing

Manufacturing is beset with several problems which include inadequate infrastructure, lack of skilled labour, inefficient rules and regulations, high capital costs and low share in world exports. Additional factors include low total factor productivity (TFP) – which measures the level of technological change and innovation in the economy and is separate from capital and labour productivity.

India figures in the bottom half of the countries in TFP ranking. The growth rate in TFP increased from 0.5% per year during 1990s to around 2.5% during 2000-05. Though the literature on TFP growth in manufacturing is vast and not unambiguous, most of them show a positive trend in the post-reform period. A higher TFP can be achieved through sustained efforts but currently India is significantly disadvantaged in terms of productivity when compared to competing countries in the world trade.

The OECD Economic Surveys on India in 2014 compares the level of capital per worker in the manufacturing sector for different countries. In all the major industries, India has less than $ 50,000 (PPP) of capital per worker as compared to $ 20,000-30,000 (PPP) for China. Thus, India has been creating lesser jobs but uses more capital. This may result in over capacity, low labour absorption and compared to China may use higher capital at more expensive rates. All this would adversely affect India’s ability to be globally competitive.

In 2012-14, manufacturing’s contribution to GDP and total employment both stood at 15% demonstrating that compared to services manufacturing has a better contribution to employment and it is the only sector that can be the multiplier for Indian economy in the medium term.

The government has taken some initiatives to increase the share of manufacturing like implementing GST, expanding scope of FDI and correcting the inverted duty structure. However, it will take more than just investment to boost the job growth in manufacturing if India were to lift the demographic cross and emerge successful in its endeavour.

However, it will take more than just investment to boost the job growth in manufacturing if India were to lift the demographic cross and emerge successful in its endeavour.

Manufacturing is beset with several problems which include inadequate infrastructure, lack of skilled labour, inefficient rules and regulations, high capital costs and low share in world exports. Additional factors include low total factor productivity (TFP) – which measures the level of technological change and innovation in the economy and is separate from capital and labour productivity.

India figures in the bottom half of the countries in TFP ranking. The growth rate in TFP increased from 0.5% per year during 1990s to around 2.5% during 2000-05. Though the literature on TFP growth in manufacturing is vast and not unambiguous, most of them show a positive trend in the post-reform period. A higher TFP can be achieved through sustained efforts but currently India is significantly disadvantaged in terms of productivity when compared to competing countries in the world trade.

The OECD Economic Surveys on India in 2014 compares the level of capital per worker in the manufacturing sector for different countries. In all the major industries, India has less than $ 50,000 (PPP) of capital per worker as compared to $ 20,000-30,000 (PPP) for China. Thus, India has been creating lesser jobs but uses more capital. This may result in over capacity, low labour absorption and compared to China may use higher capital at more expensive rates. All this would adversely affect India’s ability to be globally competitive.
attention is also being paid to address issues of 300 delayed infrastructure projects.

To improve the ease of doing business, e-Biz Portal has been introduced, which integrates 16 regulatory permissions at one source. There are plans to remove redundant bankruptcy provisions like the Sick Industrial Companies Act and Board for Industrial and Financial Reconstruction (BIFR) and replace them with a comprehensive Bankruptcy Code in the current fiscal.

These are strong winds of change and the expectations are high. The challenge of steering an economy entrenched for decades in a socialistic model of manufacturing to a global industrial powerhouse is daunting but the right steps are being taken to overcome the odds.

What to make in India
While the importance of manufacturing is well understood, identifying specific industries for attention is not easy. The National Manufacturing Policy of 2011 and ‘Make in India’ initiative of the Government of India have identified a large number of industries (the latter has shortlisted 25 sectors which include a few from services) with the emphasis on drawing up an exhaustive list of industries (the latter has shortlisted 25 sectors which include a few from services) with the emphasis on drawing up an exhaustive list of industries with which the Government of India have identified a large number of businesses and the industries that have inherent capacity to grow, add value to the economy and create more employment opportunities for the economy. It uses the five following parameters:

- Domestic market potential
- Labour absorption
- High productivity
- Total Factor Productivity Growth and innovation
- Export competitiveness and tradability

Based on the analysis of these parameters, the study identifies 14 industries as the potential leaders. These are:

- Textiles and Apparels
- Pharmaceuticals
- Metals and metal products
- Food processing
- Electronic and IT hardware
- Automotive industries
- Construction materials
- Comms and jewellery
- Chemicals
- Wood and furniture
- Leather products
- Capital goods
- Handicrafts and handicrafts
- Toys and Sports goods

TARI carried out a study to select fewer industries with marked competitive advantage for a more focused action. This study is based on both external and internal reports to identify those industries which have inherent capacity to grow, add value to the economy and create more employment opportunities for the economy. It uses the five following parameters:

- Domestic market potential
- Labour absorption
- High productivity
- Total Factor Productivity Growth and innovation
- Export competitiveness and tradability

Based on the analysis of these parameters, the study identifies 14 industries as the potential leaders. These are:

- Textiles and Apparels
- Pharmaceuticals
- Metals and metal products
- Food processing
- Electronic and IT hardware
- Automotive industries
- Construction materials
- Comms and jewellery
- Chemicals
- Wood and furniture
- Leather products
- Capital goods
- Handicrafts and handicrafts
- Toys and Sports goods

Consequently, materials, chemicals, electronics and IT hardware, automotive, capital goods and textiles and apparel constitute 3/5 of domestic demand among all the industries taken for our analysis. Electronics and IT hardware, automotive, food processing, metals, wood, and furniture and Pharmaceuticals are among those industries which are expected to grow robustly with a CAGR of 35% or more.

Textile and apparel, automotive, construction materials and food processing industries provide maximum employment in the manufacturing sector. The sheer size of their employment makes them automatic choice for labour absorption action plan.

Textiles, leather, chemicals, pharmaceuticals, rubber and plastics, metals, electric and optical equipment, and transport equipment have a TFP growth higher than the median value of 0.63 in the period of 2000-08, and hence, can significantly contribute to income.

Chemical and textiles industries have fairly large domestic and exports markets. India also holds a competitive edge in these sectors but they require constant attention of the policy makers to maintain their competitive advantage.

Food and automotive sectors, which are quite large in terms of employment and export market, need to be strengthened with sound policy initiatives. Automotive industry in particular builds its own ecosystem of a large supply chain, including those from the MSMEs, which acts as a force multiplier for creating jobs and economic growth. India is replete with examples of suppliers to automotive companies in India which turned into large global players. Food processing also has the same capability to bring transformational changes.

Where else to look for new growth opportunities
Providing jobs will be a tough task given the demographic cross that India has to bear – 13 million new entrants to the workforce annually, plus the distress migration from agriculture. These can come from three major sources large manufacturing units, MSMEs and entrepreneurship development.

Large manufacturing units: Economic kick-start could be tied by large manufacturers who have the capital, access to technology, managerial expertise and economies of scale to bring about transformational changes. India has followed for years a growth paradigm that favoured state-owned enterprises to lead growth and promoted small scale enterprises for high labour absorption. Due to low competitiveness and high sense of entitlement this model could not become scalable at a global level, nor produced equitable wealth for the small manufacturers. It took decades for India to produce a few globally competitive manufacturing companies. In the next leap, the large scalable companies would be the immediate engines of...
According to a World Bank report, over 50% of the national and international supply and produce a diverse range of products to meet manufacturing output and 40% of total export, contributing 8% to GDP, accounting for 45% of the economies like US, Germany, Japan, China and others. In India too they have played a major role, contributing 8% to GDP, accounting for 45% of the manufacturing output and 40% of total export. These units are widely dispersed across the country and produce a diverse range of products to meet the needs of local markets, global market and the national and international supply and value chains.

According to a World Bank report, over 50% of MSMEs are rural enterprises widely distributed across low-income states making them an important sector for promoting economic growth and poverty reduction.

MSMEs can provide crucial support to the large manufacturing units and also develop independently. In fact, they provide maximum opportunities for both self-employment and jobs, next only to agriculture, and are considered the nursery for entrepreneurship and innovation.

**Entrepreneurship development:** The need to develop entrepreneurship for generating employment can hardly be over-emphasised. Global Entrepreneurship Monitor (GEM) survey of 2014 shows India fares poorly among economies which are at a similar factor-driven stage of economic development. In terms of nascent (stage 0) entrepreneurship rate, only 4.17% of population aged 18-64 is engaged in business while the weighted average for similar factor-driven economies like Iran, Kuwait, Vietnam and Philippines is 12.4%. If India were to achieve the weighted average of 12.4%, the number of entrepreneurs will go up from nearly 3 crore at present to 9 crore, that is a three-fold increase, providing that many more households with income.

The number of enterprises in India has been climbing up, from 42 million non-agricultural enterprises in 2005 to 58 million in 2013, but these are not able to grow due to various risks arising out of difficult business processes and lack of financing. Their growth can be facilitated by providing special funds, dedicated business zones, capital and technology assistance in terms of both credit and equity and tax incentives.

**Industrial corridors:** India is building a pentagon of corridors across the country to boost manufacturing and build India as a global manufacturing destination of the world. While one, the Delhi-Mumbai Industrial Corridor (DMIC), is underway four such corridors are being conceptualized. DMIC alone provides a huge opportunity for absorbing labour, both skilled and unskilled labour, in manufacturing and construction activities, including the ancillaries that would develop around it. 26 new DMIC cities that are being developed as part of this corridor are expected to meet pressures of urbanization and also lead India’s economic growth for the next 20-30 years. It is estimated that the development of logistic hubs and residential townships, in addition to the manufacturing cities, will offer employment opportunities for over 3 million people with over 67% in the manufacturing/processing industry.

**Railways and Defence:** Planned expansion of railway infrastructure, like construction of six high-capacity, high-speed dedicated freight corridors along the Golden Quadrilateral and its diagonals; connecting ports and developing a network of freight terminals through PPP, will provide huge direct and indirect employment opportunities. Opening up FDI for this sector will give an added boost. Apart from employment in construction and allied activities, a substantial increase in investment (budget of 2015-16 marks more than Rs 100,000 crore for investment in the current fiscal), will help other industries such as metals and metal products, other construction materials, cement, IT etc. in generating more jobs.

The defence sector is another major area which will see increased activities now that it too has been opened for FDI and the Government of India proposes to focus on domestic production of its defence needs; 70% of which is currently met from import. The Government of India has set the target of meeting 70% of its defence needs internally in the next five years. This would require the local industry to more than double in size resulting in creation of about one million more jobs, directly and indirectly. The direct new employment will be to the tune of 1.2 lakh. Jobs created indirectly through sub-contractors and other allied agencies will add 5 to 10 lakh. Additionally, the multiplier advantages could accrue in a host of related sectors.

**Import substitution:** Trade deficit poses additional hurdle for the manufacturing sector. A slump in global demand and lower competitiveness as compared to China are discouraging factors. However, China is expected to become less competitive due to rising labour cost and appreciating currency. India needs to aggressively fill this gap in the world market by targeting competitive industries like pharmaceuticals and textiles. Recent reports suggest a shift towards India pharmaceutical exports away from their Chinese counterparts.

The other way to reduce trade deficit could be import substitution. The industries with high import intensity like petroleum products, paper and printing, plastic and rubber products can be the potential industries for import substitution. But India needs to be very selective and careful to use import substitution as a tool to improve trade balance and promote indigenous production because, in the past, it had led to protectionism and decline in the quality of products.

**Trade deficit as leverage:** The government has targeted the value of exports to $ 900 billion by 2020 and increase the share of exports in the world market to around 3.5% by the same period. One of
the major challenges in realising this goal will be the new trading agreements. Three mega agreements are currently being negotiated: Trans-Pacific Partnership (TPP), Trans-Atlantic Trade and Investment Partnership (TATIP) and Regional Comprehensive Economic Partnership (RCEP). These will add a completely new dimension to the existing global trading system and challenge India’s position and take advantage of the emerging global trading environment.

Drivers for ‘Make in India’

Given the fact that the manufacturing sector has always been small and never grew to its potential, the challenges are many and long entrenched, several of which are systemic in nature. India lacks basic infrastructure to support manufacturing. The business environment is marred by cumbersome processes and multiplicity of controls. The skill levels of the workforce are poor and the technological development and innovation virtually non-existent.

TARI used the Quadrant Scenario Development Tool developed by the economists worldwide to arrange these factors in different quadrants, on a matrix of relative importance and time continuum. This analysis identifies the drivers of growth in short and long run. TARI’s analysis show that in the short run, boosting investment, facilitating technology transfer through FDI, easing of administrative clearances, tax reforms like GST and control of illicit markets will drive India’s manufacturing sector. But in the long run, factors like infrastructure development, improvement in R&D and innovation, higher skilling development, tighter intellectual property rights regime, promotion of entrepreneurship, MSMEs and an improvement in health infrastructure will boost manufacturing growth.

What does the future hold for Indian manufacturing?

With rapid changes in technologies and innovations, the manufacturing environment is also changing. Emergence of internet, 3D technologies etc. have brought about a paradigm shift in the way businesses are being run and manufacturing activities are carried out. For India to leverage its position and take advantage of the emerging scenarios, it needs to understand these new trends and adopt new technologies.

Proximity to large consumer markets plays a significant role in expanding the manufacturing sector. Countries with large consumer markets, particularly the Asian ones (including India), will hold the key to manufacturing. These countries are expected to account for 70% of manufactured products and drive consumption as they are likely to have 64% of the world’s population.

Besides, manufacturing will be increasingly mechanised and value additions at the shop floor will be minimal. Given its technological challenges, Indian manufacturing will have to look for efficiency improvements and value addition in sales, after-sales services and logistics to compete in global markets. There is a greater possibility of generating employment in these domains of manufacturing supply chain.

Another area of opportunity is sustainable manufacturing which minimises environmental impact; improves safety for employees, communities and consumers; optimises use of natural resources, reduces and recycles wastages and reduces the carbon footprint. The future belongs to green technologies which do all these and also increase energy efficiency and reduce dependence on carbon producing fuel. As for the technology driven manufacturing, the areas to look for growth will be ICT, sensors in cars and aircrafts, industrial biotechnology, green technologies and energy storage, knowledge-based automation and big data analysis, autonomous robotics, industrial internet, cloud technology, 3D printing etc. As manufacturing becomes high-tech from the shop floor to back offices, the global supply of high-skilled workers will fall short of demand.

There is another track which may provide room for enhancing manufacturing growth, called ‘frugal innovation’. This is aimed at markets of relatively low-income countries. The aim is to produce commodities that meet basic technological standards but are cheap and affordable for export of low-cost smart phones, handmade toys etc. This may add to India’s manufacturing potential by mobilising the masses of unemployable and unutilized labour.

Conclusions and Recommendations

Indian manufacturing faces many challenges as the global demand for goods and services is shrinking and the competition from emerging countries is getting fierce. Given its low productivity and high capital intensity, the challenges for the Indian manufacturing are becoming increasingly significant. Improvements in productivity, processes, technology and skills need substantial investment in capacity building which will take years, if not decades, to accomplish. But there is a need for getting results in the immediate future and strong affirmative actions are required to accelerate transformation of the sector.

India’s demographic advantage means that domestic demand will continue to be high and drive consumption, and consequently, manufacturing growth. But the business environment in India is tough with multiplicity of controls, rigid legal and regulatory frameworks in areas of land, labour, capital and taxation and delay in administrative clearances etc. raising the cost of doing business and also the cost of capital. These issues have to be addressed.

Paradoxically as it may seem, India’s demographic dividend is also a demographic cross it has to bear as the millions of new job seekers entering the labour market who are demanding and aspirational. They need to be productively engaged to avoid socio-economic conflicts.

The challenges are daunting but not insurmountable. If India were to achieve its goal of scaling up the share of manufacturing to 25% of its GDP and create a large number of jobs it will have to take several measures which are both definitive and transformational. Now and sustainable jobs can be
India needs to use innovative products and services to create new markets too. This requires leveraging trade policies and deficits with key partner countries and careful and selective import substitutions, especially in finished products. The other value drivers will come from partnering the global value chain of transnationals which will bring new skills and technologies to Indian companies and employees. The foray into manufacturing wave needs some prioritisation by way of focusing on industries with sustainable competitive advantages which this study has listed for quicker and better results. In addition, it will have to take some policy decisions to ensure that ‘Make in India’ initiative leads India’s growth and development agenda for the next decades. Some of these policy measures could be the following:

- Investment in infrastructure needs to go up from 6% of GDP to 10% GDP. Pension and insurance funds being long term investors can be mobilised for infrastructure spending. PPP model should be redesigned through engineering, procurement and construction (EPC) model.
- SEZs need to be revived by a systematic review of the reasons for their failures. Economics of scale is a fundamental factor to kick start manufacturing and SEZs are one of such vehicles of long term change. Some of the issues that plagued SEZs included issues of Minimum Alternate Tax (MAT)/ Dividend Distribution Tax (DDT) allowing a branch of foreign company in SEZ to carry out DTA (Domestic Tariff Area) transaction; enabling External Commercial Borrowings (ECB) and implementing recommendations of Rangachary Committee report.
- Physical infrastructure needs to be developed by facilitating land acquisition and rationalising labour and tax laws. Land acquisition has always been an emotional and social issue in India and often overlooks economic realities. India needs to look at the surplus and economically vacant land that various PSUs, government including railways, defence, and large private sector hold and utilise the unused SEZ land for industrial growth.
- Regular power supply is considered as one of the major constraining factors. Empirical study by Gupta and others shows that manufacturing industries that are more dependent on power infrastructure have grown less as compared to other industries. India needs reforms in the way it manages power infrastructure and outputs. Energy is a key determinant of the success of Make in India initiative. Power generation and distribution need to be viable and adequate. In the medium term, India must look at renewable energy as alternative to coal and crude oil, not only for sustainable manufacturing processes but also reducing foreign exchange outflows.
- Sustainable and employable skills in digital, future technology and modern electronic equipment need to be developed among the minimally educated workforce. Industrial training institutes need to be developed in partnership with the private industries for higher education in vocational or technical subjects. Targeted training and development for the general management and technical supervisory level are also required.
- A conducive environment for R&D and IP regime is needed to boost innovation, trade and investment in India. This would lead to creation of more high-paying skilled jobs and encourage transfer of technology. IP regime needs to be implemented through cohesive legal framework without overlap, conflict or inconsistencies among the different ministries.
- MSMEs need to be supported through better co-ordination among the departments of local, state and central governments for creating an enabling environment for growth and their transition to the organized sector. These entrepreneurs need insurance cover and access to finance without collateral. The advent of small banks will hopefully change this sector drastically since their loan ticket size will be less than Rs 100,000.
- Entrepreneurship can be a huge accelerator for creating new employment opportunities and at the same time create new intellectual capital in technology, processes and products. India should create large innovation funds to invest in new areas of technology and give tax incentives to drive private capital to invest in such ventures.
- Reforms in the area of international taxation are needed to improve foreign investor sentiment and provide a stable and certain tax environment.
- The proposed GST will rationalise indirect taxes and increase India’s tax to GDP ratio. Similar steps may be taken in direct tax and other tax related issues to avoid conflicts, litigations and an environment of uncertainty that postpones productive investments.
- Among the measures that could improve the business environment include faster administrative clearances to reduce the time needed for starting and exiting a business, licensing private-sector banks to cater to the needs of the MSMEs, making the regulatory process more transparent and cutting compliance burdens.
- Bankruptcy law needs to be formulated to free ‘dead’ assets and mobilise capital for investment. Governance at the grassroots level should be improved for better targeting of state funds and resources.

Given the urgency to provide jobs and good living conditions to about 13 million youth who will be joining the workforce every year and others who will be migrating from agriculture over the next decade, ‘Make in India’ is just not a policy choice any more but an absolute necessity that cannot be postponed anymore.

Indian economy witnessed dramatic transformation when it opened up its industries to market and trade in 1980s, followed by another round of liberalisation in 1990s. The growth rate often referred to as the Hindu growth rate of 3.5% recorded in the previous three decades since independence improved to more than 6% in the next three decades.

The growth in GDP was exceptionally high between 2000 and 2011 when it averaged over 9% annually and was one of the highest in the world. The average growth, led by a high proportion of services, has been over 6.5% for the period from 2000 to 2014, which too is very impressive.

It is argued that economic growth is the most powerful tool to reduce poverty and improve quality of life in developing countries. The Department for International Development (DFID) of UK in their study highlights that, "World and sustained growth is critical to making faster progress towards the Millennium Development Goals – and not just the first goal of halving the global proportion of people living on less than $1 a day. Growth can generate virtuous circles of prosperity and opportunity. Strong growth and employment opportunities improve incentives for parents to invest in their children’s education by sending them to school. This may lead to the emergence of a strong and growing group of entrepreneurs, which should generate pressure for improved governance. Strong economic growth, therefore, advances human development, which, in turn, promotes economic growth.”

India’s transformation in economy, however, has not been accompanied by a similar improvement in the human development indices. While the economy grew in the 2000s at over 6.5%, the growth in human development indices, an index released by UNDP, has been below 1.5%, making India among the lower quartile of countries in human development. The trickle-down effect of economic growth did not reach a vast majority and India continued to be home to one of the largest concentrations of the poor in the world.

Is a services-led growth for India sustainable?

India’s rapid economic growth during the past two decades or more has been driven mainly by the services sector in sharp contrast to China where the post-reform economic boom happened first in agriculture and then in manufacturing. The growth in the services has been heavily concentrated in the skill-intensive segments, such as software development, financial services and other specialised work, rather than more traditional labour-intensive ones. While this enabled more educated section of the labour force to earn much higher wages and salaries, the bulk of the workforce is marooned in agriculture and other sectors including informal sector where wages and productivity are very low.

The falling number of real jobs in agriculture and manufacturing has created an overall jobless growth and human development has not been distributive and equitable. The Economic Survey of 2014-15 says while the number of people seeking jobs grew at 2.23% between 2001 and 2011, growth in actual employment was a lot less at 1.4%.

The big question confronting Indian policy-makers is where will the jobs come from?

The answer is provided by the approach paper to the 12th five-year plan which says, “While the services sector has been growing fast, it alone cannot absorb the 250 million additional income-seekers that are expected to join the workforce in the next 15 years. Unless manufacturing becomes an engine of growth, providing at least 100 million additional decent jobs, it will be difficult for India’s growth to be inclusive.”

Clearly, the jobs will come from both the manufacturing and services sectors. Some experts, however, argue that in spite of a higher contribution of the services sector in India’s growth, manufacturing continues to be the main engine of growth. Studies of many Indian states have shown that an incremental increase in the growth of the manufacturing sector leads to a substantial increase in the growth of income and that high growth of income through the growth of the service sector is not sustainable.

It has been argued that most advocates of the services-led growth have high end services like banking, insurance and IT in mind which are mostly in the organised sector and do not constitute the bulk of the growing services. The bulks is constituted by self-employed poor people and salaries paid by the government (both centre and states) for government employees. Thus, the growth of this sector does not constitute development or prosperity.

It is obvious that India needs its manufacturing sector to grow and provide the necessary space to accommodate its bulging labour force.

Manufacturing and India’s GDP

Historically, agrarian societies across the world progressed to manufacturing and then as income went up, large services sector emerged. Manufacturing played a crucial role in increasing incomes. It helped building machines and tools that made agriculture sector more productive, build and operate infrastructure, enable people to move into urban areas and produce new products that opened up the service growth opportunities, as computers

India’s high average GDP growth of 9% annually between 2004 and 2011 has not been accompanied by a similar improvement in the Human Development Indices (HDI) which has grown at a rate of below 1.5%, putting India among the lower quartile of countries.

Making in India: No longer just a policy choice

“Since the industrial revolution, no country has become a major economy without becoming an industrial power”.

– Lee Kuan Yew, late Prime Minister of Singapore

"Since the industrial revolution, no country has become a major economy without becoming an industrial power”.

– Lee Kuan Yew, late Prime Minister of Singapore

What Ails Manufacturing?, N S Siddharthan, 2014


An Uncertain Glory: India and its Contradictions, Jean Dreze and Amartya Sen, 2013

--In the speech of the Jawaharlal Memorial Lecture, delivered in New Delhi in 2005

-- http://www.ssrc.org/direct/unitedkingdom/47020582.pdf

11 http://www.ssrc.org/direct/unitedkingdom/47020582.pdf

12 An Uncertain Glory: India and its Contradictions, Jean Dreze and Amartya Sen, 2013

13 What Ails Manufacturing? Poor Investment Climate and Bad Governance, N S Siddharthan, Madras School of Economics, 2014


15 An Uncertain Glory: India and its Contradictions, Jean Dreze and Amartya Sen, 2013

16 What Ails Manufacturing? Poor Investment Climate and Bad Governance, N S Siddharthan, Madras School of Economics, 2014

17 An Uncertain Glory: India and its Contradictions, Jean Dreze and Amartya Sen, 2013

and mobile phones have done recently for software applications. India has not gone through this phase and its growth has not been equitable and inclusive and that now creates new challenges for creation of effective employment for a large number of people in a short duration.

The share of manufacturing in generating income and employment has been low. Soon after independence (1950-51), its share in India’s GDP was only 9% (overall industry’s contribution being 11%). In contrast, the share of agriculture and allied activities was 51.8% and that of the services 34.6%. Over the years, the share of agriculture has declined, as it should be expected and that of the services has risen sharply, but the manufacturing sector has grown little. In 2013-14, for example, the share of agriculture and allied activities stood at 14%, services at 67.3% but manufacturing only at a modest 15%, at constant price (factor cost). In fact, manufacturing has stagnated at 14-16% for the past 35 years (since 1978-79).

In the new GDP series, which was released recently with base year 2011-12, the share of manufacturing has increased to 17.9%. But the overall sectoral balance remains more or less same with agriculture accounting for 17% and services for 51.5% in 2013-14. (The overall industry, which includes manufacturing and others, contributes 31.3% to GDP)

This share of manufacturing is still very low compared to the developed economies, as the accompanying graph makes it clear. The National Manufacturing Policy of 2011, therefore, talks of improving its share to 25% by 2021 by giving fresh impetus to manufacturing activities. More recently, the Government of India’s “Make in India” initiative too aims at boosting India’s growth by increasing the manufacturing activities.

The share of manufacturing in total employment also remains low. In 2012-13, its share was 14%, almost as much as its share in GDP. In comparison,
agriculture and allied sector, despite its low share in GDP, has a disproportionately high share of employment – 59% in 2012-13. The services sector, on the other hand, had a share of 27% in the same year even though its share of GDP was 67.3%. This would reflect that the manufacturing sector has a far greater capacity to generate employment and hence increase incomes, in relations to the services sector.

**Sectoral share in employment (%)**

<table>
<thead>
<tr>
<th>Year</th>
<th>Agriculture</th>
<th>Allied</th>
<th>Manufacturing</th>
<th>Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999-2000</td>
<td>52</td>
<td>13</td>
<td>29</td>
<td>6</td>
</tr>
<tr>
<td>2006-2007</td>
<td>50</td>
<td>13</td>
<td>30</td>
<td>7</td>
</tr>
<tr>
<td>2012-2013</td>
<td>53</td>
<td>15</td>
<td>28</td>
<td>4</td>
</tr>
</tbody>
</table>

**Source:** Planning Commission of India

Economic Survey of 2014-15 says that the power of growth to lift all boats will depend critically on Indian economy’s employment creation potential. The challenge is to bridge the gap between the growth in workforce and jobs. The manufacturing sector seems a perfect fit to fill the gap.

**Total Factor Productivity and need to change**

Total Factor Productivity (TFP) has been identified as a key driver of growth in the literature on economic growth. It measures the level of technological change or the techniques for production in manufacturing than in services. The overall consensus in the literature is that TFP growth rates have fallen in the 1990s relative to the 1980s. The overall TFP rank of India was 73 among 112 countries, according to UN study on productivity, as compared to US (rank 3) and China (ranked lower at 79) in a UNIDO study of 2007. TFP level in manufacturing has been low in recent years as well which presents a major challenge for the "Make in India" programme. However, there is a huge potential in improving manufacturing TFP by increasing levels of educational attainment of workers, removing unnecessary labour laws and regulations and increasing the size of the formal sector.

A study by Hish and Kleven finds that when capital and labour are hypothetically reallocated to equalize marginal products to the extent observed in US, manufacturing TFP gains by a magnitude of 30-50% in China and 40-60% in India. Arzaba and Cavallo find that there exists a significant relationship between financial development and industry-level TFP growth, when country-time and industry-time fixed effects are controlled. Study by Ziebarth highlights that improvements in TFP growth in manufacturing sector (for developing countries, in general) can be made by better intra-industry allocation of resources.

Productivity of the manufacturing sector is low, partly because of the relatively small size of the firms. There are regulations and taxes which industries tend to avoid due to which they remain small in size. Employment in manufacturing firms with less than 10 employees accounted for about 65% of employment in the sector in 2011-12 compared to 14% on average in the OECD. This makes it difficult to utilize the economies of scale. Despite abundant, low-skilled and relatively cheap labour, Indian manufacturing is surprisingly capital and skill intensive.

Despite abundant, low-skilled and relatively cheap labour, Indian manufacturing remains highly capital intensive due to regulations and taxes. India has double the capital per worker than China due to which we are unable to create jobs in the industries where labour absorption rate is high.

The unorganised/unregistered manufacturing sector accounts for about 80% of the employment in the manufacturing sector. Besides, about 70% of the employees in the organised sector are informal (i.e., without social security benefits). Taken together, the size of total informal work force, which are without social security benefits in the manufacturing sector is 94%. India should aim for more formal sector jobs in the organized manufacturing sector as these tend to be the more secure and provide more incentives for improving the quality of labour since families can invest in education and health if they access to regular income. Indeed, NSSO survey of 2011-12 shows that an urban male with regular job in manufacturing on average gets a 2.5 times higher salary than those in a similar contractual job. Informality is typically associated with low productivity and many workers remain outside the reach of labour market regulations and social protection schemes, resulting in higher inequality.

India has high capital intensity due to low availability of skilled manpower and strict labour laws and regulations, thus compelling firms in the manufacturing sector to invest more in capital endowments. Hasan, Mitra and Sundaram empirically establish that India uses more capital intensive techniques for production in manufacturing than countries at similar level of development because of inflexible and stringent laws restricting labour freedom and capital market development. This has led to excess capacity and low levels of employment in the sector. The OECD Economic Surveys on India in 2013 compares the level of capital per worker in the manufacturing sector for different countries. In all the major industries, India has over $5,000 (PPP) of capital per worker as compared to around $25,000-30,000 (PPP) for China. India has been creating lesser jobs even in area of high labour absorption but have been increasing capital outlay and all new manufacturing efforts need to look at higher labour and skill absorption.

Skill development is a major challenge as only 2% of the total workforce has formal and 8% informal vocational training. Besides, 38% of the total workforce is illiterate. The Ministry of Skill Development released an NSDC study in April 2015 which estimates the skill gap for the possible jobs at about 44 million in 2022 for the 16 key manufacturing sectors identified by TARI where India has definitive competitive advantage. The latest NSDC data on employment (which points to a low job creation in manufacturing during the past decade) casts doubt over our ability to create skills and then gainfully employ them.

Skilling of workforce requires capacity building, identification of relevant future technologies, manufacturing processes and normally such large scale of skilling has to be financed significantly through public finance. In order to make skilling effective and absorbed by industries, India needs to make detailed mapping of incremental increase in manufacturing capacity, including the regions or locations where such capacity will be created, define type of skills and align these with overall skilling plans and initiatives.

**Challenges of demographics and migration**

With the rising population, an official estimate of...
the Government of India says that about 12.8 million youth will be entering the labour force annually.69 OECD Economic Survey of India, November 2014, puts this at about 13 million annually. Can India provide jobs to so many to keep them productivity engaged?

This is not all. India is witnessing distress migration from agriculture in recent years which is adding to the stress on the economy. According to official documents, more than 36 million workforce moved out of agriculture and allied activities between 2004-5 and 2011-12, a bulk of which has been absorbed in low productive construction activities, where the workforce increased by 25 million during the same period.70

The distress migration is unlikely to change any time soon because the growth in agriculture is low and largely dependent on the size of land holdings. Meanwhile, the size of individual landholding has been rapidly declining. A World Bank data on arable land – defined as land under crops – shows that in India landholding has come down from 0.33 hectare per person in 1961 to 0.126 hectare per person in 2012.71 This decline has increased the burden on land, leading to low productivity and income in agriculture. Besides, landlessness in rural areas is also increasing. According to a 2009 report of the Ministry of Rural Development,72 landlessness increased “phenomenally” from 40% in 1991 to 52% in 2004-5 in rural areas.

World Bank data shows that landholding size has come down from 0.33 hectare per person in 1961 to 0.126 hectare per person in 2012.

Mechanisation of agriculture is also on the rise. According to an UN report, the overall mechanisation level is 40-45% at present, which is comparatively lower than US (95%), Western Europe (95%), Russia (80%), Brazil (75%) and China (57%).73 However, the potential for rapid increase in mechanisation exists and this would lead to lower demand for farm labour. That would mean the demand for jobs in the non-agriculture sector will increase in the future as the surplus farm labour will look for alternatives.

Mechanisation in agriculture is high at around 45%. This will lower the demand for farm labour, thus increasing future demand of non-agriculture sector jobs.

India is expected to hold a competitive advantage when the world population, especially in the developed countries, will be ageing. India’s young workforce is best placed to fulfil both labour force60 and skilled workforce61 gap.

However, the demographic dividend for India comes with a big rider in that unless the young population is adequately skilled and channelized into productive work, this may well become a demographic disaster. Worse, it can foment social unrest as perceived inequities increase.

As the above graph demonstrates, going forward India will have an advantage in replenishing the working age population compared to China, Japan, Korea, Brazil and other countries. A larger share of India’s population is in the 0-14 age group compared to them. Some of the developed countries like Japan, China and Korea already have a larger share of aged people in the population. A relatively larger share of working age population for India would mean the dependency rate (defined as the proportion of the population below 15 years of age and above 64 years of age to the total population) will be less and various studies have pointed out that India will continue to enjoy this demographic advantage until 2040.

Make in India: A national imperative
Manufacturing can help building machines and tools to make agriculture more productive, build and operate infrastructure, support the people who move into urban areas, on the one hand and on the other, produce new products like computers and mobile phones which can lead to the growth of the services sector.

World Bank data on arable land (ha per person)

Declining arable land (ha per person)
Manufacturing is important even when it is small in size, as is the case with India, because it increases income through increases in exports, productivity growth, R&D and broader innovation which raise productivity across the economy, enhances competitiveness.

Moreover, manufacturing is also important to take advantage of India’s demographic bulge. Every job created in manufacturing has a multiplier effect of creating two to three additional jobs in related activities (ancillary industries), including the services sector. Manufacturing is critical to ensure that growth is sustainable by providing value addition to natural and agricultural resources, addressing strategic needs and developing new technologies.15

There is no doubt that manufacturing didn’t reach its potential in India, a level it did in other economies. At the time of independence, manufacturing was at a nascent stage and the presence of private sector was limited. The government stepped in to develop capital goods and set up heavy industries but soon a socialist mindset got into play, bringing in industrial capital goods and set up heavy industries but soon a socialist mindset got into play, bringing in industrial capital goods and set up heavy industries but soon a socialist mindset got into play, bringing in industrial capital goods and set up heavy industries but soon a socialist mindset got into play, bringing in industrial capital goods and set up heavy industries but soon a socialist mindset got into play, bringing in industrial capital goods and set up heavy industries but soon a socialist mindset got into play, bringing in industrial capital goods and set up heavy industries but soon a socialist mindset got into play, bringing in industrial capital goods and set up heavy industries but soon a socialist mindset got into play, bringing in industrial capital goods and set up heavy industries but soon a socialist mindset got into play, bringing in industrial capital goods and set up heavy industries but soon a socialist mindset got into play, bringing in industrial capital goods and set up heavy industries but soon a socialist mindset got into play, bringing in industrial capital goods and set up heavy industries but soon a socialist mindset got into play, bringing in industrial capital goods and set up heavy industries but soon a socialist mindset got into play, bringing in industrial capital goods and set up heavy industries but soon a socialist mindset got into play, bringing in industrial capital goods and set up heavy industries but soon a socialist mindset got into play, bringing in industrial capital goods and set up heavy industries but soon a socialist mindset got into play, bringing in industrial capital goods and set up heavy industries but soon a socialist mindset got into play, bringing in industrial capital goods and set up heavy industries but soon a socialist mindset got into play, bringing in industrial capital goods and set up heavy industries but soon a socialist mindset got into play, bringing in industrial capital goods and set up heavy industries but soon a socialist mindset got into play, bringing in industrial capital goods and set up heavy industries but soon a socialist mindset got into play, bringing in industrial capital goods and set up heavy industries but soon a socialist mindset got into play, bringing in industrial capital goods and set up heavy industries but soon a socialist mindset got into play, bringing in industrial capital goods and set up heavy Industries. The recent FDI policy changes allow higher FDI in sectors including food and beverages, textiles and apparel, and electrical equipment and machinery — to an inflection point. It estimates that these sectors are expected to grow from 12 to 20% annually over the next 15 years.16

The winds of change are blowing. India stands fourth in the Global Manufacturing Competitiveness Index (GMCI) of 2013, prepared by US Council on Competitiveness and Deloitte, behind China, Germany and US. The report further says India will improve its position in the manufacturing competitiveness to second behind China in the next five years.

In short, there is a convergence of ideas regarding the necessity to revive the manufacture sector in India and make ‘Make In India’ a success but what exactly should we be making in India? That is the big question we seek to answer in the next chapter.

McKinsey report finds that rising demand in India, together with the MNCs’ desire to diversify their production to low-cost plants in countries other than China could help India’s manufacturing sector to grow six-fold by 2025 while creating up to 90 million domestic jobs.

# Supporting initiatives

15 National Manufacturing Policy 2011

16 Fulfilling promise of India’s manufacturing sector, McKinsey Report, 2012
Chapter 2

What to make in India

Having come to the conclusion that India must “Make in India” to revive the industrialisation process, spur economic growth and provide productive work to an anticipated huge annual addition of labour force and distress migration from agriculture, the next big question that needs to be asked and answered is “What to make in India?”

India’s National Manufacturing Policy of 2011 identifies six industrial verticals for special attention:

1. Employment intensive industries
2. Capital goods
3. Industries with strategic significance
4. Industries where India enjoys a comparative advantage
5. Small and medium enterprises
6. Public sector enterprises

The logic is clear. Since providing employment is the focus of the policy – which aims at creating 100 million jobs in a decade{}^{14} and improve manufacturing’s share to 25% of GDP – employment intensive industries are the obvious choice. Textiles and garments, leather and footwear, electrical equipment, heavy transport, earth moving machines, mining equipment etc. Capital goods industry is the mother industry for manufacturing and has had sluggish growth in recent years.

The strategic requirements will warrant building national capabilities in sectors like defence equipment, aerospace, railways, solar energy, telecommunication equipment and others. Then there are areas in which India enjoys a comparative advantage due to large domestic demand, technological progress and strong engineering base it has built over the years. Public sector enterprises have to play a major role in certain critical sectors like defence and energy, in addition to the private sector.

Micro, small and medium enterprises are key to India’s manufacturing. The sector contributes about 45% to manufacturing and account for 40% of total export. It is critical also because it offers opportunities for self-employment and jobs across India’s diverse geographies. In fact, entrepreneurship opportunities for self-employment and jobs across India’s diverse geographies. In fact, entrepreneurship development assumes greater importance in this context. The data from the 68th round of NSS indicates a positive hope for employment in manufacturing as the share of manufacturing employment in total employment has improved from 11% in 2009-10 to 12.6% in 2011-12.{}^{15}

Another criterion, domestic demand, can also be considered to select what to make in India. A growing domestic demand provides a good opportunity to invest and expand a particular product. A McKinsey report says India’s national income has increased to significantly create demands for automotive, food and beverages, textiles and apparel, electrical equipment and machinery.{}^{16}

Indian policy makers also look at the manufacturing sector for its capacity to serve as the engine of structural transformation of the economy. Economic Survey of 2014-15 identifies five attributes that enable a sector to play this role and examines India’s manufacturing sector for its suitability to play that role.

One such attribute is high level of productivity, in which the registered manufacturing sector scores very high, but not the unregistered segment which account for 80% of employment but 33% income in the Indian manufacturing industry.{}^{17}

Productivity of the registered sector is 7.2 times that of the unregistered.{}^{18} This makes the registered manufacturing sector a potentially transformational one.

Second attribute is convergence or faster growth in lower productive areas, both in terms of domestic productivity and international productivity. Registered manufacturing is characterised by domestic convergence but not international convergence. Unlike China, India’s registered manufacturing has not witnessed labour productivity converging to global frontiers.

Third element is expansion. For productivity gains to spread through the economy, it is essential for sectors experiencing convergence to absorb resources. Convergence accompanied by contraction of the sector will not ensure economy-wide distribution of benefits. For India to have an inclusive growth, its industrial sector should experience both convergence and expansion. The latter is clearly
missing with industry's share in GDP stagnating at 18% and that of manufacturing at 14-16% since 1978-79. Policy makers are worried that India's de-industrialisation may well have begun. In the case of states, in no state barring Gujarat, registered manufacturing's share of GDP reached 20% and in case of others manufacturing is now declining, even in the poorer states like Bihar and West Bengal.

Fourth attribute of transformational status is comparative advantage. Since Indian workforce is predominantly low skilled – only 24% are formally skilled – the transformational sector has to be relatively low skilled to benefit more from convergence. Registered manufacturing, being highly skill intensive, fails this criterion.

Fifth attribute is tradability. Trade and export have traditionally spurred high and sustained growth in developed economies by providing unconstrained demand for the expanding sector.

This appraisal leaves out the unregistered manufacturing segment because (apart from agriculture) it is one of the lowest productive sectors and has little potential to transform Indian economy. The analysis raises disturbing questions about the registered manufacturing too, observing that it has “limited” potential to transform economy and bring inclusive growth because of two primary reasons – one, it is highly skill intensive while Indian labour force is very poorly skilled and second, lack of expansion of the sector.

It comes to the conclusion that India can either create conditions to ensure that its “existing, unlimited supplies of unskilled labour” are utilisable or make the currently inelastic supply of skilled labour more elastic (which has been declining). Accepting that both are major challenges the survey emphasises that the focus should equally be on ‘Make in India’ and ‘Skilling India’ initiative that the Government of India recently launched.

Make In India Initiative

The government’s ‘Make in India’ initiative, launched in 2014, is aimed at improving manufacturing. The objective is to facilitate investment, foster innovation, enhance skill development, protect intellectual property and build best-in-class manufacturing infrastructure.

It identifies 25 sectors for special attention – automobiles, automobile components, aviation, biotechnology, chemicals, construction, defence manufacturing, electrical machinery, electronic systems, food processing, IT and BPM, leather, media and entertainment, mining, oil and gas, pharmaceuticals, ports, railways, renewable energy, roads and highways, space, textiles and garments, thermal power, tourism and hospitality and wellness.

Some of these sectors go beyond the definition of manufacturing and include services and strategic sectors which India needs to strengthen.

Key Determinants of What to Make in India - Our Approach

Keeping in view the objectives of ‘Make in India’, academic studies and various analysis, we have adopted a holistic approach to identify specific manufacturing industries that have the inherent capacity to grow, add value to the economy and create employment opportunities by examining certain determinants. Based on our own analysis, we have identified five such determinants. The manufacturing industries and products qualifying on these key considerations will have significant strength and scope for growth in India.

These five key determinants are:

- **Leveraging the Domestic Market Potential**
- **Alignment with Comparative Advantage - Labour Absorption**
- **High Productivity - Manufacturing Value Added (MVA)**
- **Total Factor Productivity (TFP) Growth**
- **Strengthening Exports, Competitiveness and Tradability**

**Leveraging the Domestic Market Potential**

Leveraging the potential for products in the domestic market is key to manufacturing. India currently ranks 3rd in purchasing power parity and domestic market size index and ranks 4th in foreign market size index out of 144 countries. Growth in India between 2015 and 2020 is stated to be larger since more people will come into the consumption curve and India will become the fifth largest consumer economy in the world by 2025, giving rise to augmented domestic demand.

With large domestic market and rising income of individuals, products like textiles and apparel, foods and products, electronics and automotive goods have large market potential. In addition, infrastructure needs of the country provide a huge market for construction material and capital goods. A growing domestic demand will provide a good opportunity to invest and manufacture these products.

**Industries with bigger market size in terms of domestic demand are presented below:**

<table>
<thead>
<tr>
<th>Market Size (Rs Crore)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Key Industries</strong></td>
</tr>
<tr>
<td><strong>Construction Material</strong></td>
</tr>
<tr>
<td><strong>Chemicals</strong></td>
</tr>
<tr>
<td><strong>Electronics and IT Hardware</strong></td>
</tr>
<tr>
<td><strong>Automotive Products</strong></td>
</tr>
<tr>
<td><strong>Capital Goods</strong></td>
</tr>
<tr>
<td><strong>Textile &amp; Apparels</strong></td>
</tr>
<tr>
<td><strong>Cams &amp; Jewellery</strong></td>
</tr>
<tr>
<td><strong>Food Processing</strong></td>
</tr>
<tr>
<td><strong>Metals and Metallic Products</strong></td>
</tr>
<tr>
<td><strong>Wood and Furniture</strong></td>
</tr>
<tr>
<td><strong>Pharmaceuticals</strong></td>
</tr>
<tr>
<td><strong>Leather</strong></td>
</tr>
</tbody>
</table>

Source: Author’s compilation based on report from Industry, Planning Commission, and related Ministries. “Construction materials growth is based growth of cement sector”

**Alignment with Comparative Advantage - Labour Absorption**

India has a huge labour force of 502 million that is only second to China (585 million). The labour cost in India is cheaper than developed countries, China, Brazil and Malaysia, but only slightly higher than countries like Indonesia. According to a report of bureau of labour statistics, workers engaged in production activities are paid only US$1.46 per hour worked.

A Planning Commission report says textiles, food processing, wood and furniture, construction material, and metals and metallic product are the five top most labour intensive industries.

---

10 Labour Bureau Report, Government of India, 2014


12 A report by National Council for Applied Economic Research’s (NCAER) Centre for Macro Consumer Research

13 Economic Intelligence Unit, 2014

14 http://www3iis.gov.in/India.htm

We have selected top 10 industries which provide the highest number of employment. The employees considered include skilled, semi-skilled, un-skilled work force; those at managerial, supervisory and senior positions and those employed in related services, like dealerships and after sales services.

### Sector Wise Labour Absorption (Rs Crore)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Textile &amp; Apparels</td>
<td>1.52</td>
<td>1.81</td>
<td>2.15</td>
<td>3.93%</td>
</tr>
<tr>
<td>Handloom and Handicrafts</td>
<td>1.37</td>
<td>1.59</td>
<td>1.78</td>
<td>4.79%</td>
</tr>
<tr>
<td>Automotive</td>
<td>1.10</td>
<td>1.28</td>
<td>1.49</td>
<td>3.43%</td>
</tr>
<tr>
<td>Construction material*</td>
<td>0.83</td>
<td>0.97</td>
<td>1.10</td>
<td>3.18%</td>
</tr>
<tr>
<td>Food Processing</td>
<td>0.70</td>
<td>0.82</td>
<td>1.14</td>
<td>3.77%</td>
</tr>
<tr>
<td>Gems &amp; Jewellery</td>
<td>0.46</td>
<td>0.59</td>
<td>0.82</td>
<td>6.63%</td>
</tr>
<tr>
<td>Electronics and IT Hardware</td>
<td>0.43</td>
<td>0.62</td>
<td>0.89</td>
<td>8.42%</td>
</tr>
<tr>
<td>Wood and Furniture</td>
<td>0.41</td>
<td>0.64</td>
<td>1.15</td>
<td>11.92%</td>
</tr>
<tr>
<td>Leather</td>
<td>0.31</td>
<td>0.43</td>
<td>0.68</td>
<td>9.12%</td>
</tr>
<tr>
<td>Pharmaceuticals</td>
<td>0.19</td>
<td>0.26</td>
<td>0.36</td>
<td>7.36%</td>
</tr>
<tr>
<td>Chemicals</td>
<td>0.09</td>
<td>0.10</td>
<td>0.11</td>
<td>2.25%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1.52</td>
<td>1.81</td>
<td>2.15</td>
<td>3.93%</td>
</tr>
</tbody>
</table>

Source: Industry human resource and skill requirement report, NSDC http://www.nsdcindia.org/nsdcreports, (Employment figures above also comprise employment in related services and both organized & unorganized sector within each industry). *Construction material includes manufacturing of basic metals, bricks and cement.

**Note:** We have also calculated employment in different manufacturing using NSSO employment data (68th Round Employment and Unemployment Survey 2011-12) and using the same growth rates used by the NSDC for their calculation.

There is a substantial difference in the total employment projections between the two. The NSDC projection is higher by 3.75 crore for the year 2022.

### High Productivity - Focus on Manufacturing Value Addition

Economic Survey of 2014-15 highlights that for faster economic growth the focus should be on high productivity activities. For this purpose, we have taken value addition in the manufacturing industry as a key factor.

Value addition is the net output of a sector and it is calculated by adding all output and subtracting intermediate input from it, but without deducting depreciation of fabricated assets. It reflects the value additions that an industry makes.

The table below shows the manufacturing value added for manufacturing industries in the formal sector (as MVA data is derived from the Annual Survey of Industries). We have calculated manufacturing value addition done in each of the industries based on average of three years of ASI data: 2010-11, 2011-12, and 2012-13. It has been highlighted that registered manufacturing, which is 7.2 more productive than the unregistered manufacturing, has the potential for structural transformation.

Pharmaceuticals have highest value addition (34%), whereas gems and jewellery (7%) and food process are among the industries that have lowest value addition. Capital goods, metals and metals product, paper, wood and furniture, electronics and IT hardware, and chemicals are the industry that with a value addition of more than 20% (but not more than 22%).

### Manufacturing Value Added (MVA) - Manufacturing Industries

<table>
<thead>
<tr>
<th>Industries</th>
<th>MVA</th>
<th>Industries</th>
<th>MVA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pharmaceuticals</td>
<td>34%</td>
<td>Rubber and Plastics</td>
<td>18%</td>
</tr>
<tr>
<td>Capital Goods</td>
<td>22%</td>
<td>Textile and Apparels</td>
<td>18%</td>
</tr>
<tr>
<td>Metal and Metal Products</td>
<td>21%</td>
<td>Automotive</td>
<td>18%</td>
</tr>
<tr>
<td>Paper and Printing</td>
<td>21%</td>
<td>Sport Goods</td>
<td>17%</td>
</tr>
<tr>
<td>Wood and Furniture</td>
<td>20%</td>
<td>Leather Industry</td>
<td>17%</td>
</tr>
<tr>
<td>Chemicals</td>
<td>20%</td>
<td>Games and toys</td>
<td>16%</td>
</tr>
<tr>
<td>Electronics and IT Hardware</td>
<td>20%</td>
<td>Food Industry</td>
<td>12%</td>
</tr>
<tr>
<td>Construction Material</td>
<td>19%</td>
<td>Gems and Jewellery</td>
<td>7%</td>
</tr>
</tbody>
</table>

Source: Authors, Annual Survey of India, MoSPI

---

*Economic Survey 2014-15, Vol 1, pg 105*
Total Factor Productivity (TFP) Growth
We have selected the total factor productivity (TFP) growth as a key determinant for analysing manufacturing industries. The productivity (TFP) growth has been taken from KLEMS research project done by ICRIER in collaboration with the RBI based on gross output methodology through incorporating primary inputs of capital (K) and labour (L) along with the intermediate inputs of energy (E), materials (M), and services(S).51

TFP growth in 2000-2008 was higher than that in 1980-2008, reflecting that manufacturing sector showed better efficiency in utilizing the input resources in the recent years. Manufacturing industries that show TFP growth greater than the median value 0.63 in period of 2000-08 are used in our final analysis for identifying key manufacturing industries. These industries include textiles, leather products, chemicals (including pharmaceuticals), rubber and plastics, metals and metallic products, electric and optical equipment and transport equipment.

Exports Competitiveness and Tradability
Export competitiveness and tradability is one of the key factors as it provides a source of unconstrained demand for the growth of an industry. Table on the right shows the world export of manufactured products and its growth over the previous year. The share of manufactured products is 65% in the world export in 2013 (64% in 2012). Fuel (including petroleum products), chemicals, food, automotive products, electronics & IT (including telecom equipment), metals (including ferrous and non-ferrous metals) and textile and clothing are key industries that have substantial share in world exports. The metals and fuel have shown decline in exports; electronics components and textile and clothing have shown the highest growth.

Exports Potential- World Exports of Manufactured Products (2013)

<table>
<thead>
<tr>
<th>Manufactured Products</th>
<th>Value ($ billion)</th>
<th>Growth (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel</td>
<td>3258</td>
<td>-2</td>
</tr>
<tr>
<td>Chemicals</td>
<td>1479</td>
<td>2</td>
</tr>
<tr>
<td>Food</td>
<td>1457</td>
<td>6</td>
</tr>
<tr>
<td>Metals</td>
<td>805</td>
<td>-5</td>
</tr>
<tr>
<td>Automotive Products</td>
<td>1348</td>
<td>6</td>
</tr>
<tr>
<td>Textile and Clothing</td>
<td>766</td>
<td>8</td>
</tr>
<tr>
<td>Pharmaceuticals</td>
<td>522</td>
<td>2</td>
</tr>
<tr>
<td>Electronics, IT and Telecom Equipment’s</td>
<td>3750</td>
<td>13</td>
</tr>
<tr>
<td>Ores and Minerals</td>
<td>389</td>
<td>-1</td>
</tr>
<tr>
<td>Personal and Household Goods</td>
<td>343</td>
<td>8</td>
</tr>
<tr>
<td>Raw Materials</td>
<td>288</td>
<td>3</td>
</tr>
</tbody>
</table>


The government has targeted the value of exports to $900 billion by 2020 and increase the share of exports in the world market to around 3.5% by the same period. One of the major challenges in realising this goal will be the new trading agreements. Three mega agreements are currently being negotiated Trans Pacific Partnership (TPP), Trans-Atlantic Trade and Investment Partnership (TAIP), and Regional Comprehensive Economic Partnership (RCEP). These will add a completely new dimension to the existing global trading system and challenge India’s industry by increasing competition in the region and reducing the import barriers which are generally part of the agreements.

For our analysis of manufacturing industries on exports competitiveness and tradability of products, we have selected revealed comparative advantage (RCA) as a key factor. This index developed by Balassa (1965) shows the strength of a country’s product in the world trade. The RCA index of country A for its product B can be measured as:

\[
RCA_{AB} = \left( \frac{X_{AB}}{W_{AB}} \right) / \left( \frac{X_{A}}{W_{A}} \right)
\]

51 Estimates of Productivity Growth for the Indian Economy 2014, RBI; Available at: https://rbi.org.in/Scripts/PublicationReportDetails.aspx?ID=785
Where XAB and WWB are the values of country A exports of product B and world exports of product B, and where XAT and WWT are the country’s total exports and world total exports respectively. A value of RCA greater than 1 for a product reveals that country holds a revealed comparative advantage in the product. When value of RCA is less than 1, it implies that the country has a revealed comparative disadvantage in the product.

The industries which scored highest Revealed Comparative Advantage (RCA) are textiles and apparel, gems and jewellery, leather, footwear, minerals, chemicals, and metals.

Textiles, gems and jewellery and leather are the major industries in which India is best placed in exports competitiveness. For supporting rapid economic growth, India needs to develop RCA in the key manufacturing industries with high exports potential. Footwear, chemicals and metals are the products in which we can increase our export potential.

A dis-aggregate level analysis reveals that the extent of fragmentation varies greatly across commodities. It is observed that in the year 2007-08, petroleum products, ships and boat building and repair, and aircraft and spacecraft had very high foreign value added share in exports. The import share is well above the average foreign value added share across commodities. Other products with relatively high foreign value added share include fertilizers, coal tar products, inorganic and organic heavy chemicals, non-ferrous basic metals, electric wires and cables and communication equipment. By contrast, sectors like trade, insurance, computer and related services, fruits, vegetables, milk and milk products, and poultry products have relatively low import content in exports (below 5%).

Data Sources
We have relied on data from Government of India, World Bank and other established and credible organisations like ICRIER. The employment levels have been considered from the industry specific reports of the National Skill Development Corporation (NSDC). For considering market size based on consumption and export reliance has been placed on Planning Commission of India’s data base and industry reports – annual reports of departments concerned and industry associations.

Manufacturing Value Added by sectors have been derived from latest available data for three years 2010-11, 2011-12 and 2012-13 of the Annual Survey of Industries (ASI), Ministry of Statistics and Programme Implementation ( MOSPI).The data on exports and revealed comparative advantage (RCA) for India is taken from the World Bank data source that covers all countries. The data on public procurement demand and supply by micro and small enterprises is from the report on Effective Implementation of Public Procurement Policy for Micro and Small Enterprises, 2012.

Findings and Analysis
We have analysed various sectors of manufacturing industry based on performances on five identified parameters. The grouping is based on their scores on a descending scale as the chart below reflects.
**Additional Factor - Contribution of the MSME Sector**

The micro, small and medium enterprises (MSMEs) are important from the perspective of entrepreneurship and employment generation. As per Ministry of MSME, in 2012-13 there are about 467.56 lakh MSME units providing employment to about 10.62 crore people. The sector’s contribution towards manufacturing output is 37.52% and its GDP share is 7.28% [in 2011-12]. The leading manufacturing units in MSME sector include:

<table>
<thead>
<tr>
<th>Leading Manufacturing Industries in MSME Sector (%) Contribution: 2012-13</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Wearing apparel, dressing and dyeing of fur</td>
</tr>
<tr>
<td>2. Food products and beverages</td>
</tr>
<tr>
<td>3. Furniture, nec</td>
</tr>
<tr>
<td>4. Textiles</td>
</tr>
<tr>
<td>5. Fabricated metal products</td>
</tr>
<tr>
<td>6. Others</td>
</tr>
</tbody>
</table>

Source: Ministry MSME, Annual Report 2013-14

In 2014-15, it has been estimated that public procurement stood at Rs 249,219 crore, and the unfulfilled gap between demand and supply by MSME was estimated at Rs 30,919 crore, an average gap of 12% each year. There is a large gap both in quantity and type of items demanded by PSEs and MSME. The closing of this gap is of extreme significance for the competitiveness and growth of the MSME.

**Public Procurement Policy of 2012**

The Public Procurement Policy of 2012, which mandates public sector enterprise/government departments to procure 20% of all products from MSMEs, as a tool can lend vital demand support to the sector. An office memorandum (OM) issued in 2015 expanded the mandate to allow CPSUs to get more than 20% supplies from MSMEs whenever earlier supplies exceeded 20%.

In 2014-15, it has been estimated that public procurement stood at Rs 249,219 crore, and the unfulfilled gap between demand and supply by MSME was estimated at Rs 30,919 crore, an average gap of 12% each year. There is a large gap both in quantity and type of items demanded by PSEs and MSME. The closing of this gap is of extreme significance for the competitiveness and growth of the MSME. The figure below shows the products from the manufacturing industries that are demanded by the public sector enterprises. An enabling environment and support for the MSMEs manufacturing these products will increase competitiveness of MSMEs and boost manufacturing in India.

**Products Linking PSE Demand and Potential MSE Supply**

Industries of Significant Potential for Manufacturing in India

Textile and Apparel

The textile industry has been one of the important ones to contribute towards GDP growth. It contributes about 5% to GDP, and 1.4% to the overall Index of Industrial Production (IIP). Synergistic efforts of all the stakeholders, including GOI, has resulted in the industry growing at 8-9% in the last 2-3 years as compared to 3-4% during the last six decades.

The market size of the industry in 2012-13 was Rs 588,500 crore. The domestic segment was Rs 354,650 crore, whereas exports were to the tune of Rs 233,850 crore in the same fiscal.

The industry is expected to robustly grow and its market size is expected to rise to Rs 870,000 crore by 2017 and Rs 1,000,000 crore by 2022. The domestic demand is expected to grow at a CAGR of 10.2% and the export at 10.4% till 2020 making it an engine for manufacturing inclusive growth. The industry has witnessed a positive productivity growth over the period.

The strength of this industry lies in the strong raw-material base, home-grown design capabilities, availability of relatively trained manpower at internationally competitive rates and lastly, presence of a large and growing domestic demand.

The industry consumes a diverse range of fibres and yams but is predominantly cotton based. India is poised to become a significant player in the global textile economy both as a consumer and as a producer. India’s share in global apparel market is expected to reach 7% in 2020 as compared to 4% in 2011. India stands top in production of jute yarn and is the second largest producer of cotton, cotton yarn, cellulosic fibre/yarn and silk. Moreover, India is fourth largest producer of synthetic yarn/fibre.

Textiles and apparel sector has a significant market potential and labour absorption capacity. This industry has largest presence among MSME manufacturing units. It provides maximum employment in the manufacturing sector with a labour strength of 1.52 crore in 2012-13, as per NSDC data. Future projections show the employment will rise to 1.81 crore by 2017 and 2.15 crore by 2022 with a market size growing at CAGR of 10.2%.

Policy recommendations

- Greater investment to increase industry competitiveness by incentivising large investments, including FDI.
- Decentered economic zones to attract investment in the sector;
- Skill development needs to be scaled up significantly to improve average output and quality and
- Focus on domestic value addition and increase in share of finished products in exports.

Pharmaceuticals

India’s pharmaceuticals sector is the sixth largest globally in terms of size. Its market size stands at Rs 121,015 crore in 2012-13, 53% of which is domestic and the rest exports component. The manufacturing value added is 54%, and the gross value added to the entire manufacturing is 6.78%. India’s generic drugs account for 20% of global export in terms of value, which makes it the largest provider of generic drugs. Presently, 100% FDI is allowed in the sector under automatic route.

Pharmaceutical is one of the high performing knowledge sectors in which India has developed significant technology and innovation. The industry has achieved a global status through firm level strategies, industry initiatives and also appropriate policy support. The soft patent regime prior to 2005 has allowed this sector to strengthen its position. India has now developed exports competitiveness with a revealed comparative advantage of 1.51.

The industry is quite fragmented and comprises of nearly 10,500 units, of which only about 300-400 units are in the medium to large category. Considering large presence of small scale enterprises and linkage with public procurement demand, the industry has significant scope for growth and competitiveness of SME sector.

The sector has a capacity to play a pivotal role in providing generic medicines to the world and also become a global hub for R&D activities. It is also expected to play a pivotal role in domestic healthcare as India’s outlay on health moves up from the present 1.2% to over 3% in the next decade. The governmental obligation is to provide products to the society that can be accessible to the lowest strata and with additional government spend and impetus, the sector will create large number of jobs in pharmaceutical, research and related healthcare industry.

Policy recommendations:

- Introduction of schemes for up-gradation of SMEs to WHO GMP, USFDA/EDQM/TGA and other international standards;
- Support for new generics and bio-generics through setting up of Formulation Development Centres

The Next Leap

Make In India: The Next Leap

Make In India: The Next Leap
Metals and Metallic Products

India is among the largest producers of metal and metals products. The metal industry contributes 9.45% of value addition to the total manufacturing. It has highest TFP growth (TFPG) of 3.77 in post-2000, 9.45% of value addition to the total manufacturing. It has highest TFP growth (TFPG) of 3.77 in post-2000, and holds competitive advantage in exports with RCA of 1.1. The domestic market for metals and fabricated metal products that stood at Rs 110,000 crore in 2011-12 is expected to grow by 18% to reach at Rs 220,000 by 2018.

India has abundant raw materials, particularly iron ore, a strong skill base and a strong expanding domestic market. It is a key sector that meets the requirements of infrastructure including construction (60%) and other key manufacturing industries like automobiles (15%), capital goods and white goods (other-25%). The domestic market potential for such products is very high. With huge investments likely to occur in near future in infrastructure, railways, and defence, the demand of these products is likely to increase. However, from being a net exporter, India has now become a dumping ground for China, Japan, Korea and Russia. The industry, both in world exports and domestic market, has seen contraction due to decline in demand.

The fabricated metal industry is quite fragmented with a large presence of micro and small enterprises. As per the MSME Census of 2006-07, there were about 9.27 lakh registered and unregistered enterprises employing about 31.40 lakh people. The number of registered MSME enterprises has increased by 1.67 lakh from 2006-07 to 2012-13. The sector also assumes significance because of the public procurement demand.

The steel production has grown consistently by 24% over the last five years. The sector is expected to sustain its growth as the Government of India has plans to treble production from the current position to 300MT by 2025.

Policy recommendations

- Higher rate of depreciation (50%) for the sector and duty free imports of used power industry equipment;
- Government sponsored research in collaboration with industry in beneficiation of low grade manganese ore of eastern India with high Fe content and refractory;
- Allocation of captive coal blocks to power plants attached to ferro-alloys producing units and waiver of import duty on anthracite coal from the current level of 5% ad valorem and
- Development of rail linkages to mines for reducing dependence on roads.

Food Processing

Indian food processing industry comprises mainly of milled grain, sugar, edible oil, fruit and vegetable extracts, beverages and dairy products, which are growing rapidly. India’s food processing industry is the fifth largest in the world in terms of production, consumption and export. The domestic market size of industry in 2012-13 stood at Rs 24.7, 680. It has grown annually at 8.4% for the last five years up to 2012-13. The online food ordering business in India is in its nascent stage the share of which would still be in the single digit in terms of overall food ordering business. The market size of it was estimated to be around Rs 5,000-6,000 crore in 2013-14.

India has a strong agricultural base and is a leading producer of food grains, milk, fruits and vegetables.

66 http://indiabusiness.nic.in/newdesign/index.php?parent=industryview&area_Landing%5B5%5D=1
67 Euro monitor International, 2013, Metal Packaging, Wire and Other Fabricated Metal Products in India: ISIC 2899
69 Annual Report 2013-14, Ministry of MSME
70 ibid
71 IBEF
India’s food production is sufficient to take care of its food security and enough of surplus for exports. The industry can provide strong linkages between agriculture, industry and the consumers and has significant potential to boost rural economy of India.

The food process industry only uses 10% of the produce, which is low in comparison to the other countries where it is 30-100%. This would indicate a space to expand food processing. A well-developed food processing industry will increase prices at farm level, reduces the wastage, add value, create employment opportunities and boost export. But for all this we need to create suitable infrastructure, such as cold storages, technologies, equipments and manufacturing/ process facilities near the production centres. Food processing industry employed 70 lakh in 2012-13, and future projections by the NSDC show that it will be able to provide jobs to the tune of 87 lakh by 2017 and 1.14 crore by 2023. There is significant market potential for this industry due to significant demand from a large middle class with a disposable income. The total size of process food industry is expected to reach a level of Rs 1.681,000 crore by 2017. The industry is projected to grow at CAGR of 15% for the next decade. The food processing industry, both on supply and demand accounts, has the potential of becoming a global leader with a positive policy push.

**Policy recommendations:**
- Formulation of comprehensive national policy on food processing to bring about a second Green revolution in Agriculture;
- Overcoming long and fragmented supply chains and providing impetus to logistics and supply chain management;
- Inter-Ministerial Working Group to address cross-departmental issues to improve ease of business in the sector and single window clearance;
- Implementation of GST to remove state-level skew in movement of raw materials and finished products;
- Implementation of Food Security and Safety Act to improve oversight;
- Improve credit access to food processing industries and;
- Promotion of agri-food parks by involving industry participation for better functioning of these parks.

**Automotive Industry**
The Indian Automotive industry is the fastest growing industry with largest automotive market in the world. It had a market size of Rs 436,624 crore in 2012-13, with automobile segment contributing Rs 312,470 crore and auto components Rs 124,154 4 crore. The industry contributes 9.97% in terms of GVA towards the manufacturing sector and has a good positive TFP growth.

According to 12th Five-Year Plan paper, the automotive sector is described as the next sun rise sector of the Indian economy with a CAGR of over 15% during the last 5-7 years. Its contribution to the GDP has risen from 2.77% in 1992-93 to about 7% in 2013-14. The industry has made a rapid progress after the sector was opened up in post-1991 liberalisation. It was later opened up for 100% FDI through automatic route. Since then almost all the global majors have set up their facilities in India. Despite challenges it has developed technological depth.

The competitiveness of auto industry is changing on account of environmental and safety norms. It is estimated that by 2020, Electric Vehicles and other green cars will represent up to one-third of the total global sales in developed markets and up to 20% in urban areas of emerging markets. The Indian auto sector which has close linkages with international auto industries will be deeply impacted by these evolving trends.

The industry in 2012-13 employed about 1.1 crore people, including the ancillary units. According to NSDC, the sector is projected to provide employment to about 1.28 crore by 2017 and 1.49 crore by 2022. The growth potential of industry will continue as the passenger and commercial vehicles segment is expected to grow at a CAGR of 15% till 2022.

**Policy recommendations:**
- Promotion of manufacture and export of small cars, MUVs, two & three wheelers, tractors, components;
- Appropriate Tariff Policy to attract investment;
- Integration of IT in manufacturing and promotion of Automotive Infotronics;
- Closer partnership between Industry, research institutions and academia for innovation and creation of IPR and;
- Rationisation of motor vehicle regulations and Setting up of virtual SEZ and Auto Parks.

Industry has significant scope for expansion both in domestic market and exports. The industry has a share of 0.7% in the global electronic market. India exports electronics goods and components to middle-east and European Union countries, which registered a growth of 5.23% 2012-13. 100% FDI is allowed through automatic route. The domestic demand for electronics and IT hardware is growing rapidly and investments are flowing in to augment manufacturing capacity. India is set to become the fifth largest consumer electronics in the world with a CAGR of 16% and size of $ 104 billion by 2020.

The progress of this industry has been slow because of poor R&D, which is critical for this industry. As per NSDC, the sector employed 4.5 lakh in 2012-13 and is expected to provide jobs to 62 lakh by 2017 and 89 lakh by 2022. To meets the growth needs of this industry a significant skilling of labour is required.

**Policy recommendations:**
- Infrastructure development to ensure long term competitiveness and sustained development of IT hardware and electronics sector. Current incentives to SEZs may be continued and IT hardware packages be developed within SEZs;
- Increase in number of ITIs and redesigning of curriculum to meet changing needs of the industry.
Construction Materials

Construction is the second largest industry in India after agriculture in terms of employment. It accounts for around 10% of India's GDP.

Construction materials mainly comprise of manufacturing of basic metals, bricks, building materials, fittings and cement. In terms of contribution towards the manufacturing sector, it ranks second after petroleum products with 12.53% GVA of the total value of the manufacturing. However, value addition by the industry stands at 19%. Data is not available for its market size, but the entire construction industry was estimated to be Rs 923,400 crore in 2012-13.

Labour absorption – Construction (Rs Crore)

<table>
<thead>
<tr>
<th>Sectors</th>
<th>2013</th>
<th>2017</th>
<th>2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td>4.56</td>
<td>5.94</td>
<td>7.66</td>
</tr>
<tr>
<td>Construction material</td>
<td>0.83</td>
<td>0.97</td>
<td>1.00</td>
</tr>
<tr>
<td>Total</td>
<td>5.39</td>
<td>6.91</td>
<td>8.66</td>
</tr>
</tbody>
</table>

Source: NSDC

The industry is expected to grow robustly on account of housing, real estate and infrastructure development demands. According to forecasts made by the Global Construction Perspective and Oxford Economics India will become the world's third largest construction market by 2025, adding 11.5 million homes a year to become a $1 trillion a year market.

With growth in housing and construction industry the backward linked industries such as electrical and electronic goods, fabricated metal products, paints, wood products and sanitary are also likely to get a significant boost.

Industry has capacity to absorb significant employment. It employed 83 lakh people in 2012-13 and is projected to employ 97 lakh by 2017 and 1.1 crore by 2022.

Policy recommendations:
- More resources need to be made available;
- Skills development programs to meet this technological advancement;
- Scrapping of service tax for under-construction projects, higher tax exemption limits and tax holidays for the industry and
- A structured policy framework with transparency to boost investor confidence.

Gems and Jewellery

The market size of gems and jewellery industry stood at Rs 325,000 crore in 2012-13. The sector has grown at 22% between 2008 and 2013. In terms of contribution towards gross value addition it has a share of 4.82%.

It is one of the fastest growing industries which are highly skill intensive and also export oriented. India is the largest cutting and polishing centre for diamonds and exports about 95% of world's polished diamonds. It has been contributing hugely to the country's foreign exchange earnings. It has a significant competitiveness in terms of exports with a revealed comparative advantage of 3.33.

Gems and Jewellery industry has sufficient skills as well as market but has little raw materials. Skilled labour is available for polishing diamonds, designing and manufacturing gold jewellery. However, the industry relies heavily on the import of these raw materials. The industry has a huge domestic market potential with a high demand for diamond and gold jewellery. It employed 66 lakh in 2012-13 and is expected to provide employment to 59 lakh by 2017 and 82 lakh by 2022. India will need more skilled labour as the industry grows.

Policy recommendations:
- Formulation of policies to promote career opportunity and give boost to training opportunity;
- Setting-up skill enhancement centres;
- Specific incentives and promotion schemes to protect hand-crafted gems & jewellery and develop women entrepreneurship and
- Promoting branded jewellery to augment value addition.

Chemicals

The chemical industry is one of the oldest in the country. India is the third largest producer of chemicals in Asia and sixth in the world. The estimated market size is $ 144 billion. This is one of the most diversified sectors covering more than 70,000 commercial products. India accounts for 16% of the world production of dyestuff and dye intermediaries.

The size of the market is expected to grow to Rs 1,000,000 crore by 2017 and Rs 1,700,000 crore by 2022. Domestic demand is expected to grow at a CAGR of 11% and export at 18% in the next decade.

India now allows 100% FDI under the automatic route. Some products like wax candle, laundry soap, safety matches, fireworks and incense sticks come under the MSME sector in which FDI is limited to 24%.

India has good growth potential for products like polymers, bulk petrochemicals, fertilizers etc. due to infrastructure demands. However, industry faces shortage of basic feedstock and building blocks. Since the industry is a knowledge-based one, the competitiveness of products depends on the supply of new and innovative products. Therefore, the future of the industry depends on research and development.

Policy recommendations:
- Boost productivity and production through cutting-edge R&D facilities and creation of IPRs;
- Promotion of investment for setting up integrated Petroleum, Chemicals & Petrochemical Investment Regions (PCPIRs);
- Investment for upgradation to Environment Friendly technologies;
- Specific Incentives for backward linked industries; and
- Setting-up women entrepreneurship units under Udyadhar from 2012-13.
Wood and Furniture

The wood and furniture industry is among the most labour intensive industries. It employed 4.1 lakh in 2012-13 and is expected to provide jobs to 1.22 crore by 2022.

The industry is largely informal with around 18.01 lakh MSME enterprises and employing about 62.80 people. This sector is important from the perspective of SME and employment as it is less labour intensive and has large capacity to absorb labour.

The industry is slowly moving towards the formal and readymade and branded furniture. The industry stood at Rs. 120,000 crore in 2012 and is expected to grow to Rs. 330,000 crore by 2018.

The sector is expected to grow at around 18% till 2018.

**Policy recommendations:**
- Increasing demand and per capita chemicals consumption and leveraging the significant export potential in segments like agrochemicals, dyes and dyesuffts, and specialty chemicals;
- Setting up world class state owned chemical companies for the manufacture of base chemicals such as phenol, methanol, nitril benzene, ammonia etc.;
- Promotion of MSMEs through consolidation of chemical clusters by shifting downstream capacities closer to their mother plants and
- National Chemical Policy should be implemented.

Leather Products (including footwear)

India is the second largest footwear and leather garment producer in the world. It produces 10% of world’s leather production. The leather industry employed 51 lakh people in 2012-13. It is among the top ten exports earning sectors and has strong export competitiveness with revealed comparative advantage (RCA) of 2.67 in leather and 1.77 in footwear. The micro and small enterprises dominate the sector as they constitute around 70% of total.

It has a strong domestic resource base of raw materials as country has – 21% of world’s cattle and buffalos and 11% goat and sheep population. 100% FDI allowance since 2002 and focused market scheme of the Department of Commerce has led to the expansion of this sector. However, India is yet to tap the market potential, especially in high end value chain.

The industry is critical to economy in view of its massive employment potential, growth potential and exports competitiveness. The future projections show that it will provide jobs to 4.1 lakh by 2017 and 68 lakh by 2022. The industry is expected to grow around 14-15% in the 12th five-year plan and beyond.

Rising disposable income of population along with a relatively low share of leather products in the household expenditure, abundance of raw material and low cost manufacturing base are positives that can shape future growth story of this industry.

**Policy recommendations:**
- Quality Council of India and BIS can provide sufficient support for identifying and establishing quality standards and branding;
- An incentive scheme for product branding;
- Focus on niche markets like women’s fashion footwear, where India has design advantage and cost competitive;
- Need for modernization of the sector;
- Development of integrated clusters with Special Economic Zone facilities and
- Encourage FDI and global benchmarking.

Capital Goods

Capital goods industry is the mother industry of all. It has a multiplier effect on the overall growth as it facilitates faster growth for a whole range of industries by providing machinery and equipment. The sector can be broadly classified as following major segments: Machine tools, Process plant machinery, Electrical machinery, Textile machinery and Earth Moving, Construction & Mining machinery.

The capital goods industry stands third in terms of contribution of GVA with a contribution of 12%. In terms of market size, its total value stood at Rs. 4,25,000 crore in 2012-13, of which domestic market constituted about 84%. The industry is expected to grow at a CAGR of 16% till 2017.

Many of the public sector enterprises, such as BHEL and BEML, are likely to source products from SMEs in accordance with the Public Procurement Policy. Economic growth will require a spurt in demand for capital goods, giving a boost to employment.

In recent years, production of capital goods has not grown fast enough to match domestic demands, leading to a growing dependence on imports. The industry has significant potential for import substitution and a focus on the domestic manufacturing.

**Policy recommendations:**
- Setting up common facilities for the clusters of capital goods across the country for consolidation & scaling up SME units;
- Improving access to finance and extending concession in interest rate (as in some other sectors like textiles)
Handloom and Handicrafts

India has a rich heritage of handloom and handicrafts. Various communities are known for their distinctive handmade products of daily use, art and craft which are made of wood, metal, bamboo and other materials. The sector can play a significant role in absorbing labour migrating from agriculture and support rural economy at low investment.

The handloom and handicrafts industry largely prevails in the unorganised sector, and faces challenges due to lack of adequate financial support. The sector is the second highest employer after textile and apparel among the manufacturing industries. About 1.17 crore people were engaged in handloom and handicrafts in 2012-13. Future projections show that industry will engage 1.39 crore by 2017 and 1.78 crore by 2022.

Policy recommendations:
- A unified “Handmade in India” brand should be promoted and back-end capacity building services and welfare support to producers should be provided;
- Overall policy framework on consolidation, impact evaluation and efficacy of implementation of clusters;
- Social welfare schemes for better living conditions for weavers, artisans and ancillary workers;
- Women workers be recognised as contributors and included in various schemes/programmes in their own individual capacities;
- Financial inclusion and financial literacy support programs;
- Policy to support entrepreneurship, private sector and growth in business and
- Reforms in handloom cooperatives to provide incentives to well-functioning cooperatives and absorbing dysfunctional cooperatives.

Toys and Sports Goods

Toys and sports goods industry is one of the most labour intensive ones having a large presence of MSMEs. According to Sports Goods Export Promotion Council (SGEPC), the industry grew at 10-12% in last five years. Currently, 100% FDI is allowed in the industry.

The industry is around a century old but its contribution in the global trade is less than 1%. The exports stood at $ 239.61 million in comparison to imports of $ 446.78 million in 2013-14. There is a considerable scope for increase in domestic consumption as well as in exports.

Key problems of traditional retailers in the toys and sports industry are infrastructure, regulations, sourcing and finance if these are met they can face competition. Availability of raw material along with product designing and innovation are some of the major challenges facing the industry. The critical raw material such MDF boards, synthetic leather, fur and fabrics are not easily available in the India. Further, the industry is hampered by the inverted duty structure, in which duty on finished products is 10-15% while that on raw materials in the range of 29-70%.

Policy recommendations:
- Focused funding through PPP model;
- Implementation of Comprehensive Sports Policy, 2007 and greater autonomy for federations;
- Removal of FDI restrictions;
- Focused approach on development of electronic toys and games and battery operated toys and
- Expanding product range of MSME toys manufacturers to include sensor based toys, solar toys that are being imported in India.

Summary

As the above findings suggest, construction materials, chemicals, electronics and IT hardware, automotive, capital goods, and textiles and apparel constitute 3/4th of domestic demand in terms of value among all the industries taken for our analysis. Electronics and IT hardware, automotive, food processing, metals, wood and furniture, and pharmaceuticals are among those industries, which are expected to grow robustly with a CAGR of 15% or more.

Textile and apparel, automotive, construction materials and food processing industries provide maximum employment in the manufacturing sector. The sheer size of their employment makes them automatic choice for labour absorption action plan.

Textiles, leather, chemicals, pharmaceuticals, rubber and plastics, metals, electric and optical equipment and transport equipment have a TFP growth higher than the median value of 0.63 in the period of 2000-08, and hence, can significantly contribute to income.

Chemical and textiles and apparel industries have fairly large domestic and exports markets. India also holds a competitive edge in these sectors but they require constant attention of the policy makers to maintain their competitive advantage.

Food and automotive sectors, which are quite large in terms of employment and export market, need to be strengthened with sound policy initiatives. Automotive industry in particular builds its own ecosystem of a large supply chain, including those from the MSMEs, which acts as a force multiplier for creating jobs and economic growth. India is replete with examples of suppliers to automotive companies in India which turned into large global players. Food processing also has the same capability to bring transformational changes.

Pharmaceuticals, gems and jewelry, and metals are the other high growth industries which should attract the attention of the policy makers because of their high export earning potentials. They enjoy comparative advantage in export and are expected to maintain their leading positions for some years to come. Electronics and IT, along with capital goods, are among the highly productive, efficient and faster growth industries having large domestic as well exports markets. Handloom and handicrafts, toys and sports goods and leather are high labour absorbing, require less capital, have large presence in the MSME sector, create significant exports, rural jobs and go a long way in preserving the arts and culture of India.

Additional recommendations for the Toys industry can be accessed in the following report: http://www.nsic.co.in/STUDY/STOYCHINA.PDF
Where else to look for new growth opportunities

Given the fact that about 30 million new labour forces will be entering the market every year, and there could be continued distress migration from agriculture, India needs to create many employment opportunities to keep them productively engaged. In this chapter, we seek to take a close look at areas like large manufacturing units, entrepreneurship, MSMEs, industrial corridors, railways and defence productions, reducing import dependency and trade deficit as an access to new markets, etc. which could provide employment to a large number of unskilled and semi-skilled labour. The Indian government has recently opened up defence sector for FDI and increased substantial budget allocation for the expansion of railways. These will also provide job opportunities and boost manufacturing.

Large manufacturing units as the leaders

Economic kick-start could be led by large manufacturers who have the capital, access to technology, managerial expertise and economies of scale to bring about transformational changes. This, in turn, will boost MSMEs, entrepreneurship and allied services. One of the tools to accelerate economic growth is scaling up manufacturing and its export through SEZs. The tax-free enclave status and single-window clearance mechanism resulted in the mushrooming of SEZs. Following the notification of the SEZ Act, backed by SEZ Rules in February 2006, exports from these tax-free enclaves touched a high of $87.5 billion in 2012-13. The growth in SEZ exports, however, fell from a high of 11.5% in 2009-10 to minus 6% in 2013-14. In fact, out of the total area of 47,804 hectares in 68 notified SEZs, around 66.5%, or 21,310 hectare, was lying vacant as of January 2016. It is important to stimulate investment in SEZs through changes in policy regime and reinstatement of the fiscal incentives carved out under this scheme.

MSMEs as growth drivers

These are typically owner-driven enterprises, varying in size of capital from less than Rs 25 lakh to Rs 10 crore, including both manufacturing and services. This sector provides the foundation for manufacturing in all large manufacturing economies like US, Germany, Japan, China and others. In India too, they have played a major role, contributing 8% to GDP and account for 43% of manufacturing output and 46% of total export of the country.

MSMEs employed about 106.2 million people – both in manufacturing and services – in 2012-13 spread over 46.8 million units throughout the country. Of this, 42.2 million jobs were in the manufacturing and the rest in services. The sector has consistently registered a higher growth rate than the rest of the industrial sector for many years, except for the years during the last slowdown in the economy. Latest data shows an encouraging revival in manufacturing jobs, including those of MSMEs and this represents hope for increasing focus on this sector. Its importance lies in the fact that it provides maximum opportunities for both self-employment as well as jobs, next to agriculture and is considered as the nursery for entrepreneurship and innovation. The units are widely dispersed across the country and produce a diverse range of products to meet the needs of local markets, global market and the national and international supply and value chains.

Labour absorption by MSMEs (in Rs Crore)

<table>
<thead>
<tr>
<th>Year</th>
<th># of Enterprises</th>
<th>Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Manufacturing</td>
<td>Service</td>
</tr>
<tr>
<td>2006-07</td>
<td>3.62</td>
<td>3.20</td>
</tr>
<tr>
<td>2007-08</td>
<td>3.77</td>
<td>3.55</td>
</tr>
<tr>
<td>2008-09</td>
<td>3.94</td>
<td>3.50</td>
</tr>
<tr>
<td>2009-10</td>
<td>4.11</td>
<td>3.66</td>
</tr>
<tr>
<td>2010-11</td>
<td>4.29</td>
<td>3.84</td>
</tr>
<tr>
<td>2011-12</td>
<td>4.48</td>
<td>4.02</td>
</tr>
<tr>
<td>2012-13</td>
<td>4.68</td>
<td>4.22</td>
</tr>
</tbody>
</table>

Source: MSME Annual Report 2013-14

About 95% of MSME units are in the unorganised sector because of which access to institutional finance is limited. As per the All India Census of MSMEs for a period between 2001-02 and 2006-07, the growth in unregistered segment is much higher than the registered segment. The number of registered enterprises grew only at the rate of 2.61% while the unregistered enterprises grew at 30.50% (registered with District Industries Commission, the appropriate authority for MSME registration). According to a World Bank report, over 50% of MSMEs are rural enterprises and widely distributed across low-income states making them an important sector for promoting economic growth and poverty reduction.

A 2013 inter-ministerial report of the Indian government said evidence from across the world provides hope for employment and entrepreneurship to a large section of population. The Indian government has been trying to boost growth of the sector through various initiatives, an important element of which is the 2012 Public Procurement Policy which envisages that 20% of total procurement of central public sector entities will be sourced from MSMEs. This is in effect on a gradual time scale since FY 2012-13 and will become mandatory from FY 2016-17 and give a considerable fillip to growth of the MSME sector.

Entrepreneurship as a big leap

India needs to develop entrepreneurship for generating employment. As the Global Entrepreneurship Monitor (GEM) survey of 2014 shows, India fares poorly among similar economies which are at factor-driven stage of economic
According to the Global Entrepreneurship Monitor (GEM), India fares poorly among similar economies in terms of providing entrepreneurship. Only 2.54% of the population aged 18-64 own new business.
agriculture, education/skill development, sanitation, employment generation etc. A corpus of Rs 500 crore has been set up for the purpose. However, the government needs to avoid slip ups that led to the failure of its earlier initiative – National Innovation Fund of 2010.

Industrial Corridors as pathways to progress

The Government of India is building a pentagon of corridors across the country to boost manufacturing and build India as a global manufacturing destination of the world. While one, the Delhi-Mumbai Industrial Corridor (DMIC) is underway for quite some time now, four more have been conceptualized. These are: Bengaluru-Mumbai Economic Corridor (BMMEC); AmritsarKolkata Industrial Development Corridor (AKIC); Chennai-Bengaluru Industrial Corridor (CIBC), East Coast Economic Corridor (ECEC) with Chennai Vizag Industrial Corridor as the first phase of the project (CVIC).

The DMIC project is very large in scope which spans several states – UP, Haryana, Rajasthan, Madhya Pradesh, Gujarat, and Maharashtra - and is being built by utilising 1,483 km-long high capacity western Dedicated Railway Freight Corridor (DFC) as the backbone. The objective, according to the ‘Make in India’ initiative, is to increase the share of manufacturing in the GDP and create smart and sustainable cities in which manufacturing will be the key economic driver. The DMIC plan includes developing 24 manufacturing cities, besides many key economic driver. The DMIC plan includes developing 24 manufacturing cities, besides many

Employment opportunities in DMIC

<table>
<thead>
<tr>
<th>Sector wise Employment</th>
<th>Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing/Industrial Processing Area</td>
<td>2,000,000</td>
</tr>
<tr>
<td>Employment in agro/food processing and allied infrastructure</td>
<td>2,000,000</td>
</tr>
<tr>
<td>IT/ITES/Biotech Hubs</td>
<td>600,000</td>
</tr>
<tr>
<td>Knowledge Cities</td>
<td>100,000</td>
</tr>
<tr>
<td>Logistics infrastructure</td>
<td>100,000</td>
</tr>
<tr>
<td>Total</td>
<td>3,000,000</td>
</tr>
</tbody>
</table>

Source: DMIC, Centre for Urban Research, Mumbai

In the first phase of DMIC, seven cities are being developed one each in UP, Haryana, Rajasthan, Madhya Pradesh and Gujarat and two in Maharashtra which is expected to be completed by 2019.

The other four industrial corridors, when developed, will similarly boost employment, especially for the unskilled. Most of the unskilled labour migrating from rural areas to urban areas have found job in construction activities. Since the manufacturing, especially those in the organised segment, and services sectors are highly skill intensive, construction provides a big window of opportunity for the unskilled and semi-skilled.

Railways as growth engine

Indian Railways is one of the biggest employers with a 1.3 million-strong workforce. It is world’s largest passenger carrier and fourth largest freight carrier.

It provides substantive opportunity for “Make in India” initiative, and support to the manufacturing sector. The ministry of railways has, in its budget of 2015-16, undertaken four goals to transform railways over next five years. One of their goals is to substantially expand its capacity and modernize infrastructure with objective to increase daily passenger carrying capacity from 2 million to 30 million, increase track length by 20% from 114,000 km to 138,000 km and grow annual freight carrying capacity from 1 billion to 1.5 billion tonnes. 44

The budget for 2015-16 proposes measures to make the railways a prime mover of the Indian economy once again. It envisages an investment of Rs. 8.5 lakh crore over the next five years. The annual plan size has gone up by 52% to Rs 100,011 crore for 2015-16. The foreign investment policy has been liberalised to allow 100% FDI under the automatic route for construction, operation and maintenance of sub-urban corridor projects, high speed train projects, dedicated freight lines, railway electrification, signalling, freight terminals, passenger terminals and MRTS etc.

Indian government has embarked on a massive expansion plan of the railways which includes construction of six high-capacity, high-speed dedicated freight corridors along the Golden Quadrilateral and its diagonals; connect ports and develop a network of freight terminals through PPP model of funding; modernize its logistics operations by setting up logistic parks that provide for warehousing, packaging, labelling, distribution, door-to-door delivery and consignment tracking in order to achieve better efficiency and mass rapid transit systems (MRTS) projects in Ahmadabad, Bengaluru, Hyderabad, Chandigarh, Chennai, Delhi, Jaipur, Kochi, Kolkata, Mumbai, Patna, Pune, Lucknow and Surat.

Investment Plan of Railways: 2015-2019 (in Rs Crore)

<table>
<thead>
<tr>
<th>Project Category</th>
<th>Total Investment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network Decongestion (including DFC, Electrification, Doubling including electrification and traffic facilities)</td>
<td>199,320</td>
</tr>
<tr>
<td>Network Expansion (including electrification)</td>
<td>193,000</td>
</tr>
<tr>
<td>National Projects (North Eastern &amp; Kashmir connectivity projects)</td>
<td>39,000</td>
</tr>
<tr>
<td>Safety (Track renewal, bridge works, ROB, RUB and Signalling &amp; Telecom)</td>
<td>127,000</td>
</tr>
<tr>
<td>Information Technology / Research</td>
<td>5,000</td>
</tr>
<tr>
<td>Rolling Stock (Locomotives, coaches, wagons, production &amp; maintenance)</td>
<td>102,000</td>
</tr>
<tr>
<td>High Speed Rail &amp; Elevated corridor 65,000</td>
<td>65,000</td>
</tr>
<tr>
<td>Station Redevelopment and Logistic Parks</td>
<td>180,000</td>
</tr>
<tr>
<td>Total</td>
<td>830,320</td>
</tr>
</tbody>
</table>

Source: Annual Budget, 2015-16

44 Indian Railways Budget 2015-16
Expansion of the railways offers huge opportunities for manufacturing in India. The railways would require more locos, more wagons and more coaches as the capacity increases. The ‘big ticket’ manufacturing ideas include high horse power and green technology locomotives, commodity specific wagons like auto carriages, signalling systems and train protection systems and track laying and track maintenance machines. The Economic Survey 2014-15 says that increasing the railway output by 1 unit would increase output in the economy by 3.3 units in rupee term. This large multiplier effect has been increasing over time, and it is the strongest in the manufacturing sector. Investing in railways could thus make a meaningful impact on the ‘Make in India’ programme.

While the construction activities will provide opportunity for absorption of low skilled labour, railways’ expansion will also mean the demand for related industries like metal and metal products, construction materials, ICT related electronics and IT hardware etc. propelling these industries into a higher growth trajectory and more jobs for the skilled personnel.

**Defence Production as Force multiplier**

India has opened up the defence sector for the private sector to promote self-reliance, indigenisation and technology up-gradation and develop export capabilities. India’s current defence requirements are largely met by imports – about 60%.

Opening up the sector would allow foreign original equipment manufacturers to enter into strategic partnerships with Indian companies and leverage the domestic markets, besides aiming at global business.

Towards this end in mind the government has allowed up to 49% FDI under the government route and above that on a case-to-case basis. The Defence Production Policy of 2011 encourages indigenous manufacture of defence equipment. The offset policy, which stipulates mandatory offset requirement of a minimum 30% for procurement of defence equipment in excess of Rs 350 crore, introduced in the capital purchase agreements with foreign defence players would ensure that an eco-system of suppliers is built domestically. The licensing regime has also been liberalised to exclude a large numbers of parts/components, castings/forgings etc. from the purview of industrial licensing.

An increase in defence production will only help the Indian manufacturing acquire new technologies, capital and skills, improve demand for related industries besides providing new jobs.

The defence public sector enterprises and ordnance factories with a turnover of $8.46 billion in 2010-11 are expected to grow significantly considering the new initiatives being taken. This sector is currently growing at a CAGR of 13% (from 2007-08 to 2010-11) and is expected to grow at about 20% because of larger procurement and reliance on domestic production. These units provide direct employment to around 200,000 employees.

An increase in domestic defence production will help the Indian manufacturing sector to acquire new technologies, capital and skills, besides providing new jobs. There is strong linkage between defence PSUs/ordnance factories and SMEs, as many of the latter act as ancillary units to which these defence units outsource their various requirements. A growth of domestic production will thus increase large-scale indirect employment through these ancillaries.

The Government of India has set the target of meeting 70% of its defence needs internally in the next five years. This would require the local industry to more than double in size resulting in creation of about one million more jobs, directly and indirectly. The direct new employment will be to the tune of 1.2 lakh. Jobs created indirectly through sub-contractors and other allied agencies will add 5 to 10 lakh.

Additionally, multiplier advantages could accrue in a host of related sectors.**

**Reducing import dependency for self-reliance**

India’s import basket amounted to $450.2 billion in 2013-14. The following table lists the industries in which India’s import of finished goods, including intermediary goods, crosses $10 billion, amounting to $160.8 billion (31.28% of total imports).

### Imported Finished Goods (2013-14)

<table>
<thead>
<tr>
<th>Industry</th>
<th>HS Code</th>
<th>Commodity</th>
<th>Value (US$ Billion)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical and Electronics</td>
<td>85</td>
<td>Electrical machinery and equipment and their parts</td>
<td>29.153</td>
<td>7.97%</td>
</tr>
<tr>
<td></td>
<td>90</td>
<td>Optical, photographic and medical appliances</td>
<td>6.723</td>
<td></td>
</tr>
<tr>
<td>Capital Goods</td>
<td>84</td>
<td>Machinery and mechanical appliances and their parts</td>
<td>30.669</td>
<td>8.3%</td>
</tr>
<tr>
<td></td>
<td>98</td>
<td>Capital goods (project goods)</td>
<td>4.955</td>
<td></td>
</tr>
<tr>
<td>Chemicals</td>
<td>28</td>
<td>Inorganic chemicals</td>
<td>4.797</td>
<td>1.3%</td>
</tr>
<tr>
<td></td>
<td>29</td>
<td>Organic chemicals</td>
<td>17.044</td>
<td></td>
</tr>
<tr>
<td></td>
<td>31</td>
<td>Tanning and dyeing chemicals</td>
<td>3.529</td>
<td></td>
</tr>
<tr>
<td></td>
<td>34</td>
<td>Other Chemicals (Soap, Washing Preparations, Lubricating Preparations, Waxes, Polishing etc.)</td>
<td>0.573</td>
<td></td>
</tr>
<tr>
<td></td>
<td>38</td>
<td>Miscellaneous chemical products</td>
<td>3.827</td>
<td></td>
</tr>
<tr>
<td>Automobiles And Other</td>
<td>87</td>
<td>Vehicles</td>
<td>4.476</td>
<td>1.2%</td>
</tr>
<tr>
<td>Transports Equipment</td>
<td>88</td>
<td>Aircraft, spacecraft, and parts thereof</td>
<td>4.506</td>
<td></td>
</tr>
<tr>
<td></td>
<td>89</td>
<td>Strips, boats and floating structures</td>
<td>6.735</td>
<td></td>
</tr>
<tr>
<td>Rubber And Plastics</td>
<td>39</td>
<td>Plastic and plastic articles</td>
<td>10.104</td>
<td>2.8%</td>
</tr>
<tr>
<td></td>
<td>60</td>
<td>Rubber products</td>
<td>3.430</td>
<td></td>
</tr>
<tr>
<td>Metals And Metal Product</td>
<td>73</td>
<td>Articles of iron or steel</td>
<td>5.996</td>
<td>1.6%</td>
</tr>
<tr>
<td></td>
<td>74</td>
<td>Copper and Articles thereof</td>
<td>3.910</td>
<td></td>
</tr>
<tr>
<td></td>
<td>75</td>
<td>Nickel and articles thereof</td>
<td>0.905</td>
<td></td>
</tr>
<tr>
<td></td>
<td>76</td>
<td>Aluminum and articles thereof</td>
<td>3.087</td>
<td></td>
</tr>
<tr>
<td></td>
<td>78</td>
<td>Lead and Articles thereof</td>
<td>0.525</td>
<td></td>
</tr>
<tr>
<td></td>
<td>81</td>
<td>Products of other base metals</td>
<td>0.284</td>
<td></td>
</tr>
<tr>
<td></td>
<td>82</td>
<td>Tools implements, cutlery, spoons and forks</td>
<td>0.944</td>
<td></td>
</tr>
<tr>
<td></td>
<td>83</td>
<td>Articles of base metals</td>
<td>0.639</td>
<td></td>
</tr>
</tbody>
</table>

**India’s Total Import**

$450.199  160.804  35.28%

Source-Department of Commerce, Government of India

**Make In India: The Next Leap**

Indigenisation of defence production will generate one million jobs in five years.

Where else to look for new growth opportunities

**Note:**

- The Manufacturing Plan, 2012; Planning Commission of India.
- Creating a Vibrant Domestic Defence Manufacturing Sector, 2012; by Boston Consultancy Group.
There is a silver lining though. India has a positive trade balance with the western countries, mostly OECD countries including UK, US, on account of its exports of gems, jewellery and textiles. The underlying message is if these industries can be strengthened further it will facilitate India’s dollar earning. Another striking feature of the western hemisphere is its ability to aid Indian economy. It is important to take note of their contribution in net services exports ($ 73 billion in FY2014), remittances ($ 65 billion) and FPI and FDI inflows ($ 26 billion).

Trade agreements aimed at facilitating export of manufactured goods can be negotiated and markets created to absorb the additional productions, thereby enhancing the forex reserve. The deficit can work to India’s advantage in creating greater market access. The fact that India has a large trade deficit vis-a-vis China is a concern. For example, India has large imports from China of bulk pharmaceutical drugs. Due to our cost disadvantage, import substitution may not be immediately feasible in this industry. Due to the government’s trade policy, industries with high levels of import substitution and exports will be given trade facilitation benefits. The government has targeted the value of exports to be $ 900 Billion by 2020 and increase the share of exports in the world market to around 3.5% by the same period.

The three mega agreements that are currently being negotiated namely the Trans Pacific Partnership, Trans-Atlantic Trade and Investment Partnership and the Regional Comprehensive Economic Partnership (RCEP) add a completely new dimension to the global trading system. India is a party to the RCEP negotiations. The mega agreements are bound to challenge India’s industry in many ways, for instance, by eroding existing preferences for Indian products in established traditional markets such as the US and EU and establishing a more stringent and demanding framework of rules. Indian industry needs to gear up to meet these challenges for which the Government will have to create an enabling environment.

On a closer look, it can be assessed that India runs a negative deficit with the countries from which it imports machinery, oil, coal and gold, items which are essential for the economy. Oil supplying countries together constituted $ 500 billion trade deficit, while coal suppliers – Australia and Indonesia constituted $ 74 billion and $ 46 billion, respectively. China continues to export machinery goods, appliances and goods while Switzerland is a gold exporter to India.
Chapter 4

Drivers for ‘Make in India’

How India proceeds to improve its manufacturing base, and thereby, reversing the declining trend depends on how it tackles various hurdles and challenges that stare at the face. Given the fact that the manufacturing sector has always been small and never grew to its potential, the challenges are many and long entrenched, several of which are systemic in nature. The business environment is marked by cumbersome processes and multiplicity of controls. The skill levels of the workforce are poor and the technological development and innovation virtually non-existent. The need, therefore, is to identify and address the key constraints.

Bridging the Infrastructure Gaps

Lack of adequate physical infrastructure (roads, ports, airports, railways, water and energy etc.) has been identified as one of the biggest challenges that India faces. Frequent power cuts and below par transport are particularly worrisome. Poor infrastructure adds its own costs to businesses, discourages entrepreneurship, and reduces competitiveness and profits. A well-developed quality infrastructure, on the other hand, reduces distance and integrates markets at a lower cost.162

There is sufficient empirical evidence to show that improvement in the quality of infrastructure significantly improves growth and productivity. For example, a World Bank study163 finds that a unit change in transport index (improvement in transport infrastructure) leads to a 1-2% increase in GDP.164

The Global Competitiveness Report of 2014-15 shows India poorly among the BRICS and other developing countries on the quality of infrastructure with a score of 3.7 (out of 7), and ranked 90 among 144 countries.165

Quality of Infrastructure 2014-15

<table>
<thead>
<tr>
<th>Country</th>
<th>Score</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brazil</td>
<td>3.98</td>
<td>76</td>
</tr>
<tr>
<td>China</td>
<td>4.66</td>
<td>46</td>
</tr>
<tr>
<td>Germany</td>
<td>6.09</td>
<td>10</td>
</tr>
<tr>
<td>India</td>
<td>3.7</td>
<td>90</td>
</tr>
<tr>
<td>Japan</td>
<td>6.13</td>
<td>6</td>
</tr>
<tr>
<td>Korea</td>
<td>5.74</td>
<td>14</td>
</tr>
<tr>
<td>Malaysia</td>
<td>5.46</td>
<td>25</td>
</tr>
<tr>
<td>Russia</td>
<td>4.82</td>
<td>39</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>6.01</td>
<td>10</td>
</tr>
<tr>
<td>United States</td>
<td>5.82</td>
<td>12</td>
</tr>
</tbody>
</table>

Source: WEF Global Competitiveness Index 2014-15

The mid-term appraisal of the 11th five-year plan noted that the country has been adversely impacted on an average by 1-2% points due to infrastructure bottlenecks. High transaction costs arising from inadequate and inefficient infrastructure prevent economy from realizing its full growth potential. Infrastructure constraints are adding to a cost disadvantage of 6-8% for Indian manufacturers. Empirical study by Gupta et al reveals that those manufacturing sectors are hurt that are largely dependent upon the availability of infrastructure. Indian states with poor infrastructure have not performed well in the manufacturing sector.166

The plan panel report referred to earlier also pointed out that India needs to invest on an average 10% of GDP till 2017 (from about 5-6% level) which works out to be Rs 65,79,660 crore (nearly 1 $ trillion), after adjusting for inflation.167

Investment Required in the Infrastructure (12th Five Year Plan)

Investment as % of GDP

Source: Mid-term appraisal of 11th Five Year Plan, Planning Commission of India

The subsequent plan proposed to meet half of this, Rs 32.5 lakh crore, through budgetary support, Rs 18.92 lakh crore from debt/equity/FDI that will be available during the period of 2012-17 and Rs 13.6 lakh crore through various capital market reforms. Yet, there was a shortfall of Rs 5.80 lakh crore.168 Investment by the private sector will be critical to bridge this gap.

In addition to this, India needs to improve digital connectivity which has a significant and sizable impact on all manufacturing industries, in particular transport equipment and textile. India ranks very poorly (121st) in the Global Competitiveness Report 2015 and is one of the world’s least digitally connected countries with only 15% of the population having access to internet on a regular basis.

Sufficient and Regular Power Supply

Regular power supply is considered as one of the major constraining factors.169 Empirical study by Gupta and others170 shows that manufacturing industries that are more dependent on power infrastructure have grown less as compared to other industries.

---

162 World Economic Forum, Global Competitiveness Index 2014-15
164 Source: WEF Global Competitiveness Index 2014-15
165 India poorly among the BRICS and other developing countries.
167 Mid-term Appraisal of 11th Five Year Plan, Planning Commission, GDP
168 Planning Commission Working Sub-Group on Infrastructure Funding Requirements and its Sources over the implementation period of the Twelfth Five Year Plan (2012-2017)
169 OECD Economic Survey: India, 2014
India has a power supply shortage of 8.9% at the consumer level.\(^{108}\) This is largely because of significant transmission and distribution (T&D) loss. It is estimated 21.14% was lost in T&D in 2011, which is among highest in the world.\(^{109}\) Further, thermal power accounts for nearly two-third of power supply and is dependent on regular supply of coal. As against a requirement of around 614 MT of coal annually, there is currently a deficit of 165 MT in supply.

The measures for improving availability of electricity would include restructuring of state electricity boards, many of them are heavily cash strapped. The viability for producers by having an equitable tariff rate needs attention along with the creation of an efficient market for inputs like coal.

India needs to look at renewable energy as a source of green energy to replace the fossil fuels. Given the plans of both private and government sectors in creating new capacity in wind, solar, hydro and bio mass, we will see this sector playing a major role in meeting India's energy demands.

**Investment**

Poor investment in manufacturing, which had its origin in the colonial era policies and a 'closed' economic paradigm that post-independent India had until 1980s, was one of the main reasons for India to jump from an agriculture-led economy to the services-led one. Manufacturing has remained low, never growing beyond 16%.

The National Manufacturing Policy of 2011 seeks to increase the share to 25% and generate 100 million jobs by 2021. For this to happen India needs to find resources to invest in building manufacturing capabilities, particularly in capital goods, and technologies, improve innovation through R&D spends and lending a helping hand to micro, small and medium enterprises which fail to reach economies of scale due to lack of funding.

Centre for Monitoring Indian Economy (CMIE), a leading Indian business and economic database, has been tracking how manufacturing projects routinely scrapped or stalled due to lack of administrative clearances, availability of land etc. In the December 2014 quarter, it said the manufacturing sector witnessed scrapping of 57 projects with investments worth Rs 73,300 crore. Power sector took the second largest hit with 7 projects worth Rs 20,700 crore being stalled. This was an improvement as the rate and magnitude of scrapping and stalling of investment was on a declining trend.

Source of investment is no longer a constraint with India continuing to be the second most attractive investment destination country, next to China. Recent years have witnessed Indian businesses preferring to invest outside due to various reasons that include poor business environment but the trend can easily be reversed with right policy changes.

**Technology Transfers**

Technology drove manufacturing growth worldwide and will continue to do so. India's performance in developing new and improved technologies has been dismal, except for biotechnology and pharmaceutical sector. Technology improves productivity and provides a competitive edge. India largely depends on import of advanced plants and machinery, IT hardware and most other capital goods.

---

\(^{108}\) Power supply deficit from Fy 2009-10 to 2012-13 as per Central Electrical Authority.

\(^{109}\) World Bank Database.
and this dependence is growing. On the other hand, it is exporting raw materials in return, which is creating adverse trade balance. Traditionally, Indian business has relied on trade, which is a synonym for being risk-averse; Indian business has preferred to buy technology from the global marketplace rather than invest in creating home-grown technology. While this approach has the advantage of quick uptake of production, the downside is that the purchased technology is usually not the latest cutting edge but on the verge of becoming obsolete.

Considering the low innovation and research in India, technology transfer can provide an alternative in the short run but care must be taken to ensure that the technology has plenty of usable life still remaining. Foreign direct investments could be a good source of technology transfers to propel manufacturing growth. There is strong evidence that R&D spills over from the industrialized countries to developing countries have positive effects on productivity growth. India, therefore, needs to adopt policies that could leverage global knowledge networks and technology transfer to overcome its handicap.

The 12th plan paper recognises the need for India to increase its technological depth in its manufacturing sector to improve competitiveness and trade balance. Strategies are required to induce more depth and value-addition in India’s manufacturing that leverage FDI and is compatible with an open global trade regime. India could focus on developing green technologies which would have an increasing demand worldwide but it requires relatively higher initial investment and also has a high incremental capital output ratio (ICOR).

### Regulatory/Institutional Reforms

National Manufacturing Policy of 2011 says, on an average, a manufacturing unit needs to comply with nearly 70 laws and regulations, file as many as 100 returns in a year. In the World Bank’s Doing Business 2015 report, India dropped down two places to 142 among 189 countries in the measure of ease of doing business. In various parameters relating to regulations that enhance business activity or constrain it during the life of a business, India ranked miserably — starting a business (rank-158), getting electricity connection (rank-137), registering property (rank-121), getting credit (rank-30), paying taxes (rank-156), trading across borders (rank-128), resolving insolvency (rank-137), etc.

A business environment which is more prone to corruption hinders manufacturing sector. India ranked 85th among the 175 countries in the global graft watchdog Transparency International’s Corruption Perceptions Index of 2016. India has dropped down two places to 142 among 189 countries in the measure of ease of doing business in 2015. It also ranked 85th among the 175 countries in the global graft watchdog Transparency International’s Corruption Perceptions Index of 2016.

Business regulations, two-thirds of which apply to typically manufacturing firms are made and administered by the states. The OECD 2007 finding shows that the states which are able to improve their business regulatory environment, such as removing barriers to entrepreneurship and trade, attract higher investment.

In order to make India an investment hub the foremost important step would be to create efficient administrative machinery. Studies show that tardy and plethora of procedures put constraints on the growth of Indian manufacturing sector. Delay and non-transparency in approvals increases the cost of a project. The important aspects of an enabling business environment which will promote entrepreneurship and attract foreign manufacturers are time-bound regulatory clearances and ease of starting a business.

### Ease of Doing Business in India

<table>
<thead>
<tr>
<th>Business Procedures</th>
<th>Procedures</th>
<th>Days</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Permit</td>
<td>25.6</td>
<td>185.9</td>
<td>184</td>
</tr>
<tr>
<td>Getting Electricity</td>
<td>7</td>
<td>105.7</td>
<td>157</td>
</tr>
<tr>
<td>Registering a Property</td>
<td>7</td>
<td>47</td>
<td>121</td>
</tr>
<tr>
<td>Enforcing a Contract</td>
<td>46</td>
<td>1420</td>
<td>186</td>
</tr>
</tbody>
</table>

Source: Doing Business Report 2015


— Radhika Kapasi 2014.


— National Manufacturing Policy of 2011 specifically speaks the following measures:

- Rationalisation and simplification of business regulations
- Simple and expeditious exit mechanism for closure of sick units while protecting labour interests
- Financial and Institutional mechanisms for technology development, including green technologies
- Industrial training and skill up gradation measures
- Incentives for SMEs
- Special Focus Sectors
- Leveraging infrastructure deficit and government procurement - including defence
- Clustering and aggregation: National Investment and Manufacturing Zones (NIMZs) and appropriate trade policy.

### Skilled and Quality Workforce

To take advantage of the demographic advantage that India holds over other countries, it needs to build a strong pool of human capital with adequate and sophisticated skills. Studies have shown that a higher human capital measured in adult literacy rate has a positive impact on the productivity of the formal sector manufacturing, though not in informal manufacturing sector.

Skill development is equally important. To develop a skilled labour force, Planning Commission recommendation to expand the scope and outreach of vocational education in secondary and higher secondary schools, reforming the government Industrial Training Institutes (ITIs) and private Industrial Training Centres (ITCs), raising the standard of polytechnics and improving quality of both publicly and privately provided higher technical education etc. need to be implemented at the earliest.
Promoting Entrepreneurship and Competitiveness of MSMEs

Entrepreneurship Monitor (GEM) 2014 survey shows its peers in the factor-driven economy like Kuwait, India has a very poor entrepreneurship level. Among Iran, Vietnam and Philippines, only 2.54% of people joining the workforce every year. Global Entrepreneurship Monitor (GEM) 2014 survey shows India has a very poor entrepreneurship level. Among India's projected demographic dividend can be rapidly converted to a demographic nightmare if skills are not provided to both new and existing workforce.

Promoting Entrepreneurship and Competitiveness of MSMEs

Promoting entrepreneurship will go a long way in absorbing both educated and uneducated workforce in a productive way and will be key to addressing India's challenge of providing jobs to the millions joining the workforce every year. Global Entrepreneurship Monitor (GEM) 2014 survey shows India has a very poor entrepreneurship level. Among its peers in the factor-driven economy like Kuwait, Iran, Vietnam and Philippines, only 2.54% of people in 18-64 age group own new business while the average for the group is 12.6%. Similarly, in established business ownership, India scored 3.73% while the average for the peer group was 12.7%.

A large informal manufacturing sector, that mainly comprises of MSMEs, need to be more competitive. Linkages of MSMEs to more dynamic formal manufacturing sector and public sector would help. Effective implementation of Public Procurement Policy of 2012, which necessitates centre public sector enterprise/government departments to procure at least 20% of products from MSMEs, can drive growth and productivity in the informal manufacturing.

These entrepreneurs need insurance cover. There is none like a total insurance cover for their business risk. With a slight tweaking in the insurance policy it can be extended to include personal accident risk too. An insurance platform administered in conjunction with ministry of MSMEs can change the risk profile of this sector drastically.

The other is access to finance without collateral. The advent of small banks will hopefully change this sector drastically since their loan ticket size will be less than Rs 100,000. Banks at present are unable to perform this role.

Research and Development (R&D) and Innovation

It is well established that there exists a positive relationship between a country's R&D and its productivity growth. Therefore, it is crucial that a country spends more on R&D. India just spends 0.8% of GDP on this, which is the lowest among BRICS and other countries. It is estimated that in 2012, the gross expenditure on R&D in India was $ 41.3 billion against China’s $198.9 billion. It is because of this that India lacks in knowledge creation leading to innovation as ‘outputs in terms of patents and non-technological innovation, as reflected in trademark counts, are still limited.

The private sector investment in R&D is very little as it is not seen as something that would provide immediate business gains. Only a handful of big corporate entities in India invest in R&D while multinationals like Samsung spend more than India’s entire R&D spending.

Tax Reforms

India has a total tax rate of 61.7% on commercial profit, which is slightly less than Brazil (69%) and China (66.6%), but more than the other developing countries like Malaysia (24.5%) and Indonesia (36.5%). The direct tax on the profit in India is 33%, which is about 10% more than these developing countries. Higher tax reduces competitiveness of manufacturers of goods in India. Further, complexity of the tax regime, along with recurrent changes in tax laws, augments the problem.

Tax reforms such as Goods and Services Taxes (GST), along with rationalization of tariff and non-tariff infringement, can be key enabler to improving the growth and competitiveness of Indian manufacturing sector. India is poised to introduce GST from next financial year, which will rationalise indirect taxes. Corporate tax is also being lowered from 30% to 25% over the next five years. However, tax to GDP ratio has remained at 9-12% of GDP since 1980.
mainly because of poor tax base, high rates and ineffective enforcement, among other reasons. Less than 3% of population in India pay income tax, is in sharp contrast to, say US where the numbers are more than 50%. Effective rate for corporate tax in India is only 23%, while the official tax rate is 30%. Policy measures are needs to expand the base and improve effective tax rates.

Protection of Intellectual Property Rights and Control on Illicit Market

This is not just important but the most important phenomena to help entrepreneurship grow. Unfortunately, the rush to keep the domestic pharma sector in business has made it extremely difficult to protect intellectual property rights and keep a check on steadily growing illicit markets. A study by TARI estimates that the average size of illicit market of counterfeited products for seven key manufacturing industries in India is around 20% of the total market, causing a sales loss of Rs 72,969 crore in 2011-12 for these industries.

A study by TARI estimates that the average size of market of counterfeited products for seven key manufacturing industries in India is around 20% of the total market, causing a sales loss of Rs 72,969 crore in 2011-12 for these industries.

<table>
<thead>
<tr>
<th>Industry Sector</th>
<th>Size of Illicit Market (%)</th>
<th>Loss of Sales (Rs Crore)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auto Components</td>
<td>33.7</td>
<td>9,148</td>
</tr>
<tr>
<td>Alcoholic Beverages</td>
<td>16.7</td>
<td>5,866</td>
</tr>
<tr>
<td>Computer Hardware</td>
<td>27.9</td>
<td>4,725</td>
</tr>
<tr>
<td>FMCG-Packaged Foods</td>
<td>21.7</td>
<td>20,578</td>
</tr>
<tr>
<td>FMCG-Personal Goods</td>
<td>31.6</td>
<td>15,835</td>
</tr>
<tr>
<td>Mobile Phones</td>
<td>29.4</td>
<td>9,062</td>
</tr>
<tr>
<td>Tobacco</td>
<td>20.2</td>
<td>8,965</td>
</tr>
<tr>
<td>Total Loss</td>
<td>20.2</td>
<td>72,969</td>
</tr>
</tbody>
</table>

This potential loss to industry has several consequences, including low sales to capital ratio, shrinking opportunities for organised labour, contraction of money available for public works through taxation, and perhaps the most insidious being increase in the level of corruption as a direct consequence of a cash economy as most illicit trade tends to be. Presence of illicit markets poses a tough challenge to create conducive investment climate which technology can help mitigating it.

Improving Health Infrastructure

The quality of health infrastructure in India is poor. Public expenditure on health is just 1.34% of GDP, which is among the lowest in the comparable countries and need to go up to 6% of GDP. The large manufacturing sector employees are outside the coverage of social security, including healthcare system, which make the employees of this sector more vulnerable. This could have adverse effect on labour productivity. The government policies need to bring informal sector employees under the public health care system.

Comparative Strength of Healthcare System

<table>
<thead>
<tr>
<th>Country</th>
<th>Regulatory/ Institutional Reforms</th>
<th>Technology Transfer &amp; R&amp;D</th>
<th>Infrastructure</th>
<th>Investment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>8.56</td>
<td>7.07</td>
<td>9.28</td>
<td></td>
</tr>
<tr>
<td>China</td>
<td>4.5</td>
<td>2.18</td>
<td>3.50</td>
<td></td>
</tr>
<tr>
<td>India</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td></td>
</tr>
</tbody>
</table>

Source: Deloitte, 2015 Global Manufacturing Competitiveness Index

How will the drivers work

Using the Quadrant Scenario Development Tool used by economists worldwide, these drivers have been arranged in different quadrants on a matrix of relative importance and time continuum.

Top right quadrant shows drivers that are most important but come into play in the long run. Bottom right quadrant shows drivers of lesser importance which also come into play in the long run. On the other hand, top left quadrant refers to most important drivers that come into play in the short run and those in the bottom left are the ones which are less important but also come into play in the short run.

Investment, technology transfers and regulatory/institutional reforms are the most important drivers of manufacturing growth in India in the short run.

Investment remains a critical driver for growth of manufacturing though with an improvement in business sentiment following a change of guard at the centre and India’s continued run as one of the most favoured investment destinations it is no longer a major constraint. Textile and apparel, food processing, automotive, construction, chemicals and electronics and IT hardware industries present great promise in terms of market potential and employment growth. Therefore, greater focus on these sectors can greatly affect manufacturing sector growth and generate adequate jobs to employ the increasing shift of labour from agriculture sector.

\( \text{Illicit Markets: A threat to our National Interests, FICCI, 2015} \)
By opening up defence sector to FDI and mobilising additional resources through budgetary provisions, which includes setting aside Rs 1.7 lakh crore of public funds for infrastructure and proposed strategic sale of PSUs etc., India is moving towards a heightened activity in manufacturing.

Technological handicap can be addressed in the short run through FDI. Labour productivity has been mostly constant, even decreasing marginally in recent years, and hence, absorbing high-tech processes into India’s manufacturing can be possible in the short run. Regulatory and institutional reforms related constraints too can be addressed quickly. Indian government has already taken some measures with time-bound administrative clearances in some areas like green clearances, amendments in land acquisition law, auctions of natural resources like coal and other minerals which will give a boost to minerals-related manufacturing and power generation.

Critical long term drivers for the manufacturing sector are infrastructure (road, rail, ports, airports, energy etc.), skill development, R&D and innovation, protection of IPR and development of competitiveness of MSMEs. Development of physical and digital infrastructure is a time-consuming exercise given the wide gaps and administrative delays. A beginning has been made by setting aside large sums of public money for infrastructure, setting up a national fund and infrastructure bonds to mobilise resources and regulatory changes to quicken the pace of administrative clearances but these will take a long time to produce the desired result. Skill development is another critical area which suffers from lack of capacity. According to National Council on Skill Development, as against an annual addition of 12.8 million new workforces, skill training capacity is only for 3.1 million, leaving 75% of potential entrants with no opportunity to acquire skills.

Innovation has suffered because of poor investment in R&D, among other reasons. India spends less than one-fifth of what China does or some of the leading multinational companies do. Improving investment on R&D is an issue with little participation of the private sector. India’s IPR regime is at a nascent stage with a national policy still in the works. Enforcement of IPR and commercialisation of patented products are the other aspects which can’t be achieved in the short run. In terms of value addition, again, metals, pharmaceuticals, textiles and apparel, food processing, automotive, wood, electronics & IT hardware and capital goods industries have shown greater capabilities. Therefore, higher R&D in these industries will result in greater overall productivity of the manufacturing sector.

Similarly, it will take effort and time to develop entrepreneurship, which is below par among the peer group of countries, and make MSMEs competitive. MSMEs being in the informal sector have difficulties in accessing institutional funding and technologies to achieve economic of scale. Besides, MSMEs are handicapped because of low productivity, beset as it is with low productive labour.

Among the relatively lesser drivers that can drive manufacturing in the short run are tax reforms and control of illicit markets. Apart from education and skill training, productivity will improve with better healthcare and social safety nets. Labour productivity is greatly influenced by the attitude to work and value the society puts on dignity of labour. Given the fact that 94% of India’s labour force work in the informal sector without any social securities and abysmal level of government’s attention on it, this remains a big constraint.
What could be disruptive: Differentiating Factors and Role of Technological Innovations

With a rapid change in technologies and innovations, the manufacturing scene is changing too. New trends and new technologies are rewriting the rules of games. Emergence of internet, 3D technologies etc. have brought about a paradigm shift in the way businesses are being run and manufacturing activities are carried out. What are India’s advantages and how can it leverage its position to improve its footprints in manufacturing? What are the emerging technological challenges and how is India trying to adapt? These are the questions that this chapter will seek to answer.

Proximity to Large Consumer Markets
Countries with large consumer markets, particularly the Asian ones, will hold the key to manufacturing in future. According to McKinsey research, annual consumption will increase in the developing economies by up to $ 30 trillion by 2025, more than double from $12 trillion in 2010. These countries are expected to account for 70% of manufactured products. These countries will drive the consumerism as they are likely to have 60% of the world’s population (3.2 billion people) by 2050.109

A PwC report highlights middle class in India earning more than Rs 300,000 a year will nearly double from 25 crore in 2010 to 49 crore in 2021. With the rising income, spending on the personal goods and demand for higher end products such as television, mobiles, automobiles etc. is expected to grow significantly in these markets. India’s emerging and middle-class segments will open up new opportunities for businesses. Companies with base in emerging economies like India will benefit from the proximity to large consumer markets.

India’s Population Economic Distribution

<table>
<thead>
<tr>
<th>Household Income / year (Rs)</th>
<th>Economic Class</th>
<th>Population 2010 (118 crore)</th>
<th>Estimated population 2021 (155 crore)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 850,000</td>
<td>Upper Middle</td>
<td>8</td>
<td>18 (14.5%)</td>
</tr>
<tr>
<td>300,000-850,000</td>
<td>Middle</td>
<td>17</td>
<td>30 (22%)</td>
</tr>
<tr>
<td>150,000-300,000</td>
<td>Emerging Middle</td>
<td>47</td>
<td>57 (42%)</td>
</tr>
<tr>
<td>&lt;150,000</td>
<td>Lower</td>
<td>46</td>
<td>29 (21%)</td>
</tr>
</tbody>
</table>

Source: Profitable growth for the emerging middle, PwC 2012

Companies with base in emerging economies like India will benefit from the proximity to large consumer markets. For India, the large consumer base acts as a ‘pull’ factor for multinational or foreign companies to set up factories or units, which in turn, has a multiplier effect on the entire economy.

Value Addition in Manufacturing - Servitisation

Manufacturers are increasingly looking for creating value in pre and post-production activities for profit. Capturing value from manufacturing is, therefore, increasingly about capturing value throughout the lifecycle of products.110

The pre-production (e.g. R&D and design) and post-production (marketing and logistics) segments are where relatively high levels of added value are concentrated. Services and after-sales services (such as customer support) are the activities which generate the most value addition for the manufacturer.111

Servitisation, which means offering quality services to consumers along with a product from the manufacturer to foster and develop a long term relationship, will hold the key for manufacturers.112 The share of services in some manufacturing sector revenue and employment is as high as 55%.113 Demand for services is particularly capital intensive. The US had the greatest proportion of manufacturing firms offering services in 2011 (59%). In China, servitisation increased to 20% in 2011 from paltry 1% in 2007.114

With an increase in income of the Indian households, demand for products with better services will certainly go up. Services such as repairs and maintenance which are linked to manufacturing have the capacity to absorb the country’s large workforce.

Sustainable Manufacturing

Sustainable manufacturing minimizes negative environmental impacts, conserve energy and natural resources, are safe for employees, communities, and consumers and are economically sound.115 Interactions between manufacturing and the natural environment will be subject to a number of changes in the decades ahead. Linkage of the manufacturing sector to environmental degradation as depicted below, hinges on the method of use of natural resources, manufacturing processes, products use and end-of-life methodologies.
Climate change is likely to increase the vulnerability of global supply chains and increase the pressure on manufacturers to reduce their greenhouse gas (GHG) emissions. India is one of the lowest emitters of GHGs in the world on a per capita basis.

As India’s manufacturers enter a competitive environment increasingly defined by resource-price volatility, adoption of the sustainable manufacturing practices will be a differentiating factor. A keen sense of balance between the kind of technology transfer undertaken and the long term impact on environment is critical for India as it seeks to increase the share of manufacturing in the total economy. Manufacturing firms need to seek out newly available and emerging technologies and develop a stronger innovation culture that ultimately leads to the design and development of energy efficient and low wastage machinery, equipment and processes.

**Role of Technology and Innovation in Manufacturing**

Successful firms in the future will be the ones which are capable of rapidly adapting their physical and intellectual infrastructures to exploit changes in technology to make manufacturing processes more efficient, productive and more responsive to changing requirements of the global markets. Cutting-edge technologies and innovation will drive new product development and this in turn will spur R&D to give an impetus to manufacturing excellence.

With advancements in technology, the future of manufacturing will be driven by those who innovate most effectively and succeed in capturing and dominating global markets. The most adaptable technologies, primary and secondary, will be the ones capable of transforming the future of manufacturing processes and products and collectively facilitate:
- Mass personalisation of low-cost products, on demand, and better customisation;
- A much more distributed local and global production base, with manufacturing facilities much closer to the customer and a greater diversity in the factories of the future;
- Digital connections through the manufacturing value chains increasing the speed and efficiency of manufacturing, and enhancing opportunities for international collaboration;
- Greater freedom of design and delivery of innovative new products and
- More flexible manufacturing systems delivering better quality and cost performance.

**Information and Communication Technology**

The rapid emergence of Indian IT sector has played a significant role in transforming India’s image from a slow moving bureaucratic economy to a land of innovative entrepreneurs. More recently, online retailing, cloud computing and e-commerce have altered the practice, timing, and technology of business-to-business (B2B) and business-to-consumer (B2C) commerce. A recent study\(^\text{[2]}\) by CRISIL on India’s online retail market suggested that India’s online retail industry has grown at a compounded annual growth rate of over 56% in the past 5 years - from around Rs 15 billion in revenues in 2007-08 to Rs 139 billion in 2012-13 - primarily attributable to the increasing internet penetration and changing lifestyles, and mainly driven by books, electronics and apparel.

**Sensors**

Sensors are another technology ubiquitous across the factories of the future and provide data about the progress, quality or condition of manufacturing systems. Modern cars have sensors to measure the performance of vital components in real-time, for example tyre pressure, oil temperature and fuel injection. Aircraft would be unable to operate without sensors providing real-time feedback on all aspects of the airframe and engine status even from the most inhospitable environments within the hot areas of the gas turbine engine. Future development of nano-electromechanical systems is likely to support sensing and control of very small systems, for example in consumer electronics.

**Industrial Biotechnology**

Industrial biotechnology is another development in the manufacturing sector and provide data about the progress, quality or condition of manufacturing systems. Modern cars have sensors to measure the performance of vital components in real-time, for example tyre pressure, oil temperature and fuel injection. Aircraft would be unable to operate without sensors providing real-time feedback on all aspects of the airframe and engine status even from the most inhospitable environments within the hot areas of the gas turbine engine. Future development of nano-electromechanical systems is likely to support sensing and control of very small systems, for example in consumer electronics.

**Primary Technologies**

- Information and Communication Technology
- Sensors
- Medical Biotechnology
- Sustainable or Green Technologies
- Energy Storage

**Secondary Technological Developments**

- Knowledge-based automation and Big Data
- Autonomous Robotics
- Industrial Internet
- Cloud Technology
- Manufacturing Execution Systems
- 3D printing

More recently, the capacity for storage and global interconnectivity has led to the development of ‘big data’, cloud computing and the ‘Internet of Things’. Over the next 20 years, modelling and simulation is expected to be integrated into all design processes as the cost of computing continues to fall and specialised tools for virtual reality are developed.

**Biopharmaceuticals**

Biopharmaceuticals have dominated the sector, but food biotechnology is an emerging area where microorganisms and microalgae are being used to synthesise a range of food supplements. India is among the top 12 biotech destinations in the world and is the largest producer of recombinant Hepatitis B vaccine. Out of the top 10 biotech companies in India (by revenue), six focus their expertise in biopharmaceuticals and four specialise in agribiotech.

In addition, traditional production of leather and meat is already starting to be supplemented with engineered products, though on a small scale at present. With India offering numerous comparative advantages in terms of research and development facilities, knowledge, skills, and cost effectiveness, the biotechnology industry in India has immense potential to emerge as a global leader.

**Green Technologies and Energy Storage**

The growing trends in industry to improve corporate sustainability and implement energy and carbon reduction targets are expected to continue. Future production processes are likely to compete on minimising energy and use of non-renewable...
materials, whilst simultaneously shifting to renewable and re-usable sources as they become available and economically viable.119

Energy storage is a limiting factor in many technologies, including consumer electronics, mobile computing, vehicles, remote mechanical systems and alternative energy production. If new ways to store energy at high density could be found through novel approaches to battery technology, nano-science and advanced materials, multiple new applications and potential for new manufactured products would be achievable.

Knowledge-Based Automation and Big Data
An integration of artificial intelligence, natural user interfaces, more intuitive computing and new techniques for analysis of large data sets will allow continued automation of many tasks that formerly required people, making information more accessible, transparent and usable at much higher frequency.

The Economic Times120 in its November 14, 2016 issue reports that by 2015, more than 15 billion devices will be connected to the Internet, generating a new (and bigger) wave of big data in industries such as manufacturing automation, energy and transportation, according to research firm International Data Corporation. IT companies are readying to tap the big data market globally as well as in India, where the market is expected to be worth $4 billion by 2015, according to Nasscom.

Autonomous Robotics
In the next three decades, the development of powered exoskeletons, a wearable robotics suit, artificial and enhanced visual, aural and touch sensations, remote control and operation and artificial intelligence will make a number of routine operations within manufacturing, healthcare and surgery, food preparation, cleaning and consumer activities obsolete, and provide a wealth of opportunities for manufacturers.121 Autonomous and near-autonomous vehicles such as cars, drones, trains and ships will boost the development of computer vision, sensors including radar and GPS, communication with networks, and remote control algorithms.

Industrial Internet
In today’s digital age, most of the hype over Internet of Things (IoT) centres on consumer applications, such as smart homes, connected cars and consumer wearables. However, it is the application of IoT to manufacturing or the Industrial Internet, which has the potential to stult the consumer side in potential business and socioeconomic impacts in future. According to a recent study122 conducted by the World Economic Forum, the future evolution of the Industrial Internet will likely follow four distinct phases. Phases 1 and 2 include immediate opportunities that drive the near-term adoption, starting with operational efficiency. Phases 3 and 4 include long-term structural changes that are roughly three years away from mainstream adoption.

The report further highlights that the most widely cited application of the Industrial Internet is predictive maintenance and remote asset management, which can reduce equipment failures or unexpected downtime based on the operational data now available. Further, early adoption of the Industrial Internet would lead to improvement of worker productivity, safety and working conditions by measures such as minimizing workers’ exposure to noise, chemicals and other hazardous gases, especially in traditional heavy industries like oil and gas, manufacturing and chemicals.

Cloud Technology
Cloud technology can provide centralised computing facilities to serve company intranets, suppliers or service providers. In the future, more efficient and effective use of computing and software resources may enable the manufacturers to access resources more economically than by building their own systems and architectures. Cloud storage and processing can offer tools for enhancing productivity which were previously unaffordable for small and medium enterprises (SMEs), to strengthen the management of supply chains, requirements for resources and materials, and customer relationships.

OSEC Switzerland123 estimates that the cloud computing market in India stands at $1.10 million in 2010 with software-as-a-service (SaaS) accounting for $0.30 million of revenue. The total market is expected to reach $1.084 billion by 2015. However, the major challenges that the cloud companies have to face in India are around data security and reliability, lack of customization, lack of training and support and poor market reach.

Manufacturing Execution System
Manufacturing execution systems are computerised systems used to show the manufacturing decision maker how conditions on the factory floor can be optimised to improve production output. MES work in real-time to enable the control of multiple elements of the production process such as inputs, personnel, machines and support services. Over the next decade, cloud-based software will move from specialist applications towards the shop floor.

Siemens India believes that for companies to achieve sustainable competitive advantage, they must deploy measures and solutions that respond to market changes both quickly and correctly and help adopt production processes in real-time. A critical tool to achieve this is an efficient manufacturing execution system (MES) that supports timely execution.

3D printing
Last but not the least is the 3D printing technology which has been around for decades, better known as additive manufacturing (building an object layer by layer). What is new is that 3D printing has reached consumer-friendly price points and footprints, new materials and techniques are making new things possible, and the Internet is tying it all together. It is expected to lead to profound changes in the way businesses make almost any product over the coming decades.

Telling India’s story on additive manufacturing, Suboth Kolhe124 writes that India is relatively new to 3D printers and there have been increasing initiatives by local assemblers and domestic manufactures to make 3D printers available at affordable prices. The applications of 3D printing have been identified in the field of electronics, automotive, medical, architectural, aerospace, educational, and industrial, among others. The predominantly used technologies in the market are selective laser sintering, stereolithography, fused deposition modelling, and polyjet and India’s 3D printer market revenue is projected to reach $6.6 million by the year 2019 reports Kolhe.

The globally established companies such as Stratasys and Optomec have partnerships or alliances with...
India based technology companies for increasing their customer base. Other established global players in 3D printing industry include Fab fabber, 3D Systems, Leapfrog and Fischertechnik. Major players active in India 3D printing market (including manufacturers and distributors) space are Altem Technologies, Imaginarium, Brahma 3, KCbots and JGroup Robotics.

Impact of Technological Advancements on Labour

The role of manufacturing in job creation is shifting over time as companies invest in technologies and process improvements that raise productivity. Hiring patterns are skewed towards high skill production jobs and both high and low skill service jobs. In the future, as manufacturing becomes high-tech from the shop floor to back offices where big data experts analyse data for machinery products in the field and consumers, the global supply of high-skill workers will fall short of demand. A McKinsey report projects a potential shortage of over 40 million workers for high-skill jobs by 2020.

The Boston Consulting Group predicts that investment in industrial robots will grow 10% a year globally, India’s manufacturing industry has reached an advanced stage of technological preparedness of most players are extremely limited due to growing technological obsolescence, inferior quality, limited range and high costs. These inhibit the ability of organizations to respond to the challenges, not only of increasing international competition from other low-wage countries such as China, but also of trade liberalization within the context of WTO.

There are, however, some bright spots other than biotechnology and pharmaceuticals. Indian firms are innovating and using resource within their reach to adopt technology in a way that creates value and provide appropriate alternatives. In this chapter, we take a look at some of these bright spots we also look at where our study leads us to and how the future of India’s manufacturing looks like.

India Innovates and How

Indian manufacturing sector is incorporating different levels of technology to serve the needs of the diversified Indian customer base. For instance, the Indian market at the macro level is divided into urban and rural, with the factor differentiating them being purchasing power of customers, which is lower in the rural segment. Thus, the manufacturing sector is introducing products to serve the large untapped price-sensitive Indian rural market. A private sector consumer electronics company, Godrej Appliances, has innovated technology to launch an affordable refrigerator for rural India that costs 35% lower than the cheapest available refrigerator in urban India. This was achieved by changing the engineering process of the refrigerator. The company introduced ‘Chotukool’, a 35-litre refrigerator that is assembled with 20 parts vis-à-vis 200 in a regular refrigerator and was customised for penetration into power scarce rural India. The product has an option of operating on battery, and the high insulation enables it to remain cool for hours even without power.

Another instance of innovation in manufacturing, targeting the price-sensitive Indian consumer, is Tata Motor’s Nano world’s cheapest car. FMCG companies and telecom companies have always been quick to spot opportunities to expand the consumer base - with small, affordable packages of consumer goods and pre-paid mobile phone recharge. Manufacturing companies can discover a huge market at the ‘bottom of the pyramid’ by focusing innovative solutions aimed at different segments of the market.

According to a UNIDO publication, most Indian manufacturing firms appear to be stuck at the basic or intermediate level of technological capabilities. An industry-wise level of technological capability (TC Level) in India is depicted below which shows that only auto components, IT and telecom sectors have reached an advanced stage of technological capability.

<table>
<thead>
<tr>
<th>Sector</th>
<th>TC Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food Processing</td>
<td>Basic</td>
</tr>
<tr>
<td>Metal forming and forging</td>
<td>Basic</td>
</tr>
<tr>
<td>Steel</td>
<td>Intermediate</td>
</tr>
<tr>
<td>Machine Tools</td>
<td>Basic</td>
</tr>
<tr>
<td>Pharmaceuticals</td>
<td>Intermediate</td>
</tr>
<tr>
<td>Chemicals</td>
<td>Basic</td>
</tr>
<tr>
<td>Electrical and Electronics</td>
<td>Basic</td>
</tr>
<tr>
<td>Automotive</td>
<td>Intermediate</td>
</tr>
<tr>
<td>Auto Components</td>
<td>Advanced</td>
</tr>
<tr>
<td>Information Technology</td>
<td>Advanced</td>
</tr>
<tr>
<td>Telecommunication</td>
<td>Advanced</td>
</tr>
<tr>
<td>Petrochemicals</td>
<td>Intermediate</td>
</tr>
<tr>
<td>Light Engineering</td>
<td>Basic</td>
</tr>
</tbody>
</table>

It is observed that the verticals with comparatively high technological maturity such as auto components, chemicals and electrical machinery are ahead of the others in the adoption of ICT in their operations. For instance, in the auto industry, the original equipment manufacturers in the country have advanced technology and are large in size which has resulted in a top-down push towards Tier I suppliers who are auto component manufacturers.

A report by market research firm Zinnov Management Consulting* puts it straight. The five growth levers identified by the Prime Minister – Digital India, India as the Innovation Hub, Next Gen Infrastructure, Enhance Ease of Doing Business, and Revive Manufacturing – will be executed by a focus on 35 – Skill, Scale and Speed propelled by technology encompassing IoT, High Performance Computing, Analytics and Cloud.

The Indian manufacturing industry presents $8 billion opportunity for the ICT sector by 2017. Research firm International Data Corporation’s Manufacturing Insights forecasts IT spending to grow to $8,781.8 million by 2016, which is double the manufacturing IT spending in 2011, representing a CAGR of 14.5% between 2012 and 2016. The sector with the highest IT spend in the Indian manufacturing sector in 2012 is automotive, followed by chemicals and consumer products.

According to the National Manufacturing Competitiveness Council, India has the capability to achieve 12-14% average manufacturing growth over the next 10 years, backed by the talent that has the potential to drive innovation and take critical decisions at the micro and enterprise level.
Indian manufacturing faces many challenges as the global demand for goods and services are shrinking and the competition from emerging countries is getting fierce. Given its low productivity and high capital intensity, the challenges for the Indian manufacturing are becoming increasingly significant. Improvements in productivity, processes, technology and skills need substantial investment in capacity building which will take years, if not decades, to accomplish. But there is a need for getting results in the immediate future and strong affirmative actions are required to accelerate transformation of the sector.

India’s demographic advantage means that domestic demand will continue to be high and drive consumption, and consequently, manufacturing growth. But the business environment in India is tough with multiplicity of controls, rigid legal and regulatory frameworks in areas of land, labour, capital and taxation and delay in administrative clearances etc. raising the cost of doing business and also the cost of capital. These issues have to be addressed.

Paradoxical as it may seem, India’s demographic dividend is also a demographic cross it has to bear as the millions of new job seekers entering the labour market who more demanding and aspirational. They need to be productively engaged to avoid socio-economic conflicts.

The challenges are daunting but not insurmountable. If India were to achieve its goal of scaling up the share of manufacturing to 25% of its GDP and create a large number of jobs it will have to take several measures, which are definitive and transformational. New and sustainable jobs can be created through a growth impetus led by large scale industries along with promotion and development of entrepreneurship. MSMEs will play a significant role as they will scale up in value, size and technology by riding the wave created by large firms and government initiatives. Studies suggest that every job created in manufacturing has a multiplier effect of three on related services.

India needs to use innovative products and services to create new markets too. This requires leveraging trade policies and deficits with key partner countries and careful and selective import substitutions, especially in finished products. The other value drivers will come from partnering the global value chain of transnationals which will bring new skills and technologies to Indian companies and employees.

The foray into manufacturing wave needs some prioritisation by way of focusing on industries with sustainable competitive advantages which this study has listed for quicker and better results. In addition, it will have to take some policy decisions to ensure that ‘Make in India’ initiative leads India’s growth and development agenda for the next decades. Some of these policy measures could be the following:

Conclusions and recommendations

India's demographic advantage means demands for textiles and apparels, processed food products, leather products, wood products, toys and other personal goods will remain high.
Reforms in the area of international taxation are needed to improve foreign investor sentiment and provide a stable and certain tax environment. The proposed GST will rationalise indirect taxes and increase India’s tax to GDP ratio. Similar steps may be taken in direct tax and other tax related issues to avoid conflicts, litigations and an environment of uncertainty that postpones productive investments.

Among the measures that could improve the business environment include faster administrative clearances to reduce the time needed for starting and exiting a business, licensing private-sector banks to cater to the needs of the MSMEs, making the regulatory process more transparent and cutting compliance burdens.

Bankruptcy law needs to be formulated to free ‘dead’ assets and mobilise capital for investment. Governance at the grassroots level should be improved for better targeting of state funds and resources.

Given the urgency to provide jobs and good living conditions to about 13 million youth who will be joining the workforce annually and others who will be migrating from agriculture over the next decade, ‘Make in India’ is just not a policy choice anymore but an absolute necessity that cannot be postponed anymore.

Investment in infrastructure needs to go up from 6% of GDP to 10% GDP. Pension and insurance funds being long term investors can be mobilised for infrastructure spending. PPP model should be redesigned through engineering, procurement and construction (EPC) model.

SEZs need to be revised by a systematic review of the reasons for their failures. Economics of scale is a fundamental factor to kick start manufacturing and SEZs are one of such vehicles of long term change. Some of the issues that plagued SEZs included issues of Minimum Alternate Tax (MAT)/Dividend Distribution Tax (DDT), allowing a branch of foreign company in SEZ to carry out DTA (Domestic Tariff Area) transaction, enabling External Commercial Borrowings (ECB) and implementing recommendations of Rangachary Committee report.

Physical infrastructure needs to be developed by facilitating land acquisition and rationalising labour and tax laws. Land acquisition has always been an emotional and social issue in India and often overlooks economic realities. India needs to look at the surplus and economically vacant land that various PSUs, government including railways, defence, and large private sector hold and utilise the unused SEZ land for industrial growth.

Regular power supply is considered as one of the major constraining factors. Empirical study by Gupta and others shows that manufacturing industries that are more dependent on power infrastructure have grown less as compared to other industries. India needs reforms in the way it manages power infrastructure and outputs. Energy is a key determinant of the success of Make in India Initiative. Power generation and distribution need to be viable and adequate. In the medium term, India must look at renewable energy as alternative to coal and crude oil, not only for sustainable manufacturing processes but also reducing foreign exchange outflows.

Sustainable and employable skills in digital, future technology and modern electronic equipment need to be developed among the minimally educated workforce. Industrial training institutes need to be developed in partnership with the private industries for higher education in vocational or technical subjects. Targeted training and development for the general management and technical supervisory level are also required.

A conducive environment for R&D and IP regime is needed to boost innovation, trade and investment in India. This would lead to creation of more high-paying skilled jobs and encourage transfer of technology. IPR regime needs to be implemented through cohesive legal framework without overlap, conflict or inconsistencies among the different ministries.

MSMEs need to be supported through better co-ordination among the departments of local, state and central governments for creating an enabling environment for growth and their transition to the organized sector.

Entrepreneurship can be a huge accelerator for creating new employment opportunities and at the same time create new intellectual capital in technology, processes and products. India should create large innovation funds to invest in new areas of technology and give tax incentives to drive private capital to invest in such ventures.

Reforms in the area of international taxation are needed to improve foreign investor sentiment and provide a stable and certain tax environment.

The proposed GST will rationalise indirect taxes and increase India’s tax to GDP ratio. Similar steps may be taken in direct tax and other tax related issues to avoid conflicts, litigations and an environment of uncertainty that postpones productive investments.

Among the measures that could improve the business environment include faster administrative clearances to reduce the time needed for starting and exiting a business, licensing private-sector banks to cater to the needs of the MSMEs, making the regulatory process more transparent and cutting compliance burdens.

Bankruptcy law needs to be formulated to free ‘dead’ assets and mobilise capital for investment. Governance at the grassroots level should be improved for better targeting of state funds and resources.

Given the urgency to provide jobs and good living conditions to about 13 million youth who will be joining the workforce annually and others who will be migrating from agriculture over the next decade, ‘Make in India’ is just not a policy choice anymore but an absolute necessity that cannot be postponed anymore.
About ASSOCHAM

The knowledge architect of corporate India

ASSOCHAM initiated its endeavour of value creation for Indian industry in 1920. Having in its fold more than 400 Chambers and Trade Associations, and serving more than 4,50,000 members from all over India. It has witnessed upswings as well as upheavals of Indian Economy, and contributed significantly by playing a catalytic role in shaping up the Trade, Commerce and Industrial environment of the country.

Today, ASSOCHAM has emerged as the fountainhead of Knowledge for Indian industry, which is all set to redefine the dynamics of growth and development in the technology driven cyber age of ‘Knowledge Based Economy’.

ASSOCHAM is seen as a forceful, proactive, forward looking institution equipping itself to meet the aspirations of corporate India in the new world of business. ASSOCHAM is working towards creating a conducive environment of India business to compete globally.

Vision
Empower Indian enterprise by inculcating knowledge that will be the catalyst of growth in the barrierless technology driven global market and help them upscale, align and emerge as formidable player in respective business segments.

Mission
As a representative organ of Corporate India, ASSOCHAM articulates the genuine, legitimate needs and interests of its members. Its mission is to impact the policy and legislative environment so as to foster balanced economic, industrial and social development. We believe education, IT, BT, Health, Corporate Social responsibility and environment to be the critical success factors.

Members—Our Strength
ASSOCHAM represents the interests of more than 4,00,000 direct and indirect members across the country. Through its heterogeneous membership, ASSOCHAM combines the entrepreneurial spirit and business acumen of owners with management skills and expertise of professionals to set itself apart as a Chamber with a difference.

Currently, ASSOCHAM has more than 100 National Councils covering the entire gamut of economic activities in India.

Insight into ‘New Business Models’
ASSOCHAM has been a significant contributory factor in the emergence of new-age Indian Corporates, characterized by a new mindset and global ambition for dominating the international business. The Chamber has addressed itself to the key areas like India as Investment Destination, Achieving International Competitiveness, Promoting International Trade, Corporate Strategies for Enhancing Stakeholders Value, Government Policies in sustaining India’s Development, Infrastructure Development for enhancing India’s Competitiveness, Building Indian MNCs, Role of Financial Sector the Catalyst for India’s Transformation.

D. S. Rawat
Secretary General
d.s.rawat@assocham.com