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Confederation of
Indian Industry



Indian Manufacturing: The Next Growth Orbit

Aspiration and Roadmap for Indian Manufacturing

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Preface

Indian manufacturing industry is at an important juncture today. The last ten years have seen an impressive annual growth rate of 6.8% marking a phase of strong performance. This compares favourably with growth rates in many other rapidly developing economies. This same period saw the Indian economy grow at around 7%. There is widespread consensus within the Indian political leadership that for India to improve its per capita income and reduce the level of poverty, Indian economy should continue to grow at a high single digit rate if not low double digit.

With a strong growth rate, the manufacturing industry has been a significant contributor to GDP growth. However, unlike many other developing nations the overall contribution to GDP is only 15%, which is the lowest among the major RDEs. It is in this context that some pertinent questions need to be answered. What should be the growth aspirations of the manufacturing sector in the country? How can India enhance competitiveness of its manufacturing sector? What are the impediments to achieving this aspiration?

This report examine these questions in the context of the major forces that are shaping global and Indian manufacturing industries. The report sets out an aspiration for the Indian manufacturing industry for 2025, a stretch but achievable target. It then examines the various constraints which could potentially hold back the Indian manufacturing sector and also the different levers which are critical to achieve the aspirational growth for the sector.

While the intent of the report is Not to develop detailed policy recommendations to be presented to the government, we do identify and contextualise four key policy themes which we believe are critical in meeting the aspirations set forth in the report.

This report's articulation of the aspirations, potential roadblocks, opportunities and imperatives for India's manufacturing sector should provide the context to guide future discussions among all stakeholders to maximize the potential of this sector.

Introduction

Indian manufacturing has grown at a robust rate over the past 10 years and with the exception of China, India has been one of the best performing manufacturing economies—growing at 6.8% per annum. Yet, critics will point to the fact that the contribution of the manufacturing sector to GDP is substantially lower in India compared to other rapidly developing economies (or RDEs, a term which will be used to describe these large and fast growing developing countries throughout this report), and thus leaving much room for significantly higher growth rates as India in-

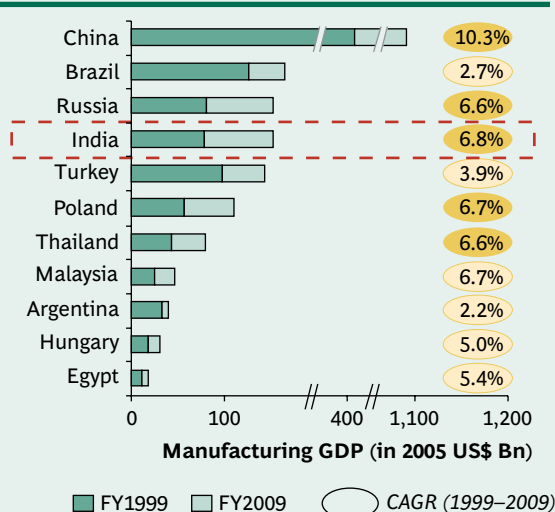
dustrialises rapidly over the next few decades (as shown in Exhibit 1a).

Evolution of Indian Manufacturing

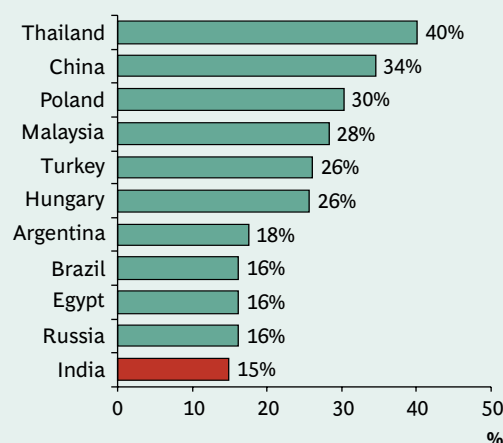
To set the context for this report it is useful to recap the history of this sector. Since Independence in 1947, the Indian manufacturing sector has traveled from the initial phase of building the industrial foundation in the 1950s and early 1960s, to the license-permit raj in the period 1965–1980, to the phase of liberalisation in the 1990's,

Exhibit 1a. While Indian manufacturing industry has shown robust growth, the share of GDP is lower that of other RDEs

Manufacturing GDP growth for comparable developing countries (FY 1999–2009)



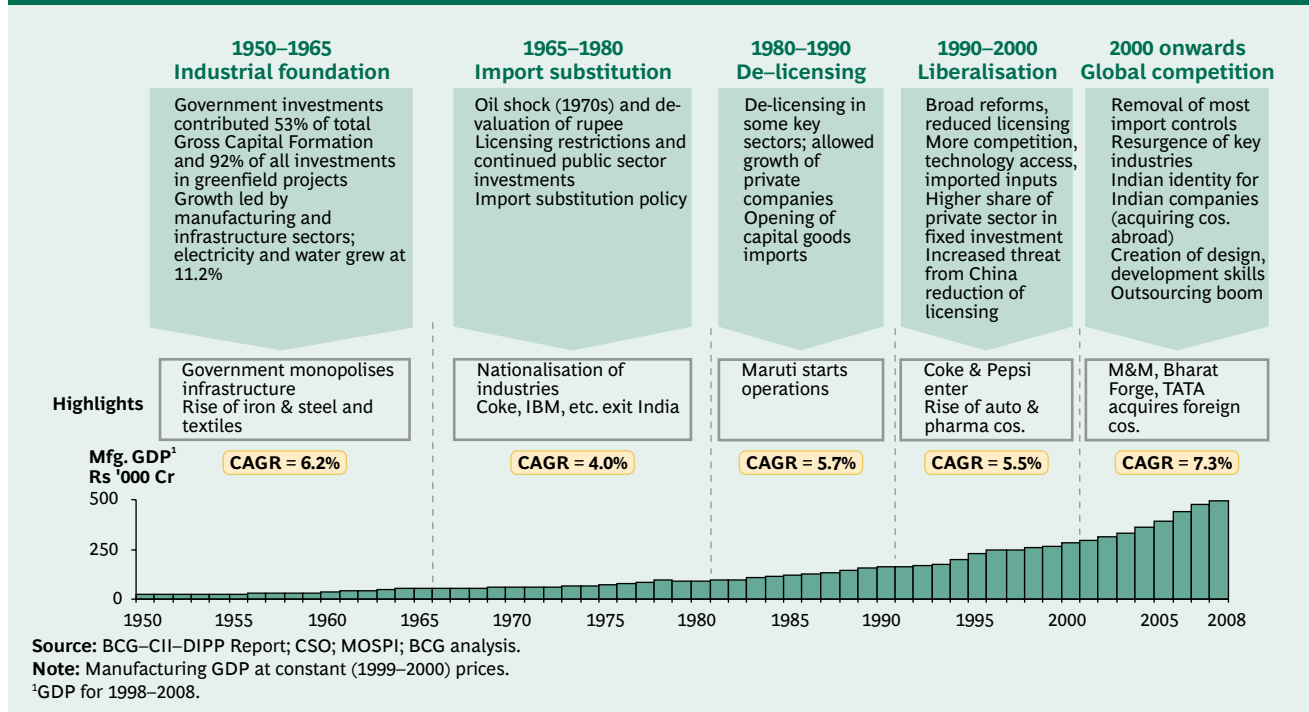
Manufacturing GDP (as % of total GDP for FY2009)



Sources: Economic Intelligence Unit; Data Monitor; BCG analysis.

Note: GDP data for FY1999–2009 refers to India's GDP from 1998–99 to 2008–09, but for some countries such as China, Brazil and Russia, it refers to calendar year 1998–2008.

Exhibit 1b. Indian manufacturing sector has grown steadily in the past



emerging into the current phase of global competitiveness as explained in Exhibit 1b.

With growing capability, Indian manufacturing companies are now making a bold move to globalise their operations. The Boston Consulting Group (BCG) has been studying this phenomenon among RDE companies for many years and publishes a report on “BCG New Global Challengers” which identifies and tracks the success of top 100 global challengers from the RDEs. In the last version of this report released in 2009¹, 20 of the 100 challengers were from India signaling the growing success of Indian firms on this front.

Starting Position of the Manufacturing Sector

The importance of manufacturing for the Indian economy cannot be over-emphasised. It contributes about 15% of India’s GDP, with estimated revenue of Rs 30 lakh crore² in 2007–08. More importantly, the sector contributes a disproportionately large share of nearly 50% to the exports from the country. Besides, around 12% of the workforce today finds employment in this sector (as shown in Exhibit 1c).

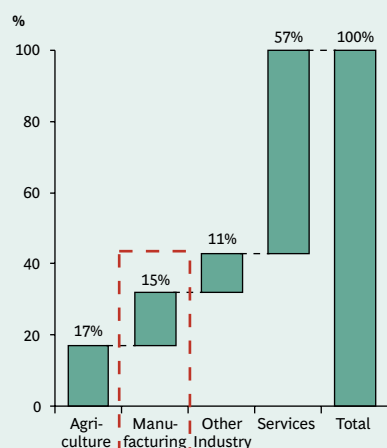
It is also critical to understand the different sub-sectors within the manufacturing sector. As shown in Exhibit 1d, food processing (including beverages and tobacco), metals and electrical machinery are the largest three segments, contributing 42% of the total output generated by the manufacturing sector, primarily through the domestic market. The next group of industries includes chemicals, petroleum, transport equipment and textiles which account for a further 40% of sector revenue. Also, these four industries rely heavily on exports, which accounts for nearly one-third of their revenue. In terms of relative growth, electric machinery and metals have been the fastest growing industries over the last 5 years with their revenues growing at 17% and 13% per annum, respectively, while food processing, textiles, rubber, petroleum and non-metallic products have grown at less than the overall industry rate. While this report does not delve into details of individual sub-sectors, understanding this baseline will be important to disaggregate and cascade targets for individual sub-sectors.

1. The 2009 BCG 100 New Global Challengers.

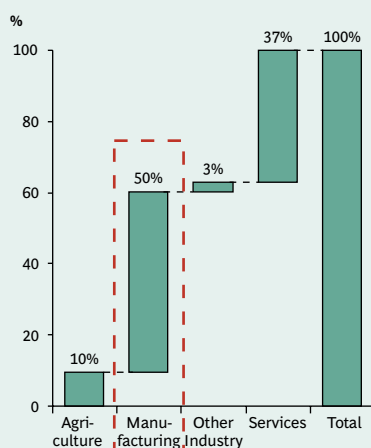
2. Central Statistical Organization (CSO) and Annual Survey of Industries (ASI) estimates.

Exhibit 1c. Manufacturing sector is important for the Indian economy

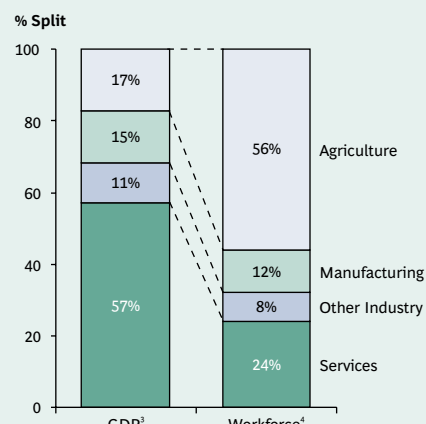
Contributes ~15% to India's GDP¹...



...~50% to the total exports²...



...and ~12% share of workforce



Sources: NSSO data; MOSPI; RBI; Institute of Applied Manpower Research; NSSO surveys; International Trade Statistics (WTO); CMIE; BCG estimates.

Note: Workforce defined as people working in the age group of 15 years and above; Other industries include mining and quarrying, construction and utilities.

¹2008-09.

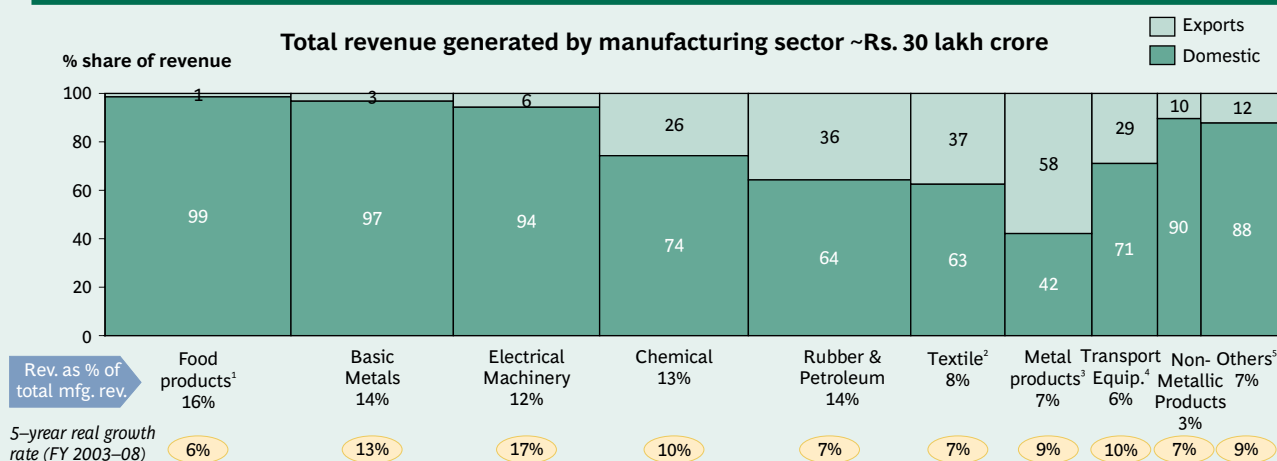
²2006-07.

³2008-09 GDP numbers.

⁴2008 employment workforce numbers.

Exhibit 1d. Manufacturing sector dominated by a few key sectors today

Revenue generated by manufacturing sub-segments through exports and domestic market (2007-2008)



Source: Central Statistical Organization; Annual Survey of Industries; D.G.C.I.&S; BCG analysis.

¹Includes tobacco products.

²Includes apparel.

³Includes machinery.

⁴Includes auto.

⁵Includes paper and wood products.

We should also understand the starting context of the two key factors—capital and labour. The average capital efficiency (revenues/invested capital) in the manufacturing sector is nearly 2.4 (based on an analysis of registered sector data) but it varies across the sub-sectors from 1.4 for non-metallic products to 3.5 for food products. The average labour efficiency (revenues in crore per 1,000 workers as reported by the Annual Survey of Industries) is nearly Rs 48 cr/1,000 workers. However, there is wide variation across different industries with wood and paper generating only Rs 7 cr/1,000 workers, whereas basic metals revenues are ~Rs 340 cr/1,000 workers (as shown in Exhibit 1e).

The manufacturing sector employed 58 million³ people (about 12% of the workforce) in 2008. By 2012, it is estimated, based on current economic projections, that this sector will employ a further 12–13 million out of nearly 89 million additional people who will enter the workforce. It is well known that manufacturing provides a transition to large numbers of agricultural labour moving from low skilled to more value added jobs. Studies have estimated that every job created in manufacturing has a multiplier effect, creating 2–3 jobs in the services sector.

In a country like India, where employment generation is one of the key policy issues, this is a critical factor to consider as we develop the aspirations for this sector.

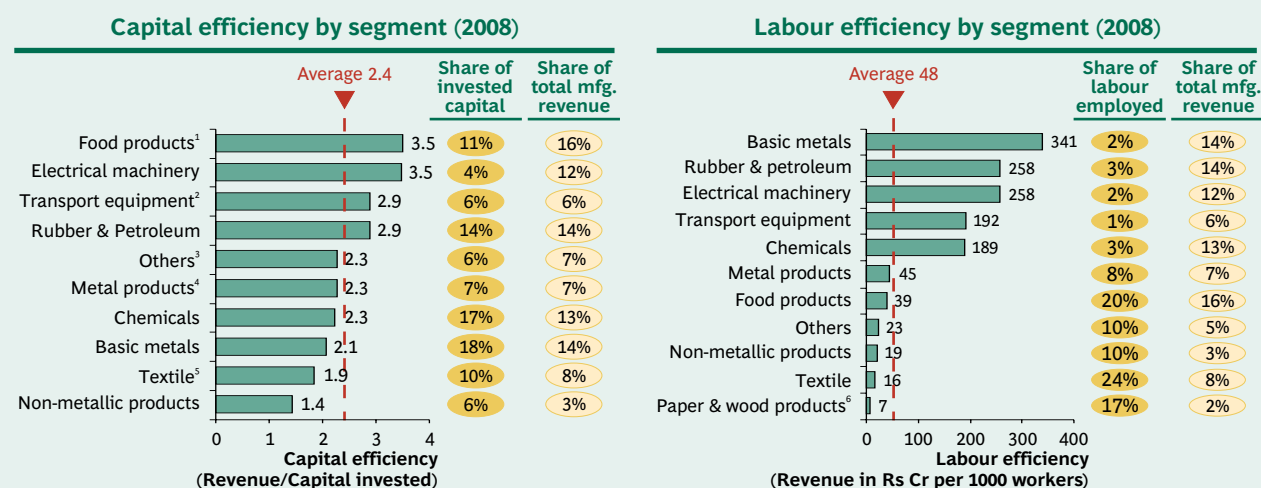
Structure of the Report

Indian manufacturing has performed strongly over the last decade. However, if India is to achieve its stated goals on GDP growth and more importantly, to generate higher levels of employment for the growing young population, India's manufacturing sector has to enter into a new orbit of even higher growth. In chapter 2 we set an aspiration for Indian manufacturing—‘What should be the target rate of growth of this sector until 2025?’ We look at some global benchmarks and set our aspirations high, but not unachievable and draw out key implications in terms of capital, labour and export requirements to support this stretch target.

Setting aspiration for the sector is the easy part. What are the levers to achieve this aspiration? Much has been written in several reports and talked about in different forums

3. CSO data.

Exhibit 1e. Capital and labour efficiency varies across sub-segment



Sources: Annual Survey of Industries 2005–06; Central Statistical Organization.

Note: Capital efficiency analysis based on only registered manufacturing sector data, All figures are rounded-off for ease of representation.

¹Includes tobacco products.

²Includes auto.

³Includes paper and wood products.

⁴Includes machinery.

⁵Includes apparel.

⁶Includes furniture and wood products, paper and printing.

on driving higher growth on the manufacturing sector. We have taken a holistic view and propose a ‘House of Manufacturing’ (as shown in Exhibit 1f) which provides an integrated framework for the government and industry to develop its long term strategy for the manufacturing sector. The ‘house’ on the foundation of four key government policy areas which have been identified, consists of three core pillars of:

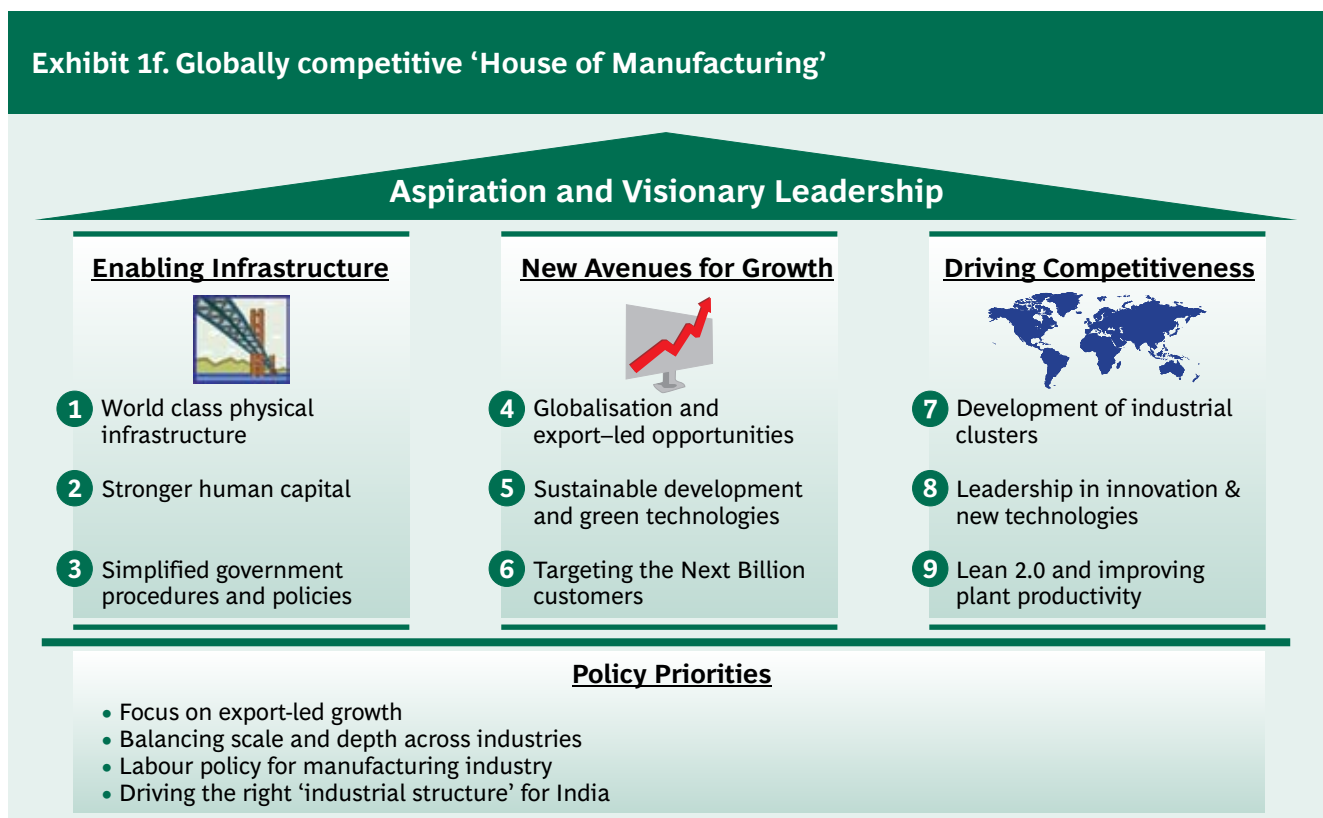
1. Enabling infrastructure.
2. Avenues for growth.
3. Driving competitiveness.

The critical challenges faced by the manufacturing sector due to gaps in infrastructure are well known. Most of the solutions are also known and have been discussed in different reports. It is not the intention of this report to propose unique solutions for improving the enabling infrastructure. However, no report on manufacturing would be complete without setting this context in place. In Chapter 3 we describe the first pillar on developing strong enabling infrastructure in three core areas:

1. Creating world class physical infrastructure.
2. Building stronger human capital.
3. Simplifying government procedures and policies and reducing the transaction costs of doing business in India.

Indian manufacturing sector has been driven mainly by the growth of the Indian economy and its rub-off impact on consumption in the domestic market. However, some of the fast growing trends in the global and domestic markets provide new large growth opportunities. In Chapter 4, we cover the second pillar which identifies three ‘new’ growth avenues for the manufacturing sector from:

1. Rapid globalisation of supply chains and migration of industrial capacities to RDEs.
2. Emergence of the “Next Billion” customer segment.
3. Threat and opportunities of the green movement and potential to build leadership in green technologies.



These three growth opportunities together have the potential to re-define the sector and fuel its next wave of growth and position India for global leadership.

In Chapter 5, we discuss the third pillar for driving higher productivity and greater competitiveness where we identify three important levers:

1. Developing industrial clusters.
2. Building leadership in innovation and in new and emerging technologies.
3. Lean 2.0 manufacturing practices and improving plant productivity.

In Chapter 6, we identify four themes where the government policy intervention will be critical for meeting the

aspirations of the Indian manufacturing sector—focus on export led-growth, balancing scale and depth across industries, developing a comprehensive labour policy for manufacturing and creating the right industrial structure for India. We draw on global benchmarks, suggest some of the policy imperatives for the government and lay out a framework that can be used to define a comprehensive policy agenda in these four areas.

At the outset, we would like to remind the readers that this report is not about short term issues and solutions or making policy recommendations to the government. It takes a long term view of the manufacturing sector, presents a perspective on challenges and opportunities and makes a case for action for both government and industry on the different fronts.

Setting an Aspiration for Indian Manufacturing

The Indian manufacturing sector has been one of the major growth engines for the Indian economy with an average growth rate of 6.8% between FY 1998 and 2008. This positions India as the 2nd fastest growing manufacturing sector among the major RDEs, with only China having a higher growth rate (10.3%)¹.

As India pushes for higher GDP growth, what should be the growth rate for the manufacturing sector, and how can this sector unleash its full potential?

Setting Aspirations

The manufacturing sector has a critical role to play in driving economic growth in the country. Subsumed within this overall role for the sector is its crucial contribution to generating employment in the country. Given this dual importance, no one will question that the aspiration should be to achieve the highest possible growth rate for the sector. What should be this target over the next 15 years—which is aspirational, but not impossible to achieve? We have approached this question from two different directions. To answer this question, we first did a peer study to understand how other large RDEs have performed in terms of manufacturing growth rates (as shown in Exhibit 2a), and examined the drivers behind this growth. We then looked at the relationship between the overall GDP growth of an economy and growth in the manufacturing sector. We then understood the relative importance of domestic consumption versus exports led growth. We also analysed the two potential constraints to the growth in terms of factor availability—primarily capital and trained labour—and developed implications for both, if India is to achieve its aspirational target.

Indian manufacturing has been the second fastest growing manufacturing economy after China among the major RDEs as shown in Exhibit 2a. China's manufacturing sector has registered a growth rate of over 10% over the past 10 years. The year-on-year growth rate has been even higher than 11% in several years during this period. Setting this as a benchmark for India could be a good starting point.

However, before we set this growth target, it is important to understand the implications of setting this high aspiration.

Unlike several other RDEs, India's manufacturing growth has been largely fuelled by domestic consumption. India's manufacturing GDP grew by 6.8% in the past 10 years while its exports grew at around 11%. In comparison, while China's manufacturing sector grew at 10.3% in this period, its exports grew at 21%².

Cross country analysis (as shown in Exhibit 2b) shows that, in general, manufacturing growth closely co-relates to overall GDP growth within 0%–2% points. The exceptions are countries which have a significant manufacturing export component like China, which has a higher growth rate of 2%–3% than GDP growth. It follows that if India has to target a high growth of 11% for its manufacturing sector over next 15 years, it needs to necessarily focus on growing its exports much faster.

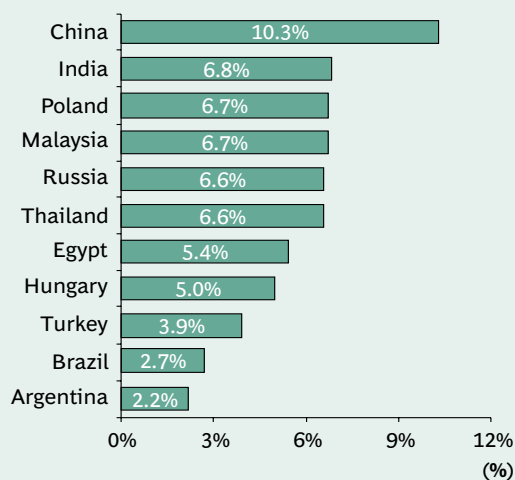
Thus, if the Indian economy can grow at 8%–10% per annum, to reach a manufacturing growth target of 11%, the exports growth has to accelerate to 15%–20%² (in real terms) and get a greater share of the globalising manu-

1. EIU data; BCG analysis.

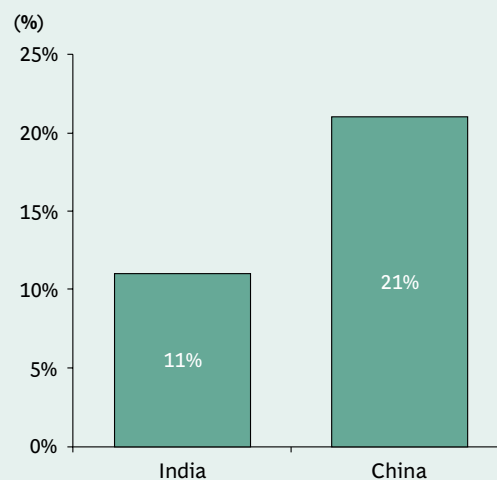
2. EIU; Datamonitor estimates; BCG analysis.

Exhibit 2a. Comparison of RDEs on manufacturing GDP and exports growth

Manufacturing GDP growth (FY 1999–2009)



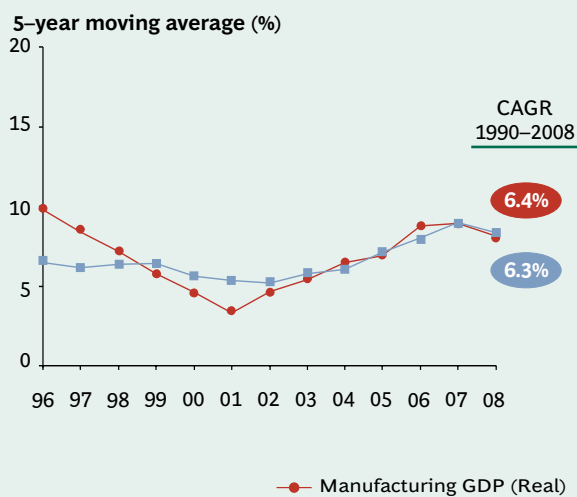
Manufacturing exports growth (1998–2008)



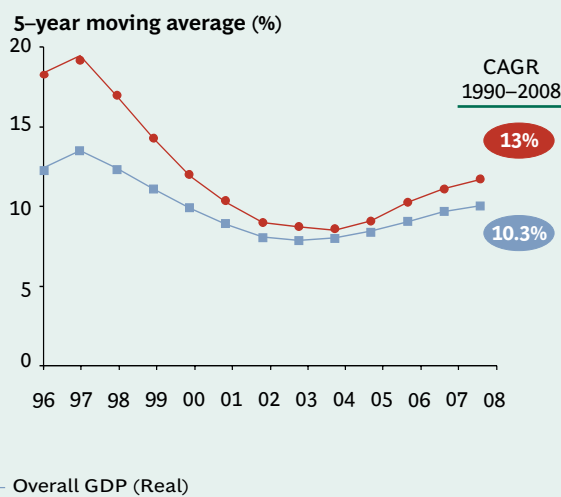
Sources: 2009 Euromonitor International; BCG analysis.

Exhibit 2b. Historical analysis: Correlation between Manufacturing GDP and Overall GDP

India 1996–2008



China 1996–2008



Source: EIU; BCG analysis.

facturing value chains (discussed in detail later). Any lower GDP growth would mean that exports have to grow even faster to achieve the target of 11% growth of the manufacturing sector. Achieving this aspirational growth would make India not only the fastest, but also catapult it to become the 4th largest manufacturing economy by 2025 compared to its 13th position today (as shown in Exhibit 2c).

It is important to recognise that this aspiration sets a stretch target for the sector. To achieve this means not just matching but surpassing China's performance over the last several years in a global trading environment that is still recovering from an economic crisis. This also has three major implications:

1. Indian manufacturing industry will need to transition from a factor cost driven advantage to a more sustainable investment and innovation driven model, with significant implications on factor requirements, cost structures and productivity levels.
2. A concerted policy agenda will be required to catalyse and support this growth which not only provides a fa-

cilitative environment to exploit global opportunities but also addresses the specific challenges of India's manufacturing sector.

3. India will have to produce many more 'world beaters' from the manufacturing sector. Currently there are nearly 25 Indian manufacturing companies with annual revenue in excess of US\$1 bn. Achieving our growth aspirations for 2025 will need this number to grow nearly 3–4 times, with 70–80 manufacturing companies having annual revenue in excess of US\$ 1 bn, and 4–5 firms with annual revenue in excess of US\$ 100 bn (assuming company growth rate at par with overall manufacturing growth rate). This calls for visionary leadership and management talent of a different order.

Investment, Human Capital and Productivity for Meeting Aspirations

In a developing country like India, one of the key questions is the level of investments required to achieve this aspiration. Our estimates suggest that four to five times the level of incremental investment will be required

Exhibit 2c. Aspirational growth will make India the 4th largest manufacturing economy in the world

Comparison of manufacturing GDP¹ (2009–2025E)²

2009		2025E	
Country	US\$ Bn	Country	US\$ Bn
United States	1,652	China	2,950
China	1,091	United States	2,360
Japan	1,042	Japan	1,110
Germany	608	India	810
Italy	307	Germany	720
United Kingdom	283	Italy	430
France	234	United Kingdom	350
South Korea	230	South Korea	330
Spain	181	France	300
Mexico	173	Brazil	260
Canada	173	Canada	250
Brazil	165	Mexico	250
Russia	152	Spain	240
India	152	Russia	210
Turkey	143	Turkey	210

Source: EIU; Data Monitor; BCG analysis.

Note: GDP data for FY2009 refers to India's GDP for 2008–09, but for some countries such as China, Brazil, Russia and US, it refers to calendar year 2008; Manufacturing GDP calculated based on Real GDP (based on expenditure) data from EIU and applying 'manufacturing % (of GDP)' from EIU and Data Monitor.

¹GDP at constant prices (in 2005 US\$ bn).

²2025 estimates based on EIU projections for all countries (except India).

Aspirational CAGR for Indian manufacturing

over the next five years. In 2007–08, Indian manufacturing companies had nearly Rs 13 lakh crore of gross fixed assets³. The average growth in asset productivity (revenues/gross fixed assets) for manufacturing companies during 2004–08 has been around 7%, with the rate dipping to as low as 3% in 2006 and 2008. A conservative estimate of 3%–5% improvement in asset productivity improvement would mean that gross fixed assets need to increase by Rs 55–80 lakh crore by 2025 to meet the 11% growth target (as shown in Exhibit 2d). Of this, the investment required for 2009–2015 would be ~Rs 12–15 lakh crore, which is a very substantial increase compared to the addition of Rs 3.2 lakh crore to the industry's gross fixed assets over the previous five years (2004–2008).

Appropriate policy measures will be required to ensure that such a massive funding requirement is met through a combination of public expenditure, and private and foreign investments. Specific efforts will need to be made to attract higher FDI into the manufacturing sector. By way of comparison, the total FDI into India, across all sectors including services and infrastructure, between 2004 and 2008 was ~US\$ 100 bn or ~Rs 5 lakh crore.

The topic of trained human capital required to meet this aspiration is equally challenging. In 2008, the manufacturing sector was estimated to employ about 58 million people or 12% of total workforce⁴. In the period between 1995 and 2005, manufacturing labour productivity was estimated to have grown by about 4.4% (in real terms)⁵. We expect that the Indian manufacturing sector will embrace a higher level of automation and other technologies and combined with improved operational processes will grow its productivity faster. Even if we assume that in the period between 2009 and 2025, the manufacturing labour productivity will grow faster at 5%–7% per year, the manufacturing workforce would need an additional 50–90 million trained people by 2025. This number would increase to over 140 million if the productivity improvement is lower at 3% (as shown in Exhibit 2e). This represents a substantial growth from the current levels and represents a much higher share of the total employment in India. Given the state of the skill training infrastructure

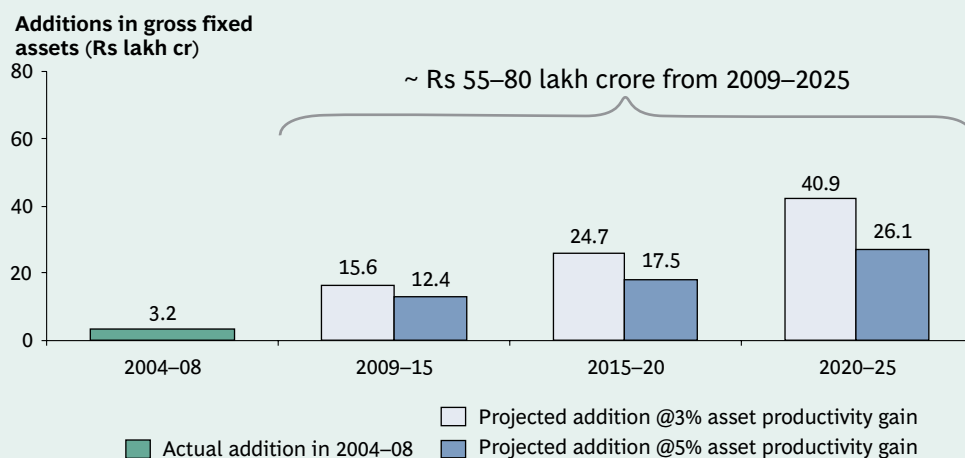
3. Capitaline; BCG estimates.

4. Central statistics organization; India's Demographic Dilemma "Talent Challenges for the Services Sector" CII & BCG report.

5. EIU country data; BCG analysis.

Exhibit 2d. Large investments required to achieve aspirations

Total additional of Rs. 55–80 lakh crore in manufacturing gross fixed assets by 2025¹



Source: CSO; ASI, Capitaline; EIU; BCG analysis.

Note: At 1999–2000 constant prices, FY 2008 base of gross fixed assets is nearly Rs 13 lakh crores, and additions required will be Rs 6–10 lakh crores. Asset productivity is defined as revenues generated per gross fixed asset.

¹At current market prices; Nominal value projections.

this represents a significant challenge, which we will discuss in some detail in the next chapter.

The overall growth possible in manufacturing employment tells only half the story. The labour intensity varies widely across different manufacturing industries. For example, the labour intensive sectors like paper and wood products, textiles and food processing contribute less than 30% to the manufacturing output but over 60% of the employment. Special focus on these labour intensive sectors can generate additional employment of 15–20 million⁶ for every additional percentage point of growth. Hence, to operationalise this aspiration, it is important to de-average the 11% growth target to individual industries with the objective to meet the twin objectives of growth in output and growth in employment.

One final point on labour: a substantial part of the incremental workforce would come from the migration from rural-agriculture to urban-manufacturing. Hence, it becomes imperative that the appropriate policies are adopted to make this workforce employable with the right set of skills and qualifications. Significant efforts would also be needed to increase the labour productivity to en-

sure the higher competitiveness of Indian industry. Also, rapid development of urban infrastructure would become an imperative to support this migration from rural to urban areas.

Exports will Need to Play an Important Role in Bridging the Gap

It is important to recognize that an 11% manufacturing growth rate cannot be achieved without rapid growth in exports. As was mentioned earlier, if the domestic manufacturing sector can grow at 8% to 10% in line with or slightly higher than the overall GDP growth rate over the period of 2010–2025, exports will need to grow at 15% to 20% annually.

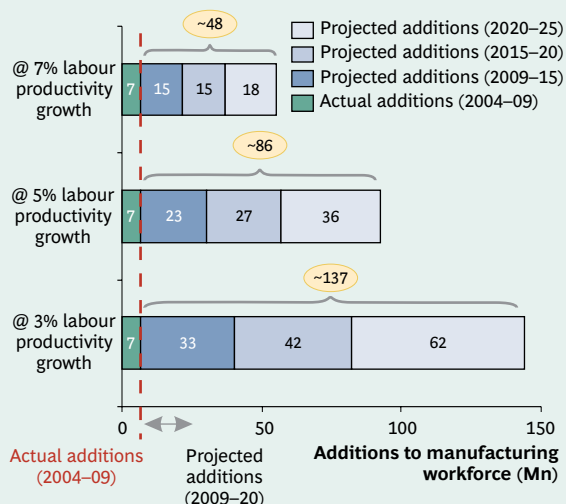
This target is not impossible. The last two decades have seen large scale migration of industrial capacity from the developed countries to RDEs, which have grown their industrial production at ~16% per annum compared to ~4% per annum for the developed countries in the last 5 years⁷.

6. CSO & ASI; BCG analysis.

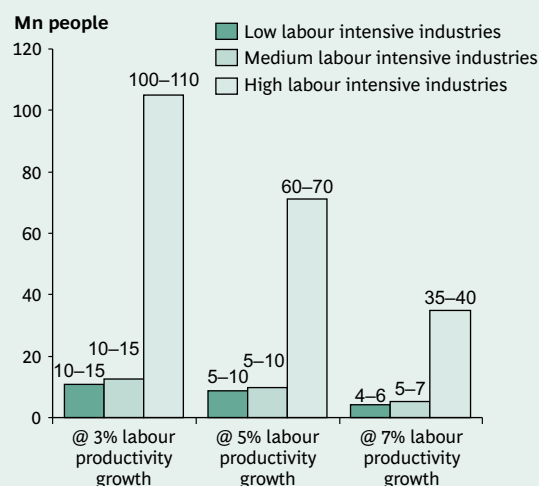
7. EIU data.

Exhibit 2e. Significant workforce requirements to achieve aspirations

Additional people required in manufacturing workforce (2009–2020)



Workforce requirement based on labour intensity of industry (2009–2020)



Source: CSO; Institute of Applied Manpower Research; NSSO surveys; BCG analysis.

Note: High labour intensive: paper, food, textiles, non-metallic products and others; Medium labour intensive: metal products and electrical equipment; Low labour intensive: basic metals, transport, chemicals and rubber; Labour productivity is defined as real manufacturing GDP/worker employed in manufacturing sector.

This trend is expected to continue—we estimate that by 2025, RDE production will account for over 55% of the global industrial production compared to 36% today⁸. Hence, over the next 15 years there will be a massive shift of manufacturing capacity from the developed to the developing countries. India has to exploit the opportunity to capture a disproportionate share of this shift thereby accelerating its exports growth rate. At the same time, India's traditional manufactured goods exports like textiles, rubber, petroleum and metal products will need to fire on all cylinders.

Key Levers for Indian Manufacturing to Achieve this Aspiration

Achieving this aspiration will not be easy. As mentioned earlier, we propose a 'House of Manufacturing' based on three pillars (as shown in Exhibit 1f) that will allow Indian manufacturing to enter the next orbit of growth. In the following chapters we describe each of these levers in detail, identifying specific opportunities and challenges for Indian manufacturing.

8. BCG analysis.



Developing Strong Enabling Infrastructure

World class enabling infrastructure is critical for the growth of India's manufacturing sector. There are three critical components of this enabling infrastructure:

- ◆ World class physical infrastructure that drives higher efficiency levels, in terms of both lower cost and faster speed to market.
- ◆ Strong human capital to ensure that the manufacturing companies have access to the requisite good quality talent.
- ◆ Simplified government procedures and policies, and reduction of transaction costs that improve the 'ease of doing business' and make it more competitive.

No one doubts or questions the need for world class enabling infrastructure. Several reports by different stakeholders have all pointed this out and have suggested many policy initiatives for implementation. Since a report on aspirations for the manufacturing chapter would not be rooted in reality without a spirited discussion on the biggest bottlenecks to meeting the aspirations, in this chapter we bring together the different issues, along with global benchmarks and some of the policy measures required.

Creating World Class Physical Infrastructure

Physical Infrastructure Quality is an Important Driver of Competitiveness

The quality of infrastructure of a country has a direct bearing on several key elements of competitiveness of

the manufacturing sector. Energy and logistics cost are two of the important costs which are directly impacted by the quality of infrastructure. Depending on the specific industry, they can constitute a significant percentage of the overall cost. For example, Exhibit 3a shows that for a cement manufacturer in India, power and freight costs form nearly 50% of the total production cost (exclusive of taxes, corporate overheads and inbound logistics costs). Though the cost of power in India is almost comparable to that of China, erratic and unreliable power supply to industries lead to use of higher cost power through generators. Poor roads increase freight costs from long turn-around times and also leads to higher breakdowns of trucks, further increasing logistics costs. In many instances, transportation time between the production site and the market is an important criterion for companies in choosing the manufacturing location and scale of operations and thus has a direct bearing on competitiveness, which goes beyond simple cost of production.

India's Infrastructure Challenge

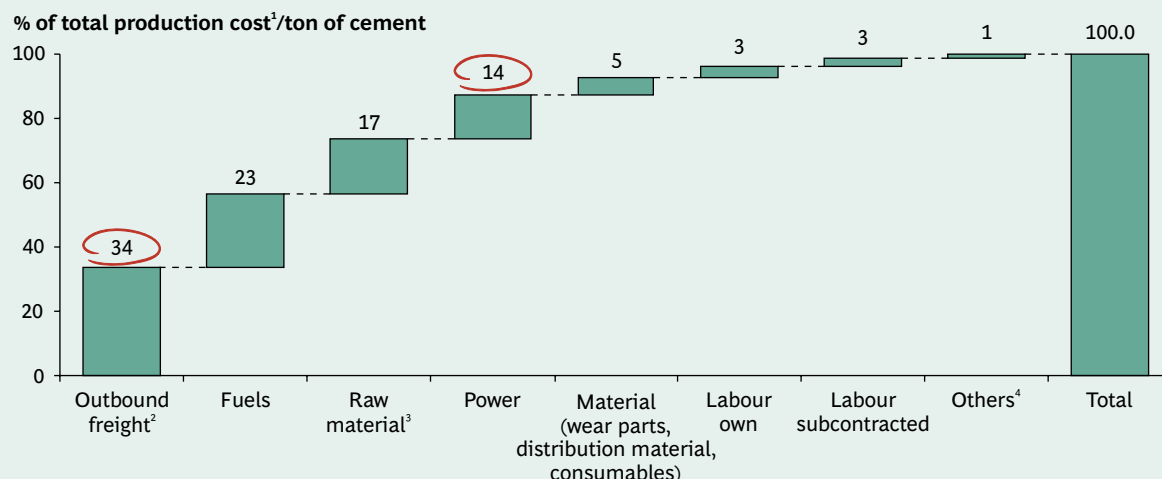
Several studies like the IMD world competitiveness survey have ranked India a lowly 54th among 57 countries on infrastructure facilities. The survey places India much lower than other developing economies like Thailand (ranked 20th), Brazil (ranked 32nd) and China (ranked 37th). An assessment of the various components of infrastructure reveals consistent gaps across all areas.

In the power sector in India, current demand supply gap is around 60 billion kWh and growing which is not expected to be bridged even by 2020¹. India's per capita electricity consumption of 0.5 MWh/capita is nearly one-fourth that of China and less than 5% that of USA.

1. IEA statistics; BCG analysis.

Exhibit 3a. Power and freight cost account for high proportion of product cost

Breakdown of product cost for a cement manufacturer in India



Source: Company annual report; BCG analysis and interviews.

Note: Cost are for Jan – Dec 2008, except Freight cost which is for Sept 07 – Aug 08.

¹Excluding provisions and depreciations and amortization cost.

²Weighted average of rail and road transport costs adjusted for distance from plant.

³Inclusive of Mining royalties and taxes.

⁴Includes administrative workforce.

The good news is that the average cost of industrial power in India is nearly 9 cents per kWh, which is comparable to that in other developing countries. For instance, the average cost of industrial power in China is nearly 8 cents per kWh². However, inconsistent and insufficient supply forces companies to rely on alternative sources of backup power like generators which are much more expensive.

A similar story exists with respect to ports infrastructure. Overall port capacity is constrained with most major ports running at close to full capacity utilisation. Average turnaround time in India is 3.5 days as against 10 hours in Hong Kong and 16.5 hours in Colombo (as shown in Exhibit 3b). Port connectivity to hinterland is often poor. Given that most of our trade is routed through sea ports, their poor efficiency has a direct impact on the competitiveness of Indian exports.

India's road infrastructure also needs substantial improvement. A significant part of the country's roads are unpaved. National Highways which account for 2% of road length but carry 40% of the traffic are under tremendous pressure. The speed of an average truck on Indian roads is about 40 kmph compared to 60 kmph in

China and nearly 100 kmph in USA and Europe, leading to significant increase in turnaround time and transportation costs³. Recent policy initiatives in this regard should go a long way in improving the road infrastructure in India.

Huge Investments Planned for Infrastructure Development

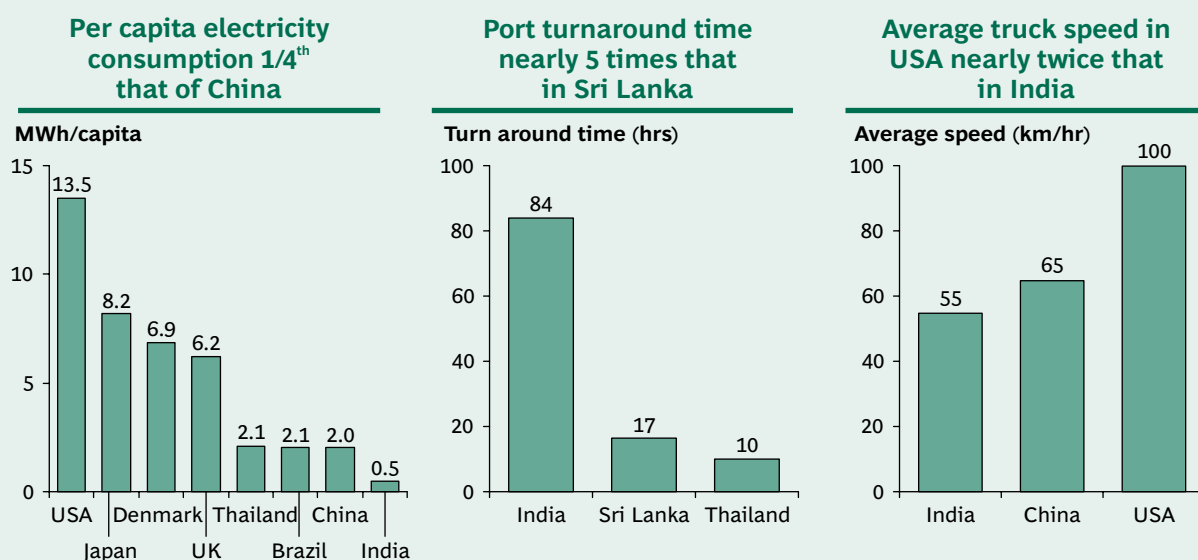
Government of India has recognised the need for massive investments in physical infrastructure and planned for the same in the 11th and 12th Five Year Plans. Exhibit 3c shows that the government has planned an investment of Rs 750 thousand crore in the 11th plan (2007–12) across power, ports and roads, more than doubling the actual expenditure in the 10th plan (2002–07).

A substantial part of this investment is expected to be made by the private sector. Exhibit 3d shows that as per the government's plans, the private sector will contribute almost 33% of all spend on roads, power and ports development projects.

2. JETRO report May 2009.

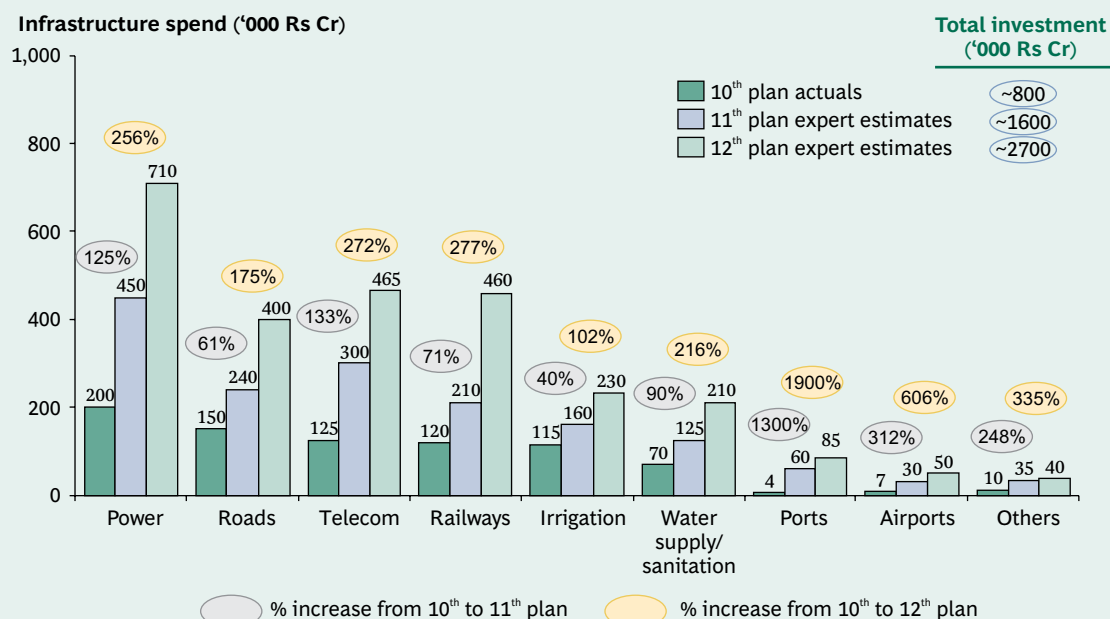
3. NHAI statistics.

Exhibit 3b. India faces significant disadvantages due to inadequate infrastructure



Sources: IEA Statistics 2008, IBP Statistical Tables–2009, Office of Freight Management & Operations, Performance Measurement Programs 2008 and Federal Highway Admn, NHA

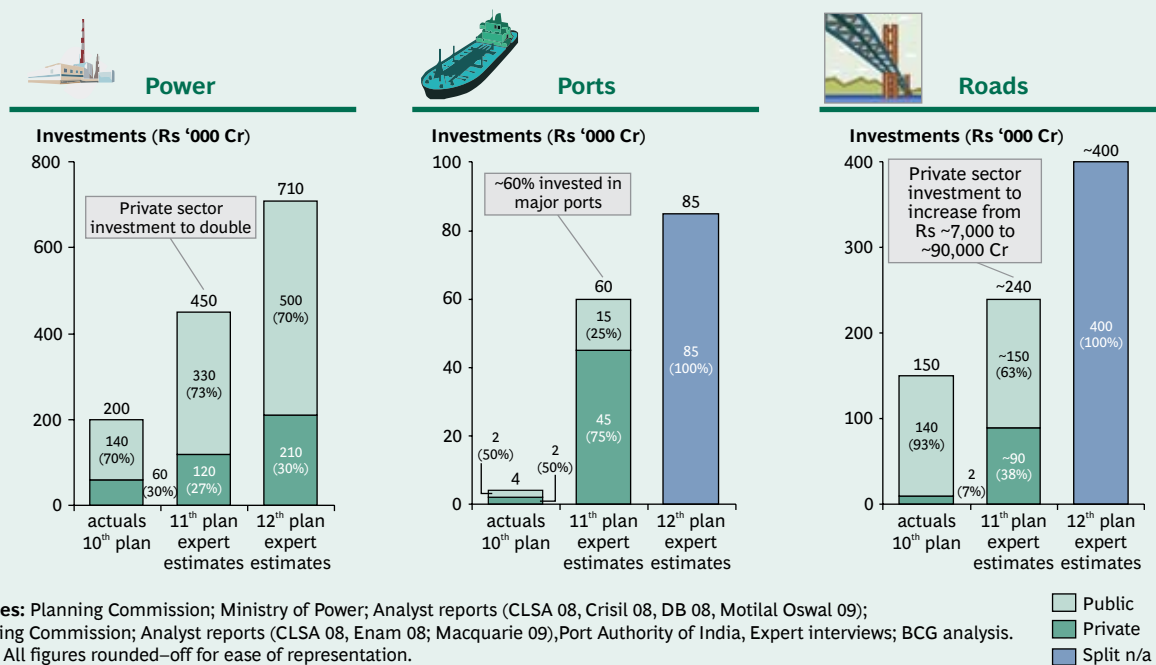
Exhibit 3c. Large increases planned in infrastructure spend



Sources: Planning commission; Analyst reports; Expert interviews; BCG analysis.

Note: 10th plan 2002–07; 11th plan 2007–12; 12th plan 2012–17; Conversion rate: 1 US\$ = Rs 45; All figures rounded-off for ease of representation.

Exhibit 3d. Private sector needs to play a significant role in Indian infrastructure development



Improving Execution of Infrastructure Projects

The challenge facing India's infrastructure is not lack of intent or plans, but failure of execution. As an example of power infrastructure (as shown in Exhibit 3e), the actual augmentation in the generating capacity has consistently fallen short of plan.

This is true for most infrastructure improvement plans. Most projects run significantly behind schedule—delays caused both in the initial planning as well as in the execution of the project. Government's own estimates indicate that over 50% of projects in India are running behind schedule and 400 big infrastructure projects are delayed between 6 months to 2 years, and costing the government an additional Rs 45,000 cr or 17% of the planned project costs⁴. For example, the Bandra-Worli sea link was awarded in 2000 and slated for completion in 2003. However, High Court clearances were obtained only by 2005. Lack of funds and design changes led to delays of another 4 years and the project was finally thrown open to public (partially) in 2009—a 6 year delay from the planned date of completion, leading to a substantial increase in total cost.

Four reasons contribute to these delays—poor planning, long lead times in land acquisitions, delays in getting environmental clearances and poor performance management. Projects are often delayed during the tendering stage itself due to unplanned and outdated cost estimates and engineering designs. Acquiring land is an extremely tedious and time consuming process due to the many government clearances, and at times rehabilitation issues of the displaced villagers. Many projects cannot start due to outstanding public litigations on rehabilitation in a court. Presently, it takes 1 to 3 years to get an environmental clearance from the Ministry of Environment and Forests and 60% of power projects and 40% of road development projects are delayed on this account alone⁴. Once the project is underway, ineffective dispute resolution and poor performance management further add to the delays. Addressing these issues will be critical if we are to achieve our stated plans.

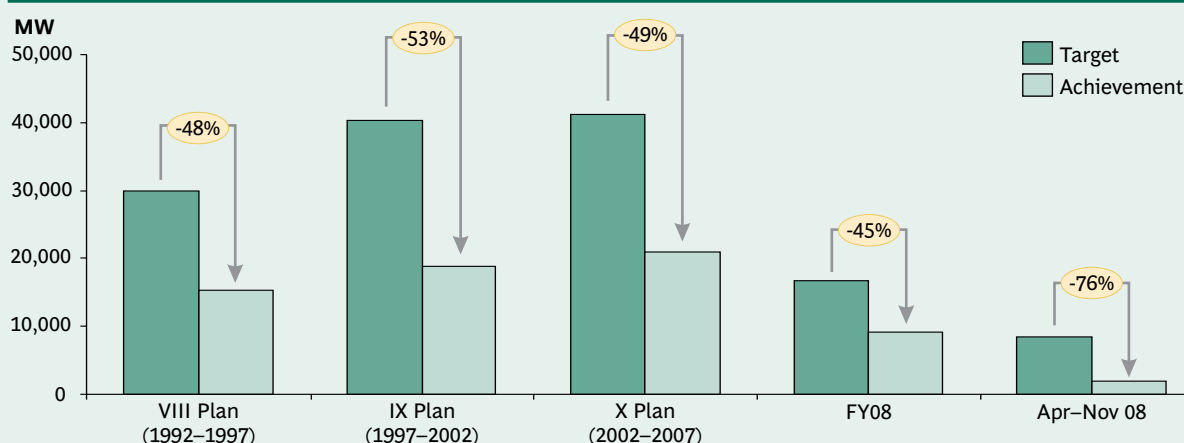
Agenda for Action

It is not the purpose of this report to make detailed recommendations on infrastructure. As we have said, the

4. Government of India estimates.

Exhibit 3e. India has a poor track record on the achievement of infrastructure development plans

Example: Power capacity added vs. planned



Historically, the power sector has realised only around half of the planned expansion

Sources: Planning Commission; Ministry of Power; Analyst reports (CLSA 08, Crisil 08, DB 08, Motilal Oswal 09); Expert interviews; BCG analysis.

challenges are well known and so are most of the solutions in terms of:

- ◆ *Better planning and coordination across different government institutions:* Responsibility of infrastructure creation is currently fragmented across multiple government ministries, departments and bodies in terms of both types of infrastructure (e.g. roads versus power) and different permissions required (e.g. land acquisition and rehabilitation versus environmental clearances). Often these agencies have different priorities and agendas. Better planning and coordination across these different entities is essential for an integrated infrastructure development effort and speedy implementation.
- ◆ *Better project execution and monitoring:* The largest proportion of infrastructure spending will still be made by the government and its agencies will be responsible for the execution of many of the projects. These agencies need to enhance their capabilities and systems to drive better execution and monitoring of the projects, ensuring adherence to quality and timelines.

- ◆ *Ease private participation in infrastructure:* The central and state governments need to ensure a stable and economically attractive environment for private players to participate in this space. Some of the elements that would contribute to this include economically viable concessionary agreements, transparent rules for award of contracts, clearly laid out environmental clearance mechanisms and setting up robust regulatory mechanisms for the different sectors.

One idea which the government may want to consider in its agenda for infrastructure is whether a ‘booster dose’—a major increase in investment in infrastructure using some of its foreign currency reserves should be considered despite potential increase in budget deficit. There are many instances in recent history where governments in several countries have done this, and the economic growth that was generated was well worth the risk of potential inflation from increased deficits.

Building Stronger Human Capital

Human capital is the second big challenge facing the manufacturing sector in meeting its aspirations. The so

–called “demographic dividend” will see a disproportionate increase in the working population in India in the coming decade. To ensure that this working population provides the requisite ‘employable’ resources for Indian manufacturing and does not become a liability, India needs to massively gear up its education and skill development infrastructure.

India’s ‘Demographic Dividend’

A study done by The Boston Consulting Group, highlights that by 2020 India would have about 45% of its population in the age group of 20–50. As a comparison, the figure is 42% for China and 36% for France⁵ (as shown in Exhibit 3f).

These favourable demographics mean that by 2020, India would be one of the few countries which to have experienced a disproportionate expansion in their working age populations (as shown in Exhibit 3f). In 2007, India had nearly 60% of its population within the working age group (20 to 50 years). By 2020, the figure will reach approximately 63%. This additional 3% will translate into a nearly 47 million addition to the working population⁶.

The ‘Demographic Dilemma’

India’s ‘demographic dividend’ should, in theory, translate into an abundant supply of working age people to fuel the drive for manufacturing growth. Unfortunately, a de-averaged picture of the demand–supply of skilled people indicates a major mismatch. In a study in 2008 along with CII, The Boston Consulting Group analysed this demographic dilemma of India and found that as the demand mix for people shifts more and more towards graduates and trained people, an availability issue starts arising. At an overall economy level, 23% of the incremental demand is expected to be for graduates and vocationally trained personnel as compared to about 10% today, leading to a shortfall of qualified talent. Our estimates suggest a shortfall of about 2 lakh engineers, 4 lakh non-engineering graduates/post-graduates, and 1.5 lakh vocationally trained personnel over a 5 year period (as shown in Exhibit 3g).

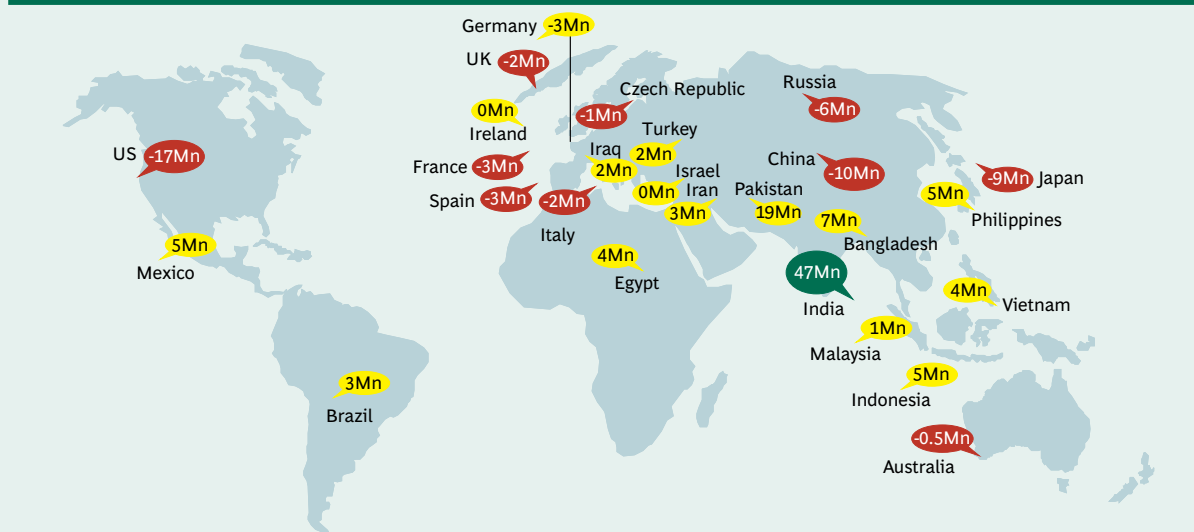
The shortfall in qualified workforce gets further exacerbated when the “employability” lens gets applied, which

5. US census bureau; BCG analysis.

6. US census bureau; BCG analysis.

Exhibit 3f. India will have a disproportionate surplus in working age population by 2020

Potential surplus population in working age group (2020)

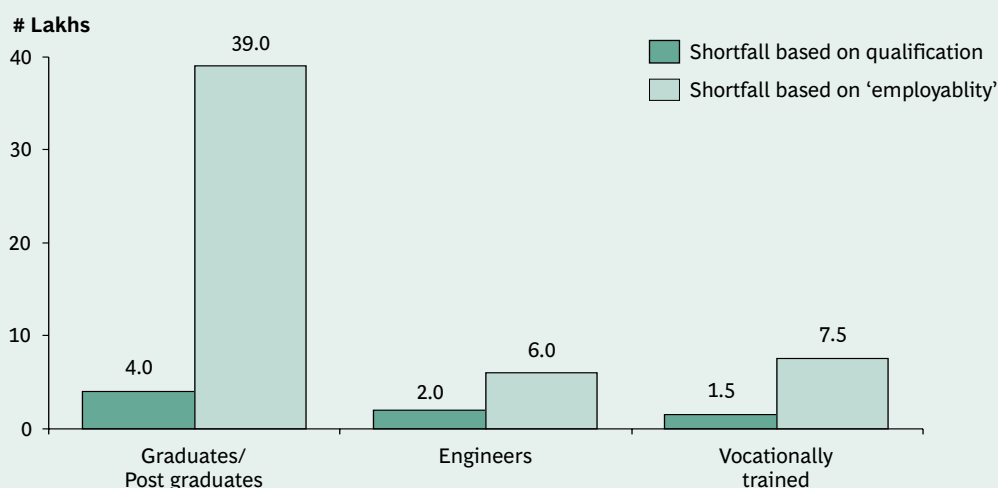


Sources: U.S. Census Bureau; BCG analysis.

Note: Potential workforce surplus is calculated keeping the ratio of working population (age group 15–59) to total population constant and under the assumption that this ratio needs to be broadly constant to support economic growth. Therefore, India will have 47 million more people in the working age group/total population by 2020 compared to today, while France will have a deficit of 3 million people in the working age group compared to today.

Exhibit 3g. India will face shortfall in availability of qualified and 'employable' labour

Shortfall in qualified personnel estimated for 5 year period 2007–12 (in lakhs)



Source: CII–BCG Report “India’s Demographic Dilemma”, 2008.

measures whether these educated personnel would have the right skills to get employed. Given the wide disparities in quality of education across different institutes in India driven by variations in infrastructure, facilities and capabilities, not all qualified graduates/engineers are directly employable. Several institutes in India, while providing formal degrees/diplomas do not adequately develop basic skills like verbal ability, comprehension and data analysis to meet the threshold of employability. Studies indicate that the employability of graduates ranges from 9% to 60% across sectors with manufacturing having an employability of 40–45%⁷.

Building in the impact of ‘employability’ on the overall demand–supply situation indicates that India could face a huge issue with a shortage of skilled people in terms of engineers (~6 lakh), graduates (~39 lakh) and vocationally trained personnel graduates (~7 lakh) for the next five years (as shown in Exhibit 3g).

It is important to emphasise the need to de-average the problem and develop initiatives specific to industry or geography as manufacturing industries have a wide variation in terms of the volume and skill level of labour

required. This is illustrated in Exhibit 3h which shows wide variation in labour intensity between industries like wood and paper which are much more labour intensive compared to sectors such as electrical machinery and basic metals.

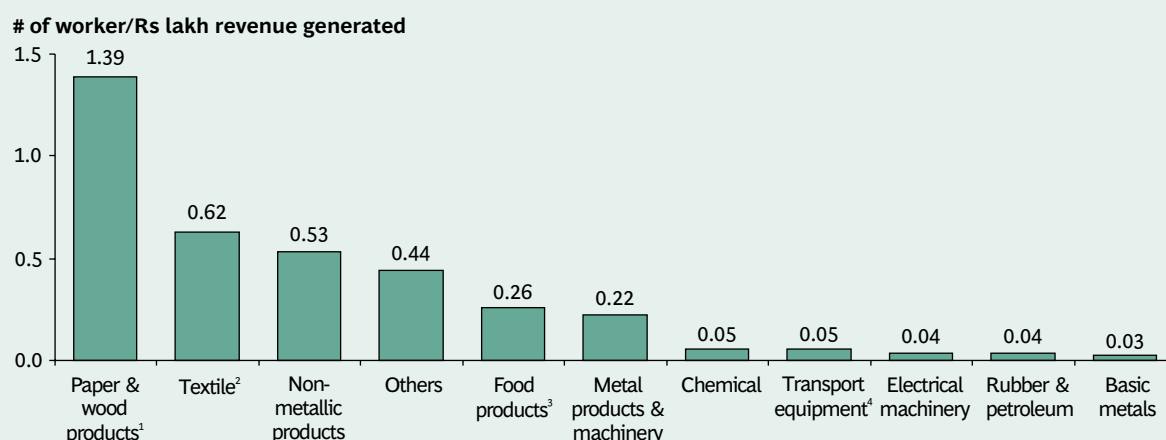
Industries like transport equipment, electrical machinery and petroleum require workforce with specialised skills and qualifications such as understanding of mechanical processes, levers and engines; also heat treatment of steels and knowledge of physical properties of metals. These will likely see a significant shortage as these sectors continue to grow, and though the number of pass-outs from ITIs and other vocational colleges increase, ‘employability’ remains a concern.

Industries such as wood, paper products and textiles on the other hand require large workforce—mostly unskilled with no special qualifications. Greater focus on the growth of these industries will offer opportunities to absorb the growing surplus of unskilled workforce in the

7. India’s Demographic Dilemma “Talent Challenges for the Services Sector” BCG–CII report.

Exhibit 3h. Wide variation in labour intensity

Labour intensity across sectors in manufacturing industry in India



Source: Annual Survey of Industries 2005–06, Central Statistical Organization, India stat online database 2008.

¹Includes furniture and wood products, paper and printing.

²Includes apparel.

³Includes tobacco products.

⁴Includes auto.

country, particularly in states such as Uttar Pradesh, Bihar, Jharkhand where the population is expected to increase by 8–11% by 2015⁸.

Agenda for Action

Similar to the infrastructure challenge, the government is quite aware of the human capital challenge and has taken several major initiatives on this front ranging from setting up a National Skills Development Council to encouraging private participation/management of ITIs. The CII–BCG report released in 2008 had highlighted several areas for government policy intervention with an equally critical focus on enhancing ‘employability’ rather than just increasing the number of qualified personnel through the upgradation of existing schools, sector-specific skill development and creation of vocational training platforms. Some of the key agenda areas include:

- ◆ *Improving quality of teaching imparted in schools and colleges:* Three key levers were identified. First, the spending on public education will need to be enhanced. India spends ~US\$ 300 per pupil compared to an average of US\$ 1,600 for the other BRIC countries. Secondly, accountability in the public school system

has to be enhanced. Currently, ~25% of the teachers in primary schools are absent on any particular day, and there is no system of performance tracking⁹. And thirdly, private participation in the education sector will need to be encouraged.

- ◆ *Enhance provision of sector specific skills to qualified personnel:* Vocational/industry-specific training post graduation is a critical element enabling the graduates to become productive quickly and calls for quality assurance and curriculum development to ensure relevance.
- ◆ *Improve attractiveness, availability and feasibility of vocational education for school drop-outs:* The current vocational education infrastructure comprising government-run ITIs, privately-run industrial training centres and private vocational institutes have many drawbacks. They suffer from poor quality of education, crumbling infrastructure and poor alignment to needs of the job market. The government has recogn-

8. Central statistics organizations projections.

9. BCG analysis.

ised these issues and is putting in place plans to address them.

While the scope of this report does not allow going into details of each of these recommendations, it is imperative for all stakeholders to align on the objectives, plans and need for speedy action to ensure that Indian manufacturing does not face constraints in the form of human capital to its future growth.

Simplified Government Procedures and Policies

Government procedures and policies play an important role in defining the attractiveness of a country as a manufacturing destination. These include:

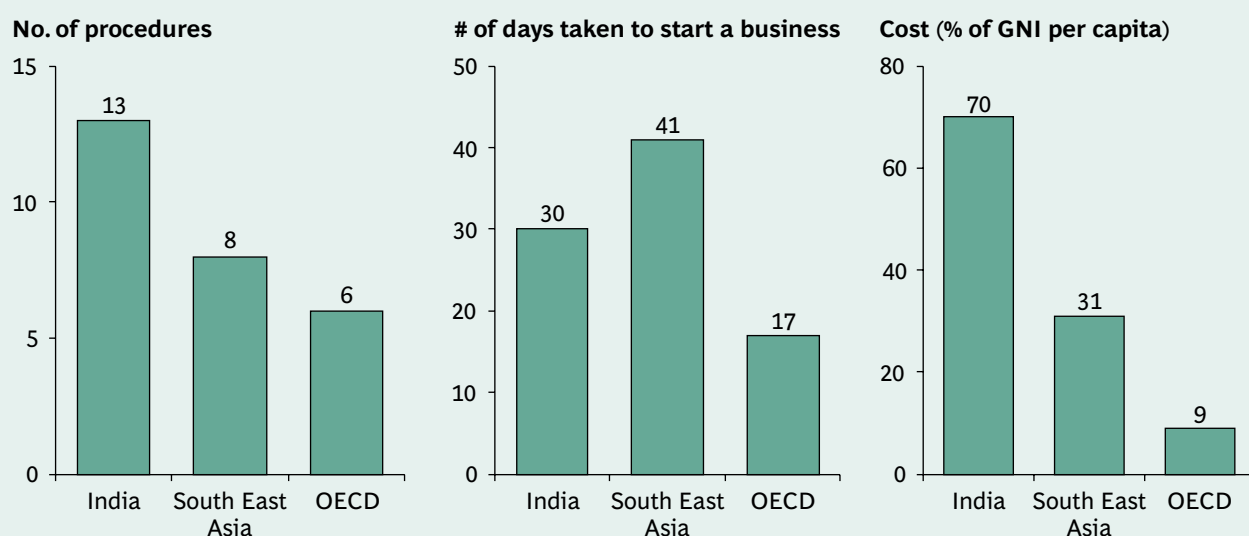
- ◇ Ease of starting or setting up a new business.
- ◇ Ease of accessing and controlling the key factors of production like capital and labour.
- ◇ Impact of taxation structures and government procedures on cost competitiveness and transaction costs.

India Rated ‘Poor’ on Ease of Doing Business

A Forbes study of “Best Countries for Business” in 2008 ranked India at a lowly 120th out of 127 economies studied, falling 11 places from last year’s position. Even though significant progress has been made through delicensing and easing of norms, there is clearly some way to go. India is still rated a difficult place to set up a new business—in terms of number of procedures and clearance required, the time taken to make things happen and the resultant cost of doing so.

This makes India an expensive destination to start business as computed by World Bank in its project ‘Doing Business’ of the World Bank group which computes a ‘cost of doing business’ score as an indicator of the cost of starting a business as a percentage of GNI per capita. This cost is driven by procedures and legalities to be completed, and the various fees paid to the government and other agencies (as shown in Exhibit 3i). There are other areas where India lags its peers. For example, enforcing contracts in India takes twice the time it takes in OECD countries and costs almost 40% of the contract value. Closing down or exiting a business is also seen as a very

Exhibit 3i. India lags on ease of starting a new business



Source: ‘Doing Business’ database–2009: www.doingbusiness.org, a World Bank Group database.

Note: Cost of starting a business, is the incremental costs incurred in starting business like fees paid for legalities and procedures.

lengthy and cumbersome process and the recovery rate of closing the business is estimated at less than 10% of the value outstanding¹⁰.

Higher Transaction Costs Faced by the Manufacturing Sector

Poor 'ease of doing business' translates to higher transaction costs for Indian businesses, which is of particular concern for export competitiveness. For example, CII studies indicate that about 31 documents in a total of 87 copies are required to ship goods from India. Many of these are certifications from various agencies and are done in manual form. Another example is the extent of documentation required for clearance of import/export shipments in an SEZ, which include: five physical copies of the Bills of Entry required for clearing a single import shipment, 28 rubber stamp impressions and 32 signatures on the Bill of Entry for clearing a single import shipment; eight rubber stamp impressions and 15 signatures for an export shipment.

Similar to the examples above on documentation for trade transactions, substantial paperwork and bureaucracy is involved in different processes at other touch-

points like indirect taxation, inter-state border checkpoints for transportation of goods, etc.

These procedures and paperwork need to be eliminated, streamlined or simplified to improve cost and time effectiveness of Indian companies. Industry and government should work together to identify specific and detailed improvements that can be implemented across various processes to bring down transaction costs in India.

Cascading Taxation Structure

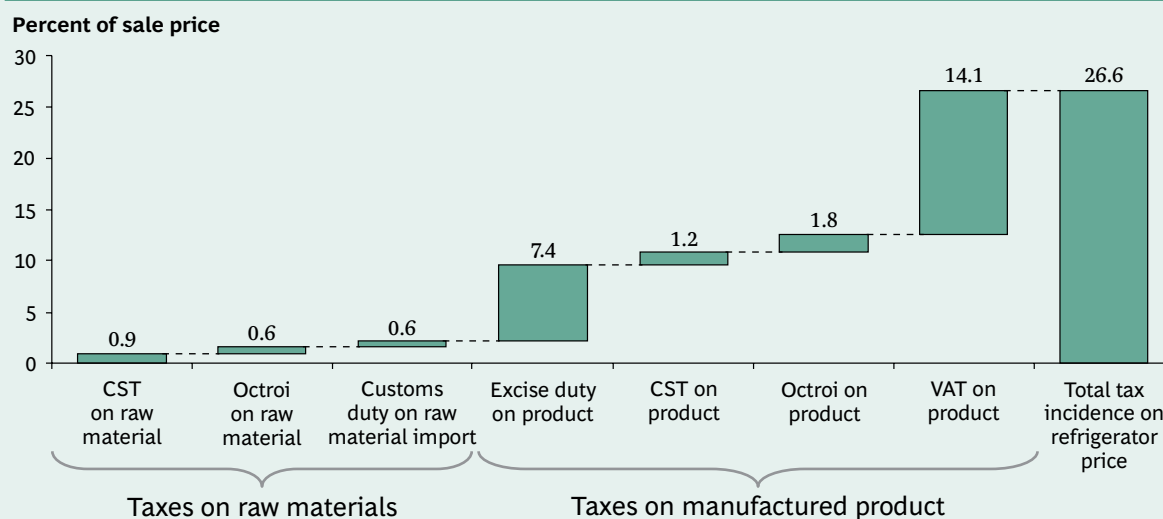
Despite ongoing tax reforms, the Indian indirect tax system continues to be complex and inefficient for the manufacturer as the cascading impact of various taxes like excise, state and central sales tax, and octroi and entry tax can be as high as 25–30% of the retail price in India. Exhibit 3j shows this cascading affect of multiple taxes on a consumer good like refrigerator where the overall tax incidence is as high as 27% of the sales price.

In comparison, many countries like China impose a single nationwide value added tax (VAT), at a level of

10. World bank 'Doing business' database.

Exhibit 3j. Total indirect tax incidence in India is between 25% to 30% of sale price

Example: Tax incidence on price of refrigerator



Source: BCG analysis and company report.

Note: CST refers to Central Sales Tax unless otherwise mentioned.

17% of the retail price. CII studies indicate that exports from most countries are exempted from taxation. In India too this is the general policy but given that there is no re-imbursement on certain categories of taxes such as octroi and central sales tax, Indian exporters end up paying 4%–6% of cost of goods as tax on their exports thereby reducing cost competitiveness¹¹.

Besides the cash outgo, the multitude of taxes and exemptions creates inefficiencies and delays in the system. Indian manufacturing firms have higher logistics and inventory costs as thousands of trucks wait on state borders to pay taxes. According to a World Bank study conducted in 2005, 15%–25% of transportation time is lost due to delays at inter-state checkpoints¹². Manufacturing companies set up warehouses in multiple locations, which further increase logistics cost, to optimise tax outgo. Finally, decisions around choice of manufacturing locations and scale of plants are distorted by tax considerations rather than economies of scale or proximity to markets/raw materials.

A simplified, transparent, unified and better administered tax structure across the country (proposed to be implemented via the Goods and Service Tax (GST)) would go a long way in helping to drive greater efficiencies for the Indian manufacturing sector.

Labour Laws in India

Several detailed reports already exist on this sensitive topic. We have therefore refrained from getting into details in this section. Instead we would like to emphasize a few key points.

India needs to protect worker rights, which becomes even more important given that there is no social security. However, this does not mean that India should not put in place a flexible, efficient labour market to optimise operations and improve efficiency. This becomes more critical as given the increased volatility in the external environment, rigidities in the labour market imply lower flexibility in operations and invariably higher costs.

At present, there is a multitude of labour laws in the country. There are 45 Central Acts and 16 associated rules that directly deal with labour. In addition, there are other acts that deal indirectly with labour. There is a need to harmonise rules across all these acts.

The key policy agenda for the government is how to simplify and refine the labour laws keeping in mind this need for flexibility and efficiency of the manufacturing sector, while at the same time protecting and managing the interests of the labour. We will discuss this in more detail in Chapter 6 on the policy agenda for the government.

Attracting Greater FDI into Indian Manufacturing Sector

As discussed earlier, India will have to get a much higher level of investments into its manufacturing sector to achieve the desired aspiration. Gross fixed assets of the manufacturing sector will need to increase by Rs 55–80 lakh crore between now and 2025, on a base of Rs 13 lakh crore of gross fixed assets today. Just to compare, the increase in gross fixed assets over 2004–2008 was Rs 32 lakh crore¹³.

To make this happen India has to start attracting higher amounts of FDI. While the FDI flow into India has improved rapidly over last few years, it still lags its peers (as shown in Exhibit 3k). Within this overall FDI flow, most of the manufacturing FDI has gone into China which has received over US\$ 40 bn into this sector¹⁴. Higher FDI into the manufacturing sector will also be a critical contributor in helping India achieve higher export growth of 18%–20%.

An interesting model that India could look at is “CzechInvest”, set up by the Czech government as an independent investment and business development agency in 1992. This agency attracts foreign investment and developing domestic companies through its services and development programs. CzechInvest is exclusively authorised to file applications for investment incentives at the appropriate governing bodies and prepares draft offers to grant investment incentives. It actively provides potential investors current data and information on business climate, investment environment and investment opportunities in the Czech Republic. Its services also include handling of investment incentives, business properties identification, supplier identification, business infrastructure development and providing access to structural funds.

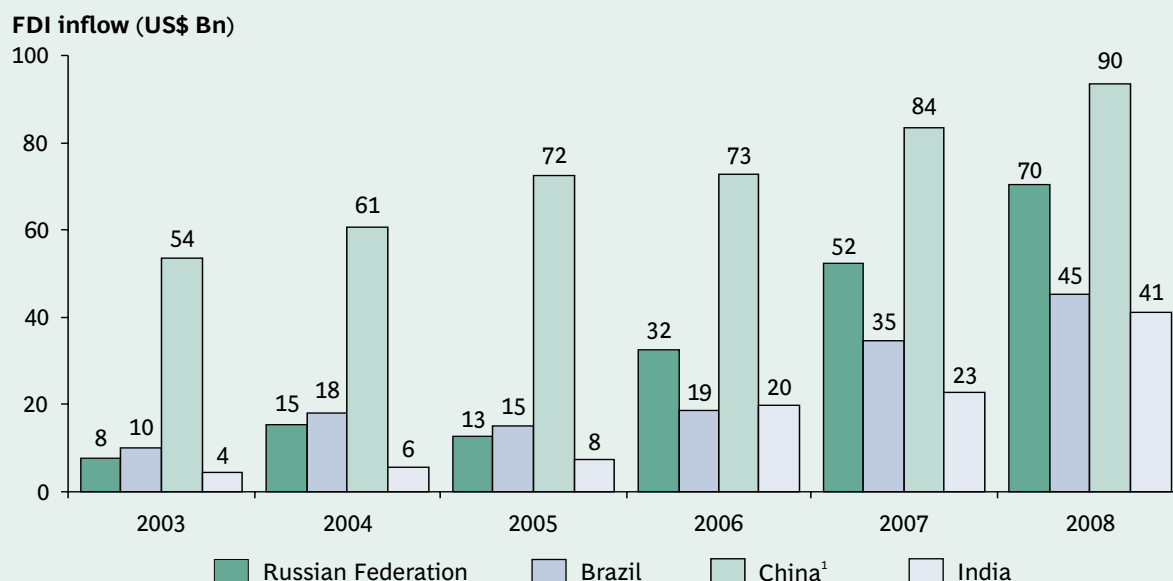
11. CII estimates; BCG analysis.

12. World Bank estimates.

13. Refer Exhibit 2d, Chapter 2.

14. UNCTAD FDI stats, EIU estimates.

Exhibit 3k. Overall FDI flows into India lag peer countries



Source: UNCTAD FDIstats, Economist intelligence unit.

Note: FDI amounts in US\$ at current prices. China 2008 numbers projected as CAGR of previous 4 years. India 2008 projection from EIU.

¹China excluding Hong Kong, Macau and Taiwan.

Agenda for Action

As in the case of infrastructure and human capital, the importance of improving upon the 'ease of doing business' and its attendant issues are well recognized. As Indian manufacturing companies compete more and more on the global stage, all these elements would become key to cost competitiveness. Specific policy recommendations have been proposed in several CII publications already. Without belabouring the issue, and getting into the details of each of these, we reiterate three broad areas of focus:

- ◇ *Simplification of procedures and rules and reduction of transaction costs:* The need to rationalise, harmonise and simplify procedural requirements at all levels of bureaucracy—both central and state, is well recognised. The aim should be to come close to establishing a 'single window clearance' to the extent possible and reduce the number of touch-points required by businesses and leverage information technology.
- ◇ *Rationalisation of indirect tax structure:* Rapid implementation of the proposed Goods and Services Tax (GST) regime is the cornerstone of simplifying and

minimising the cascading tax burden. Simplifying the administration and collection of these taxes is equally important.

- ◇ *Reform of labour laws:* The Second National Labour Commission had developed several specific recommendations in 2002, on this important topic. These need to be looked at in detail, and implementation accelerated.
- ◇ *Attracting higher FDI into India:* The recent initiative launched by the commerce ministry of setting up 'Invest India' to promote foreign investment into India in a structured and comprehensive manner is a step in the right direction. Invest India will provide structured support for foreign investors looking to invest in India, facilitate setting up of the business and help coordinate with the state governments. It is critical to ensure that the intent behind this initiative is realised, and further efforts are made as required to attract greater FDI.

This pillar of developing strong enabling infrastructure is absolutely critical for achieving the aspirations for the

Indian manufacturing sector. In this chapter we have highlighted three key areas. In addition, there is a need to improve the overall regulatory mechanism for industries, enhance the efficiency of the legal and contract enforcement system, and boost the efficiency of the capital markets and intellectual property protection mechanisms.

Most of the issues raised here have been on the radar screen of the government and industry for a while now. Action has been taken and improvements have happened along several dimensions. The imperative now is to align all stakeholders on the need to accelerate the implementation of the extensive action agenda before them.

Exploring New Avenues of Growth

The second pillar that will support India's manufacturing aspirations is identifying and exploiting new avenues for growth. Achieving the aspiration for the Indian manufacturing sector has to take into account certain important forces that are shaping the Indian and global manufacturing landscape. We examine three powerful forces that can offer significant opportunities for Indian manufacturing.

- ◆ Globalisation of supply chains—the biggest force that has transformed the global industrial landscape in recent years, offering opportunities for export-led growth from India.
- ◆ Sustainable Development and emergence of “Green Technologies”—will be one of the strongest forces over the next two decades, offering both challenges and opportunities in green manufacturing and new technologies for Indian companies.
- ◆ India's changing income demographics—will offer opportunities among different segments, especially the “Next Billion” both in India and globally.

In this chapter we examine these opportunities, India's current position and competitiveness to tap these and draw implications for the sector to drive growth in these areas.

Globalisation and Export-Led Opportunities for India

Globalisation has been one of the defining trends of the last two decades, and the pace of globalisation has been increasing rapidly. This is being driven by a unique con-

fluence of large, low-cost, high-growth markets coming together with the rapid opening up of world trade. Over the last 3 decades, merchandise trade of the US increased close to seven fold from ~US\$ 480 bn in 1980 to US\$ 3.2 tn in 2007, growing at about 7% per year. China and India have shown an even sharper growth, with China's trade growing at nearly 16 % per year to reach nearly US\$ 2.2 tn in 2007, and India's trade growing at nearly 11% per year to reach nearly US\$ 360 bn (as shown in Exhibit 4a).

Industrial Capacity Migrating to the Developing Countries

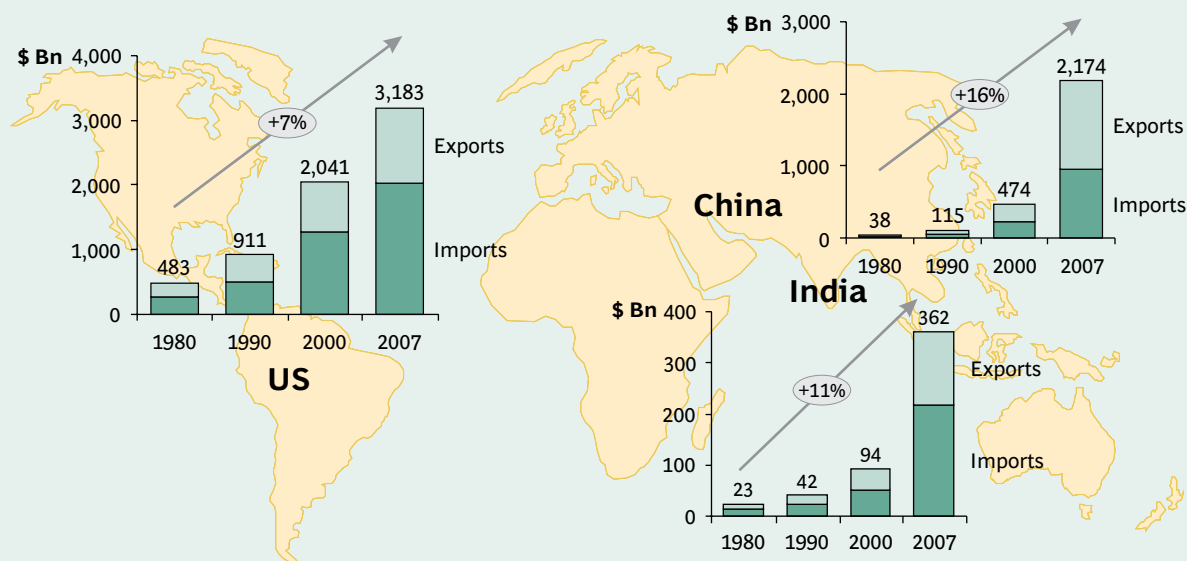
This rapid globalisation has seen large scale migration of industrial capacity to RDEs which have grown their industrial production at ~16% per annum compared to ~4% per annum for the developed countries in the last 5 years (as shown in Exhibit 4b). Consequently, the total industrial production of these RDEs has grown from less than 25% of OECD countries to more than 50% between 1990 and 2008. The primary drivers of this migration have been rapid growth of these RDE markets and lower labour costs which have led MNCs to restructure their global supply chains. For example, a leading telecom player's share of capacity in the RDEs increased from ~40% to ~70% over a six year period¹.

While China has been the leading beneficiary of this migration, several other countries including India have also grown their manufacturing sectors substantially during this period. In select categories like consumer electronics, household appliances, textiles and apparel, close to 50% of US domestic consumption is now imported from just Asian countries.

1. Market interviews; BCG analysis.

Exhibit 4a. Rapid growth in global trade

Merchandise trade (Exports/Imports) for 1980 – 2007



Sources: World Bank; WDI.

Exhibit 4b. Large migration of capacity from developed to developing countries

Migration of capacity

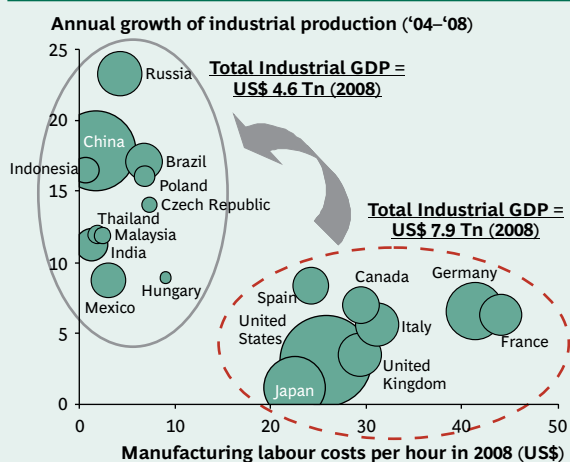
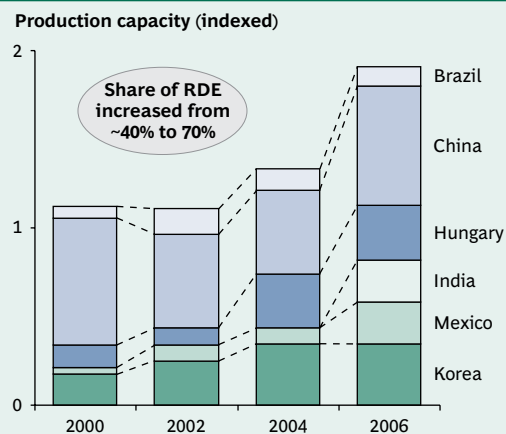


Illustration: RDE based supply chain of global telecom player



Sources: EIU; Market interviews; BCG analysis.

Note: Gross domestic product (GDP) at current market prices in US\$ from industrial production i.e. mining, quarrying, manufacturing, construction and utilities.

However, it is important to recognise that a large part of the shift in production over the last several years has been dominated by lower value added products. As an example, while many automotive companies are sourcing parts or commodities from countries like China and Mexico, only few are sourcing full modules/systems. MNCs still struggle to exploit the full potential of manufacturing and sourcing from RDEs due to external challenges like lack of scale of suppliers, high volatility in currency and transport costs, and higher quality costs and internal challenges around lack of integration between different functions like procurement and engineering— procurement wants to source from low cost suppliers while engineering wants suppliers closer to home.

The March of Globalisation Likely to Continue Unabated

The recent economic crisis has raised the spectre of greater protectionism in major economies in the world. There has also been talk about the eroding competitiveness of RDEs as wage rates increase, transportation costs rise due to higher oil prices, and currency volatility increases. Does this mean that the forces of globalisation are likely to slacken?

Let us look at some facts. Our analysis shows that the huge labour cost differential between the RDEs (~ US\$ 0.3/hour to US\$ 9/hour in 2008) and the developed countries (average for G7 countries was ~US\$ 29/hour in 2008) is very unlikely to narrow in the short or medium term. Even with the likely increase in wage rate in RDEs a substantial gap versus developed countries will continue to exist. Transportation costs are unlikely to rise substantially from current levels as oil price stays in the US\$ 65–100 per barrel range. There is increasing downward pressure on container freight rates given the demand–supply situation in the container market. RDE-based production thus continues to be significantly cheaper than the U.S. or Europe—except for products that have minimal labour content or are bulky and costly to ship and has remained so even in times of high transportation costs and strong RDE currencies. A simple product like a coarse shirt or a precision engineered product like an automotive part is still around 25%–50% cheaper to produce and ship from the RDEs to the western markets².

Similarly, while there has been a lot of talk around protectionism in several countries, free trade is expected to

prevail in the longer run. Lessons have been learned from previous recessions where raising trade barriers actually proved counter-productive. Also, the inter-linked nature of the supply chains today makes it difficult for countries to raise tariffs without negatively impacting their own producers, or inviting retaliatory responses from other countries. Support for free trade remains strong with the G20 stance being to “promote global trade and investment and reject protectionism to underpin prosperity”.

Global Markets Offer Substantial Opportunities for Indian Companies

In the last two decades, total industrial production in the RDEs has grown from ~20% of OECD countries to more than 35% between 1990 and 2008 on the back of greater cost competitiveness. We estimate that by 2025, the RDEs will overtake the developed markets in industrial production³. This continuing shift offers substantial opportunities for Indian companies. With a concerted push India could increase its share in global off-shoring effectively filling the gap between growth in domestic consumption and in its manufacturing aspirations. To do this, two important considerations emerge—choice of target industries and choice of export destinations.

Choice of industry will be important. Recent BCG analysis shows that off-shoring to Asian countries will continue to rise. However not all industries will be equal contributors to this. BCG analysis shows that based on relative competitiveness of Asia versus other off-shoring locations, six industries will continue to be the biggest contributors to the Asian off-shoring story. These are apparel and textiles, consumer electronics, furniture and wood products, automobiles, industrial machinery and industrial chemicals. Some industries where India is already an important exporter will continue to offer strong potential—specifically chemicals and textiles. India could also make a bigger push into consumer electronics, furniture and industrial machinery. The choice of future focus industries will depend on multiple factors—export potential from these industries, India’s current relative competitive advantage to serve this demand, key export destinations and India’s trade relations with them. A focused and detailed effort is required to identify priority sectors for India to target breakout growth in exports.

2. BCG analysis.

3. EIU data; BCG analysis.

Need to understand shifting global trade patterns.

Over the last decade, there has been a historic shift in trading patterns with global trade shifting from Europe and the US-based flows to intra-Asia routes⁴. For example, the intra-Asian trade in 1990 which was just 4 million TEUs had the fastest growth among all key trading routes and grew to over 28 million TEUs by 2008 and is expected to grow to over 80 million TEUs by 2015—by far the largest trading route in the world. China has accounted for the lion's share of this massive shift that has occurred. India exports to a good mix trading partners with exports to Europe accounting for 25%, USA accounting for 13% and Asia accounting for 32% of total exports. While India needs to keep USA and Europe in its sights, it needs to rapidly deepen its focus on Asia to take advantage of this massive growth in intra-Asian trade in the next decade.

India's Competitiveness Challenge

India is one of many RDE countries considered by MNCs as they globalise their supply chains. At the same time,

many Indian manufacturing companies are globalising their supply chains at a rapid pace through both organic growth and acquisitions. A strong and competitive manufacturing base in their home market will be an important competitive driver for most of these companies.

How competitive is India compared to other RDEs? Exhibit 4c shown below compares India with other RDEs on several factor costs such as land rates, power costs, taxes, prime lending rates and labour costs. At first glance, India looks competitive versus other RDEs. However, a closer look reveals several issues that reduce this competitiveness. India's manufacturing labour productivity in 2006 was 30% lower than China's in nominal terms⁵—adjusted for productivity; this virtually eliminates India's labour cost advantage over China. On several factor costs while reported costs are low, there are several hidden costs which render India disadvanta-

4. Drewery Shipping consultants; BCG analysis; refer Exhibit 6b.

5. EIU country data; BCG analysis.

Exhibit 4c. Factor costs comparison across countries

Factor cost heads	Units	India	China	Malaysia	Thailand	Indonesia
Land costs ¹ (industrial) (2009)	\$/sq-mt	32	80.4	8.5	81	40
Power costs ² (2008)	\$/KwH	0.093	0.08	0.06	0.07	0.04
VAT rate ³ (2009)	%	12.5 (~25-30) ⁴	17	5-20 sales tax 7 depend-ing on items		10 (National tax)
Prime lending rate ⁵ (2009)	%	12	5.6	5.1	5.8	NA
Manufacturing labour costs ⁶ (2008)	\$/hour	0.99	1.40	2.43	1.80	0.33
Manufacturing productivity of labour ⁷ (2006)	\$/worker	20,476	26,644	19,592	13,870	21,136
Productivity adjusted manufacturing labor cost per hour (2008) ⁸	% of US cost	55	48	26	46	14

Note: All factor costs are taken at the current market prices for the years mentioned. Factor costs like land costs, labour costs and power costs vary widely across regions within large countries like China, India and Russia.

¹Data from comparative survey of investment related costs by Japanese External Trade Organization (JETRO). Rates taken are capital values for land in industrial zones in and around key cities. For India – New Delhi and Mumbai, China – Beijing, Shanghai and Guangzhou, Singapore, for Malaysia – Kuala Lumpur, for Thailand – Bangkok, for Indonesia – Djakarta. For Russia data from web research.

²Power costs taken from IMD competitiveness online for 2008, for India (2009) average of industrial power costs taken from JETRO report for New Delhi and Mumbai, for China average of industrial power rate (2009) for Beijing, Shanghai and Guangzhou.

³Data from JETRO report, VAT rates applicable across the country uniformly. For Russia data for 2006 from EIU market indicators and forecasts; tax rates may not be completely comparable across different countries due to differences in tax structure.

⁴Total indirect tax incidence on sales price in India can be as high as 25–30% including entry taxes, cesses etc.

⁵EIU country indicators.

⁶EIU market indicators and forecasts.

⁷EIU market indicators and forecasts, Includes formal sector employment only.

⁸BCG Estimates

geous. For example, though power costs are almost comparable to other RDEs unreliability of power supply forces Indian manufacturers to use more expensive sources of power like generator sets. Similarly, land rates seem competitive but accounting for delays in land acquisitions and dispute settlements, effective land acquisition costs would become higher. Also, though the reported VAT on goods is 12.5%, additional entry taxes, cesses and customs duty increases the total indirect tax incidence on product prices to 25%–30%⁶.

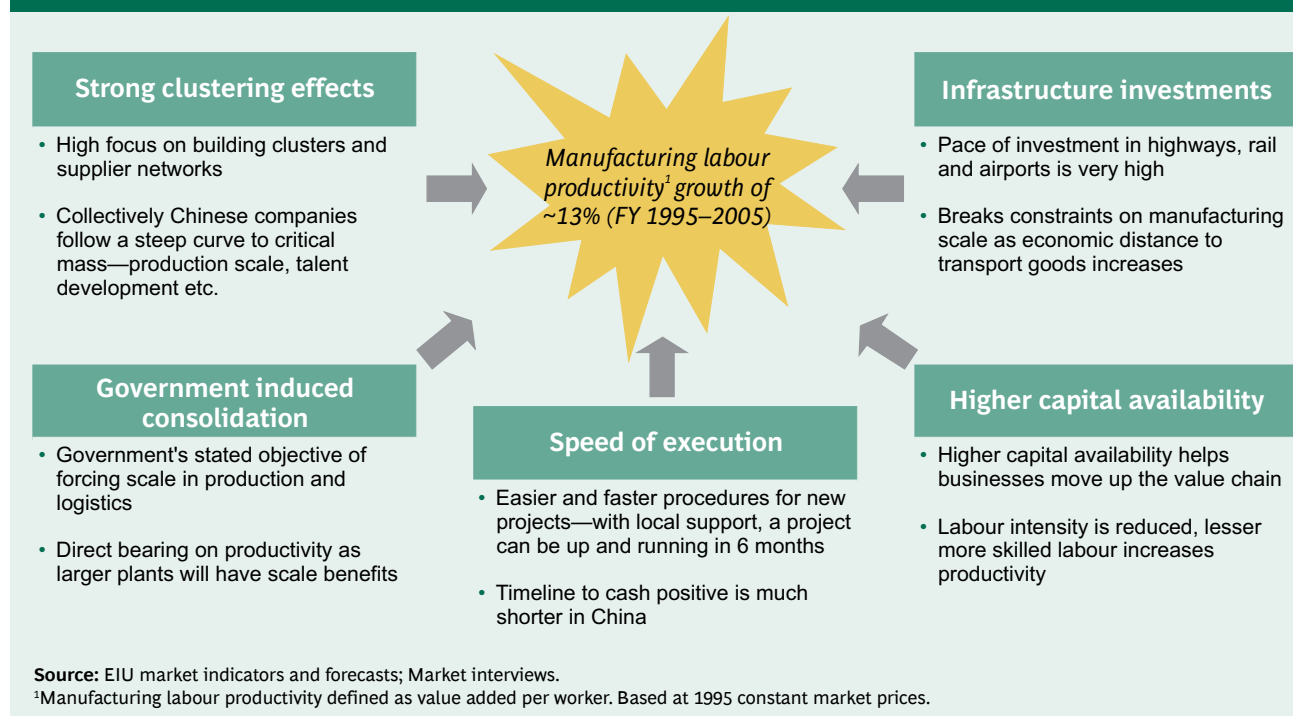
Labour productivity in particular is a crucial driver of cost competitiveness. India's real manufacturing labour productivity (value of output per worker) lags China's both in absolute terms and in rate of growth. India's labour productivity is substantially lower than China's. As a result, despite lower wage rates in India, when adjusted for productivity India's effective labour costs are actually higher than those of China (as shown in Exhibit 4c). Additionally, China's real manufacturing labour productivity has grown at a CAGR of ~12.5% with India managing only a 7% yoy growth in the same period (1998–06)⁷. This difference is driven by a combination of greater efficiency and better industry mix in China. Exhibit 4d below

explains some of the factors that have driven the rapid rise in labour productivity in China. India will need to aggressively close this gap versus China in order to compete effectively at the global level. Over the same period, China's manufacturing wage rates have also grown rapidly (~10.4% adjusted for inflation)⁷ in sync with the more flexible and skilled workforce that has contributed to this higher productivity. Indian manufacturing on the other hand has sustained extremely low nominal wage rates; in fact on inflation adjusted basis India's real wage rates have decreased in the same period (on a US\$ basis, to facilitate comparison with China). Of course, it is important to realise that this wage rate is a blended average across industries—hence while wage rates might have increased in individual industries, the workforce mix could have shifted more towards lower wage rate industries. Going forward, India will need to drive higher productivity, recognising the fact that wage costs will also need to grow at a faster pace to attract and retain a more skilled workforce—further exacerbating the need for an increase in productivity.

6. Refer Exhibit 3j, Chapter 3.

7. EIU country data.

Exhibit 4d. Key drivers that have propelled China's rapid labour productivity growth



This productivity challenge will have important implications on Indian manufacturing's employment and workforce requirements. Manufacturing industries will need to proactively develop, attract and train relevant skilled workers—already an important gap in India's talent pool today. At the same time, growing productivity to drive competitiveness would mean lower overall incremental workforce requirements. Manufacturing would therefore need to grow at an even higher pace in order to generate more employment opportunities and address India's overall employment challenge.

There are two other key areas which will contribute to India's competitiveness in global supply chains. First, in terms of factor costs, having a more stable currency outlook and improving transportation infrastructure e.g. ports and roads, so that volatility and fluctuations in transport time could be reduced are critical. Second, as MNCs look to increase the level of value-addition from their RDE plants through greater integration between manufacturing and R&D, India should position itself as the most competitive location with its English speaking strong engineering talent.

These elements of competitiveness become even more important as trade barriers come down and India opens itself more and more to imports. With several FTAs already signed, and many more on the table, the most recent being the FTA with ASEAN countries, import barriers will keep declining. Customs duties in India have been declining steadily, with the value of import duties as a percentage of total imports coming down from ~24% in 1999 to ~11% in 2008⁸. Unless India improves its global competitiveness rapidly, there remains a danger that these FTAs, at least in the short term, could lead to an increase in imports without similar growth in exports. This has been the experience since the FTA was signed with Thailand a few years ago. Exports to Thailand since the FTA was signed have roughly doubled in value while imports have gone up almost four times. This is illustrated in Exhibit 4e below.

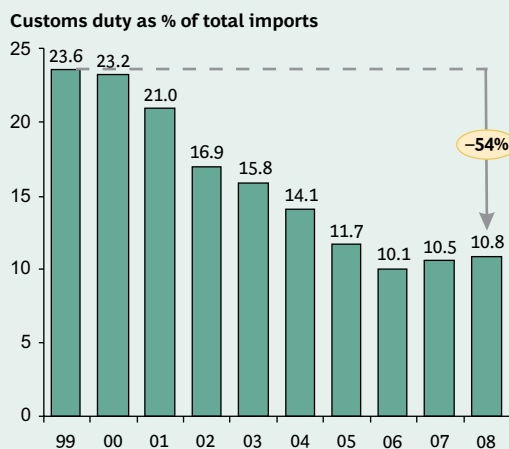
Agenda for Action

Globalisation has been the most important force shaping manufacturing industry globally in the past few decades. It will continue to play a critical role and supply

8. RBI handbook of statistics; Ministry of Commerce; BCG analysis.

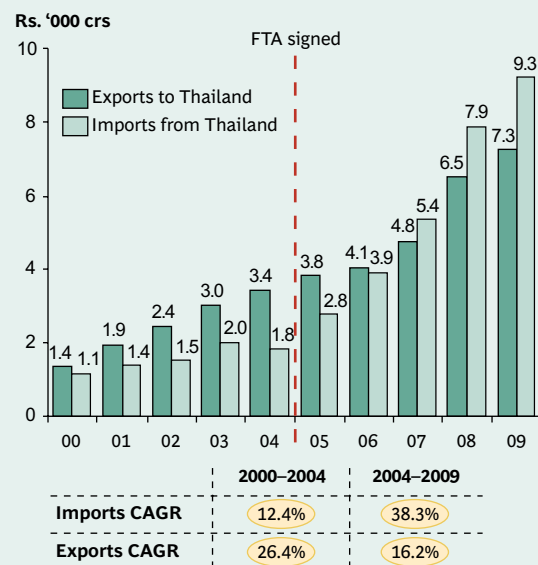
Exhibit 4e. Improving India's competitiveness will become more important with reducing trade barriers

Import duties for India have reduced over the past decade



Sources: Indiatat online; RBI handbook of Statistics; Ministry of Commerce.

Example: India now net importer from Thailand, imports increased 4x after FTA (2004)



chains will become more globally integrated. This phase of globalisation saw massive migration of industrial capacity from high cost developed countries to low cost RDEs driven by their low wage rates. The new wave of globalisation will move beyond simple labour cost arbitrage into a more value added role for RDE plants. India has to improve its competitiveness to compete against other RDEs and capture a greater share in the large opportunity that this shifting production creates.

Indian companies will have to develop focused strategies to capture a greater share of this opportunity. They will need to:

- ◇ Understand the specific needs of global players and identify industries with off-shoring potential.
- ◇ Develop industry specific approaches to drive a greater share of off-shoring.
- ◇ Continue investment in upgrading local talent, benchmark against other RDEs in terms of cost competitiveness and implement plans to improve productivity.

The government also has a key role to play which we will discuss in more detail in the last chapter on policy imperatives.

Sustainable Development and Green Technologies

Sustainable Development Now a Global Agenda

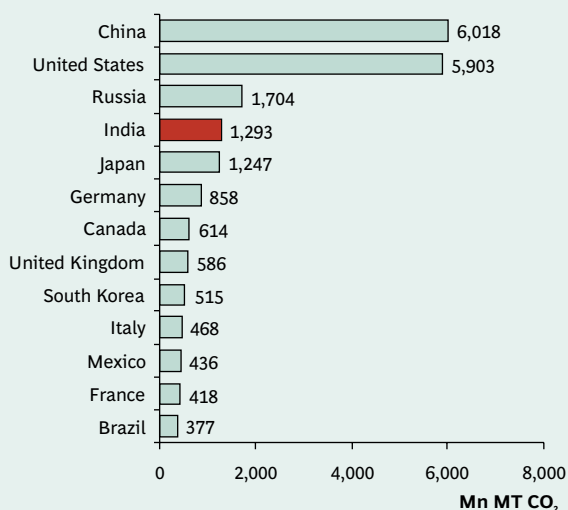
Global warming has made sustainable development a key priority for governments and companies. The topic of sustainability has the potential to change the economics of manufacturing and will significantly affect the future competitive positions of companies—changing the cost structure of industries and potentially restricting market access. At the same time, several new opportunities will emerge driven by the growing carbon trading market and demand for “green” products and technologies.

India's Sustainability Challenge

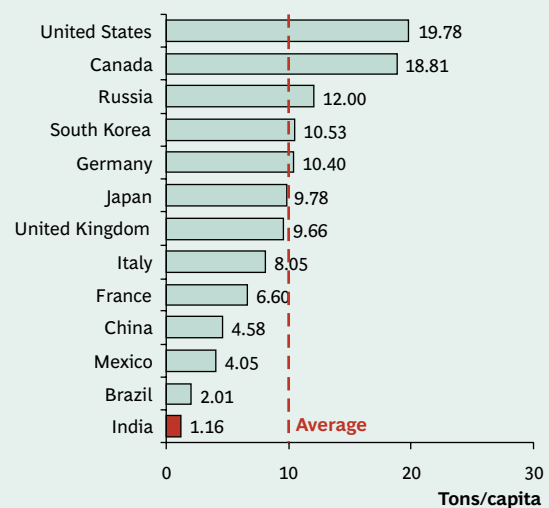
While India's carbon emissions per capita are lower than other countries, in absolute terms India is one of the largest carbon emitters in the world (as shown in Exhibit 4f). As Indian economy develops, the absolute carbon emis-

Exhibit 4f. India amongst the top carbon emitting nations in the world

India has sizable carbon emissions ...



... However, per capita emission is low



Sources: Energy Information Agency (Department of Energy) 2006; EIU; Data Monitor; BCG analysis.

sion will grow rapidly putting pressure on India to cap and/or lower its total emission.

The emerging global carbon market and growing demand for “green” products and technologies will offer significant opportunities for growth in the years to come. On the other hand, escalating carbon costs could, over time, have significant implications on future global supply chains and influence market access for Indian companies. Indian manufacturing needs to focus on four areas:

- ◆ Explore opportunities in the rapidly growing carbon trading market.
- ◆ Drive “greening of operations” to reduce their carbon footprint.
- ◆ Explore opportunities in “greening of products”.
- ◆ Explore emerging “green technologies” with opportunities to build local and global leadership.

Significant Carbon Trading Market Emerging

The Kyoto Protocol was a landmark movement in 1997,

setting binding targets for 37 industrialised countries including the European Union to reduce greenhouse gas emissions (GHG). The protocol resulted in the creation of a worldwide market for emission reductions. As Exhibit 4g shows, this market is today already worth about US\$ 125 bn and is estimated to grow to over US\$ 3.1 tn by 2020.

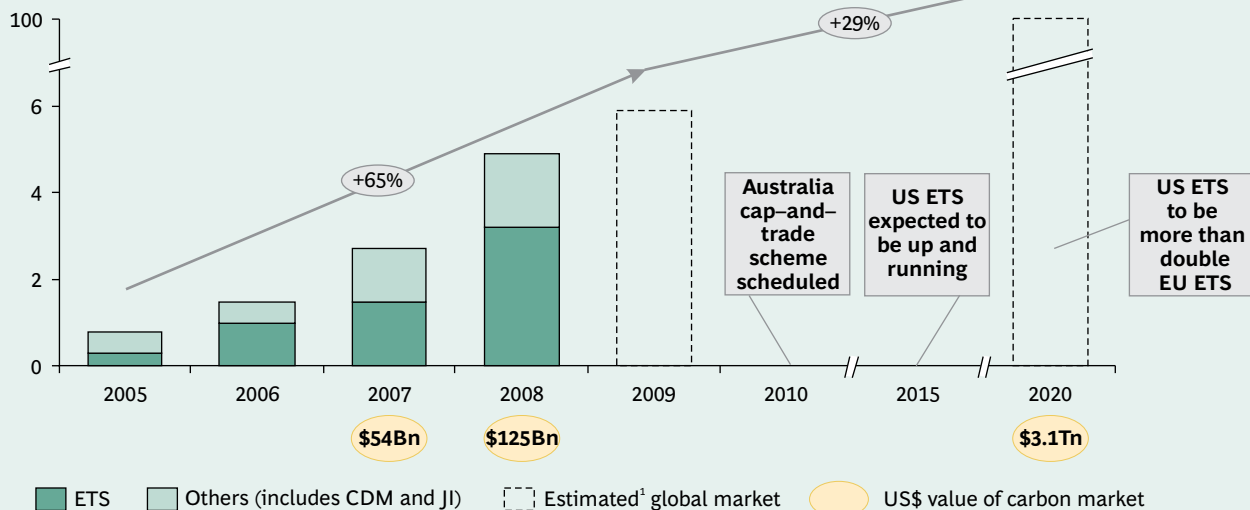
Several factors are likely to drive growth in the carbon market:

- ◆ *The European Union Emission Trading Scheme (EU ETS) itself would become more efficient:* The first phase of trading scheme (2005–2007) faced criticism due to excessive and inappropriate allocation of carbon caps. The third phase (2013–2020) is likely to have harmonised EU-wide rules which would make the system fair and robust.
- ◆ *Scope of EU ETS would be widened:* The scope of ETS is likely to be extended to include sectors like aviation, chemicals/petrochemicals and aluminium. The capture, transport and geological storage of all GHG emissions will also be covered under ETS.

Exhibit 4g. Carbon trading markets to continue to grow rapidly

World carbon market estimated at nearly \$3 trillion by 2020

Annual carbon volume (Gt)



Source: Point Carbon.

¹\$30/tn carbon price assumed in the long term.

◇ *New countries entering the carbon space:* Developed nations like the US and Australia are likely to set up their carbon trading systems. (In June 2009, US senate passed the Climate Change Bill, which binds it to reduce carbon emissions by 17% from 2000 levels till 2020 and by 83% of 2000 levels by 2050. It also sets a national cap and trade system.) The US carbon trading market itself could be almost twice the size of EU ETS.

India is still to make significant inroads in the carbon market. The Kyoto Protocol, under its clean development mechanism (CDM), allows companies in developing markets to set up emission reduction projects to earn certified emission reduction (CER) credits, each equivalent to one tonne of CO₂. These CERs can then be traded/sold, and used by countries under the Kyoto Protocol to meet emission caps. The projects range from reduction of energy consumption, better waste heat recovery and effluent treatment systems, to greater usage of renewable energy. China is already at the forefront of this movement with the largest number of CDM projects. India, however, has not been able to fully exploit the CDM opportunity. Though, India ranks second in terms of number of CDM projects, the CER value per project (as shown in Exhibit

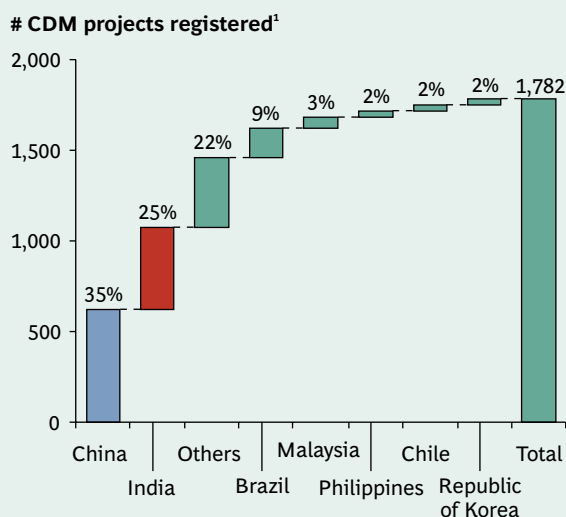
4h), is only about one-fourth of China. The Chinese government has put emission reduction on the political agenda and is strongly supporting the CDM market. A national CDM fund has been set up to facilitate the CDM market with financial incentives and capacity building support for projects. State-owned companies have also entered the market with large scale, high CER revenue projects.

Indian companies, across sectors, have already started projects that employ mechanisms to reduce emissions and earn CERs. Going forward, India needs to accelerate its progress and implement a similar consolidated and aggressive effort to target carbon credits on a larger scale and at the national level.

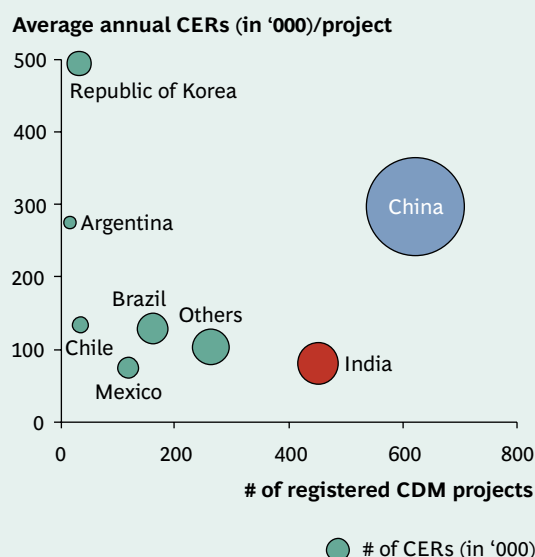
The Need for “Greening” of Operations
Sustainability linked costs could shape future global supply chains. This global ‘green’ movement can pose severe challenges for companies and sectors that have a large carbon footprint. The cost structure of various carbon emitting industries can change significantly making them less competitive with the inclusion of carbon costs. Exhibit 4i shows the potential impact of carbon cost, with increases being as high as ~5%+ in the cost structure for some in-

Exhibit 4h. India's efforts in CDM are currently fragmented

India contributes 25% to the CDM projects worldwide



India's CERs per project significantly lower than market leader China



Source: United Nations Framework Convention on Climate Change.
¹Projects registered as of 23rd August 2009.

dustries. The cost impact could be direct due to emissions of the company against caps; or indirect due to usage of fuel/power with embedded carbon cost. This has had an impact on multiple fronts. There is a much higher focus on bringing down carbon emission levels. More radical are moves by many companies who are rethinking their manufacturing and supply chain footprint on the basis of total costs including the carbon costs. A survey of some of the carbon intensive industries in the developed economies gives certain pointers to the future (as shown in Exhibit 4i). Across multiple industries like metal and cement, lime and glass, companies in the EU with carbon caps are rethinking their production as they see the economics of their industry changing dramatically due to carbon costs.

Sustainability issues could also impact market access. There has been increasing protectionist sentiment against companies and countries that do not have emission caps. While these are not likely to stand the test of WTO norms as they stand today it is likely that some sectors could come under pressure on two fronts.

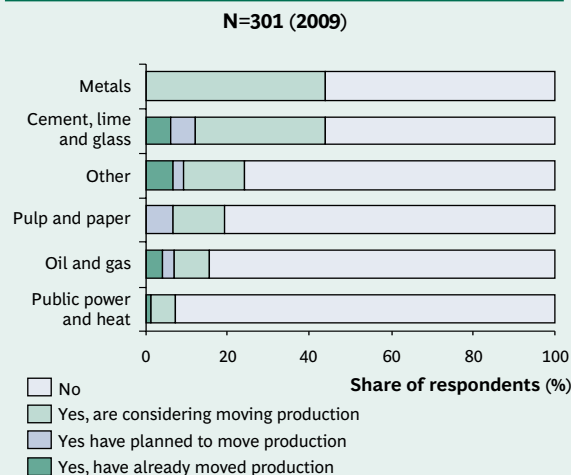
While countries may not tax or create barriers for companies or products which are not green they may create in-

centive systems for products which are greener—skewing market economics. An initiative by the Canadian government in 2007 introduced a US\$ 1000–2000 consumer incentive on new cars achieving mileage of 6.5 litres per 100 km, or better. Two of Canada’s top-selling cars failed to qualify, and the car manufacturer had to absorb a significant cost as it opted to pay the incentives from its own pocket. Growth of such initiatives could change the market landscape for companies that are not “green” enough.

At the same time, increasing consumer preference for green products could further exacerbate this. While the jury is still out on whether the consumer is ready to pay a premium for a greener product, multiple studies done in the EU and the US suggest that at a similar (or lower) price than existing products, large sections of customers would prefer greener products. This increasing awareness is even spreading among Indian consumers, a recent example being the adoption of energy ratings. Adoption of such ratings for consumer durables in India saw revamping of many product development activities by many firms to ensure that products are more energy efficient as many consumers use energy efficiency as an important criterion for product purchase.

Exhibit 4i. Carbon costs could shape future global supply chains

Several industries already moving production due to carbon costs¹



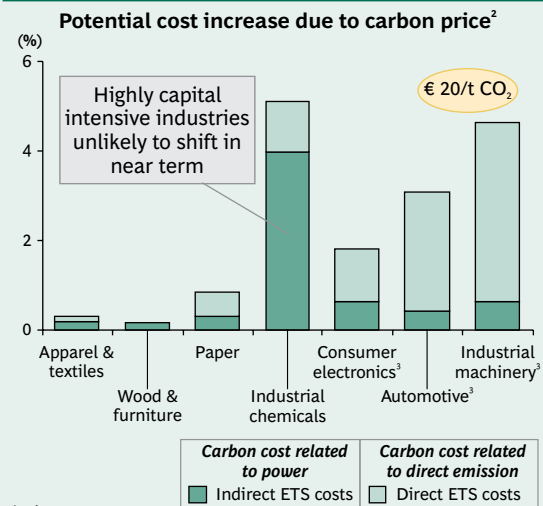
Sources: Point Carbon; de Bruyn et al, 2008; US House of Representatives; BCG analysis.

¹Either due to tariffs or developing countries’ own emissions schemes.

²Assuming €20/tCO₂ carbon price, and €14/MWh electricity price increase, estimated based on publication.

³Estimated based on industry carbon emission rates.

Carbon emissions trading could increase industry costs by up to 5%



“Green Products” Emerging as an Important Opportunity

The focus on sustainability has also meant the emergence of a growing market for “Green Products”. Globally, this market is estimated at ~US\$ 190 bn and expected to grow at ~15% year-on-year across segments like alternative energy, construction of green buildings and green consumer products like organic food and cotton (as shown in Exhibit 4j). Large sections of consumers across the developed market, and increasingly so in RDEs, are beginning to prefer greener products.

Many companies like Walmart, GE, Tesco and Unilever are already taking a lead in addressing the market for greener products. GE launched its ‘ecomagination’ campaign in 2005 to develop green products which serve customer needs, offer a superior value proposition or operational performance, and impact environmental performance. GE also instituted a product review process to quantify the product’s environmental impact. The product claims on environmental benefits were audited by a third party. Today ‘ecomagination’ spans a large portfolio with more than 80 products across multiple verticals, ranging from energy products like efficient turbines

and transformers to energy efficient consumer products like dishwashers and refrigerators. This has generated revenues of close to ~US\$ 17 bn, with R&D investments of ~US\$ 1.4 bn⁹.

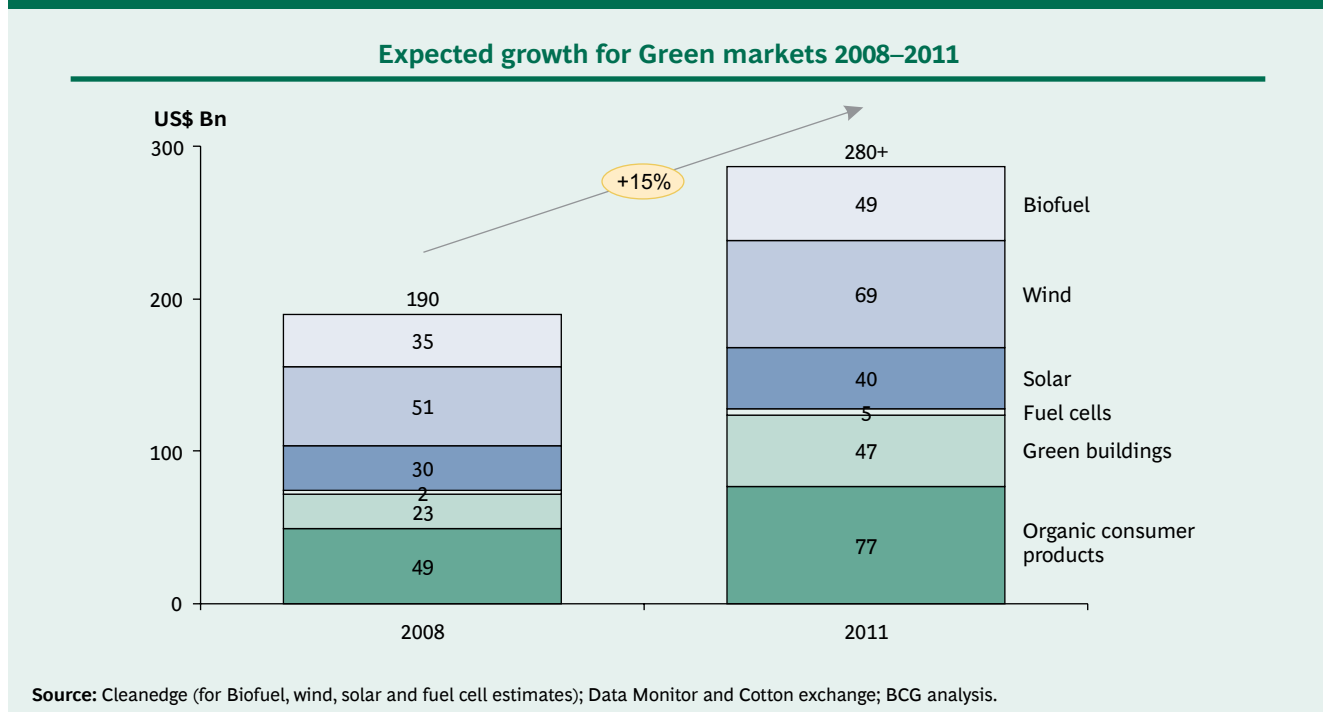
“Green” is clearly moving on from being a mere buzz word to a trend with significant business potential. Companies will need to take a closer look at their product portfolios and rethink their business models to benefit from this. The transformation will not be limited to targeting a newer product sub-segment, but rather will require re-creating a whole new business model around it.

New Green Technologies will Shape Future Markets

Sustainability trends have given rise to new technologies that will significantly impact future businesses. Research in renewable technologies like wind, solar and water is already yielding environmental and business results. Development in other areas like nanotechnology, fuel cells and wireless communication are likely to create ecosystems for sustainable growth (as shown in Exhibit 4k).

9. Company releases; new reports.

Exhibit 4j. Green markets expected to cross US\$ 280 bn by 2011



A Boston Consulting Group study estimates that a quarter of cars sold in 2020 could be electric vehicles. China is strategically promoting and investing in the electric car segment given its traditional advantages of being among the largest electric motor and battery producers across the globe. The Chinese government having realised this and eager to gain dominant position in this emerging segment has given hefty subsidies (upto US\$ 8,800) to taxi fleet owners, tax credits to consumers using these cars and invested in filling stations across cities to support usage¹⁰. India needs to scan the wide range of technologies, identify those with sustainable business prospects and strategically invest in areas where it can gain competitive advantage over other countries. Solar energy and new developments in nuclear power technologies are two such potential areas where India can take a leading position in the coming years.

Solar energy market is expected to grow at almost 9% per annum till 2017¹¹. India is already investing in solar research and is at par with global players (as shown in Exhibit 4l). The high solar irradiance across the country, of the order of ~220 KWh/M² as compared to <200 KWh/M² averages for most of the developed world¹², gives In-

dia a natural advantage in the solar market when compared to other countries like Germany, a solar market leader. India could leverage this advantage to become a frontrunner in solar technology.

Nuclear power is also gaining prominence due to its improved relative economic competitiveness and carbon free electricity generation. According to International Atomic Energy Agency's 2008 projections, nuclear power accounts for 14% of global electricity and is likely to grow at 3.2 % per annum till 2030. Uranium deposits, not as abundant and widespread as thorium, are unlikely to meet the growing demands. Countries with limited identified resources of uranium would need to switch to thorium to ensure continuous energy growth. Significant research remains before thorium can be used to run large scale power plants. India, with 31% of the world's known thorium reserves is developing a 300 MW reactor prototype and is well positioned to take the lead in the development of nuclear reactors run using thorium.

10. Government releases.

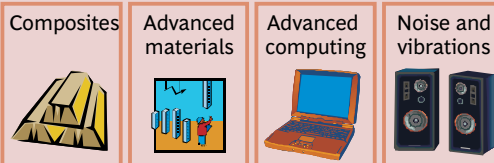
11. Clean edge; BCG analysis.

12. European Commission; PVGIS data.

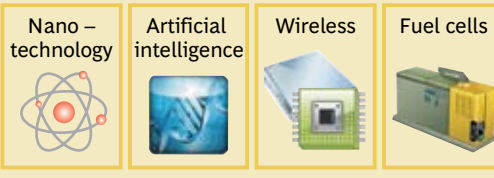
Exhibit 4k. Wide span of technologies and business opportunities in green space

Technologies that will support green businesses

Base technologies



Disruptive technologies

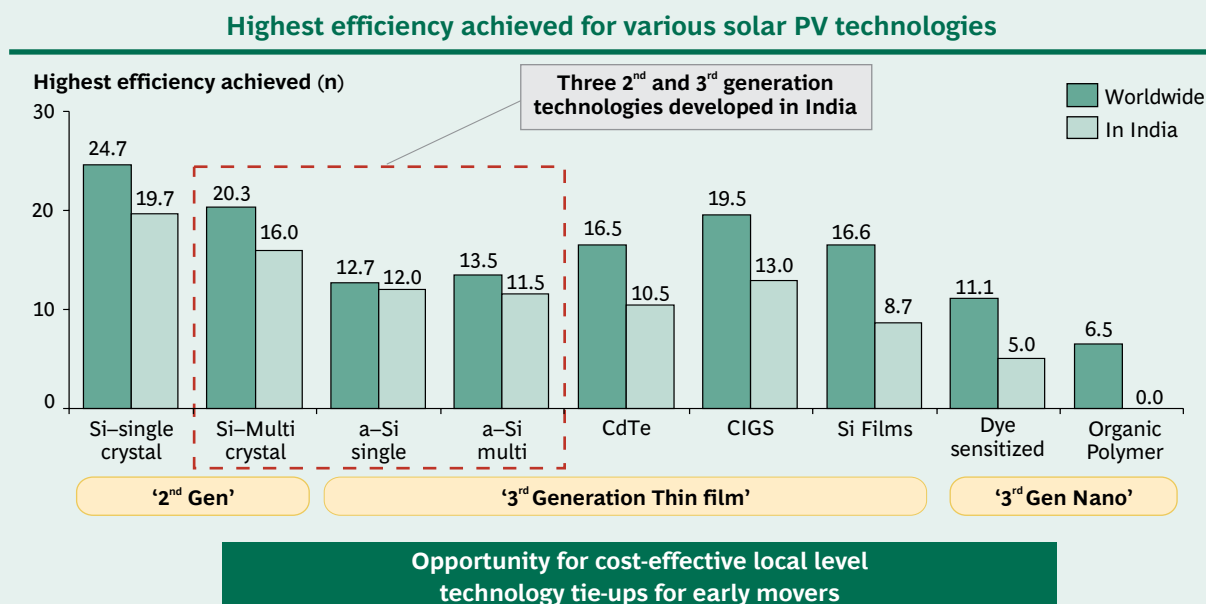


Green business opportunities requiring new technology



Note: Technologies and emerging opportunities mentioned on this slide are merely indicative – not a comprehensive list.

Exhibit 4L. India already competing neck-to-neck with global players in solar technology research



Source: Solar India 2007 Conference Presentations.

Indian Companies Need to Build their “Green” Report Card

The imperatives for Indian manufacturing companies can be classified into four key areas:

- ◇ *Establish the current “green baseline”:* This should include a comprehensive evaluation of current emission levels and “greenness” of their operations, greenness of their current products and as well as those used for development.
- ◇ *Identify and assess risks to businesses:* Proactively use the baseline to define risks to current and future business operations. This should include the impact of likely legislations, incentive systems, and consumer trends on relative cost competitiveness and access across different markets.
- ◇ *Mitigate risks through focused initiatives:* If the business is being impacted directly, companies need to take internal initiatives to balance green market forces. At the same time, if the changes impact the ecosystem in general, companies need to look through their business processes and align them towards the new ecosystem.

- ◇ *Systematically identify and exploit emerging opportunities:* Evaluate the product portfolio and operations, and define opportunities from CDM projects to tap into the carbon market and development of greener products for domestic and international markets. Companies embarking upon large manufacturing investments should also evaluate their projects through a sustainability lens for future competitiveness inclusive of carbon costs.

Improving Income Demographics and Targeting the ‘Next Billion’ Customers in India

A global market of 1.2 billion people spending ~US\$ 950 bn per annum remains largely excluded from formal markets¹³. They are considered impossible and unprofitable to serve with current business models but could become profitable if served with new business models—we call this segment the ‘Next Billion’. This is a growing population, living in expanding economies worldwide. While there are numerous challenges involved in reach-

13. BCG analysis.

ing them effectively as consumers or business partners, they can provide significant opportunities for companies that find successful approaches.

A Key Driver of Consumption Going Forward

Income demographics in India are changing rapidly. Over the last two decades India's income pyramid changed dramatically—with increasing incomes and the emergence of hitherto insignificant segments. One such segment is the 'Next Billion'. Defined as the segment with incomes between Rs 90,000 and 2 lakh per annum, it includes nearly 90 million households in India with an expenditure of over US\$ 145 bn (as per 2006 estimates) Growing at nearly 8% per annum, this segment will become an overall market of nearly US\$ 300 bn in India by 2015 (as shown in Exhibit 4m).

Even at the global level, this segment is becoming extremely important. A study by The Boston Consulting Group, suggests that the total size of this segment was around 400 million households, comprising about 1.2 billion consumers and a total expenditure close to US\$ 950 bn in 2006 (as shown in Exhibit 4n) and will grow at over 8% per annum over the next 10 years¹⁴.

The impact of this change in income demographics cannot be over-emphasized. The growing demand from 'Next Billion' customers will offer unprecedented opportunities to companies that are well prepared to serve this market. As per BCG estimates, more than 40% of 'Next Billion' demand will be served by the manufacturing industry (especially FMCG, apparel and consumer durables). Also with increased consumption of services, demand for associated manufacturing products will also grow. For example, higher penetration of telecommunication services will imply larger consumption of handsets and telecommunication equipment.

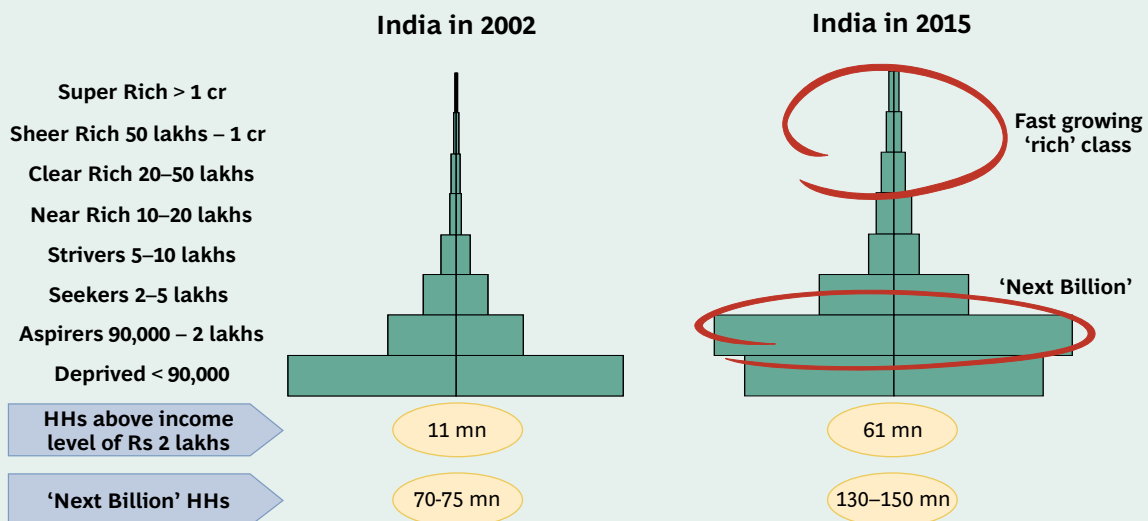
Innovative Business Models Required

Accessing this opportunity is not straight forward. The Next Billion are unprofitable to serve with existing business models and multi-pronged innovation is required to design profitable models. As a first step, companies need to carefully understand this segment. The 'Next Billion' often find themselves having to make difficult compromises: their incomes are limited, yet they desire products and services that are suited to their needs and growing

14. BCG analysis.

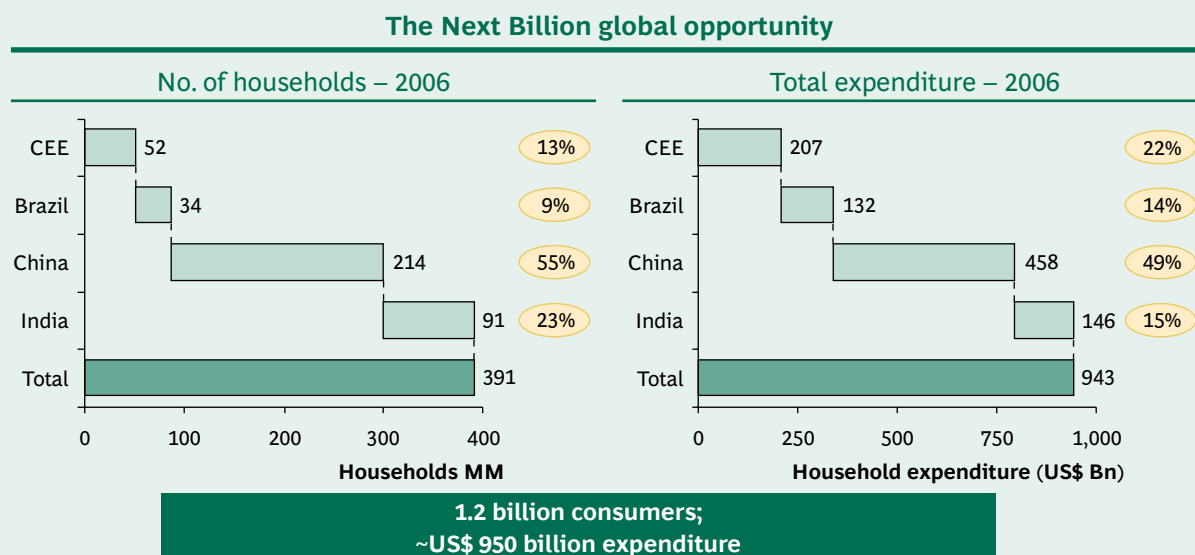
Exhibit 4m. Increasing income levels in India creating new consuming classes

Distribution of households (in '000s) by income class: India



Note: Graphs are not to scale; Income levels for India at 2001–02 prices.
Sources: The Great Indian Middle Class (NCAER); BCG analysis.

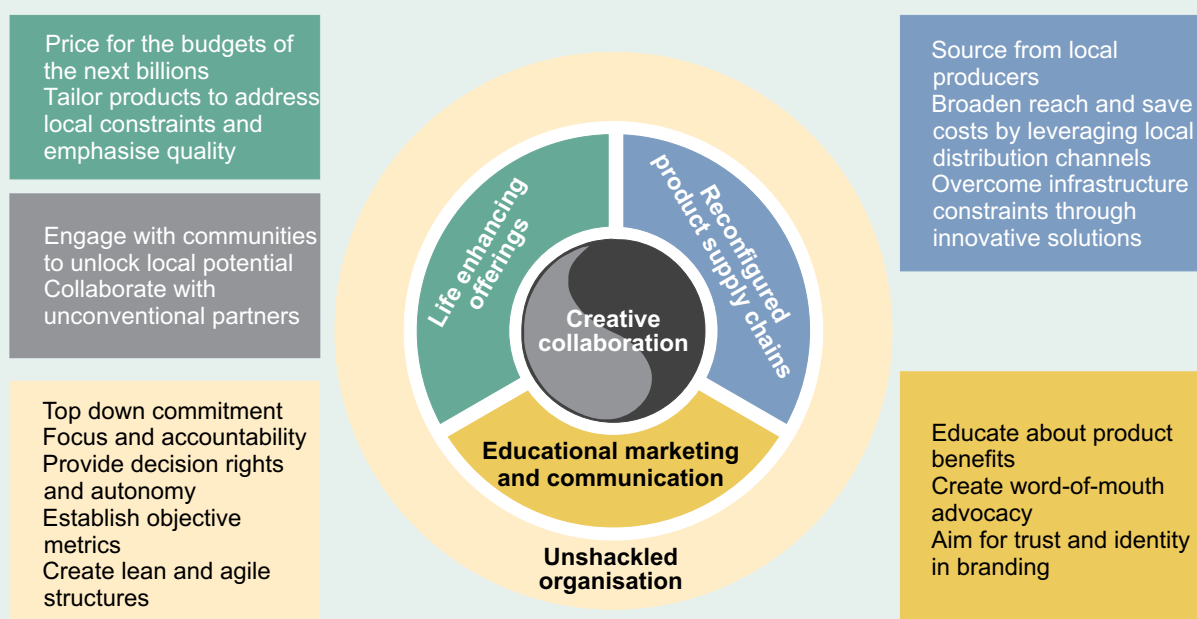
Exhibit 4n. Globally, Next Billion nearly a trillion dollar opportunity



Source: NCAER; NSS Household consumption expenditure survey 2003–04; IBGE PNAD 2005; China Statistics Yearbook; ACMR Income Survey; EIU; Quantitative Research; BCG analysis.

Note: CEE includes 18 countries—Baltic countries (Latvia, Estonia, Lithuania), Romania, Bulgaria, Russia, Ukraine, Belarus, Moldova, Slovakia, Slovenia, Hungary, Czech Republic, Poland, Croatia, Bosnia & Herzegovina, Serbia & Montenegro, Macedonia.

Exhibit 4o. Business model framework for Next Billion: Design principles for success



aspirations; they require information, yet they have difficulty accessing it; they live in scattered towns and rural villages, yet they must deliver their wares to distant markets. The next step is to create new business models that break these compromises. Companies need to work on five key dimensions (as shown in Exhibit 4o):

- ◇ *Create life-enhancing offerings:* Develop offerings that improve the livelihoods of the 'Next Billion' by pricing for their budgets and tailoring products to address their usage constraints. For example, mobile phones with single sheet key pad to prevent dust accumulation or a radio with crank mechanism to eliminate the need for electricity.
- ◇ *Reconfigure the product supply chain:* Create a cost-efficient distribution system by sourcing from local producers, leveraging existing local distribution channels, and finding creative ways to overcome infrastructure constraints through private participation.
- ◇ *Educate through marketing communication:* Design marketing programs that contain educational as well as persuasive messages about product benefits. Leverage trusted people, institutions and brands to build consumer loyalty.
- ◇ *Collaborate in non-traditional partnerships:* To lower costs and broaden distribution, partner with local producers and consumers, as well as other companies and even civil society organisations. Invest in local talent and create incentives that encourage self-governance.
- ◇ *Unshackle the organisation:* Design corporate organisational structures—including metrics, incentives and accountability systems—to support, measure and reward long-term success in business initiatives targeting the 'Next Billion'.

There is no silver bullet to succeed in this market. Organisations will need to be prepared to consider innovation on several fronts. Often there may be a need to redesign business models and build new business ecosystems to successfully tap this opportunity.

Several Success Stories Already Exist

There are many examples of Indian companies which have proactively targeted this market, be it Tata's Nano or Hindustan Unilever's Shakti. In this report we dis-

cuss some examples from other emerging markets, which may be less well known but are equally instructive (as shown in Exhibit 4p).

Local success can drive global advantage. Several companies—both multinationals such as Unilever, Nokia, LG and Whirlpool, and domestic players such as Galanz and Natura Cosméticos have invested in designing innovative businesses models to target the 'Next Billion' segment in countries like India, China and Brazil. They have benefited disproportionately not just in these countries, but also by taking this expertise to other developing and developed markets.

A Source of Global Advantage for Indian Manufacturing

Indian companies have a natural advantage in this space. By investing early in this segment they can garner leadership positions in this segment—not just in India, but also globally. Indian companies can:

- ◇ Leverage domestic 'Next Billion' market, to build scale advantage, and fundamentally alter cost structures to compete globally.
- ◇ Focus on relevant innovations for the segment, and apply across global markets with needed customisation.
- ◇ Include the Next Billion into product supply chains as producers or distributors. This will improve economics for the company and at the same time strengthen demand by providing additional income opportunities to the 'Next Billion'.

Agenda for Action

Innovative approaches can form the foundation of new growth opportunities for companies that are bold enough to experiment. The right type of engagement can bring about a transformation in the lives of the 'Next Billion' by linking them to formal markets as producers, business partners and consumers. Companies that are first to establish sustainable, profitable and scalable business models to include the 'Next Billion' will establish a competitive advantage by securing market share and winning the long-term loyalty of consumers and producers.

Companies will need to take the lead in designing and executing fundamentally new business models – other

Exhibit 4p. Several players have successfully captured the Next Billion opportunity

Customer Relevant Innovation

A global consumer durable player launched a US\$150 washing machine, targeted at the 'Next Billion' segment in Brazil. Independent surveys indicated that automatic washers were the second most-coveted item by Brazil's 30 million low-income consumers, after cell phones. To tap this opportunity, the company established an R&D centre to better understand needs of the low income segment and developed a new low-cost design, rather than stripping down an existing model from developed market. It developed a single drive machine, with lower power and small load capacity, which met the consumers' need for frequent and small load laundering. Significant focus was put on ensuring high aesthetic appeal, based on consumer insight that the washing machine was a strong status symbol. Within two years of its launch, it became the largest selling low cost washing machine in Brazil.

Game Changing Distribution

Natura Cosméticos, a Brazilian cosmetics manufacturer successfully penetrated Brazil's rural market and achieved market leadership over global majors such as Unilever, L'Oreal and Avon. It used a direct sales model to reach the rural consumer, living in small communities throughout Brazil's vast countryside (Brazil is fifth largest country in the world by area). Natura's direct sales force of 600,000 self-employed 'consultants' comprises mostly of women who work part-time and are paid on a commission basis. The rural consumers responded positively to these 'consultants' because of personal service

and close interaction, and it also provided a built-in word-of-mouth channel for Natura to extend its reach. Natura, grew at a breakneck speed, with its share in key market segments rising from 12 percent to nearly 23 percent in four years—2002 to 2006. In 2006, Natura posted revenues of nearly US\$ 1.8 bn, with total market share of 13 percent, higher than that of Unilever. After a strong performance in Brazil, Natura expanded in Latin America, and has recently entered into France¹.

Leveraging Scale Benefit

Galanz, a Chinese microwave manufacturer, exploited the 'Next Billion' opportunity to increase scale. In the first phase, Galanz focused on becoming the contract manufacturer of choice for foreign OEMs entering and catering to the Chinese Market. The emphasis was on developing a low cost microwave, utilizing the cheap land and labour available in China. By 1996, 1 out of every 2 microwaves sold in China, had been manufactured by Galanz. This large scale production, catering to the domestic market, gave Galanz a significant cost advantage. In the second phase, the company started leveraging its strengths and moving towards more global markets like USA and South Korea. Galanz created R&D centres in the target country, to ensure requisite customization, but kept the back end manufacturing largely integrated in China, to ensure that it continued to benefit from scale advantage. By 1998, Galanz had become the world's single largest microwave production facility. Today, it has a global market share of nearly 30 percent in microwaves.

¹Company data; BCG analysis.

stakeholders will often need to be an integral part of the process. Companies will need to:

- ◇ Understand the specific needs and constraints of the 'Next Billion' and invest in R&D and new product development for the market.
- ◇ Assess opportunities to integrate the 'Next Billion' into value chains and reduce overall costs, and invest

in capacity building of 'Next Billion' suppliers and distributors.

- ◇ Partner or collaborate with other companies, governments and civil service organizations to align investments, share distribution and improve infrastructure.



Driving Higher Productivity and Competitiveness

Productivity is a key driver of cost competitiveness, and estimates suggest that India currently lags several other RDEs on both labour and asset productivity. Driving accelerated improvement on this dimension is going to be critical as India positions itself as a competitive destination for global manufacturing.

Manufacturing industries have seen several revolutions over the last few decades. The 1960s and 1970s saw a surge of Japanese manufacturing with focus on Toyota Production System (TPS) which was based on waste reduction techniques such as Kaizen and JIT. The 1980s saw Motorola introducing the Six Sigma and redefining the focus on Total Quality Management (TQM). In the 1990s the focus shifted to mass customization, flexible automation and strategic manufacturing. Many of these concepts were clubbed together in the concept of Lean manufacturing that has driven unprecedented growth in manufacturing productivity in recent times.

Indian companies have also made major strides in implementing these practices to enhance their productivity and competitiveness. Nevertheless there is substantial distance to cover. While India's real manufacturing labour productivity has increased by ~65% from 1998 to 2006, this growth looks small as compared to China where it has increased by ~180% in the same period¹. Exhibit 5a shows that India's real manufacturing labour productivity lags China both in absolute terms and in rate of growth over the last decade. As a result, while labour wage rates in India are significantly lower than in China, productivity adjusted wage rates equate the two countries. India needs to make substantial efforts to close this productivity gap to remain competitive on a global level. Principles of productivity improvement will there-

fore remain important and Indian industry will need to continue to enhance its capability on these dimensions. However, it is also important to recognise that the world is changing and as a result so are some of the key dimensions for competitiveness. Indian industry will need to acknowledge and address these new dimensions or risk being left behind.

There are three important trends that will shape the future of competitiveness in the years to come—increased volatility in factor costs, shifting demand patterns and a more aware and educated labour force.

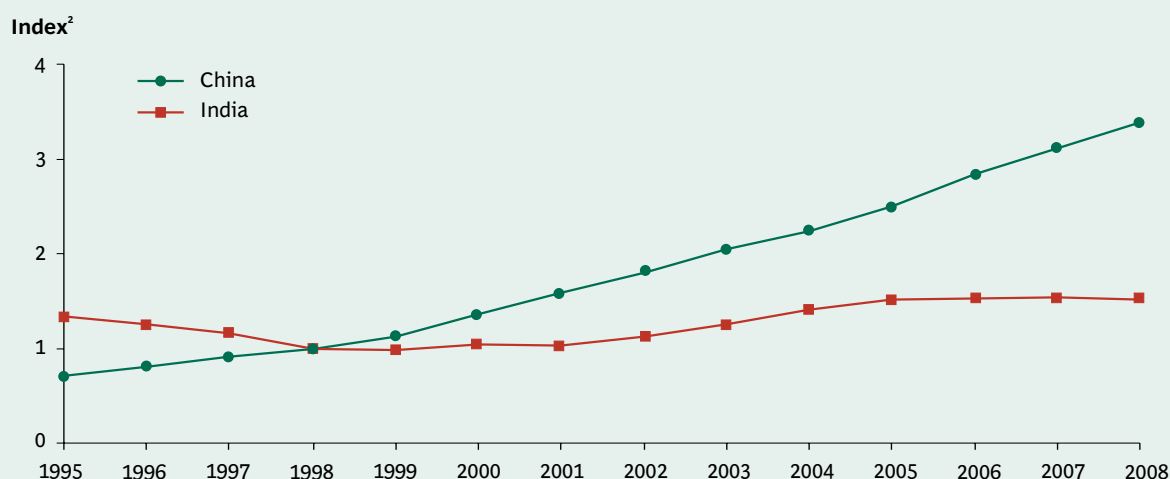
- ◇ *Increased volatility in factor costs leading to significant supply side risks.* For example the Indian rupee had dropped below Rs 40 to a US dollar in early 2008 and was expected to drop further, but instead depreciated to over Rs 50 by November of the same year. Similarly, shipping costs that had risen to very high levels suddenly dropped very sharply in the second half of 2008, on some routes by as much as 70% (Hong Kong–Rotterdam are now rising rapidly once again)².
- ◇ *Demand patterns are shifting rapidly.* Rapid advancement in technology has resulted in sharp price reductions and continuous product enhancement. This combined with increasing consumer awareness has created unprecedented fragmentation in consumer needs calling for greater variety, increased customisation and shorter product life-cycles. Close to 200 models of mobile phones were launched in 2008 alone. Hard disk drives have seen prices fall from ~US\$ 75/GB to a meager US\$ 0.29/GB within a mere 10-year timeframe.

1. EIU country data.

2. Oanda Currency Exchange Interbank Rates.

Exhibit 5a. India lags China in manufacturing labour productivity

India vs China—trend in manufacturing labour productivity (1995–2008)¹



Source: EIU market indicators and forecasts, BCG analysis.

¹ Manufacturing labour productivity is defined as value added per worker in USD, adjusted for inflation. Estimates only include formal sector employment for both countries.

² Index is at 1998 values, all figures have been adjusted for inflation at 1990 market prices.

- ◇ *Labour forces are becoming more discerning.* With rising education and awareness levels, individuals are more conscious of their options, aspirations and rights. Labour unions have become more demanding than ever before. Workers, driven by an increased awareness of their own rights as well as rapidly growing aspirations for themselves and their families, are less willing to ‘settle’ for management driven decisions.

These trends call for a new revolution in productivity enhancement. In this chapter, we identify three critical levers of productivity enhancement that combine the most powerful traditional levers with the new need for flexibility and people engagement:

- ◇ Exploiting the power of clusters.
- ◇ Leadership in innovation and new technologies.
- ◇ Lean 2.0 and improving plant productivity.

Development of Industrial Clusters

The importance of clusters in industrial development is

a well known phenomenon. Industrial development happens in clusters or ‘ecosystems’ of inter-related companies, suppliers and service providers. These clusters develop and grow with a combination of appropriate government policy and the concerted efforts of one or more large companies.

Cluster development is already happening at a rapid pace in RDEs. Cities from Chennai to Suzhou are becoming regional industry centres. In the main coastal provinces of China, hundreds of industry ecosystems have been built in the last decade. Chennai has rapidly emerged as a hub for automobiles with Ford, BMW and Hyundai choosing to locate their production facilities there. Thailand, on the other hand, has emerged as a major cluster for hard disk drives production. Several of these RDE clusters are outgrowing similar clusters in developed economies and taking away share of manufacturing.

Clusters Help Drive Higher Competitiveness

Well developed clusters provide several advantages to companies and drive more competitive economics. Companies can achieve cost and productivity gains in clusters because of multiple reasons:

- ◆ *Increased supply chain responsiveness because of manufacturing consolidation near suppliers:* Geographic consolidation of component manufacture and assembly shortens production cycles, co-location with suppliers facilitates just-in-time inventory and increased competition between suppliers helps reduce parts costs.
- ◆ *Decreased time-to-market:* Companies can more effectively leverage the capabilities available with vendors in the cluster.
- ◆ *Superior access to talent:* Better and more cost effective availability of labour, and also lower talent recruiting efforts.
- ◆ *Lower logistics costs:* Due to proximity of customers and/or suppliers etc.

Exhibit 5b illustrates the value generated by a well developed cluster location versus an isolated assembly plant. Though the extent of each benefit will vary by industry and location, the overall value of placing a unit within a mature cluster cannot be disputed.

Well Developed Clusters Could Address India's Productivity Challenge

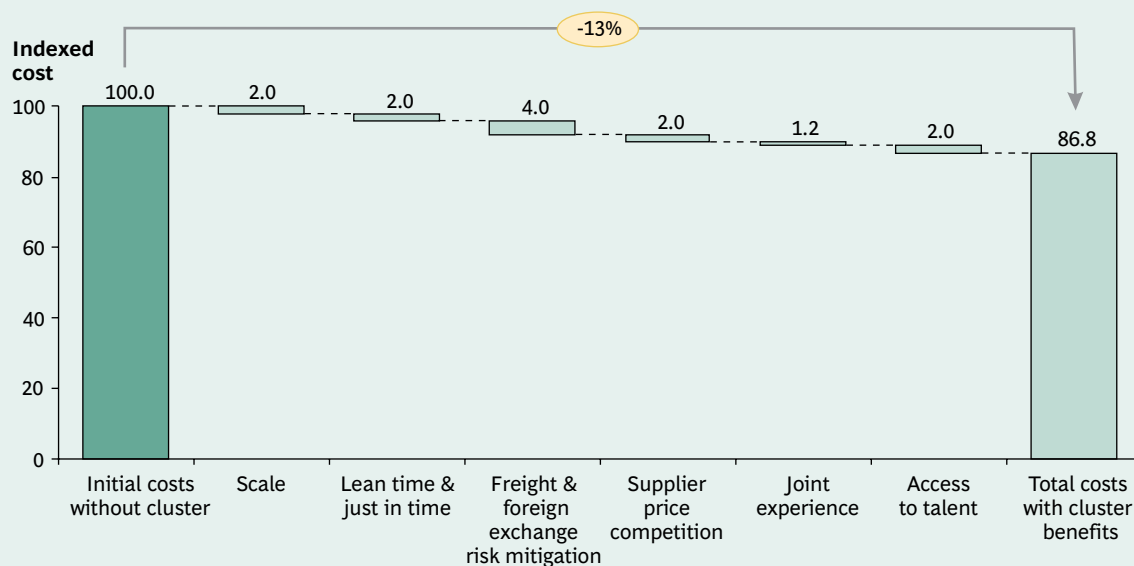
As discussed earlier, India faces a crucial productivity challenge—India's current productivity trend combined with wage increases in the next decade could erode its competitiveness when compared with China and other RDEs. However, the situation could look markedly different if cluster impact is taken into account. Exhibit 5c below illustrates the benefits of placing a manufacturing unit within a cluster for a sample RDE. Over a ten-year period from 2000–2010, wage rates in this RDE rose by 180% while productivity increased by only ~65%. This reduced competitiveness (from a labour perspective) by ~41%. However, by locating the said manufacturing unit within a cluster the increase in productivity outpaced the wage rate increase resulting in an 18% increase in productivity.

The creation and management of successful clusters will hence be critical to achieving India's productivity goals. As of August 2008, there were ~500 notified SEZs in India of which ~40% were manufacturing oriented³. While this is a

3. Ministry of Commerce and Industry.

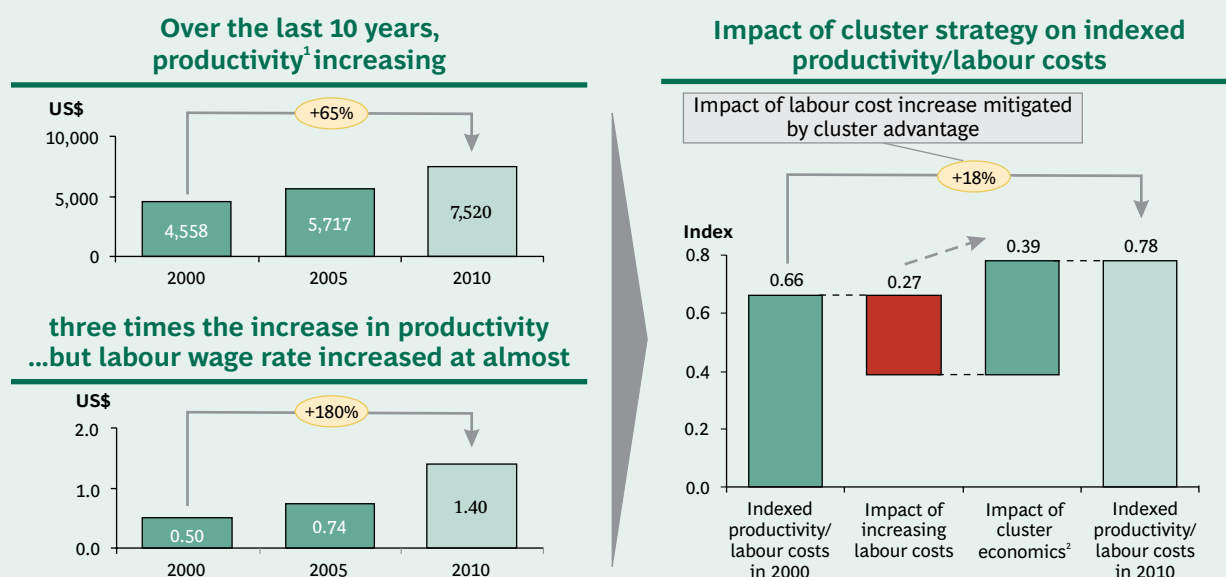
Exhibit 5b. Clusters enable substantial cost savings

Example of the value of a cluster location versus an isolated assembly plant



Source: BCG analysis.

Exhibit 5c. Example: Effect of cluster economics on productivity and wage cost in an RDE



Source: BCG analysis.

¹GDP/Worker.

²Cluster advantages due to increased productivity due to scale benefits of networks, reduced logistics costs etc.

large number, it is important to recognise that creating SEZs alone will not allow industries to reap the full benefits of cluster advantage. The entire ecosystem will need to be developed in order to get the full benefits.

Effective Cluster Development Requires Coordinated Efforts

Not every cluster that is set up will achieve sustainable scale. Some will plateau out and others will wither due to competition. However, the ones that achieve scale are likely to attract disproportionate new investment into manufacturing and drive strong growth. Success of a cluster is not mere serendipity. Careful assessment of successful clusters reveals several factors that come together to drive sustainable cluster advantage and determine success.

There are several examples of successful clusters across RDEs. We examine here the hard disk drive (HDD) industry in Thailand where close co-operation across stakeholders has led to the development of an integrated HDD cluster spanning the entire value chain (refer Exhibit 6j in Chapter 6). Leading firms came together to form an association for driving development of the cluster. The

government made HDD a priority industry and provided incentives and tax exemptions for companies for investing in R&D centres, which further accelerated technological advancements. Universities and companies jointly invested in laboratories and R&D centres. Between 2001 and 2005, Thai HDD value add rose from 30% to 45%, while the number of Thai HDD supporting industries grew by 20%. Thailand's share of the global production of hard disk drives increased from 10% to 33% making Thailand the world's largest HDD exporter⁴.

Creation and development of successful clusters should be the joint responsibility of the government and industry. Public private collaboration across the entire range of stakeholders—government, companies, suppliers, educational institutes and employees is critical to success. Several factors need to come together for the creation and development of success clusters:

- ◇ Carefully and strategically chosen locations close to existing supplier and raw material bases and with convenient outbound logistics.

4. IDEMA Thailand.

- ◇ Close public–private collaboration to ensure coverage across the complete production value chain.
- ◇ Investment in and close collaboration with supporting entities such as universities and research centres.
- ◇ Development of relevant supplier networks.
- ◇ Up–front planning and investment to design and develop relevant infrastructure.
- ◇ Planning, resources and incentives to develop and strengthen local capabilities and talent.

Agenda for Action

It is clear that cluster development needs to be an integral element of India’s manufacturing strategy. For Indian companies to drive higher competitiveness, they will need to be able to tap into manufacturing networks in industrial clusters. Also, as global companies make decisions on setting up capacities, they will increasingly want to locate their plants in successful clusters. While larger companies may choose to seed new clusters, smaller ones will typically gravitate towards existing clusters. All stakeholders will need to work together to plan new clusters as well as strengthen existing clusters across different industries.

The first step will be to identify the specific industries and the geographic locations to establish and grow clusters. Two key parameters that should drive these choices:

- ◇ *The objective of the cluster:* Stakeholders will need to define whether the objective of the cluster is to enhance the total output or exports from the zone or primarily serve as a means to generate employment. This could to an extent dictate the specific geographies and choice of industry to promote, be it labour-intensive sectors like textile, food–products etc., or export-oriented sectors like automotive components.
- ◇ *Specific differentiating factors and advantages of an industry as well as location:* Perhaps, the most important point is to determine the key differentiating factor that could make the cluster a success. It could be proximity of domestic consumption centres, an avail-

able vendor network or concentration of companies, availability of cheap or specialised talent (as required), proximity to and availability of cheap raw material, or proximity to sea ports for exports. The focus has to be on selecting industries where the existing assets offer distinct advantages and can bring down overall cost structures.

Some of the specific actions that the government can drive include (we discuss these in greater depth in Chapter 6):

- ◇ Work with industry to identify and define target strategic sub–sectors and geographic locations for cluster development.
- ◇ Provide adequate incentive system through tax breaks or subsidies as required. It is critical that this coverage should be across the value chain, benefiting the end–industry as well as suppliers.
- ◇ Facilitate easy set up of supporting infrastructure in terms of required roads, power availability, ports, etc.
- ◇ Invest in and drive close collaboration with universities and research centers to encourage innovation and provide support to small enterprises.
- ◇ Enhance the speed of setting up and scaling business by reducing the bureaucratic process overload and adopting single window clearances.

Successful development of clusters does not depend on government alone. Industry will need to actively engage with the government and other stakeholders:

- ◇ Develop sub–sector specific approaches to drive cluster development.
- ◇ Collaborate to encourage representation across the entire production value chain including focused supplier development.
- ◇ Participate in and support development of relevant infrastructure.
- ◇ Invest in and provide resources for development and upgradation of local talent.

Leadership in Innovation and New Technologies

Innovation Crucial to Achieving Sustainable Advantage

Innovation is a critical driver that enables manufacturing companies to attain greater competitiveness and allows them to grow at an accelerated rate. In many competitive industries the only sustainable lever of competitive advantage is the ability to learn, change and innovate faster than competitors. Over time, other players can copy products, services and processes. What is difficult to replicate is the ability for continuous innovation. Exhibit 5d compares the share prices of R&D intensive companies with FTSE 100 and shows that better innovation capability consistently drives higher returns for companies.

Innovation Extends Beyond New Product Development

Innovation that brings relevant competitive differentiation can cover various dimensions.

◇ *Process innovation to enhance efficiency:* Toyota's Production System (TPS), an example of end-to-end pro-

cess innovation, has helped Toyota become a global leader in the automotive industry. The core of TPS is built on innovating processes to reduce waste and on achieving a Lean process across the value chain. Toyota also emphasises continuous process improvement to maintain its competitive advantage in the industry.

◇ *Product innovation:* Tata's Nano, is an outstanding example of product innovation with many design elements introduced into an automobile for the first time. Tata's Nano has the potential to become a world beater in its category.

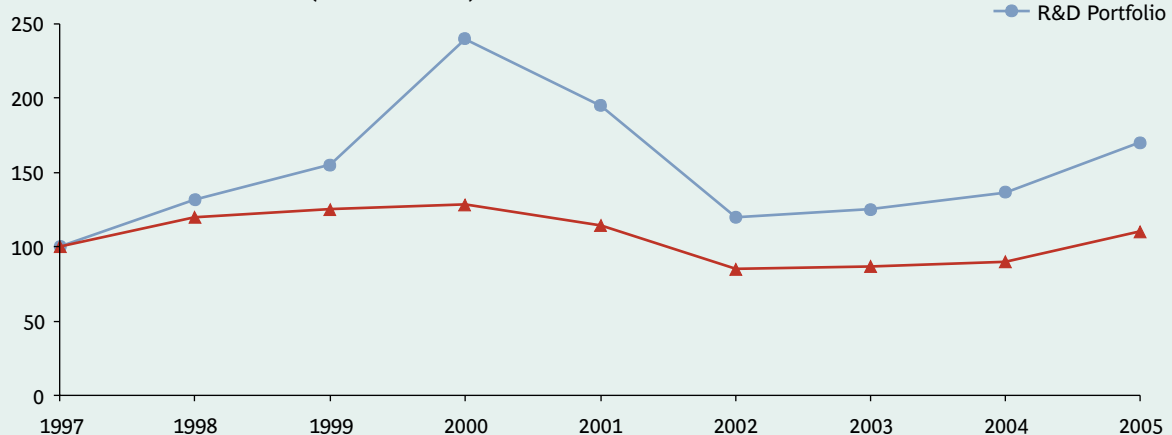
◇ *Business model innovation:* Business model innovation creates durable returns and advantage and is a way of leap-frogging competition in a mature industry. Unlike product and process innovation, it offers a completely new value proposition with a different operating model. Low cost airlines or business process outsourcing, are examples where a completely new business model offers a strong value proposition and game-changing economics.

◇ *Innovation using newer technologies:* In the past two decades technology has become a major source of

Exhibit 5d. Innovation capability is key to achieving strategic competitive advantage

Companies with high degree of R&D perform significantly better

Relative share price changes for R&D portfolio of FTSE 100¹ stocks vs FTSE 100 index (% of 1997 value)



Source: 2005 R&D scoreboard published by the Department of Trade & Industry—United Kingdom available at http://www.innovation.gov.uk/rd_scoreboard/

¹A portfolio of high R&D intensity FTSE 100 companies (R&D spend greater than 4%).

breakthroughs that can help companies upset incumbents and quickly grow to dominant positions. Innovations related to newer technologies like green energy (wind power and solar power), green buildings, nanotechnology, smart material etc. will shape the industrial landscape over the next few decades.

India's Innovation Challenge

A 2006 study by the Boston Consulting Group with CII on manufacturing Innovation covering senior management executives representing all major manufacturing industries showed that 83% of Indian respondents considered innovation as one of their top 3 priorities. This was in contrast with 66% of respondents in the same survey covering global industry leaders—clearly Indian leaders are placing greater importance on innovation.

That is the good news. The bad news is that India's R&D investment is only ~0.8% of its GDP, as compared with 4.3% for Israel, 2.6% for US and 1.2% for China. India also has only a 0.4% share of patents filed worldwide. While these have grown at 22% per year between 2002–05, most

were filed by foreign companies (as shown in Exhibit 5e).

Several factors prevent the intended focus on innovation getting realized. These constraints are well known and cover four issues:

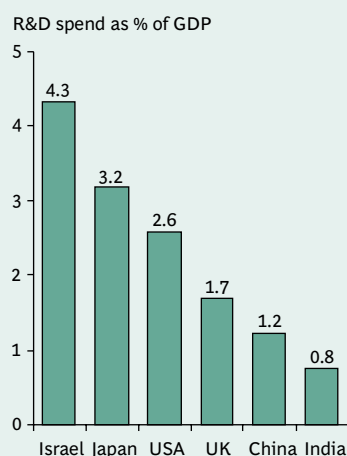
1. Low collaboration between research institutes and industry.
2. Inadequate funding of basic research in areas like manufacturing technologies.
3. Evolving IP protection regime.
4. Weak government policies to support innovation.

India Can Build onto its Traditional Advantages

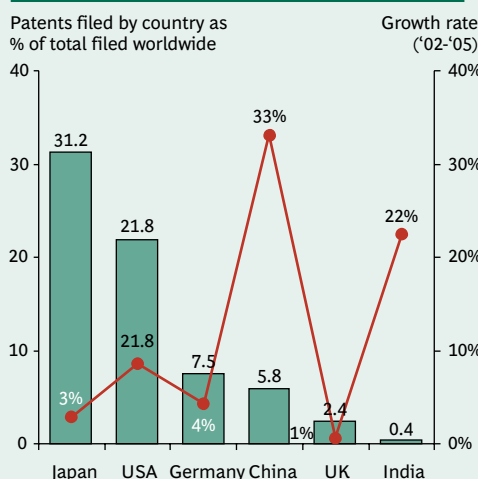
India has a unique opportunity to build leadership in innovation in two very specific areas. Unlike other RDEs, India has built a globally competitive industry and a talent pool in the IT and software space. Embedded software is fast becoming an increasingly important component and an im-

Exhibit 5e. India lags in R&D spend and patent applications

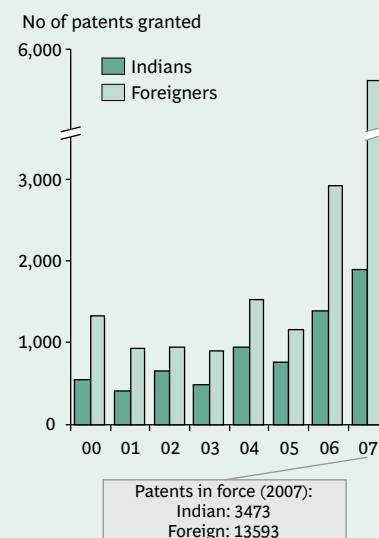
India's R&D spend to GDP ratio¹ only 2/3rd of China's



Patent applications growing rapidly, yet contribute <1%



Only 25% of total patents granted² in India were to Indians



Sources: IMD World Competitiveness Survey 2009; World International Patent Organization; Office of the controller general of Patents, Designs, Trademarks, Geographical indications, Intellectual property training institute and patent information system – Annual Report (2006–07).

¹Represents data for 2005.

²For 2007.

portant source of differentiation in products like automobiles, consumer durables, mobile phones etc. Leading consumer electronics players like Nokia and LG have extensively used software capabilities in addition to their hardware expertise to design and develop new products. The iPod and iPhone for example have built software and service features around the touch screen hardware capability to offer fundamentally superior user interfaces. India needs to think of ways of leveraging its strengths in the software space, and of driving higher collaboration between the IT and manufacturing industries to foster greater innovation.

The other area, which we discussed in the last chapter is developing and manufacturing products for the Next Billion customers. These are innovative products like Nano from Tata Motors or Chotakool from Godrej Appliances, products that break the compromise between specifications and price and reach those customers who find the normal products too expensive to buy. As we mentioned earlier, there is a market close to US\$ 1 tn out there for these Next Billion focused products and services. Indian manufacturers can design innovative products and/or business models to target these customers and bid for global market leadership in this segment.

Driving technology development and innovation in machine tool industry

Strong capabilities in designing and building machine tools and access to requisite manufacturing technologies will be critical for India to gain and retain global competitiveness in manufacturing and achieve its manufacturing aspirations. Machine tools provide the principal industrial equipment base for manufacturing industries. Local capabilities can provide easier and cheaper access to technology for Indian companies, enhancing competitiveness; at the same time effective investment in machine tools will have a strong multiplier effect on both industrial output and employment generation.

Currently the Indian machine tools industry significantly lags its RDE counterparts. The rapidly growing domestic demand (over 50% yoy from 2001–09) has been increasingly reliant on imports—India is today the 8th largest consumer of machine tools across the world, but only 16th largest producer. Over 80% of India's current machine tools requirements were imported in 2009, up from 40% in 2002. At the same time, India's share of global output is less than 1%, with Indian manufacturing exporting only ~5% of its machine tools output. In comparison, China is

the 3rd largest producer of machine tools across the globe and the largest consumer—producing over 30 times as much as India and consuming 10 times as much.

Several issues hinder the growth of India's machine tools industry.

- ◇ *Technology gaps*: India currently suffers from important technology and process gaps and lack of local capabilities in building critical inputs for most modern machine tools such as ball screws and linear guides, CNC systems and measuring systems etc that are all currently imported from markets such as Japan, Germany, Taiwan and Italy.
- ◇ *Inadequate R&D resources*: Though we have strong design and development capabilities, India lacks requisite R&D resources with a focus on machine tool technology development.
- ◇ *Insufficient manufacturing capacity*: further hindered by the fact that machine tool investment is currently less attractive driven by high investment levels and long pay-back periods.
- ◇ Lack of qualified and trained manpower.

There is clearly tremendous potential for Indian industry to further develop its machine tools capabilities—both to service domestic and global markets. However, this will require focused efforts to strengthen existing units, encourage private sector participation, attract investment, build R&D facilities and develop manpower. We shall discuss specific policy levers that could be used to spur this in greater detail in Chapter 6 on Policy Priorities. (Refer page 71).

Agenda for Action

While there are many action agenda which are well documented by different experts, we would like to highlight three points:

- ◇ There should be a technology agenda for India for at least the next two decades with clear milestones and an investment plan. These are the areas where the two key stakeholders—government and industry—believe that India should and could aspire for being one of the global leaders. This plan could include a large technology fund, fiscal incentives and preferential access to capital, which can be used by industry for acquisition and further de-

velopment of specific technologies that have been identified as critical for future success of the industry.

- ◇ There is a need for stronger collaborations between universities and research institutions and the industry.
- ◇ The Indian manufacturing industry should actively seek leadership position in two areas: designing and building of ‘intelligent’ products with a high level of embedded software role in collaboration with the IT industry, and products for the global Next Billion customers.

Lean 2.0 and Improving Plant Productivity

As supply chains continue to globalise, and volatility in the global environment increases, “Lean” practices to drive down costs, flexible manufacturing systems and improved plant productivity will become critical drivers of competitiveness for the Indian industry.

Lean Initiatives in Play but Full Value Not Yet Realised

Since its introduction by Toyota in the 1950s, the well known TPS has evolved into a more integrated and comprehensive manufacturing philosophy under the umbrella of ‘Lean’ manufacturing. Many Indian companies have adopted the Lean principles in their operations with varying level of success. There are many who have significantly improved their plant performance and claim that they are among the most productive plants within their industry. There are many others who have tasted some success but have not been able to exploit the full benefits of ‘Lean’ manufacturing. A recent global survey by BCG among manufacturing executives revealed that over half the respondents felt that ‘Lean’ principles are barely understood by line management, and only 25% of the respondents felt that they are well understood. The same study showed that most ‘Lean’ efforts have had short-term focus and at best have created well functioning plants, but missed on fully integrating the Lean concepts into the organisation.

Why do Lean programs fail to deliver the full benefits? BCG’s experience with clients across different industries reveals some insights on this:

- ◇ *Adopting individual Lean tools, without an overall business objective:* Many companies look at Lean to provide

incremental improvement in cost-reduction or production quality in specific areas but without a clear definition of the overall business objectives.

- ◇ *Lack of equal involvement of top management and ‘floor-people’:* Often Lean initiatives are either purely top-management driven or perceived as a mere shopfloor initiative. In both scenarios, the full benefits are not realised.
- ◇ *Broken link between business objectives and operational targets:* Without a clear linkage from business objectives to operational objectives to targets for each operational process, Lean initiatives yield only sub-optimal results.
- ◇ *Lack of performance metrics and accountability:* Without dedicated and qualified resources with clear KPIs and objectives, the Lean program will suffer from loss of accountability and yield poor results.

Lean 2.0—A More Comprehensive Approach

Lean 2.0 or the new Lean is the answer to today’s increasingly complex business environment which warrants a more comprehensive approach to achieve sustainable transformation. It needs to focus on developing a shared aspiration and vision of the plant around quality and cost leadership; build a strong engagement model with strong capability building across levels and an underlying cultural transformation to ensure that Lean becomes a “way of operation”, rather than a one-off initiative (as shown in Exhibit 5f).

1. Establish a clear linkage of business and operating metrics: Firms need to drill down the key business parameters as defined in the overall business strategy into tangible operating metrics, specifically around four dimensions—cost, quality, cycle time, and safety. An integrated Lean program needs to focus on all four dimensions instead of just short-term cost wins.
2. Build strong engagement models: Any Lean program should ensure collective buy-in and building of capabilities. Firms need to make the Lean programme a part of everyday life through appropriate changes in the organisational structure and role definitions. They need to build specific capabilities for problem solving and analysis through training and coaching, and ensure an increasing level of leadership and workforce engagement.

Exhibit 5f. Lean 2.0: An integrated approach for Lean adoption



3. Apply a structured suite of operational improvement tools: Successful implementation requires a structured process. The diagnostic process should identify key processes for improvement and prioritise the key improvement levers. Firms should set standards and targets for these processes through best practice benchmarking, and use a complete array of tools and principles across processes to enable process improvement.
4. Cultivate and govern performance: Firms need to steer performance by optimising management structures and MIS to act as an enabler of performance. Firms should align the KPIs of individuals/teams for Lean initiatives and enhance cross-functional collaboration through service level agreements (SLAs) between departments.

Exhibit 5g depicts the adoption of this new Lean approach by a cement manufacturer in India. This company undertook a manufacturing transformation journey with Lean as its backbone at one of its largest plants. The four key elements of the Lean approach—understanding key business requirement, operations excellence, performance governance and people engagement—were sys-

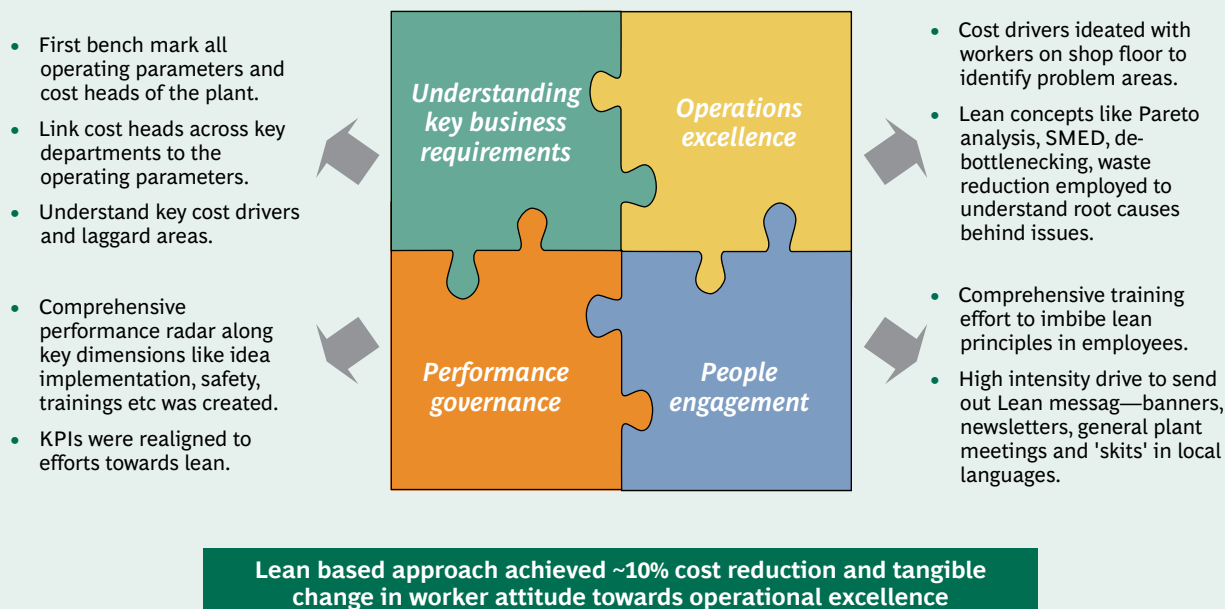
tematically applied and executed at this plant. This resulted in not just a 10% reduction in the cost base of the plant which put it among the best performing plants in the industry and transformed and the engaged workforce with a strong mindset towards operational excellence and continuous improvement.

BCG's experience with clients indicates that a well structured and focused Lean 2.0 program can help companies drive substantial value along multiple dimensions of cost, quality, safety, cycle time as well as workforce engagement, thereby helping improve competitive position. The typical impact includes process cycle time reduction of 30%–50%, decrease in scrap and rework of 20%–50%, improvement in labour productivity by upto 20%, increase in asset utilisation by 20%–40%, and decrease in inventory by 10%–20%.

Productivity Improvement Through Technology Upgradation

Though Lean management practices will have an important role to play, it is important to recognise that the extent of productivity gains will be constrained by the nature and quality of existing manufacturing facilities.

Exhibit 5g. Lean manufacturing transformation—A BCG case study



Brownfield ventures involving technology upgradation of existing plants will therefore become a crucial lever for Indian companies to achieve the next wave of productivity growth. This will be required for them to compete effectively with some of the other RDEs where productivity is growing rapidly.

One of India's strengths in the manufacturing sector has been its large and diversified industrial base with plants of different hues and technology levels. Many of these plants which were set up when the industrialisation took off in the 1950s and 1960s today are riddled with outmoded equipment and large labour force. To match the global standards of productivity which is being achieved by many of the newer plants, the older facilities require fundamental restructuring through investment in new production facilities, technology improvement and workforce upgradation. However, compared to new investments, brownfield plants face twin hurdles in carrying out this upgradation. Firstly, unlike new investments, they do not qualify for any government incentives like tax holidays and capital subsidies to help ease their financial burden of investment in new equipment or technologies. Secondly, they have to usually

deal with managing excess labour created in this process, which has a significant cost implication and is also a time-consuming process. In a sense they feel penalised for aspiring to reach global productivity standards and as a result, many companies hesitate in initiating a large technology upgradation program. Of course, there are many examples where Indian companies have done so quite successfully but very clearly if Indian manufacturing has to win the battle of productivity with the other RDEs, it has to create a wave rather than a few select individual successes.

All stakeholders (government, industry and labour) will need come together to find ways to create a level playing field between brownfield and greenfield investments and to ensure that the former do not feel penalised, if not incentivised, for productivity improvement through technology upgradation.

Growing Importance of Flexible Production Systems

In a world with growing volatility in costs coupled with rapidly changing demand patterns from an increasingly discerning and fragmented customer, flexibility is becom-

ing a critical lever for manufacturing performance. Flexible manufacturing systems offer the dual advantages of enhancing speed to market to deal with growing consumer fragmentation and rapidly shifting needs, and at the same time mitigating the investment and business risks faced by a firm in these volatile times.

Flexibility in manufacturing systems can be introduced in all aspects of the production process—product flexibility that allows rapid change and upgradation in models and simultaneous production of a broader variety, volume flexibility, lead time flexibility, process flexibility as well as financial flexibility in the investment strategy.

Several human and machine levers can be used to increase flexibility. Some of the models that manufacturing companies typically utilise to enhance flexibility of their manufacturing networks include:

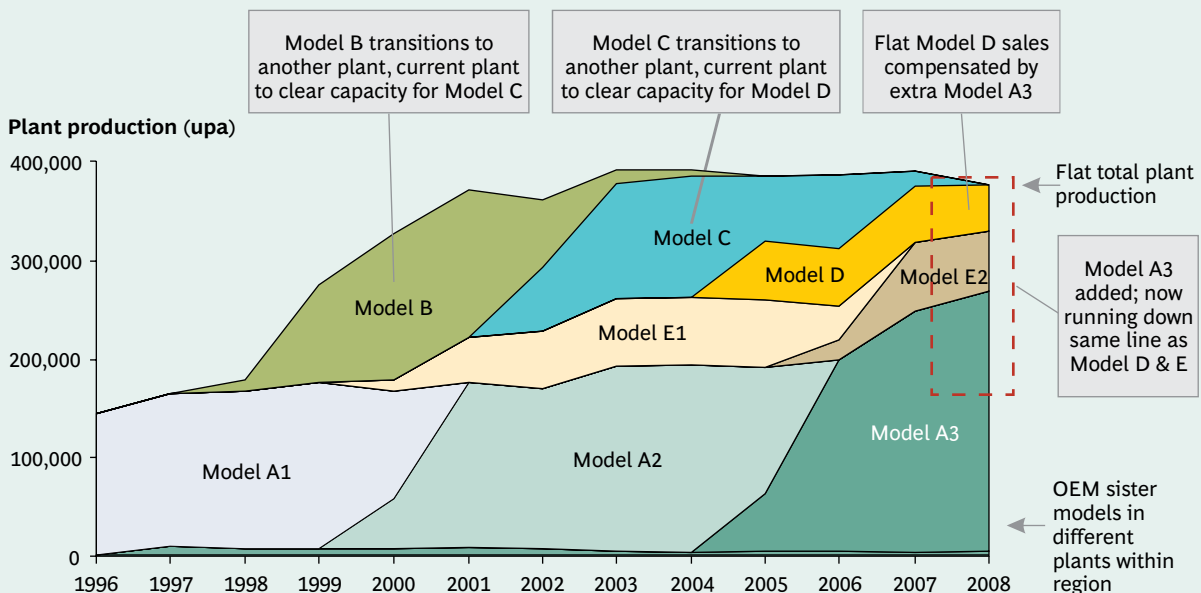
- ◆ *Flexible Automation:* Large factories use advanced robotic tools to produce several different models on the same assembly line. This allows a company to respond quickly to changing demand patterns. However, the

cost of developing these lines is significant but the benefits are enormous. Exhibit 5h shows how a global OEM has used plant flexibility driven by automation to ensure higher utilisation in one of its large US plants to produce different models of cars based on the shifting demand pattern.

- ◆ *Modular systems with a broad network of suppliers:* Companies often create highly modular products that can be quickly customised or tweaked to create alternative models by changing a few parts or modules. This modularity can be product-based and can be extended to the supplier network. A large global consumer durables manufacturer, for example, uses highly modular designs in its entire range allowing it to flexibly update and test several new models every year at minimal incremental costs.

- ◆ *Multi-location production:* Allows companies to address volatility in freight and factor costs as well as respond efficiently to changing demand across markets. A global automotive OEM leverages ‘network scale’ with 11 plants manufacturing similar models of utility vehicles across Asian, South American and Eu-

Exhibit 5h. Global OEM uses plant flexibility to maintain high utilisation



Source: Market interviews; BCG analysis.

ropean RDEs which serve as backup for other plants and also cater to the regional markets. To maintain the right balance of local sourcing and global scale, it has dedicated centres of excellence (CoEs) to ensure quality for critical components.

- ◇ *Deferred customisation:* It is often hard to predict the exact specifications that your end-user will demand. Carrying unwanted inventories can become extremely costly while waiting to produce on-demand will make you unresponsive. Deferred customisation models allow companies to break this compromise. A global power equipment company uses this extensively to their advantage. Almost 85% of their global production originates from 3 low cost large-scale plants in RDEs which manufacture ready-to-configure kits for high end products. The final configuration is performed at high-cost plants that are close to their customers offering quick response times, and targeted offers designed to suit their unique requirements.
- ◇ *Disposable factories:* These plants are the opposite to large-scale plants with expensive flexible automation. They use radically reengineered product processes to be as simple and low cost as possible. They use simple, inexpensive single product assembly lines that can be setup and dismantled at very low costs. This dramatically reduces the cost of entry and production to move in and out of changing markets at very low risk. For instance, a major specialty chemical producer expanding in Asia had traditionally relied on few massive multipurpose plants catering to the entire region leading to high investment in storage facilities, EHS protections and transport infrastructure. For its new expansion, it shifted its strategy to build many small close-to-customer plants for the emerging demand. This led to dramatic reductions on environmental impact and investment costs.

Each of these models will offer a different trade-off between risk management and speed to market. There is no one right answer. Players will need to make choices based on their own starting positions in terms of financial priorities and engineering capabilities as well as the extent of volatility in their product markets.

Agenda for Action

The final piece of the puzzle for manufacturing sector in India is to embark on the next wave of productivity and quality improvement. Many of the issues, challenges and also solutions discussed in this chapter have been covered in many other forums. However, a report on the Indian manufacturing sector would have been incomplete without covering them here as well. From this discussion, we would like to highlight several action agenda:

- ◇ While Indian industry has tasted success with the implementation of different performance improvement programs like TPS, TQM, TQC and other approaches, they need to move to the next wave of productivity improvements with a holistic and people-centric 'Lean' or Lean 2.0 programme.
- ◇ If India's older plants do not upgrade themselves and significantly improve productivity, we will lose the global battle for manufacturing leadership to competitors from other RDEs. All stakeholders from government and industry have to come together to develop a program that incentivises brownfield sites to upgrade their technology rather than penalising them in relative terms compared to new investments.
- ◇ Other than productivity, the final frontier for today's plants is flexibility. Indian companies have to carefully think through their agenda on this front and select and implement the right solution for their business.



Policy Priorities for Indian Manufacturing

If India is to change the trajectory of growth of its manufacturing sector and achieve its aspirations, government policy and support will have to play a crucial role. In the previous chapters, we have touched upon a range of policy changes and initiatives required from the government which include simplification of procedures and reducing transaction costs, measures to attract higher investment, support for R&D, facilitating creation of physical infrastructure and improving education and training infrastructure. Most of these are very much a part of the government's agenda and have been discussed extensively in several forums, and hence we will not delve into them in detail in this report.

Instead, we will focus the discussion on four themes that we have identified where the in government policy intervention would be critical for meeting the aspirations of Indian manufacturing. All four themes have complex sets of issues embedded in them, which make it more challenging to build a consensus among all stakeholders on the objectives and content of any policy intervention from the government. It also makes it imperative to take a holistic and systemic view of these four themes to bring in some fresh thinking and alignment between the different stakeholders.

These four themes are shown as a set of questions/propositions below:

1. India has a lower share of global manufacturing trade than many other RDEs. Manufacturing exports are a smaller share of its GDP. *Should India change its current policy framework and become much more aggressive in promoting export led-growth of the manufacturing sector?*
2. While India's manufacturing industry has rapidly grown in scale, driven by the growth of consumer demand in many sectors, it has not built sufficient 'depth' for value addition and capability in many industries. *Should there be much more focus on building this 'depth'?*
3. India has strong labour laws protecting worker rights. However, these rights are seen to constrain the growth of large-scale manufacturing and introduce rigidity in the labour market, encouraging widespread use of informal workforces. With the need for driving higher manufacturing sector growth and to compete with other RDEs for global demand and investments, there is growing pressure to improve labour productivity and flexibility. *How can labour laws be revised to facilitate higher scale, productivity and flexibility while protecting worker rights?*
4. Finally, India is a very large country with dispersed population and a large number of stakeholders. It faces many issues in developing its industrial infrastructure ranging from acquisition of land to growing aspirations of the local population to have a share in the benefits development. *What should be the right industrial structure for India that balances the benefits of building large-scale operations with the many advantages of having small scale and dispersed entrepreneurial businesses?*

In this chapter, we set the context for a discussion on each of these four themes, provide some initial benchmarks and analysis, offer some ideas as thought starters and present a set of next steps to align the different stakeholders on the desired policy interventions.

Focus on Exports-led Growth

Rapid Export Growth Critical for India to Achieve its Manufacturing Aspirations

As we have discussed earlier in this report, cross-country evidence suggests that domestic demand for the manufacturing sector cannot grow more than 1%–2% faster than overall GDP growth—which means that India’s manufacturing sector can expect to grow at 8%–10% over the next two decades if the current domestic consumption-led policy is followed and the GDP grows by 7%–9% over the next decade. To achieve higher growth of manufacturing sector, Indian manufacturing exports will need to grow at 15% to 20% year-on-year in real terms from 11% growth in the last decade (1998–2008). While this seems a fairly stretch target, it is not unachievable. We have seen similar export growth in other RDEs. For example, China’s manufacturing exports grew at 21% year-on-year in the last decade (1998–2008). Given continued globalisation of supply chains and migration of industrial capacity to RDEs, and the fact that India’s current position in global trade is a low of 1.4% (compared to 8% for China), there is clearly significant room for India to grow exports much faster¹.

Key Trends in Global Trade

In 1995, global trade was about US\$ 10 tn. By 2008, it had more than tripled to US\$ 32 tn². BCG analysis suggests that this trade will continue to grow over the next few decades. However, there will be some significant shifts that will happen which gives pointers to how India should refine its manufacturing export policies.

As we all know, the share of the RDEs in this trade has been rapidly increasing led by primarily labour cost advantage. In the last two decades, total industrial production in the RDEs has grown from ~20% of OECD countries to more than 35% between 1990 and 2008 on the back of greater cost competitiveness³. We estimate that by 2025, the RDEs will overtake the developed markets in industrial production as shown in Exhibit 6a.

China has led the charge from Asia with US\$ 1.2 tn worth of merchandise exports in 2007. India’s share though increasing has been much lower at US\$ 145 bn³. With a concerted push, India could increase its share in global off-shoring effectively, filling the gap between growth in domestic consumption and its manufacturing aspirations. To do this, two important considerations

emerge—choice of target industries and choice of export destinations.

Choice of industry will be important. Recent BCG analysis shows that off-shoring to Asian countries will continue to rise. However not all industries will be equal contributors to this. BCG analysis shows that based on relative competitiveness of Asia versus other off-shoring locations, six industries will continue to be the biggest contributors to the Asian off-shoring story. These are—apparel and textiles, consumer electronics, furniture and wood products, automobiles, industrial machinery and industrial chemicals (as shown in Exhibit 6a). Some industries where India is already an important exporter will continue to offer strong potential specifically chemicals and textiles. India could also make a bigger push into consumer electronics, furniture and industrial machinery. The choice of future focus industries will depend on multiple factors—export potential from these industries, India’s current relative competitive advantage to serve this demand, key export destinations and India’s trade relations with them. A focused and detailed effort is required to identify which should be the priority sectors for India to target breakout growth in exports.

Need to understand shifting global trade patterns.

Over the last decade, there has been a historic shift in trading patterns, with global trade shifting from Europe and US based flows to intra-Asia routes (as shown in Exhibit 6b). For example, the intra-Asian trade in 1990 which was just 4 million TEUs had the fastest growth among all key trading routes and grew to over 28 million TEUs by 2008 and is expected to grow to over 80 million TEUs by 2015—by far the largest trading route in the world. China has accounted for the lion’s share of this massive shift that has occurred. Today, India exports to a good mix of trading partners with exports to Europe accounting for 25%, USA accounting for 13% and Asia accounting for 32% of the total exports². While India needs to keep USA and Europe in its sights, it needs to rapidly deepen its focus on Asia to take advantage of this massive growth in intra-Asian trade in the next decade.

Priority areas to promote export growth. While India’s most important source of competitive advan-

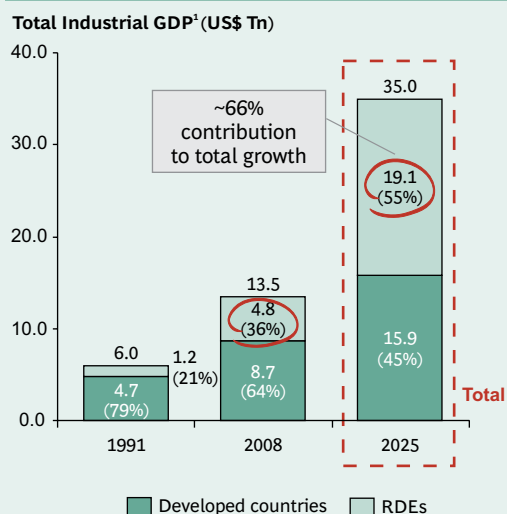
1. EIU statistics, Data Monitor.

2. World Bank statistics.

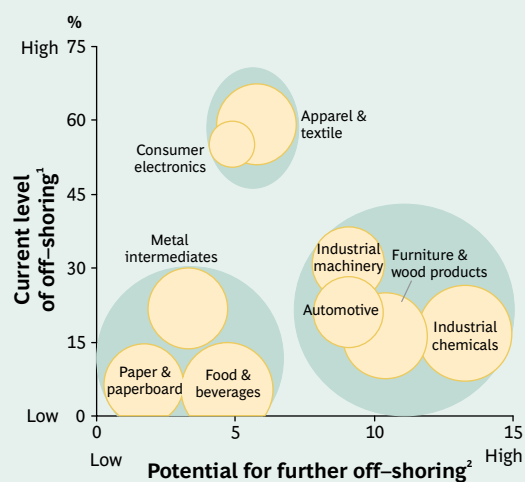
3. EIU.

Exhibit 6a. Expected RDE role in global manufacturing economy

Contribution of RDEs to world industrial output likely to grow significantly



Nine industries likely to have strongest role in off-shoring going forward



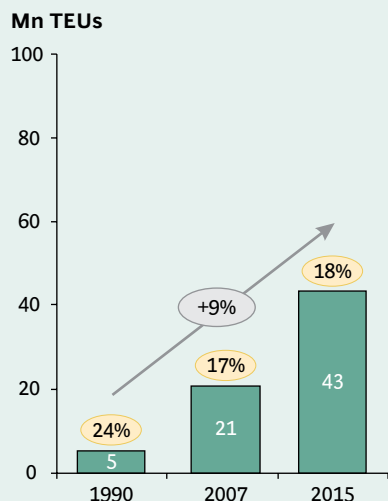
Sources: EIU; BCG analysis.

¹Nominal GDP from mining, quarrying, manufacturing, construction and utilities at factor cost (GDP at market prices, less indirect taxes, plus subsidies)

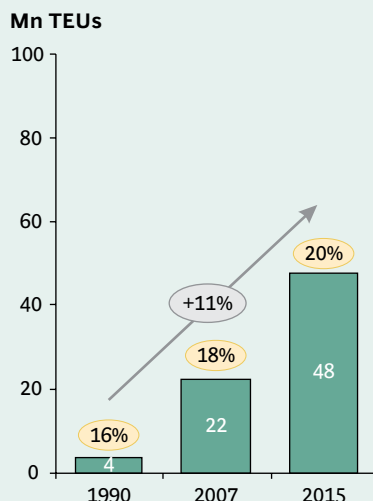
² Potential for further off-shoring is derived from the gap between maximum and current level of off-shoring.

Exhibit 6b. A snapshot of global container cargo flows

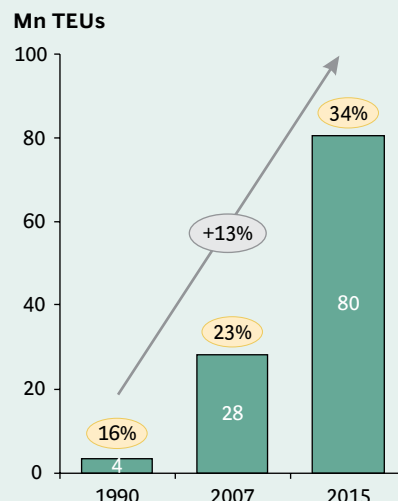
US Asia



EUR Asia



Asia-Intra



Sources: Drewry shipping consultants; BCG analysis.

¹% of global container cargo volume.

○ As % of global trade¹

tage—low labour costs—will remain so over the next few decades, as highlighted in Chapter 4, a more comprehensive look at factor costs indicate several areas where India’s competitiveness could erode rapidly. To maintain and further enhance India’s global export competitiveness, several priority areas have to be addressed as elements of a comprehensive export promotion policy. These are:

- ◇ *Attracting and facilitating investments:* As highlighted earlier, Indian manufacturing needs additional gross fixed assets of Rs 55–80 lakh crore by 2025 to meet its growth aspirations⁴. As we also mentioned earlier, large manufacturing capacity will migrate from the developed countries to RDEs. India must implement a concerted and focused initiative to attract this migrating investment to meet both its own capital requirement for growth and become a bigger player in the industrial off-shoring landscape. Simultaneously, it is important to create additional channels to tap dormant domestic savings that currently do not find their way into formal corporate funding.
- ◇ *Faster project implementation including land acquisition:* The time required to set up and execute projects in India needs to be reduced drastically. Compared to China where an industrial project can be up and running within 6 months of conceptualisation⁵, in India projects are often plagued by long delays. Some of the key areas that will require intervention to improve this include simpler government procedures, reduction in multiplicity of regulatory/control bodies, consistent and robust land acquisition policy, faster environmental clearances, etc.
- ◇ *Reducing transaction costs to drive competitiveness:* India currently compares unfavourably with many other competing economies on paperwork and time required for doing business, in particular exports. For example, CII’s studies indicate that 31 documents with 87 copies are required to ship goods from India⁶. The transaction costs have to be brought down significantly for enhancing India’s export competitiveness.
- ◇ *Simplified indirect taxation:* India’s multiple-tier taxation structure reduces the cost competitiveness of Indian manufacturing players. The cascading impact of various taxes like excise, state and central sales tax,

and octroi and entry tax can be as high as 25% to 30% of the retail price in India. Many of these taxes are not reimbursable and are estimated to add 4% to 6% to the cost of exported goods⁷.

- ◇ *Improving logistics connectivity to ports:* India’s port capacity is highly constrained, with most major ports running at close to full capacity utilisation. Average turnaround time in India is 3.5 days as against 10 hours in Hong Kong and 16.5 hours in Colombo⁸. Port connectivity to hinterland is often poor and affects port operations. Given that most of our trade is routed through sea ports, poor port efficiency reduces competitiveness of Indian exporters.

Several Policy Levers Available

A range of policy measures may be considered by the government (as shown in Exhibit 6c) to implement a well orchestrated and comprehensive exports growth strategy besides mainly fiscal incentives and SEZs which have drawn a lot of attention in India. Not surprisingly, these policy areas are well known and include:

- ◇ Infrastructure development specifically for exports which include roads, ports and creation of industrial parks.
- ◇ Proactive market development—through setting standards, branding initiatives and matching local suppliers with global players.
- ◇ Enhancing speed and ease of doing business through use of industrial parks, simplification of procedures and decentralised/automatic decision making.
- ◇ Focus on capability development of individual enterprises including awareness creation of specific export opportunities, skill development, technology support in design engineering and product development, etc.
- ◇ Attracting foreign capital through supportive government policies and “automatic” approval processes, and offering preferential access to funding

4. Refer Exhibit 2d, Chapter 2.

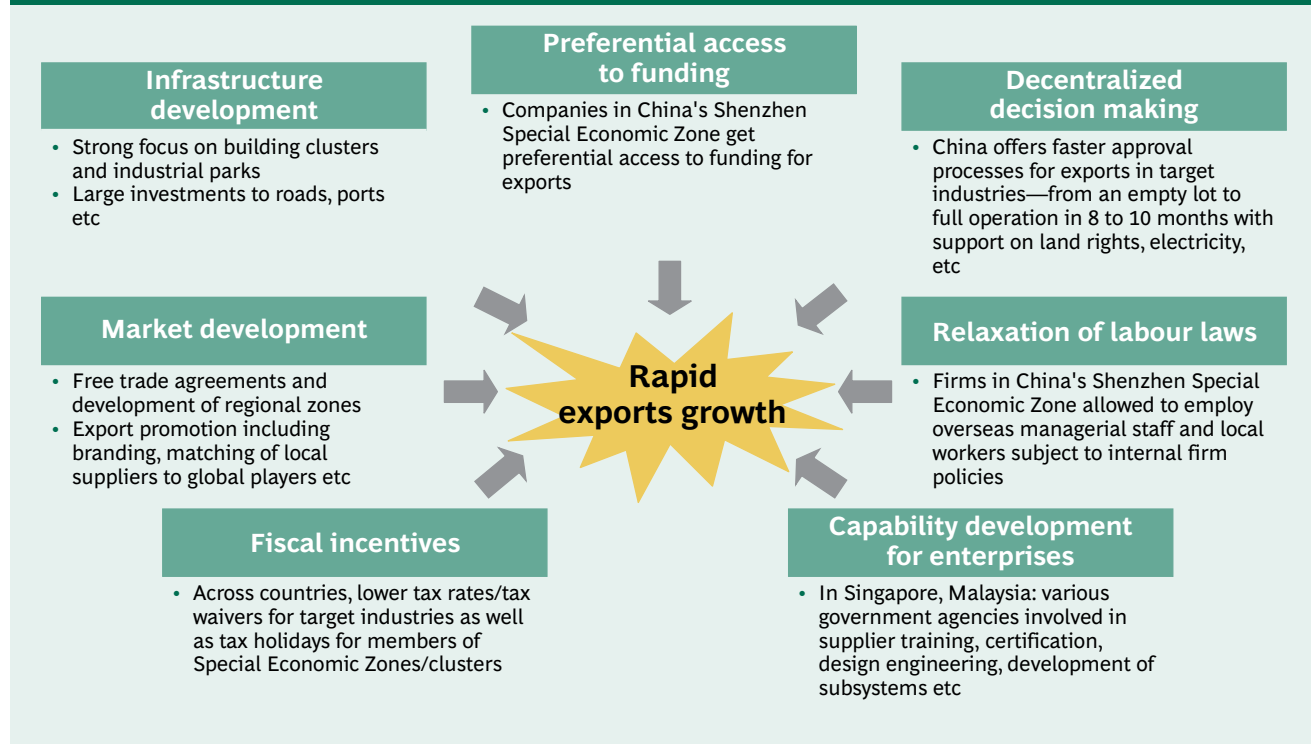
5. Expert interview.

6. CII.

7. Refer Exhibit 3j, Chapter 3.

8. Refer Exhibit 3b, Chapter 3.

Exhibit 6c. Range of policy levers adopted by RDEs to drive export growth



to domestic companies for expansion of production facilities and global expansion.

- ◇ Relaxation of labour laws to support enterprises in hiring, training and retaining high quality talent.

Setting Ambitious Growth Targets for Exports and Aligning all Policy Levers

The issues and potential solutions presented in this chapter on exports are well known. Different governments have made many efforts to set ambitious targets and implement different policies to support their achievement for specific issues or industries. As has been pointed out earlier in this chapter, there is going to be large-scale migration of manufacturing investment and capacity from the developed countries to the developing countries. The nature of global trade and also the industries which will drive these will change with intra-Asia becoming the largest trading block in the world.

We believe that as the world emerges from one of its severest economic crises, it is time to take stock and develop a long-term strategy for India to significantly in-

crease its share of the global manufacturing trade. Exhibit 6d lays out a framework for this. For example, India may want to focus disproportionately on getting a major share of the intra-Asian trade—which would be a major policy shift for the country. Similarly, the country may want to identify a few target sectors for focused efforts to enhance exports.

The key to success would be to align the different stakeholders within and outside the government on the export objectives and targets and the integrated set of policy measures required to achieve this target.

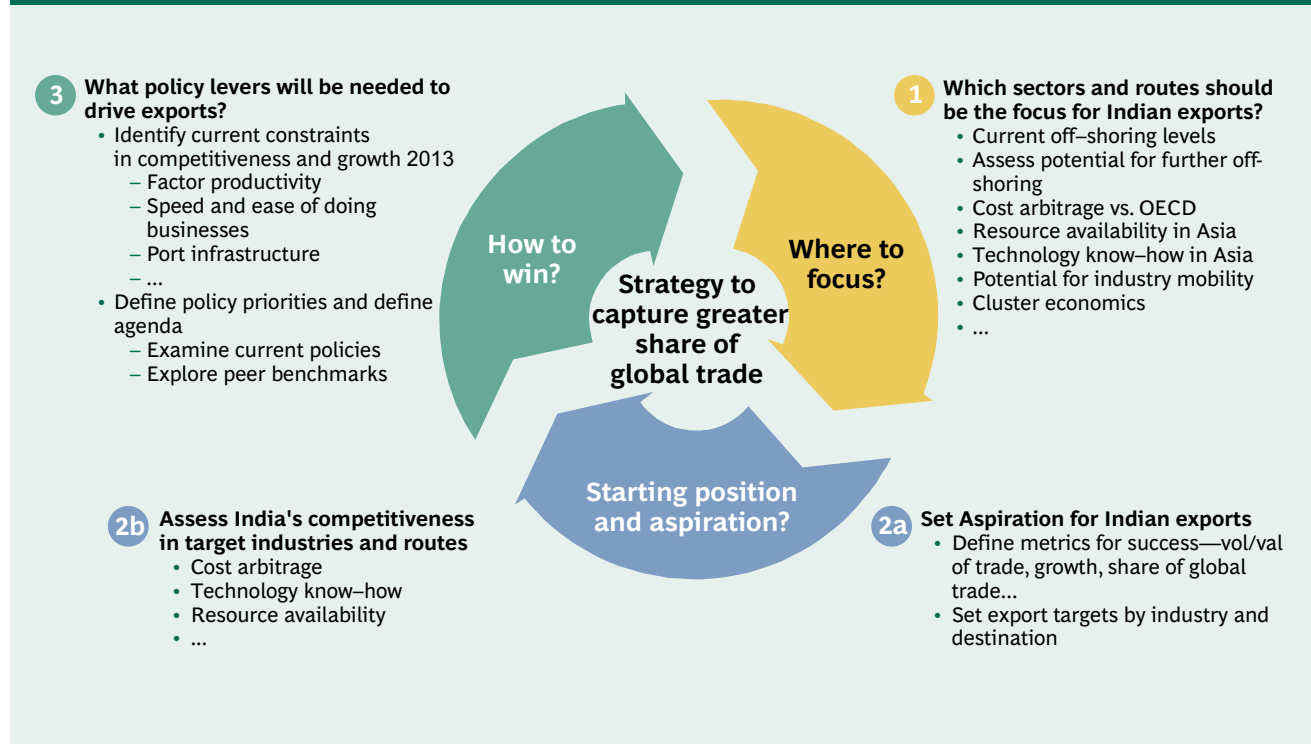
Balancing Scale and Depth Across Industries

Setting the Context for Debate Between 'Scale' and 'Depth'

Indian manufacturing output has grown from ~Rs 1.7 lakh crore in 1991 when the economy was liberalised to over Rs 30 lakh crore in 2007⁹. During this growth peri-

9. EIU; Data Monitor.

Exhibit 6d. Policy Framework: Export-led growth



od, India's economic policies have largely been consumption led, which has resulted in building scale in many industries. Mobile phones is one of the best example of this, with India becoming one of the fastest growing markets with the second largest mobile subscriber base in the world, second only China. Consequently, we have built a truly global scale industry—Nokia's plant in Chennai which assembles mobile handsets in India is a global-scale plant. However, this consumption-led growth which has built scale has failed to build 'depth' in the telecom industry, with India still importing most of its requirements of telecom equipment. Even mobile handsets assembled in India have a low level of local value addition.

For any manufacturing economy, building "deep" manufacturing capabilities in specific industries is an important aspect of sustainable growth. "Depth" is defined as capability and expertise in all aspects of a product value chain—from R&D and product design to manufacture of components and final products to installation and service where appropriate. Depth is important for multiple reasons:

- ◇ In certain industries such as defense and telecommunications, it is important to control and keep the value chain indigenous from the perspective of national security.
- ◇ Controlling the upstream value chain in some industries is critical to safeguard growth in the downstream segments. For example given the required investments in infrastructure and industrial capacity, a greater base for capital goods and equipment manufacturing in India would provide greater stability to potential growth plans in these sectors.
- ◇ Depth allows for greater value capture along the chain. Higher the proportion of economic activity for an industry that is conducted within the country, greater is the share of economic benefits that accrue to the country. This has consequent implications on key parameters like GDP growth, employment generation, etc.
- ◇ Greater depth makes the industry position more stable and less exposed to shifting global demand-supply situations and increasing volatility. For example, in 1998,

the DVD market was only US\$ 1 bn dominated by Japanese and European firms and the market was largely concentrated in the developed countries. As they began selling into developing markets, the sales rapidly grew to US\$ 19 bn by 2004. The global players built large-scale plants in RDEs to exploit the low labour costs and also serve more effectively these fast growing markets. Today these plants produce a very large percentage of the entire global production of DVDs. However, Japanese and European firms continue to control 47% of the value added segments, since they control the design and production of core components such as super multi DVD drive, optical pick up and micro-optics in their home countries (as shown in Exhibit 6e).

Over the last two decades, RDEs (including India) have grown their share of global trade by greater off-shoring by companies in the developed markets of lower value mass production or assembly driven primarily by the labour cost advantage of RDEs. The high value parts of the chain such as, R&D, design and production of core components were often not outsourced. These companies were keen to retain their technology and value creation in their home countries. Very often investments are made

in only those parts of the value chain where RDEs have greater competitiveness.

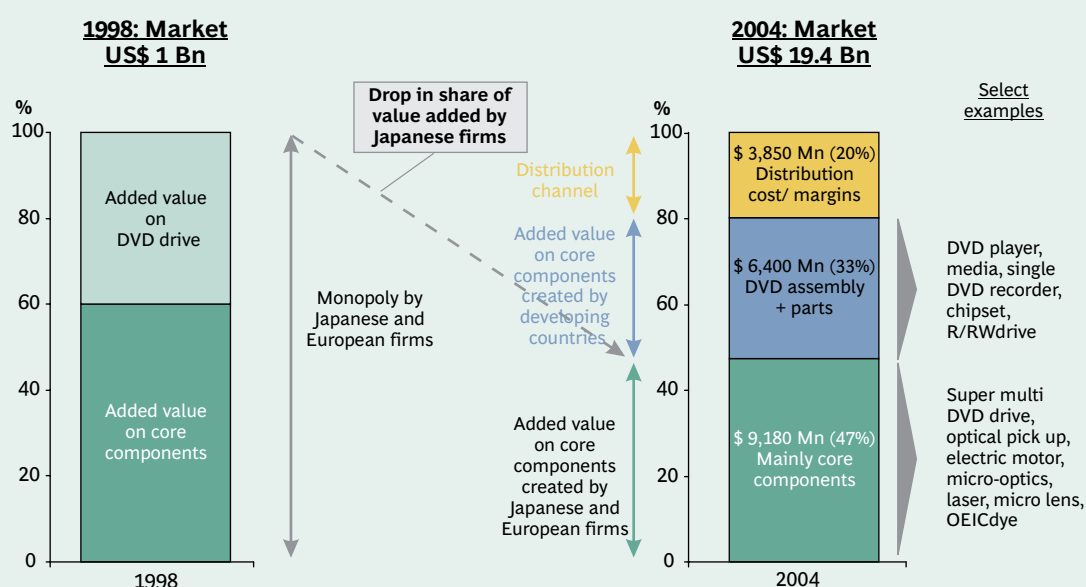
The key question is whether India should continue to build scale through consumption led growth and greater share of manufacturing off-shoring or also increase focus on building depth in industries where it is most desirable to do so.

India's Current Position

Going by several indicators, India currently lacks depth across several industries. The country currently imports a large proportion of its capital good requirements, which is the foundation of its manufacturing industry (as shown in Exhibit 6f). Even in strategic areas, like defense, we continue to import most of our advanced defense equipment and would be making huge imports for modernisation. The new offset policy, which has been announced by the government if implemented properly, could go a long way in building depth in the country in many areas of defense production.

There are several sectors where India is building to global scale, but continues to lack depth across each stage of the value chain. These include mobile phones, telecom

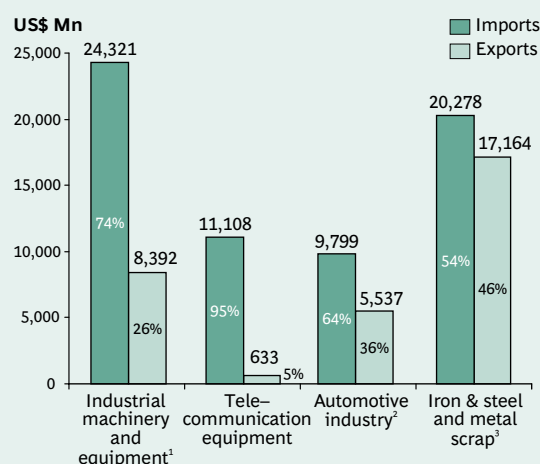
Exhibit 6e. Shift of value added in DVD production (1998–2004)



Source: Architecture based approaches to international standardization, University of Japan 2006.

Exhibit 6f. India has been a net importer in most industries

Imports continue to dominate in 2008



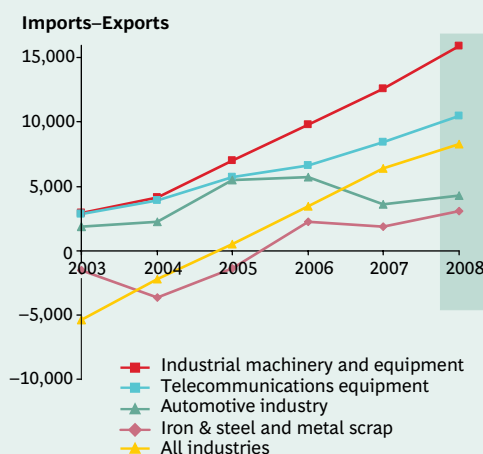
Sources: 2009 Euromonitor International; BCG analysis.

¹Sum of power-generating and general machinery and equipment.

²Sum of passenger cars, commercial vehicles, motor cycles, other road vehicles and transport equipments.

³Sum of metalliferous ores, metal scrap and iron and steel.

Net imports have been continually on the rise



equipment, consumer electronics and even passenger cars. For example, in telecom equipment while a proportion of wireless devices and software content are now produced in India, the design, components and telecom infrastructure continue to be imported from other countries, and no single Indian player has been able to build capabilities to have a major play in the domestic market, leave alone the global market. In passenger cars, several Indian players have made a strong beginning and are building capabilities to design and manufacture cars from scratch but their capabilities and products are still largely focused on the domestic market and now face the challenge of scaling up to global level. Even in the pharma industries, where Indian firms have made a mark in the global generics market, India has not been able to exploit their position to develop strong equipment suppliers and continue to depend largely on imports. Other core sectors like power, railway transportation, mining, ports and shipping and steel depend largely on imported machinery even though India provides one of the largest and fastest growing markets for these products.

Finally, as discussed earlier in the report, India currently lags behind many other countries on R&D and inno-

vation. Spend on R&D is only 0.8% of GDP which is much lesser than developed or even several RDE countries¹⁰. Given that innovation, technology and R&D are critical drivers of depth in any industry, this low spend on innovation will have to be substantially increased in the future.

Policy Levers to Drive 'Depth'

India has progressively liberalized its industrial policy to modernize industrial sectors and attract investments and build scale of production. This has paid off as manufacturing growth has averaged over 8% over past few years and Indian industry has become much more cost competitive. With its aspirations to achieve a growth rate of 11% and become the 4th largest manufacturing economy in the world, India should also focus on taking its manufacturing capabilities to the next level and significantly increase depth in many industrial sectors.

Government policy can play an important role in building depth. Many other RDEs, in particular China, provide some pointers to the policy interventions that are needed

10. Refer Exhibit 5e, Chapter 5.

to do so. An analysis of China's policy framework for industrial development offers three themes which India could draw from:

1. A systematic selection and focus on specific industries to build depth.
2. The range of policy levers deployed to build depth in these industries.
3. Variations by industry in terms of strategy as well as choice of levers used.

Industry selection. RDEs may select different industries to drive depth. For example, China divides its industries into three main groups (as shown in Exhibit 6g): strategic or “vital” industries, basic or “pillar” and others, and has laid out a very different set of policies for each group, specifically in terms of participation by non-Chinese players.

Range of policy levers used. A comprehensive set of policy levers can be used to drive depth. Exhibit 6h shows the policy levers for different industries used by China to promote strategic depth. These include demand side le-

vers such as offering preferential customer access and creating tariff and non-tariff barriers like setting industry standards. On the supply side, the government has facilitated innovation and technology development, provided preferential access to finance and offered fiscal incentives to encourage corporate investment.

Two key benchmarks stand out. Firstly, China's focus on building depth in specific hi-tech industries. Secondly, the crucial role played by universities in driving technology development and promoting local enterprise.

To build depth in hi-tech industries through development of technology and innovation, (as shown in Exhibit 6i), China established the Torch High Technology Industry Development Center in 1989, under the Ministry of Science and Technology to create an integrated program to support and drive innovation in a set of priority “high-tech” industries. These included information technology, biology and new medicine, aerospace and aviation, new materials, high-tech services, new energy/energy saving technology, environment protection, and reconstruction of traditional industries by new technologies. Key initiatives include:

Exhibit 6g. China has divided its industries into 3 main buckets based on their strategic importance

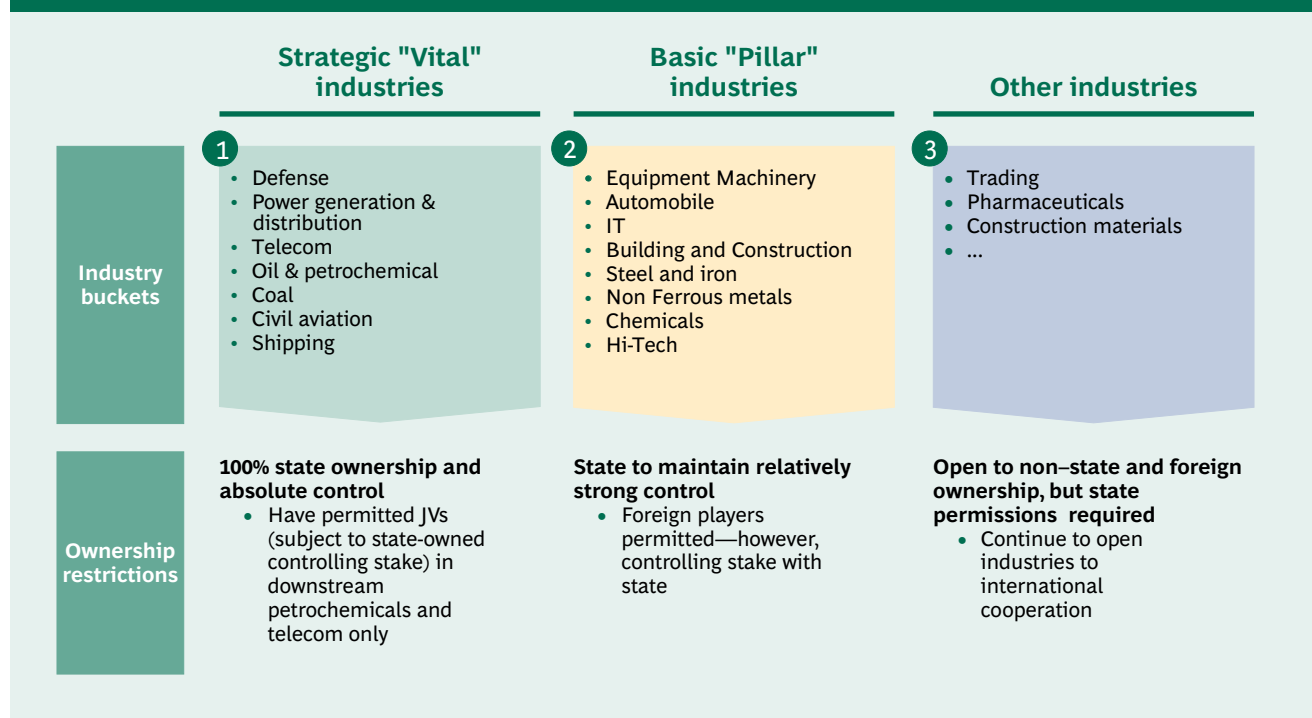


Exhibit 6h. Range of policy levers adopted by China to promote strategic depth in select industries

	Policy levers — Illustrative	Examples
Create ownership constraints	• Mandate state ownership of enterprises • Limit extent of foreign ownership	• Steel: Participation of global player limited to less than 50% • Civil aviation: 100% state ownership mandatory
Offer preferential customer access	• Preference in government contracts • Restrict market access for foreign players	• Local telecom equipment firms, e.g. ZTE and Huawei have preference in government contracts
Set industry standards	• Set buying standards to encourage purchase of domestically produced products and equipment	• Steel standards for construction • Technology standards in telecom
Offer fiscal incentives	• Tax incentives/rebates for investment in upstream businesses and technology • Import tariffs to encourage purchase of domestic products and equipment	• Tax rebates for companies in hi-tech science parks
Offer preferential access to finance	• Mandates to banks to offer stronger lines of credit to specific industries/players • Government owned funds for specific industries	• Huawei has \$10 billion line of credit to sell telecom equipment in Africa • State-owned innovation fund created for early stage enterprises
Drive & facilitate technology development	• Develop technology parks and business incubators with access to funds and technical support etc • Offer preferential policies to tenant companies • Create technology transfer markets	• Tax rebates and lower land fees offered to tenant companies in technology parks • Encourage companies to partner with local universities at low cost

Exhibit 6i. Policy levers adopted by China to drive strategic depth in hi-tech industries

Provide access to finance	• Innovation Fund (Innofund) for Tech-based SMEs, 1999 – Investment support for early stage projects still unattractive for commercial capital – 5.3 billion Yuan to ~8,000 projects; over 100 SMEs, listed on stock exchanges • Roadmap Scheme for Financing Tech-based SMEs, 2004 – Policy loans to commercial banks for loans to tech-based SMEs—default covered by Innofund • Tech-based SMEs Venture Capital Introductory Fund, 2007: 100 million RMB fund
Facilitate technology development capabilities	• Technology Business Incubators (TBIs), June 1987 – Offer customized incubation services and technical expertise to start-ups – 62 University Parks jointly in collaboration with Ministry of Education; 100 incubators for returned overseas scholars; 9 International business Incubators (IBIs) – ~500 TBIs hosting 40,000 companies; successes including Lenovo, Huawei, Suntech Power • Specialized Industrial Bases, 1995 (129 bases) access to local talent, technology and capital • Productivity Promotion Centres (1270 centres): Capability development, technology assistance
Offer preferential policies	• National Science & Technology Industrial Parks, 1988 – 54 parks, over 40,000 companies—33% of R&D spend in 2006 – Get preferential policies and administrative support including lower tax rates, land usage fee...

- ◇ Providing preferential access to finance—especially for early stage enterprises that are unattractive for commercial capital.
- ◇ Supporting capability building for start-ups and small enterprises through access to science parks, low cost tie-ups with universities etc.
- ◇ Developing and promoting innovation clusters through government investment and providing preferential policies such as tax incentives, lower land usage costs etc.
- ◇ Building supporting soft infrastructure such as creation of a technology transfer market for sale of technology contracts.

China has attached huge importance toward collaboration with universities. Universities have been assigned a crucial role in the policy framework for creating “know-how clusters” and in promoting local enterprise. Over the last two decades, 62 university parks have been developed in joint collaboration with the Ministry of Science and Technology and Ministry of Education. Universities in these parks are given funding and expected to support technology transfer and product development enterprises. For example, four of China’s largest automotive clusters are linked to top universities. In addition, universities play an important role in promoting local enterprises. Their “design institutes”, such as, in building technologies, road construction and industrial automation, play a key role in setting standards and specifications for contracts in many industries. Many of these design houses at the same time make money as system integrators (they buy products from small players) and play a significant role in driving the competitiveness of local companies.

Variation by industry. The third theme for India to consider is that not all industries are treated the same and the policy agenda could vary by industry. Depending on the starting position, strategic importance and global landscape of the industry, the government can pick a sub-set of levers to be deployed for each industry.

For example, in railway and power equipment sectors, China has very aggressively used the attractiveness of large potential markets to encourage foreign companies to sign JVs with minority share holding and transfer technology in exchange for lucrative deals. Over a peri-

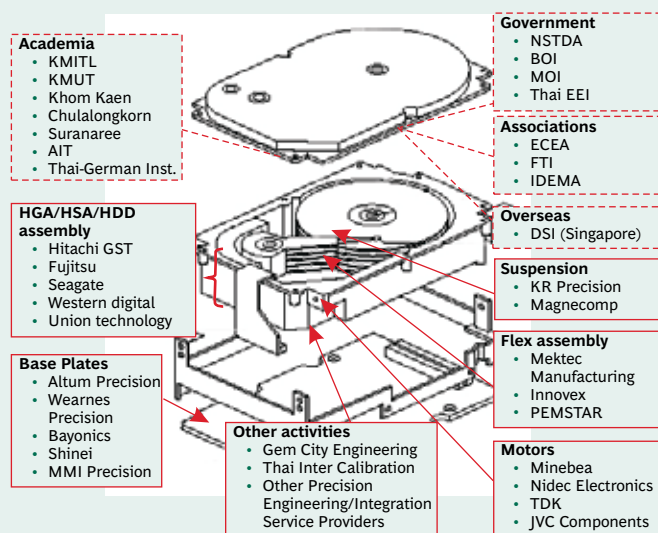
od of time, the local firms with this knowledge have built their capability and are now producing competitive products cheaper than those of overseas originators. For example, foreign companies could build generators for the first stage of the massive Three Gorges hydroelectric dam, only if they agreed to transfer technology to Chinese partners, who took the lead in later phases of construction. In recent years, a very similar pattern is playing out in the alternative energy sector. Foreign wind-turbine manufacturers held nearly 60% of the Chinese market in 2006. As Chinese firms gained knowledge and capabilities, and with the favoured access policies of the Chinese government to support them, that position was reversed by 2008 with the Chinese firms accounting for 74% of new installations.

In telecom, on the other hand, China adopted a different policy of protecting domestic players, to give them an advantage in selling locally. ZTE and Huawei, the two major local players had access to cheap funds and preference in local sales. They developed their capabilities, through reverse engineering and then through numerous technology tie-ups with MNCs. Now the government is supporting them in their strategy to become global leaders in telecom equipment industry. Huawei, for example, has a low interest US\$ 10 bn line of government credit to sell telecom equipment in Africa.

It is important to note that such initiatives to build depth are not unique to China. Thailand’s government policies too have led to strong capability development and depth in specific industries. Thailand’s hard disk drive (HDD) industry is a good example: the HDD cluster spans the full production value chain developed as a result of close cooperation between government, industry and universities. Exhibit 6j shows how cooperation of all stakeholders led to the development of an integrated HDD cluster spanning the entire value chain. The government made HDD a priority industry and provided incentives like one extra year of tax exemption for HDD manufacturing companies for investing in R&D centres which further accelerated technological advancements. Universities and companies collaborated to develop an effective labour force for the industry, with companies investing in laboratories and R&D centres at universities. Between 2001 and 2005, value addition by Thailand’s HDD industry had risen from 30% to 45%, while the number of HDD supporting industries had grown by 20%. Thailand’s share of the global production of hard disk drives in-

Exhibit 6j. Thailand's government policies played critical role in development of HDD industry

Thailand's HDD cluster spans full production value chain...



... with close cooperation between government, industry and universities

Firm cooperation

- Leading HDD firms formed IDEMA Thailand to promote HDD domestic cluster development

Government cooperation

- Coordination between IDEMA and Thai Board of Investment (BOI) makes HDD a "prioritized" industry
- Firms receive tax incentives in return for domestic investment in skills and technology development
 - Eg, one extra year of tax exemption in return for establishing an R&D center within 3 years of operation¹

Educational cooperation

- Universities and companies coordinated to develop an educated and efficient labor force

- Thailand became largest global exporter of HDD
- Thai HDD value add has risen from 30% to 45%
- Thai HDD supporting industries grew by 20%

Sources: IDEMA Thailand, The Roles of Intermediaries in Clusters by Patarapong Intarakumnerd, ITC development in Thailand.

¹Among other incentives and requirements as part of package.

creased from 10% to 33% making Thailand the world's largest HDD exporter¹¹.

Successful Offset Policies

Many countries have used 'offset' strategy as a policy lever to build their defence production capabilities. More successful countries have looked beyond their defence industry to have a multiplier effect on the country's manufacturing industry through offset strategy. At the same time many offset programs have failed to meet the stated or unstated objectives and local partners have been used by global defence contractors to 'pass through' so called value addition.

India has embarked on a large scale modernisation of its defence forces and has put in place a stated offset policy to encourage local value addition. BCG has studied successful offset policies in different countries and has summarised 10 best practices shown in Exhibit 6k. There are two best practices that merit emphasis. First, most successful offset programs have clearly articulated objectives and very active government support to achieve these objectives. For example, if one of the objectives is to have a multiplier effect on the country's economy, the incentive

system for the defence contractor in form of credit for different elements of capability development in the country is designed in such a way to make this happen and this is monitored closely. For example, in one programme the defence contractor was awarded multipliers for R&D, investment and targeting SMEs as partners. Another interesting innovation in the offset policy has been implemented by South Africa which separated the strategy/advisory and monitoring of impact on the country's economy from the executing of each offset contract. While the latter team is part of the Ministry of Defence, the former is part of the Ministry of Trade Industry.

Clearly, closer alignment between the different stakeholders both within the government and outside is critical to get the maximum benefit for the economy from such programmes.

Developing the machine tools industry

A strong machine tool industry is a critical building block for India to achieve its aspirations for the manufacturing sector. As mentioned earlier, Indian machine tools indus-

11. IDEMA Thailand.

Exhibit 6k. Top ten elements of World Class Offset Programs

Element	Description
1 Gov. Procurement/Ministry support	- Alignment with governing department (Gov. Procurement) on mandates, projects and performance targets - Time and resource allocation for policy review and approval of key decisions (eg, Projects)
2 Clear and achievable mandate	- Specific performance targets (eg, Create 10,000 jobs, develop 5 R&D aerospace technology companies) - Alignment of mandate with nation's capabilities
3 Relationships with defense contractors	- Efficient working arrangement with defense contractor to launch projects - Communication with defense contractor for insight on capabilities including potential projects
4 Market scanning and synergy creation	- Understanding of nation's value proposition (eg, Access to raw materials, efficient logistics, etc) - Targeted channeling of defense contractors to local companies to form successful ventures
5 Sector expertise	- Databank on sector financial performance, organizational metrics, and other benchmarks - Experts on specific sector trends and analysis
6 Efficient project incubation	- Targeted deal generation and deal qualification pipeline - Experienced team to support company formation and monitoring
7 Transparent mechanisms	- Documented and simple-to-follow mechanisms for proposal evaluation, crediting, etc - Consistent for each contractor and purchaser
8 Dynamic policies	- Constant review and update of Offset policies (eg, Multipliers, penalties, etc) based on evolving mandate - Customizations for special situations (eg, High multipliers for desired technology)
9 Analytics for decision making	- Robust analytics (valuation, industry analysis, portfolio evaluation, etc) to evaluate new ventures - Experts to drive decision analysis (eg, Portfolio optimization)
10 Monitoring systems	- Processes to enable frequent auditing of defense contractor obligation fulfillment - Defined format (templates) and criteria for performance measurement

try is heavily reliant on imports – over 80% of India's current machine tools requirements were imported in 2009, up from 40% in 2002. Current policy framework in terms of zero import duty structure without matching incentives for domestic players has incentivised imports and worked against deepening capabilities in the Indian industry.

Many countries have recognized the importance and multiplier effect of this industry and have implemented different levers to develop and strengthen their machine tools industry. Some of these levers are described below:

- ♦ *Strong government focus:* Machine tools have been identified as a key priority for China with a well defined goal in the 11th 5 Year Plan: "To develop advanced technology, high precision machines and reduce dependence on imports by 2010".
- ♦ *Preferential market access:* The US and UK drive machine tool and manufacturing technology through defense contracts and government grants for development of advanced technologies.

- ♦ *Preferential access to capital:* Taiwan and Korea offer concessional interest rates (5–6%) for machine tools development.
- ♦ *Fiscal incentives:* Taiwan, Korea have supported several fiscal measures including incentives for local machine purchase, tax holidays for 5–7 yrs and export incentives etc.
- ♦ *R&D institutes:* Germany has 7 R&D institutions exclusively dedicated to production technology. The Chinese government has also set up several R&D centres for machine tools and manufacturing technology.
- ♦ *Overseas acquisition/investment:* Chinese government has enabled the acquisition of several reputed machine tool companies in Germany as a strategy to acquire critical technologies.

Building a strong and globally competitive Indian machine tool industry will require a combination of these different levers and a duty structure which creates a 'level playing field' for both imports and domestic players. Technology parks which are focused on developing

and manufacturing cutting edge manufacturing technologies could be an important element in this national endeavor.

India Needs to Define Clear Policy Agenda Around the Issue of Building Depth

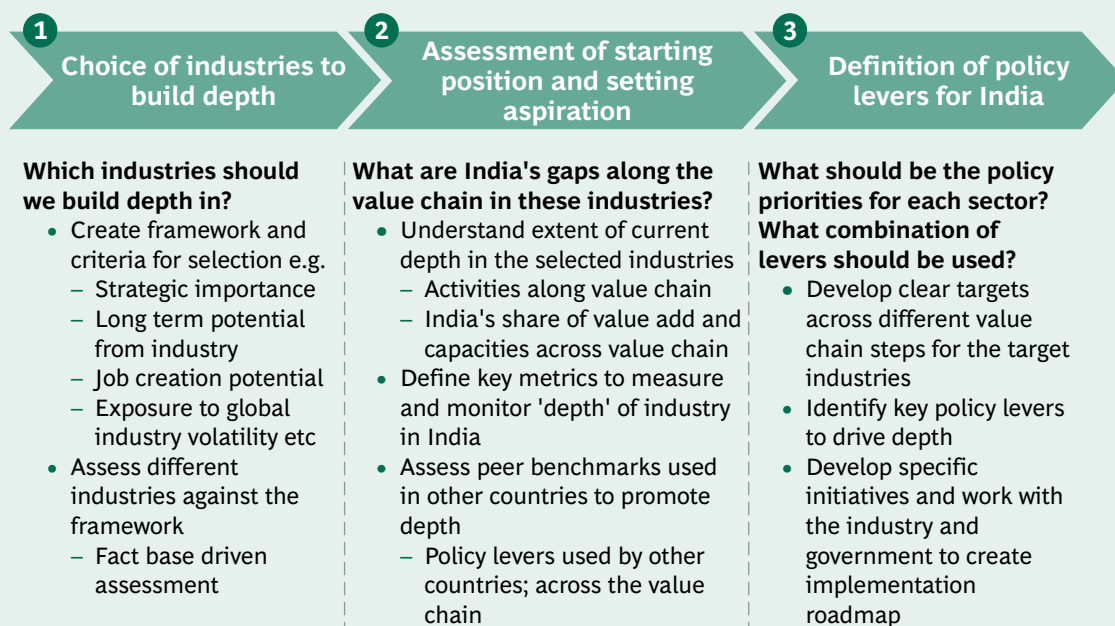
We saw that the starting position in many Indian industries ranging from defence production to core infrastructural sectors like railways to hi-tech sectors is weak in terms of depth of capability and local value-addition. If India wants to build leadership position in select industries, it will require a concerted policy agenda specific to the target industry. We present a framework on how the Indian policy makers can develop a differentiated policy to build depth (as shown in Exhibit 6I):

- ◇ The nation's "building blocks"—infrastructure, capital goods, machine tools, etc require focused efforts and large investments to build technical expertise and manufacturing capabilities and should get special focus.
- ◇ India has already begun to build to scale in many consumer led industries. The focus here should be to fa-

cilitate these industries to continue to rapidly build scale to drive down costs, and at the same time, proactively "learn" and transfer knowledge from the more developed markets.

- ◇ Over the next few decades, many new/emerging technologies will grow very rapidly. This gives India an opportunity to position itself as an early mover and possibly global leader. It requires careful assessment to identify the right emerging technologies where India can display advantage. These technologies will require support through earmarked "innovation" funds, open experimentation and active teaming and investment in research institutes to gain early mover advantage.
- ◇ India will need focused investment to build capabilities in manufacturing defense equipment. Articulation of clear objectives for the offset program, not just for defence industry but also for the economy as a whole and effective implementation will be important levers to build the defence equipment industry and thereby maximise the multiplier effect on the country's manufacturing sector.

Exhibit 6I. Policy Framework: Building strategic depth



Since India's economy was liberalised, its industrial policy has moved away from direct intervention in terms of mandating ownership or technology transfer or local value addition. It has also moved at towards creating a level playing field irrespective of ownership. Any incentive like accelerated depreciation or R&D support has been individual issue based and limited in scope. A comprehensive and integrated policy intervention to build depth at this stage of India's industrial development will be a controversial topic and will generate a lot of debate among the different stakeholders within and outside the government. The benefits to the country will be well worth the debate.

Labour Policy for Manufacturing Industry

Driving Consistent Labour Policies Important for Manufacturing Growth

A productive, effective and engaged labour force is critical to support manufacturing growth in any economy, particularly so in India. India's low labour costs have been a key source of competitive advantage over the last decade and will continue to be important going forward. Most industry observers say that the current labour policy framework introduces rigidity in the labour market, encouraging use of widespread informal work forces and there by disincentivising skill development. If we have to achieve the growth aspirations laid out in the earlier chapters, Indian manufacturing will need to focus on three imperatives as regards its labour force:

1. Rapidly increase employment and mobility opportunities for people joining the workforce.
2. Improve productivity and flexibility to enhance competitiveness.
3. Have a robust policy framework to protect worker rights.

Driving Employment in Manufacturing Sector.

Despite recent growth, India's manufacturing sector is estimated to employ only 12% of the country's total work force. Over the next decade, nearly 80 million people will join the workforce and a large proportion will need to find employment opportunities. Through faster growth,

the manufacturing sector can play an important role in creating employment for this growing workforce. Our estimates suggest that for every additional 1% point growth in manufacturing 20–30 million additional jobs can be created¹².

Two aspects are to be considered in this regard:

- ♦ *On the demand side, which industries will drive employment?* Labour requirements vary significantly by industry. Hence focus on labour-intensive industries like textiles, paper and wood products, and food-processing can generate faster employment. These industries contribute 30% of manufacturing output but constitute over 60% of the manufacturing workforce¹³. For every 1% point growth in labour intensive industries, ~15–25 million additional jobs can be created.
- ♦ *On the supply side, which states will generate surplus, employable manpower?* Demographic projections indicate that five states (Uttar Pradesh, Maharashtra, Bihar, Madhya Pradesh, Rajasthan and West Bengal) will account for ~65% of the additional workforce in the next decade¹⁴. Other than Maharashtra and (to a lesser extent) Uttar Pradesh, none of these states are currently among the top contributors to manufacturing employment. Focused efforts to build labour intensive industries in these states can go a long way in addressing this skew and creating employment opportunities.

Driving Productivity and Flexibility

India's productivity adjusted labour rates are among the lowest across RDEs. The challenge will be to maintain this competitive advantage in the face of increasing wage rates (particularly for organised labour in industrial pockets), and faster productivity growth in other RDEs. Secondly, as we increase our share of the global manufacturing trade, we will need to build greater flexibility to deal with the volatility and seasonality of global markets. Finally, a significant part of the growing workforce who join the manufacturing sector will come from the migration of agricultural workers who are to be trained to improve their pro-

12. BCG analysis.

13. CSO, BCG analysis.

14. BCG analysis.

ductivity. As RDEs competing with India for global customers rapidly improve their workforce productivity, India could lose its factor cost advantage unless we rapidly improve the labour productivity of our manufacturing sector on one hand and become much more flexible to address the increasing volatility and seasonality in demand. This is further accentuated as a significant part of our workforce continues to be seasonal, going back to their villages during sowing and harvesting seasons.

The productivity and flexibility imperative has implications for the training and skill development infrastructure as discussed in earlier chapters. Solutions may have to be thought of in terms of specific industries as different industries face very different challenges on this front. For example, textile industry has high seasonality of labour requirements. It is important for the industry to develop structures to effectively hire and utilise workers during this period and possibly across seasons to drive higher productivity, at the same time ensuring sufficient compensation and adequate living conditions for them during the seasonal period.

At the same time, companies should not be penalised for technology upgradation. As discussed in earlier chapters, technology improvement will be a critical lever in improving productivity and competitiveness, yet it will often lead to workforce reductions. While greenfield expansions receive several fiscal incentives existing facilities grapple with expensive and long-drawn processes for any workforce reduction. Policy initiatives need to bring together all stakeholders to create a level-playing field for existing manufacturing facilities and encourage technology upgradation to meet India's productivity challenge.

Robust Policy Framework to Protect Worker Rights

Indian industry has enjoyed strong labour relations for almost two decades now, but recent spate of strikes and worker agitation in the manufacturing sector across the country and covering different industries is a strong indicator of growing unrest amongst the workforce. Indian workers have not reaped proportional benefits from the overall economic growth in India over the last two decades—manufacturing wage rates in India have grown slower than the overall increase in household income in the country. At the same time, the modern Indian worker is more aware of the world around him, expects more

and has higher aspirations. The nature of dispute is varied—in addition to greater compensation workers are demanding union recognition, reacting to productivity demands and expressing concerns over outsourcing and growth of contract labour. Part of the recent wave of unrest is among contractual and temporary workers who have burgeoned in numbers as companies have used them to get around the perceived rigidity in labour laws. These temporary and casual workers lack recourse to legal redressal in industrial and labour courts and now want to change this situation.

At the same time, existing labour laws are seen as outmoded and many experts claim that they have adversely impacted labour productivity by discouraging large-scale operations and encouraging use of less productive informal workers. Manufacturing firms have been reluctant to set up large scale plants with several thousand workers in labour-intensive industries like textile, leather, jewelry, electronics and other assemblies despite better economies of scale. They often set up several small plants instead of a single large one. They also find it easier to employ large numbers of contract workers. In fact, the formal Indian manufacturing sector employs only ~2% of the total workforce¹⁵—over five times this number being made up for through contract workers. This limits overall productivity, their flexibility to meet seasonal variations in demand as well as restricts the economies of scale and investment. For example, a typical Indian textile and clothing plant is one-fifth the size of a typical Chinese textile plant—a huge disadvantage in terms of economies of scale which has direct bearing on labour productivity and global competitiveness.

Several Policy Levers are Available

As was mentioned at the start of this discussion, India needs to put in place a robust policy framework which on one hand supports building scale, promotes higher productivity and greater flexibility, and on the other protects worker rights. Many RDEs have been faced with similar policy dilemmas. The example of Brazil could be instructive for Indian policy makers to look at. Like most RDEs, Brazil suffered from similar issues like outmoded labour laws that discouraged workforce upgradation, encouraged informal worker contracts and constrained growth of scale and productivity. In recent years, Brazil

15. BCG analysis.

has taken several steps to develop its labour market policies to (as shown in Exhibit 6m) balance the need for growth and productivity with worker rights.

Driving employment. The Brazil government undertook two main initiatives to drive employment:

1. Focused impetus for small and medium enterprises that can be strong drivers of employment generation.
2. Creation of an employment service for more efficient demand–supply matching.

Under the Program for Creation of Employment and Income (PROGER) in 1994, credit was extended to micro and small enterprises, cooperatives and production initiatives in the informal sector. The government also created a public unemployment service, Sistema Nacional de Empleo (SINE), where unemployed workers were able to get information on potential opportunities and companies could efficiently access large pools of surplus labour.

Improving flexibility and productivity. Like in other RDEs, improving labour productivity and managing flexi-

bility has been an important challenge in Brazil. The government initiated the National Plan for Professional Formation in 1995 to increase labour productivity, training 11 million workers between 1990 and 2001.

Protecting worker rights. To protect worker rights, workers were given access to unemployment insurance and cash transfer programs as a safety net between jobs instead of discouraging additional employment. At the same time, companies were mandated to provide non-cash benefits to workers that involved maintaining superior working conditions and providing active training.

The issues on labour policy are well known and so are the policy measures listed above. India needs a much higher level of formal employment as its workforce grows rapidly. The manufacturing sector will necessarily have to play a key role in this. There are many labour policy levers that can be implemented quickly like simplification of labour laws, worker training and effective employment exchanges while other policy measures will have to be debated among all stakeholders and aligned and consensus arrived at. However, there needs to be a recognition and acknowledgement that unless India can

Exhibit 6m. Steps taken by Brazilian government to improve labour market policies

	Policy initiative	Description	Outcome
Driving employment	Micro credit programs	Program for the Creation of Employment and Income (PROGER) established in 1994 to extend credit to micro enterprises and small enterprises, cooperatives, and production initiatives in the informal sector	~2.8 million loans offered with an average credit of R\$9,000 in 2006
	Public employment service	Sistema Nacional de Empleo (SINE), created to provide guidance to unemployed workers and find employment opportunities	Over 5 million workers registered at SINE since 2002
Improving productivity	Training program	1995 National Plan for Professional Formation (PLANFOR) sought to increase labor productivity and set the goal of training 20 % of the country's economically active population	11 million workers were trained between 1990 and 2001
Maintaining worker rights	Cash transfer programs	Established in 2003 to serve as a safety net for workers from poor families	Over 11 million families received benefits in 2006
	Unemployment insurance	To provide benefits for three to five months to registered workers who meet minimum contribution requirements	5.3 million workers received average benefit of R\$389 (~1.36 times minimum wage) for 4.2 months, in 2005

Source: 2009 Carnegie Endowment for International Peace and International Labour Organization.

implement a comprehensive policy framework (as shown in Exhibit 6n) that modernises its labour laws to balance the protection of worker rights with scale and productivity/flexibility. Without this it would be difficult to meet the aspirational growth targets for the manufacturing sector and drive employment.

Driving The Right ‘Industrial Structure’ for India

Setting the Context for the Right ‘Industrial Structure’ for India

The final theme that we want to explore in this chapter on policy imperatives is the right ‘industrial structure’ for India. Over the last few decades, India’s pattern of manufacturing growth has been uneven and concentrated in select pockets. We have also seen different policy initiatives on SMEs with varying degree of success and the conclusion seem to be that reservation for SMEs is a failed policy in today’s globalising world and large scale is the need of the hour in many industries like textile which were reserved for SMEs. On the other hand, in recent years, setting up of mega-scale greenfield industrial projects has faced major problems on account of

land acquisition to displacement of families in different states—seemingly a manifestation of the lack of ‘ownership’ by the local people of these projects, which in theory should have been welcomed as they would have led to improvement of the local economy.

India needs to build scale and productivity to compete globally. But at the same time we face issues like geographically concentrated industrial development leading to under-penetration in several states, ineffective growth of SMEs which are employment drivers, and lack of alignment of all stakeholders in industrial development leading to issues such as challenges in land acquisition. What should be the future ‘industrial structures’ which will work in India and meet the seemingly diverse set of objectives?

Geographically Dispersed Industrial Development

Industrial development is currently concentrated in few cities and clusters, and several states remain under-penetrated. Seven states alone—Tamil Nadu, Maharashtra, Andhra Pradesh, Gujarat, Uttar Pradesh, Punjab and Karnataka—account for ~70% of all factories, employ-

Exhibit 6n. Policy framework: Labour policy for manufacturing

	Driving employment	Improving productivity& flexibility	Maintainin worker rights
Where to focus?	- Target industries and states for employment generation - Growth potential, labour intensity, job creation potential... - Surplus labour availability by state, employability levels...	- Industries to improve labour productivity and flexibility - Labour intensity and productivity, export potential, peer benchmarks - Demand and production seasonality...	- Size of enterprise and labour segments for focus - Labour intensity, worker satisfaction levels...
Set aspiration; Identify gaps	- Set employment targets by industry and state - Current constraints—training facilities, tax incentives, information asymmetry...	- Set measurement metrics and productivity targets by industry - Current constraints—size of enterprise, skill levels, moving workforce...	- Set measurement metrics and worker benefit targets - Current issues—recent instances of worker unrest, sources of dissatisfaction...
Define policy levers	- Peer benchmarks—labour policies used and their experience - Identify policy levers and develop specific initiatives	- Peer benchmarks—policies used and their experience - Identify policy levers for India and develop specific initiatives	- Peer benchmarks - List monetary and non-monetary support - Identify policy levers and develop specific initiatives

ment and capital invested in manufacturing¹⁶. Currently only 29% of India's population lives in urban areas, and 41 cities have a population of over 1 million¹⁷. Given India's geographic spread and diversity, we strongly need to widen the scope of our industrial development. India likely requires at least 30–40 new and geographically dispersed urban cities by 2025 and not simply SEZs.

Concerted efforts required to build new centres.

Huge investments in urban infrastructure will be needed to manage this dispersed urbanisation. This would require creation of newer demand centres, with strong growth in infrastructure requirements in four areas: shelter, utilities, transportation and communication. Given the constraints on natural resources, these centres would perhaps need to develop new urbanisation models which will impact the way we live and work, travel and consume. A comprehensive plan will be needed to create these urban centers and carefully design the role of the manufacturing sector within them. Explicit policy efforts across all areas—export impetus, creating industry depth and labour rights—will need to be made in this regard. This is also critical from the perspective of ensuring that existing urban centres in India do not start buckling under the load of huge population migrating to them.

Balancing Small and Large Enterprises

Both small and large enterprises have important roles to play in the economic development. Small and medium enterprises (SMEs), if used effectively, can be important drivers of both employment and innovation within an industry. For example, in the US, small firms have been rapidly increasing R&D spend from 4% of total spend in 1981 to 24% in 2005 compared to larger firms which saw a fall in their R&D spend from 71% to 38% in the same period¹⁸. In India, SMEs account for 45% of manufacturing output, 40% of total exports and employ 42 million people (~70% of the total manufacturing workforce)¹⁹. At the same time, it is well recognised that larger enterprises are key to driving scale and cost advantages. The challenge is to identify a way to combine the higher innovation and employment generation potential in smaller firms with the scale benefits associated with larger organisations.

SMEs in India currently suffer on account of sub-optimal scale of operation and technological obsolescence. They lack the infrastructure and funding to support product development and technology upgradation. They also

find it difficult to attract high quality talent—being unable to match the wage rate, job security and career development opportunities available in larger organisations. For example, most are unable to hire high quality IT talent. Government initiatives to support SME growth and technology upgradation have seen limited success suffering from low awareness and ineffective adoption and utilisation.

‘Clusters’ as an industrial structure. Clusters are an industrial structure which has many small and large companies working together in an ecosystem with distinct roles for each type of enterprise. Well developed clusters can lead to significant cost savings as well as productivity increases because of multiple reasons:

1. Increased supply chain responsiveness because of manufacturing consolidation near suppliers.
2. Decreased time-to-market as companies can more effectively leverage the capabilities available with vendors in the cluster.
3. Better and cost effective availability of labour and also reduced talent recruiting efforts because of the power of clusters in drawing labour.
4. Lower logistics costs due to proximity of customers and/or suppliers etc.

In the section on building ‘depth’ we had discussed clusters in China and Thailand being used as key policy levers by the government. Not just building depth, China has leveraged clusters effectively to drive its manufacturing growth.

The cluster approach has also been used in India across a range of sectors with varying level of success, with auto components being seen by many as a success story. The government and industry need to think through how clusters could be leveraged to promote an optimal mix of large and small enterprises, combining the benefits of both types of enterprises.

16. ASI.

17. Census of India.

18. US National Science foundation, 2006.

19. Ministry of Micro, Small and Medium enterprise, Government of India.

Balancing Value Across Stakeholders

Equitable value sharing across all stakeholders is important for sustainable development. Value generation from India's recent manufacturing growth has been constrained to individual enterprises—workers for example have not seen commensurate growth in wages. Similarly, land owners have complained of being unfairly treated in the acquisition process and locals have agitated for greater share of jobs created.

Land acquisition for example, is one of the biggest roadblocks to industrial growth in India. Though land rates in India are competitive with other RDEs, effective cost becomes much higher due to delays in land acquisition and dispute settlements. Several issues arise from disputes in procurement of small parcels of land with individuals feeling inappropriately compensated for their assets. New ideas on how to give the land owners a stake in the development can help address these challenges.

Cooperative structures could present interesting options. An alternative cooperative structure with smaller cooperatives/enterprises connected to large enterprises rather than merely selling at market prices can be one

possible solution. The Mondragon Cooperatives of Spain (MCC) is a good example to follow. It is one of the best business-based socio-economic initiatives and led to the creation and preservation of manufacturing jobs via education, technology development and cooperative organisation with a worker-centered model. The workers are empowered with equal voting rights (1 vote per person) and the profits/losses are shared equitably among all members. This system of distributing profits to its employee owners strengthens the co-operatives as a group and increases the long-term viability of the individual employee-owned company. As of 2008, MCC had sales of US\$ 21 bn with 103,700 employees across 264 cooperatives and subsidiaries²⁰.

Building the Right Industrial Structures for India

The discussion in this theme has taken a very different shift in thinking about the right industrial structures for the Indian manufacturing sector. The different elements mentioned have typically been dealt as a stand alone policy area by the government. We suggest that there is

20. Company data.

Exhibit 6o. Policy framework: New industrial structure for India

	Geographic spread	Size of enterprise	Value for all stakeholder
Where to focus?	- Target states and urban centres - Industrial output - Resource availability and surplus workforce - Proximity to ports ...	- Target balance of small and large enterprises. How will this vary by industry? - Identify threshold scale and investment by industry - Establish role for each segment	- Identify gaps in value sharing - List stakeholders - Current value split - List areas of dispute – e.g. land acquisition, worker rights etc.
Set aspiration; Identify gaps	- Set aspiration by state and urban centre - Assess constraints to growth—infrastructure, funding, fiscal incentives, workforce employability etc.	- Set metrics and aspirations for size by industry - Identify constraints –funding, access to technology, speed of execution, access to talent etc.	- Set metrics and aspirations for each issue - Examine constraints – transaction costs, lack judicial recourse for contract adherence...
Define policy levers	- Assess peer benchmarks on successful policies and models - Identify policy levers and develop specific initiatives	- Peer benchmarks - driving scale; supporting SMEs - Identify policy levers and develop specific initiatives	- Explore peer benchmarks - Identify policy levers and develop specific initiatives

strong logic to bring these different elements together and see this not as individual policy areas but a bigger system design of new age industrial structures, which combine the benefits of clusters for increased efficiency and competitive advantage with cooperative ownership for more equitable value distribution across large number of stakeholders who may be operating small businesses. This structure, if implemented efficiently would create high employment in an ecosystem that operates like a large enterprise and its attendant benefits.

To support this, Exhibit 6o proposes a comprehensive framework to develop such a full system view for any policy formulation on this topic.

Way Ahead: Defining a Comprehensive Policy Agenda for Indian Manufacturing

In this chapter, we have identified and described the four critical themes for formulation of policy to accelerate the

growth of India's manufacturing sector. For each theme, we have established the logic for these priorities and provided some initial ideas. Careful assessment and design will be required to examine each of these areas in depth and develop a policy plan and get alignment and consensus among all stakeholders.

We suggest that CII should constitute four cross-stakeholder teams to examine the themes and develop a more detailed perspective of the trade-offs and suggest different policy prescriptions to the government. These teams could include representations across industry, government, the CII and specific industry bodies. The CII should play the role of the orchestrator, develop a focused mandate, facilitate the discussions and alignment between the different members and summarise the final set of recommendations which can then be handed to the government for its consideration.



A Call to Action

Indian manufacturing is at an important crossroad today. In the last decade (1998–2008), the sector was one of the best performing manufacturing economies across the globe. Yet contribution to the overall GDP was one of the lowest across major RDEs—signaling strong potential for faster growth.

What should be the aspiration for India's manufacturing sector? Over the next decade, the performance of The Indian manufacturing will be crucial to achieving India's overall growth aspirations and employment generation. China has been the best performing manufacturing economy in recent. We should aspire for this position and target a growth of about 11% per annum (versus 6.8% for FY1999–2009) which will make India the fourth largest manufacturing economy in the world by 2025 from its current ranking of 13th.

Achieving these aspirations will not be easy. It will require coordinated efforts to develop necessary enabling infrastructure, capture new avenues for growth and higher labour and capital productivity and shift India's manufacturing competitiveness to the next level—and all together. All these different levers have been summarised in our 'House of Manufacturing' (as shown in Exhibit 1f, Chapter 1).

Government policy and support will clearly have to play a crucial role. We identify four themes where government policy intervention could be critical for meeting the aspirations for the Indian manufacturing sector. These are driving manufacturing exports, balancing the growth of scale with building 'depth' across select industries, developing a robust labour policy for manufacturing which can balance worker rights with the flexibility and productivity imperatives of today's business environment, and creating the right future industrial structures for India given the country's specific issues and challenges. Each of these themes has a set of complex issues embedded within them, which make it challenging to build consensus among all stakeholders. It will therefore be necessary to take a holistic and systemic view to bring in some fresh thinking and alignment between different stakeholders.

Indian manufacturing has the potential to be a driving force in India's economic development over the next two decades. Success will require strong commitment, careful planning and willingness to make bold moves. Governments and industry alike will need to acknowledge the constraints holding back the sector and take joint responsibility for driving this important agenda. This will enable India to enter the next growth orbit and squarely place itself as a leading player on the global manufacturing landscape.

Note to the Reader

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