



The Future Of Manufacturing - *India*

Arvind Goel

Tata AutoComp Systems Ltd. India

December 12, 2012

- Indian Economy
- Indian Manufacturing Sector
- Challenges for the Manufacturing Sector
- Indian Automotive Sector
- Challenges for the Automotive Sector
- Initiatives by Government for the Manufacturing Sector
- Strategy to expand Manufacturing in India
- Conclusion

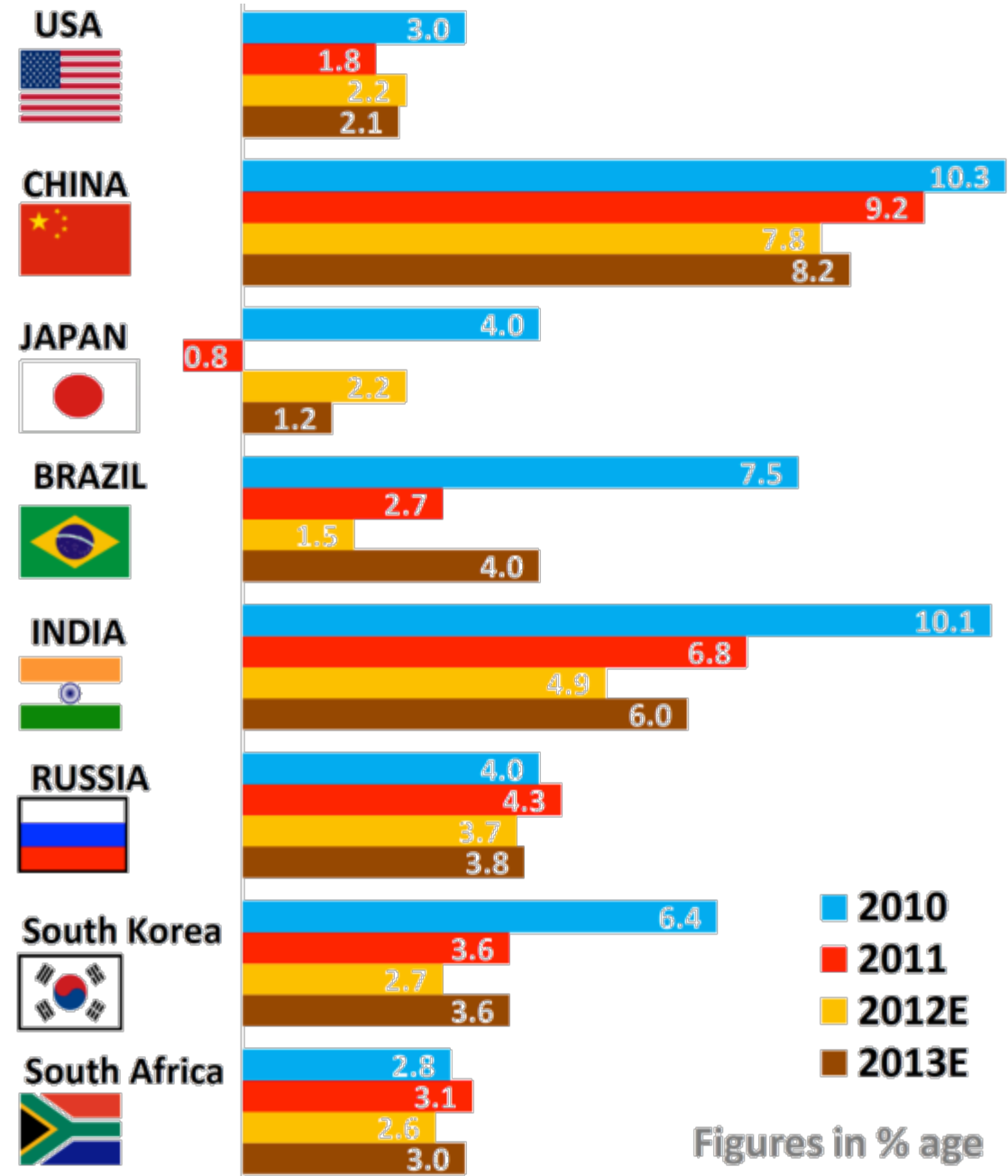
- Indian Economy

International Monetary Fund GDP Growth Forecast:

Improved activity in the US during the second half of 2011 and better policies in the Europe have reduced the threat of a sharp global slowdown.

The Europe is still projected to go into a mild recession in 2012 as a result of the sovereign debt crisis and a general loss of confidence. Will have an impact to an extent to the other linked economies.

Emerging economies will show a stable growth which will be low to medium, except Brazil

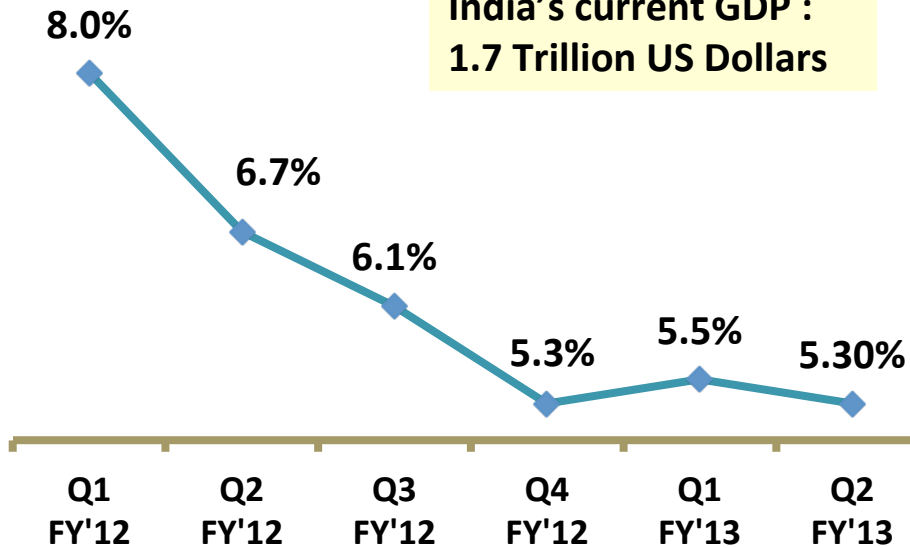


Figures in % age

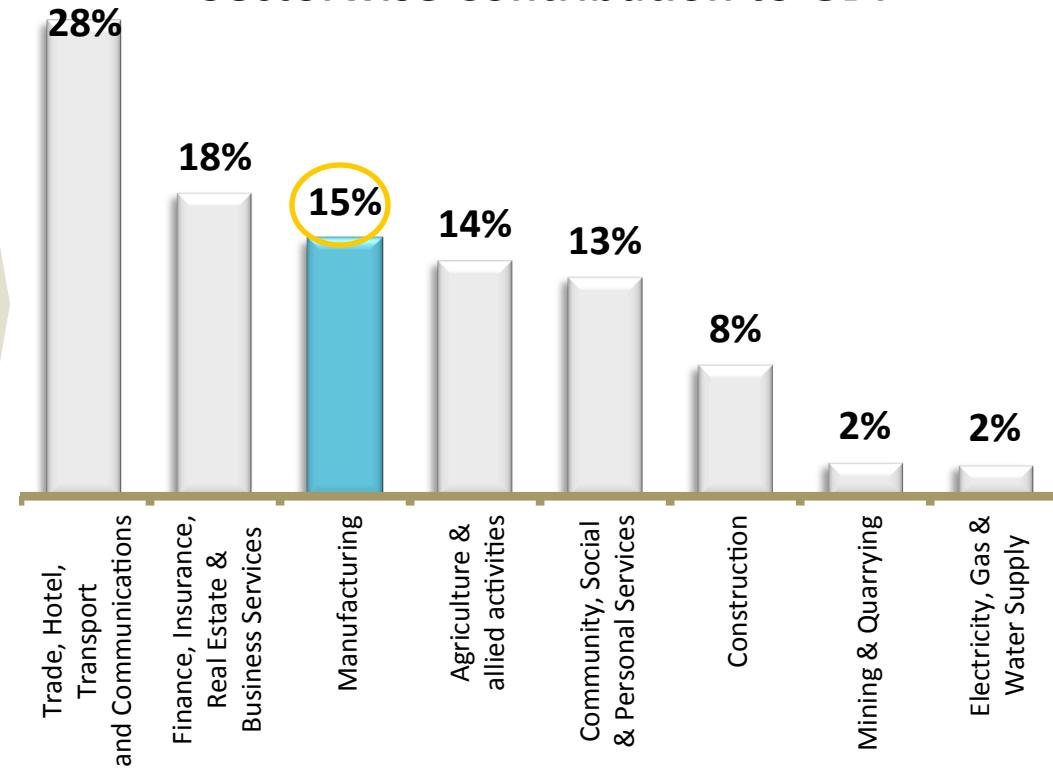
Indian Economic Performance Q2 FY'13:

Quarterly GDP growth trend India

India's current GDP :
1.7 Trillion US Dollars



Sectorwise Contribution to GDP

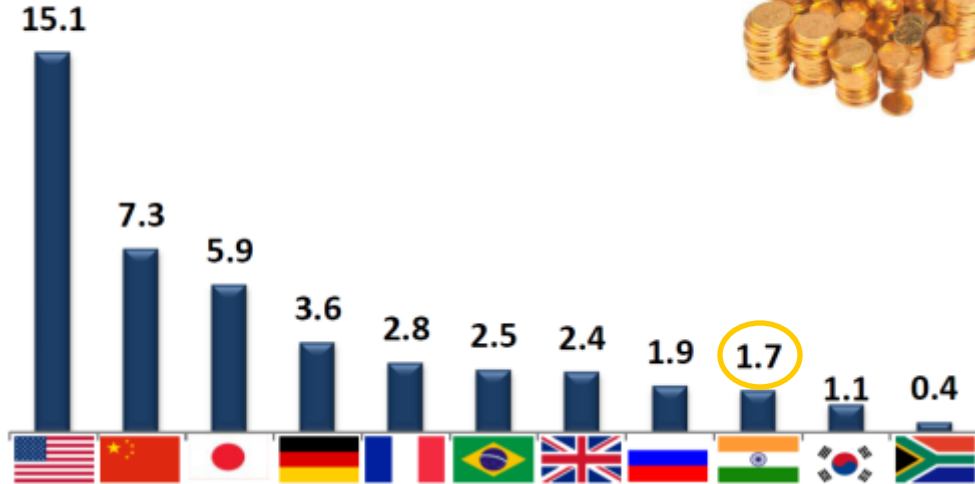


- The GDP growth for India dipped to 5.3% in Q2 2012-13.
- GDP growth of 6.9% in FY 2012-13 predicted in the economic survey of 2012.
- Drop mainly due to dismal performance by farm & manufacturing sectors.
- Recent government reform include allowing FDI in multi brand retail, aviation and broadcasting, hiking diesel prices and putting a cap on LPG subsidy

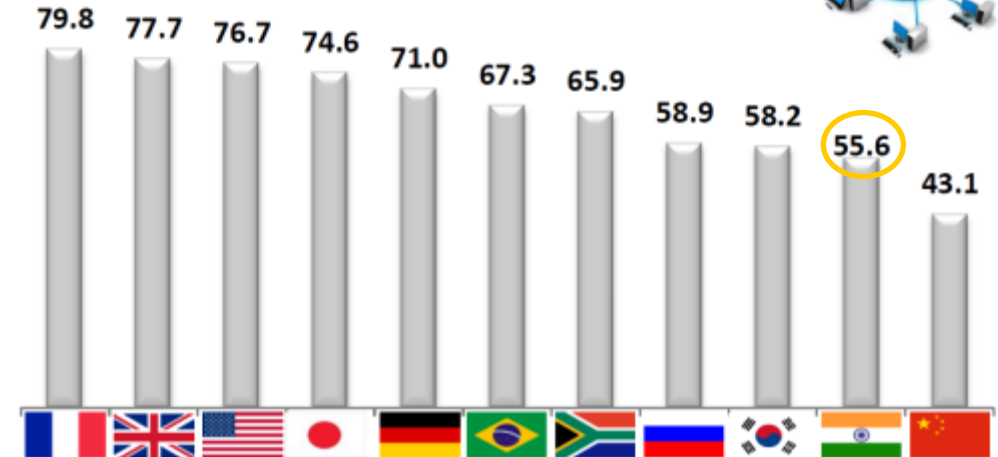
Economic Performance: Comparative

Agriculture contribution in GDP is still high, Industry is medium, Services are fast catching up

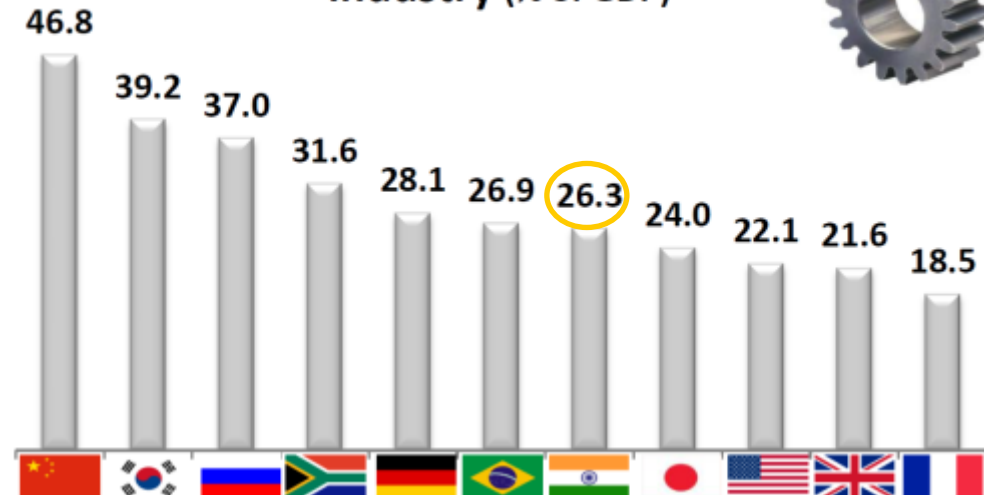
GDP in Trillion USD



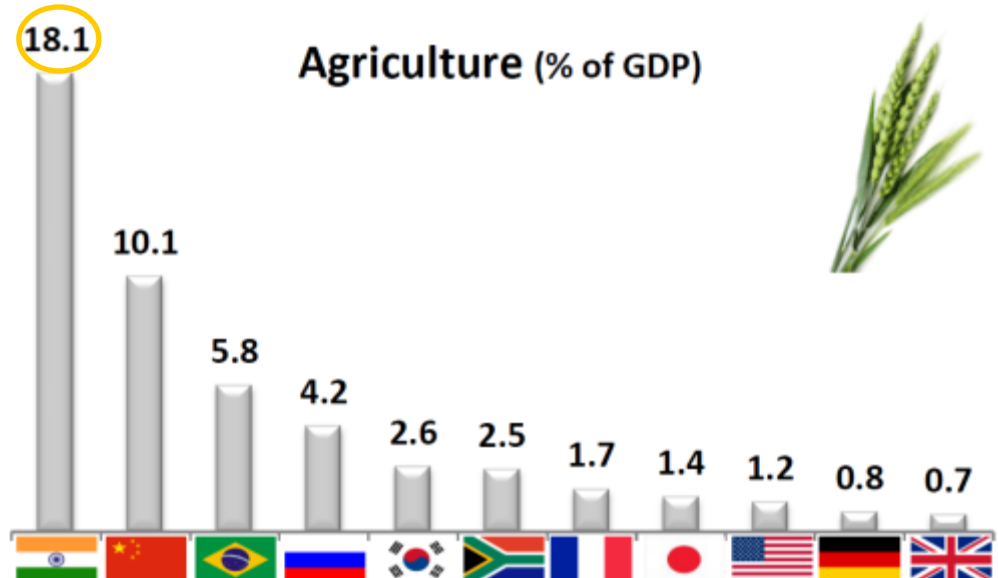
Service (% of GDP)



Industry (% of GDP)



Agriculture (% of GDP)



Forces shaping the Future India

1. Aspirations of citizens:

- Changing aspirations of “Marginalized” Communities, Middle Class & Youth.
- Increasing demand for Human Rights.

2. Demographics:

- Distribution within India (Age/Regional Distribution).
- Vis-à-vis rest of the world.

3. Impatience & Protest:

- Restive Populations, Protest movements.
- Increased violence.

4. Democracy & its Institutions:

- Growing lack of Trust in Government, Big Corporations & (even) Judiciary.
- Challenges in Democratic Politics.

5. Availability of Earth’s Resources:

- Lowering water table & drying up of water bodies.
- Depletion & wastage of traditional sources of energy.
- Conflicts in land use & depleting forest cover.
- Distorted priorities in food production & inefficient supply chains.

2011 Census: 59% of Indian households have a mobile phone, but only 47% have a toilet on the premises.

It is expected that in 2020, the average age of an Indian will be 29 years, compared to 37 for China & 48 for Japan.

Left-Wing Extremism currently affects 182 out of 640 districts in India, with 83 seriously affected.

The 2012 Edelman Trust Survey: Globally trust declined in govt. from 52% to 43% & in business from 56% to 53%.

Recent Indian anti-corruption movement started in the aftermath of CWG & Adarsh Housing scandals, among the “Top Ten New Stories of 2011” by TIME magazine.

India has just 1197 m³ of renewable freshwater per capita compared to global average of 6258.

6. Climate Change & Natural Forces:

- Stochastic Events.
- Long-term Climate Change Impacts.

7. Information & Communications Revolution:

- Ubiquity of information, & proliferation of channels for communication like cell phones, 24X7 news, Internet / Social Media, Right To Information.

8. Global & Regional Forces:

- Stability of India's Neighbors & Developed Economies.
- Growth of China.
- Conflicts impacting Oil & Energy Production.
- Imposition of global financial systems (IMF, World Bank)
- Barriers to Trade.
- Global developments & Treaties on Climate, Energy.

9. Threats to National Security:

- Internal violence & terrorism.
- Proliferation of New Threats.

Glaciers in the Himalaya are receding faster than in any other part of the world & at the present rate may disappear by 2035.

India has the highest number of mobile operators (10) & the lowest average call tariffs(Rs.0.50/ min) in the world.

Due to trade embargo, state run Indian oil companies, which are Iran's biggest oil buyers, have cut imports from Iran drastically in 2012

With an estimated annual budget of \$47 B India is the eighth ranked military spender globally. However, with a \$143B defense budget, neighboring China is ranked second after US.

- Indian Manufacturing Sector

Top 15 Global Manufacturers (by share of nominal gross value added)

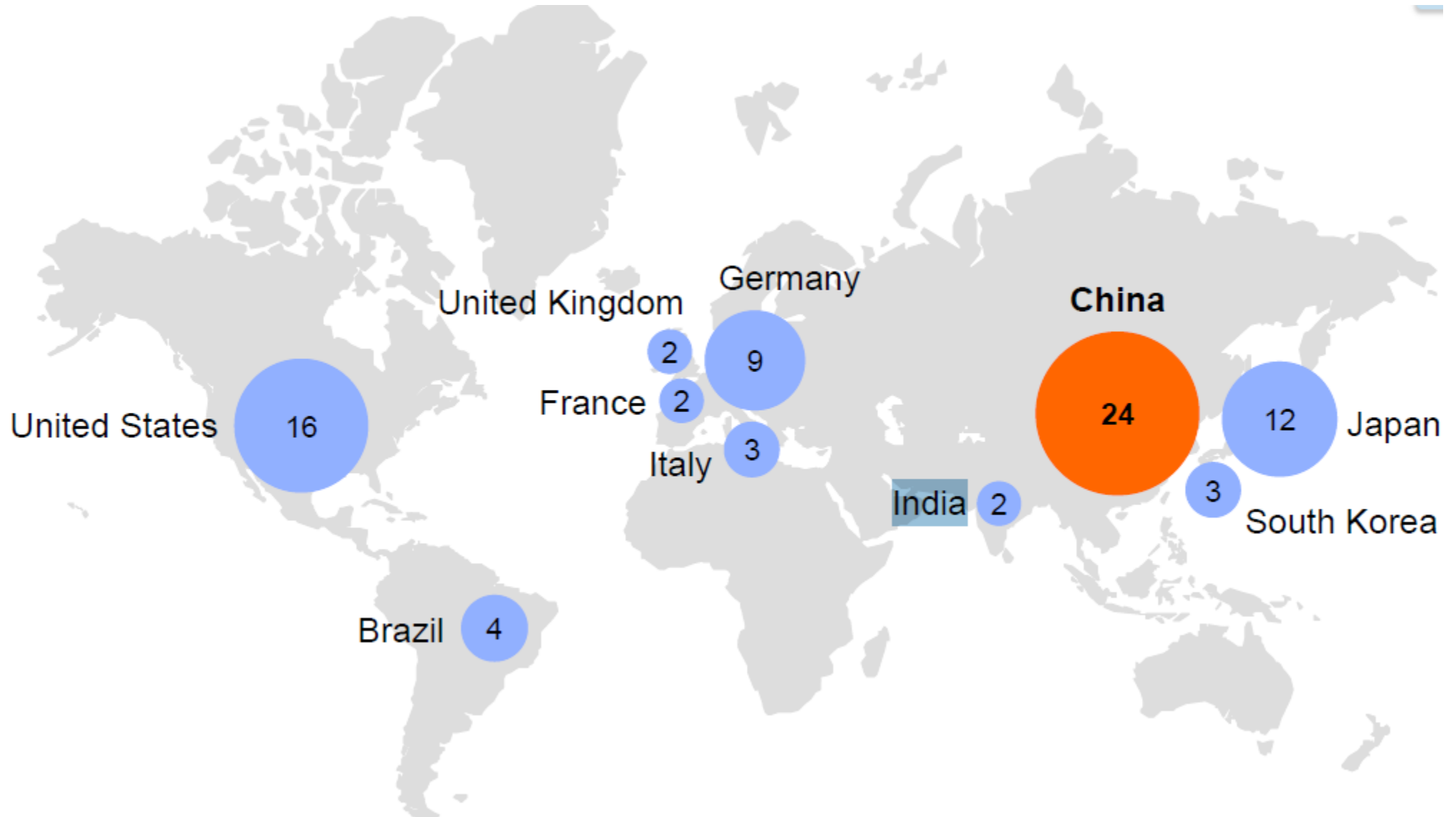
Rank	1980	1990	2000	2010
1	United States	United States	United States	United States
2	Germany	Japan	Japan	China
3	Japan	Germany	Germany	Japan
4	United Kingdom	Italy	China	Germany
5	France	United Kingdom	United Kingdom	Italy
6	Italy	France	Italy	Brazil
7	China	China	France	South Korea
8	Brazil	Brazil	South Korea	France
9	Spain	Spain	Canada	United Kingdom
10	Canada	Canada	Mexico	India
11	Mexico	South Korea ¹	Spain	Russia ²
12	Australia	Mexico	Brazil	Mexico
13	Netherlands	Turkey	Taiwan	Indonesia ² (new entrant)
14	Argentina	India	India	Spain
15	India	Taiwan	Turkey	Canada

Source: McKinsey Global Institute

Top 10 Global Innovator For Local Markets

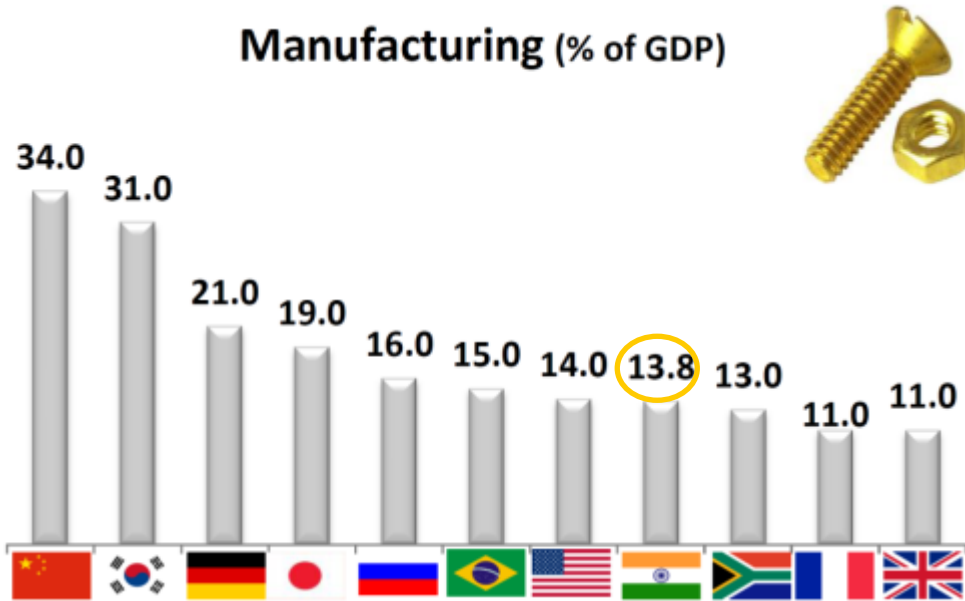
China leads in value added, followed by United States and Japan

(global market share of top ten countries, based on gross value added 2010)

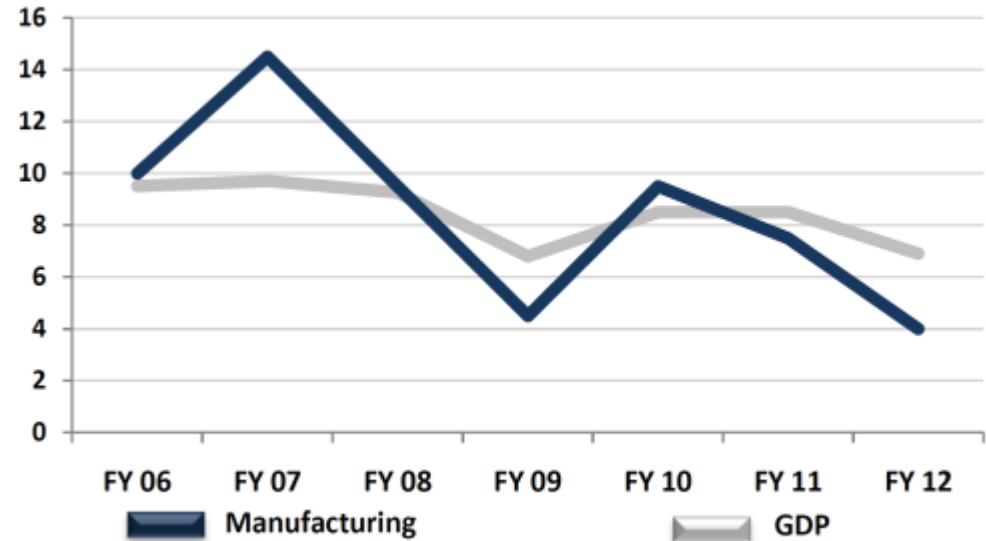


Indian Manufacturing Sector

Manufacturing (% of GDP)

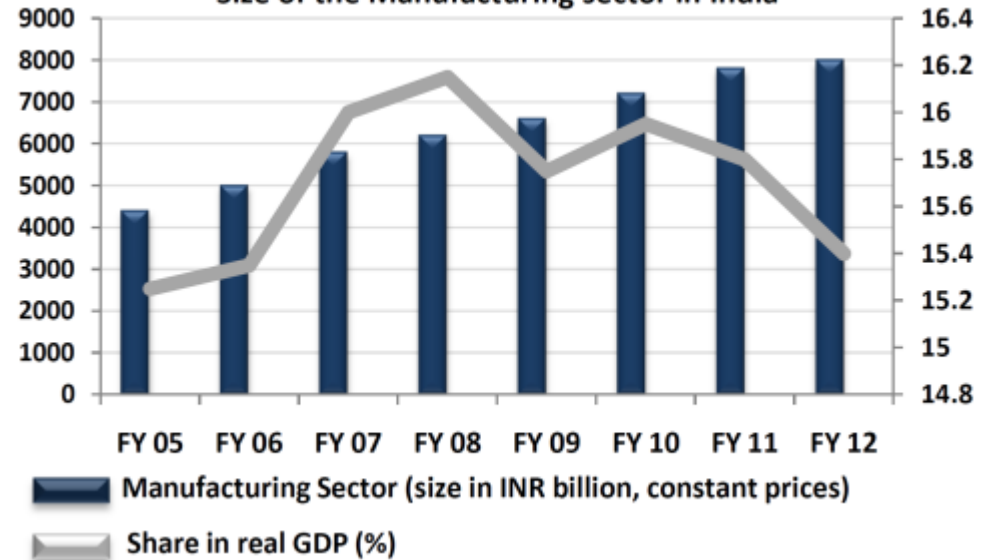


Growth in real GDP & Manufacturing in India (%)



- Indian manufacturing needs lot of catching up
- Manufacturing sector grew by only 0.8% in Q2 2012-13.

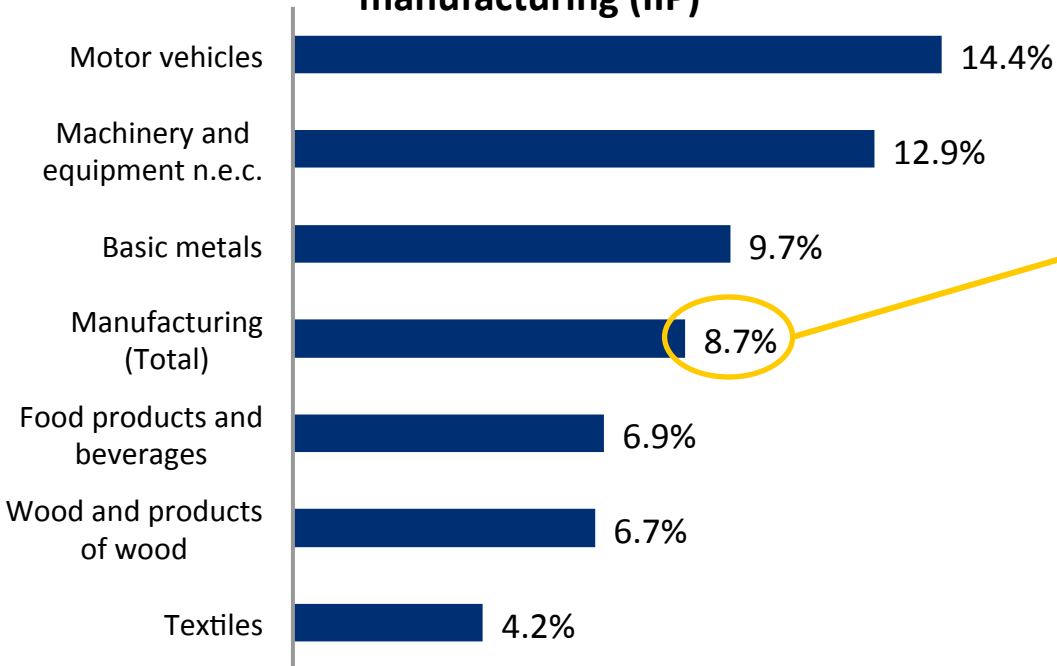
Size of the Manufacturing sector in India



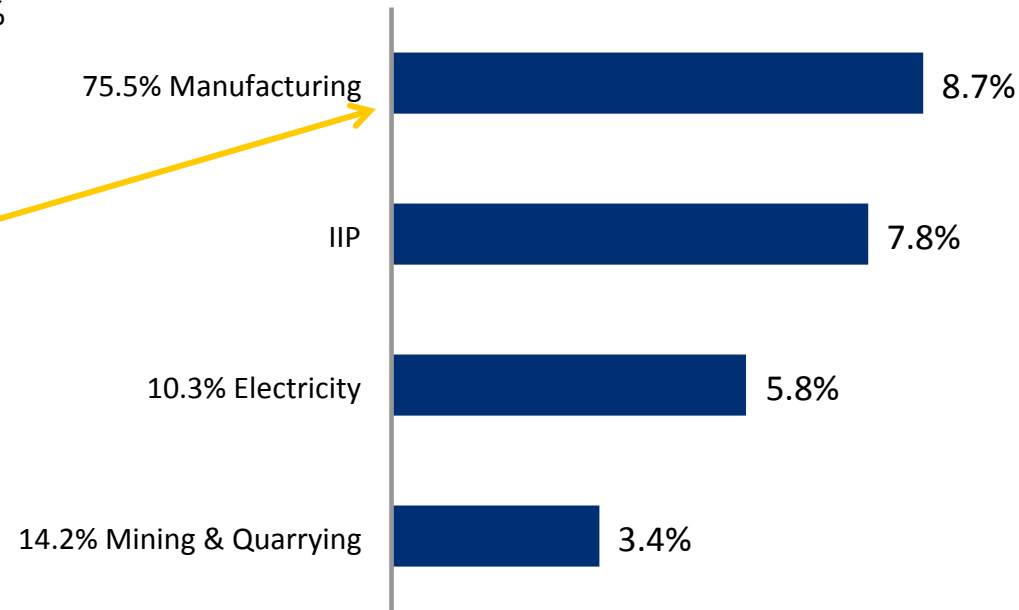
Source: CSO (Central Statistical Office, India, RBI)

India's Index of Industrial Production

CAGR (FY05-FY10) of key sub-sectors within manufacturing (IIP)



CAGR of IIP (FY05-FY12); axis headings also indicate shares in IIP



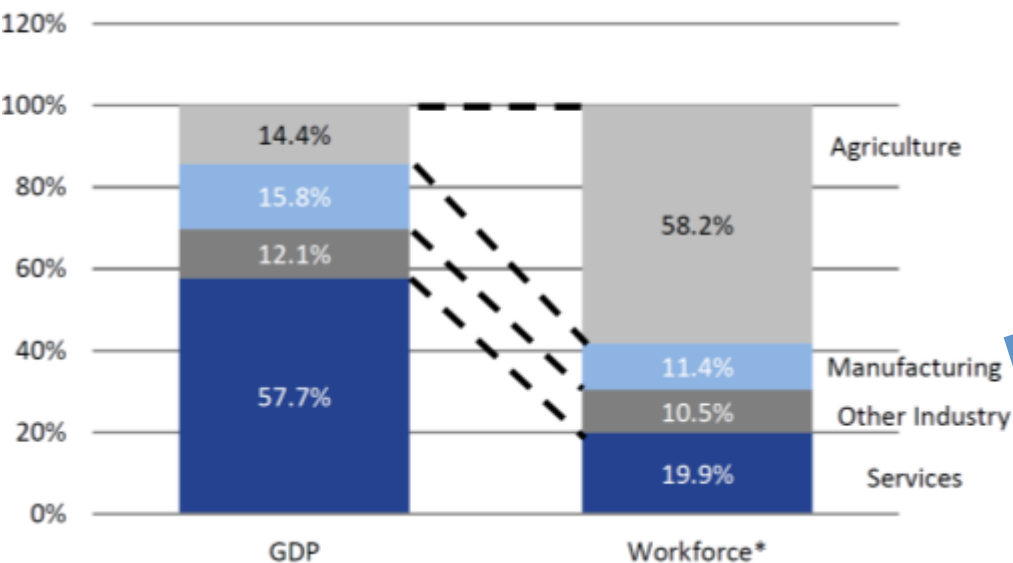
- Manufacturing accounts for a large chunk of India's industrial production, a fact borne out by the sector's 75.4 per cent share in the Index of Industrial Production
- Automotive has shown the highest CAGR as key sub sector within Manufacturing at 14% for the last 8 years
- Due to recent scam in coal block allocation exposed in March 2012 and the subsequent actions initiated, the mining sector has shown a drop of 2.2% in Q2 of 2012-13

Source: CSO (Central Statistical Office, India)

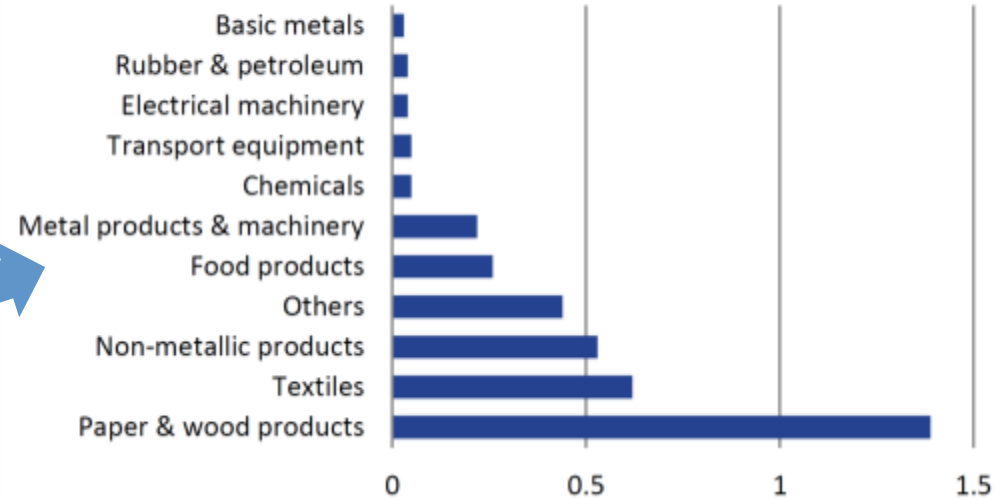
Contribution Of Manufacturing To Employment In India

- Manufacturing plays a crucial role in absorbing surplus agriculture labor.
- The manufacturing sector is critical for the economy's growth as it employs 12% of the country's labor force as well as provides a transitional opportunity to the labor force in agriculture.
- In addition, the sector has a multiplier effect for job creation in the services sector.
- According to National Manufacturing Policy 2011, every job created in the manufacturing sector creates two-three additional jobs in related activities.

Labour distribution across different sectors (FY11)



Labour intensity across manufacturing in India* (number of workers per INR hundred thousand of output generated)

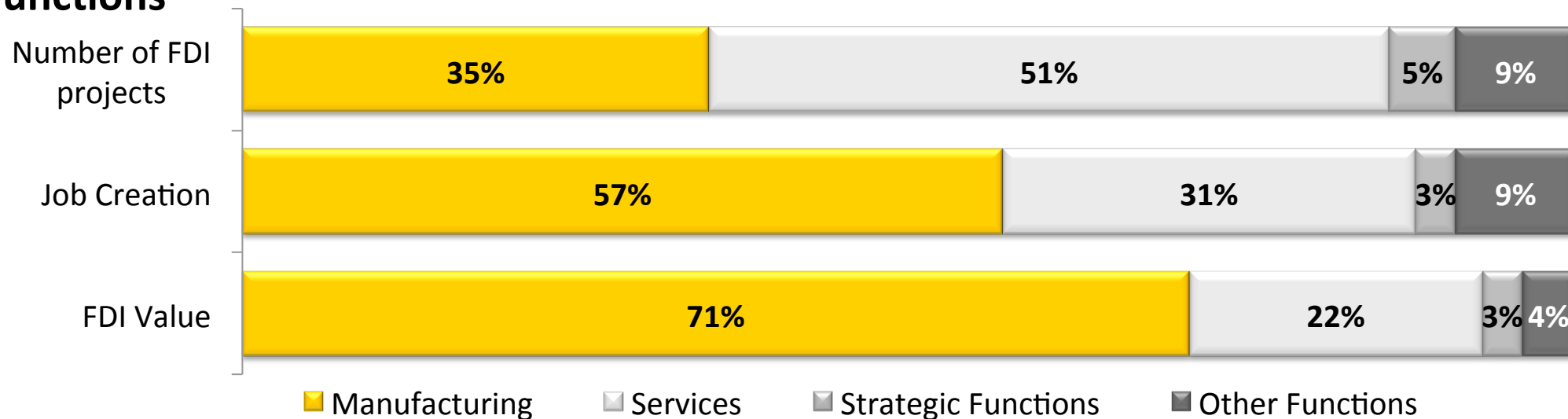


Source: RBI (GDP data); Economic Survey (Workforce data)
 Note: * workforce data is for FY10 (recent articles show manufacturing sector employs as much as 12% of the total workforce); Economic Survey FY12 uses Census 2001 data to arrive at agriculture labour force; industrial sector also includes construction

Source: CII- BCG Report on manufacturing- 2010; ASI; CSO; Aranca Research;
 Note: * indicates labour intensity data is for 2008

Investment In India In 2011: Breakdown by

Functions



FDI Type 2011	Number of FDI projects	Job Creation	FDI Value (US\$ Mn.)
FDI In Manufacturing	320	1,44,449	41,092
FDI in Services	479	79,578	12,601
FDI in Strategic functions	50	8,725	1,639
FDI in other functions	83	22,664	2,929
Total	932	2,55,416	58,261

Source: FDI Intelligence.

Manufacturing includes: Manufacturing, Logistics, Distribution and transportation, electricity.

Services includes: Sales, marketing and support, business services, design, development and testing, customer contact center, technical support center, maintenance and servicing, ICT and internet infrastructure, shared services center.

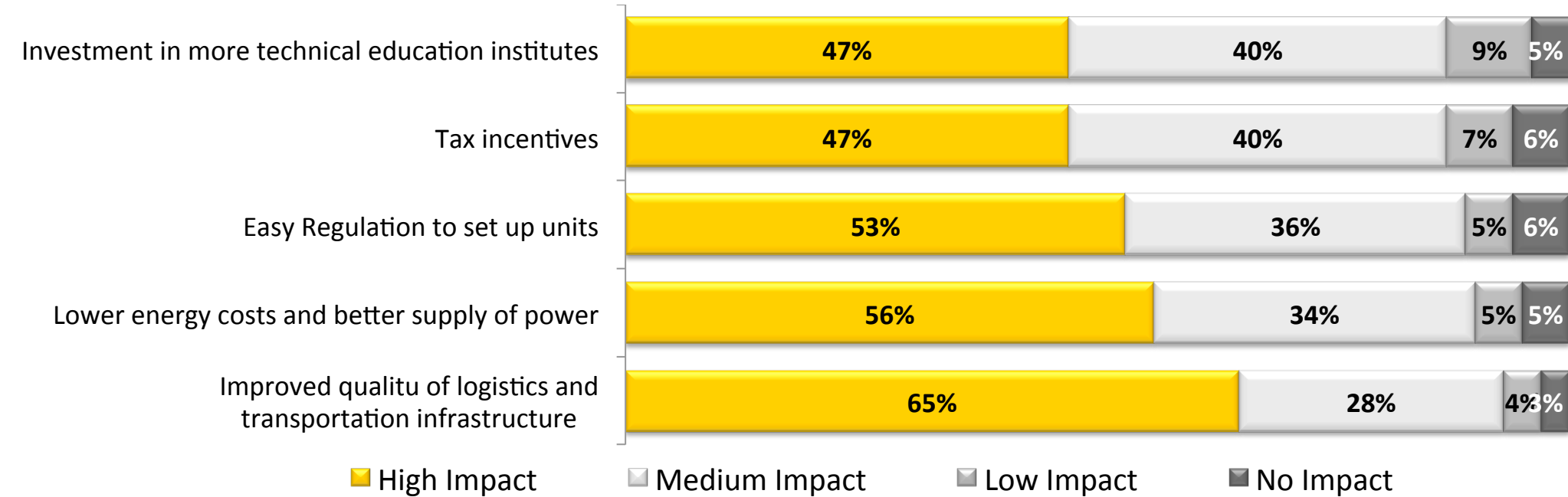
Strategic functions includes: retail, construction, recycling, extraction.

Source: E&Y

Investment In India In 2011: What requires to be done?

Results of a recent survey carried out:

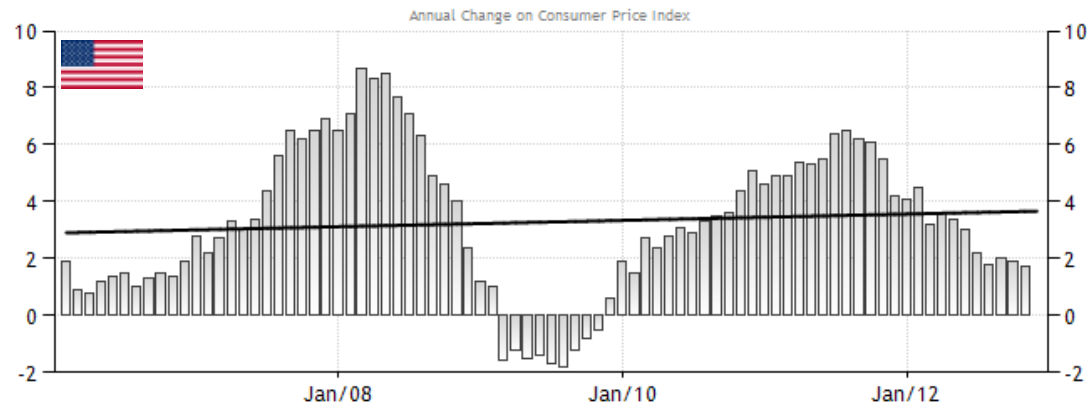
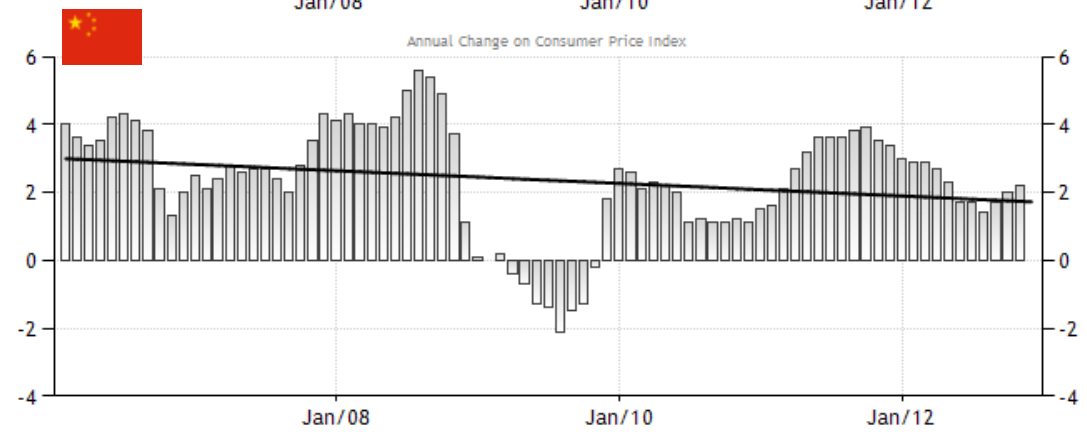
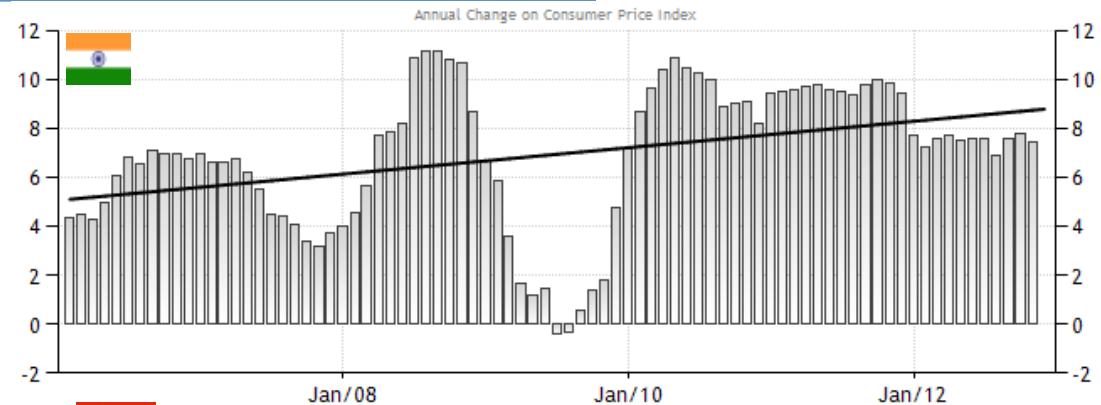
What changes are required to accelerate India's attractiveness as a destination for manufacturing?



- Challenges for the Manufacturing Sector

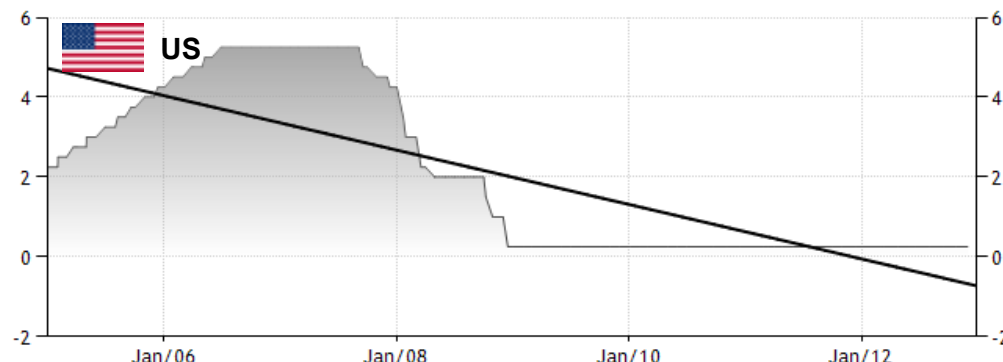
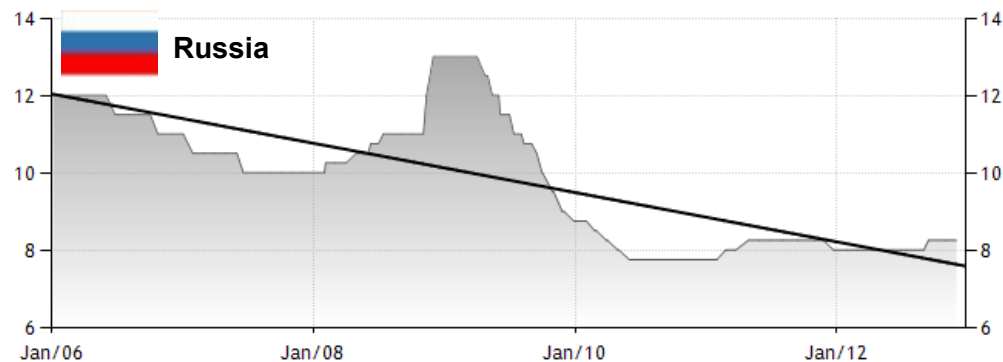
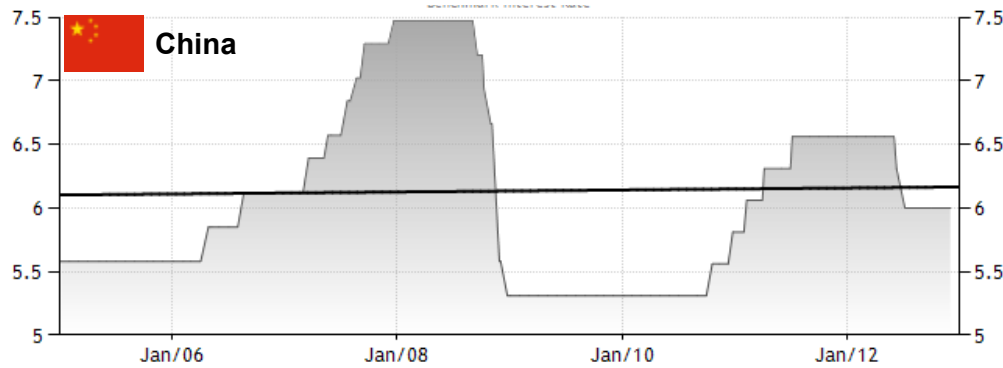
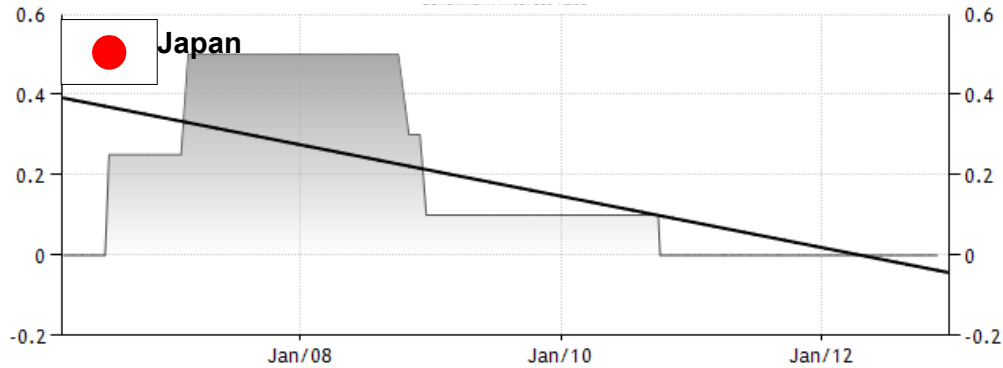
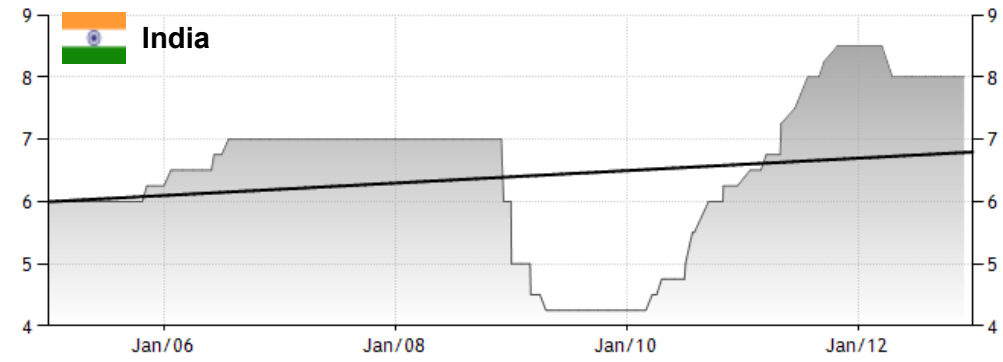
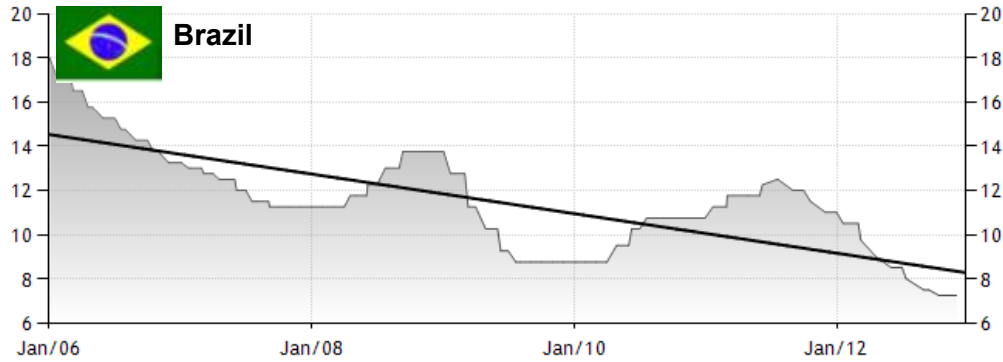
Challenges: High Rate of Inflation

- Inflation in India is still not in the range of lower single digits. Presently remains at between 8~9% and taming it remains the single, most important target for the Reserve Bank Of India.
- Industrial output is contracting after sustained monetary tightening as higher credit costs have forced companies to defer fresh investments.



Source: www.tradingeconomics.com; Central Banks

Challenges: High Rate of Interest

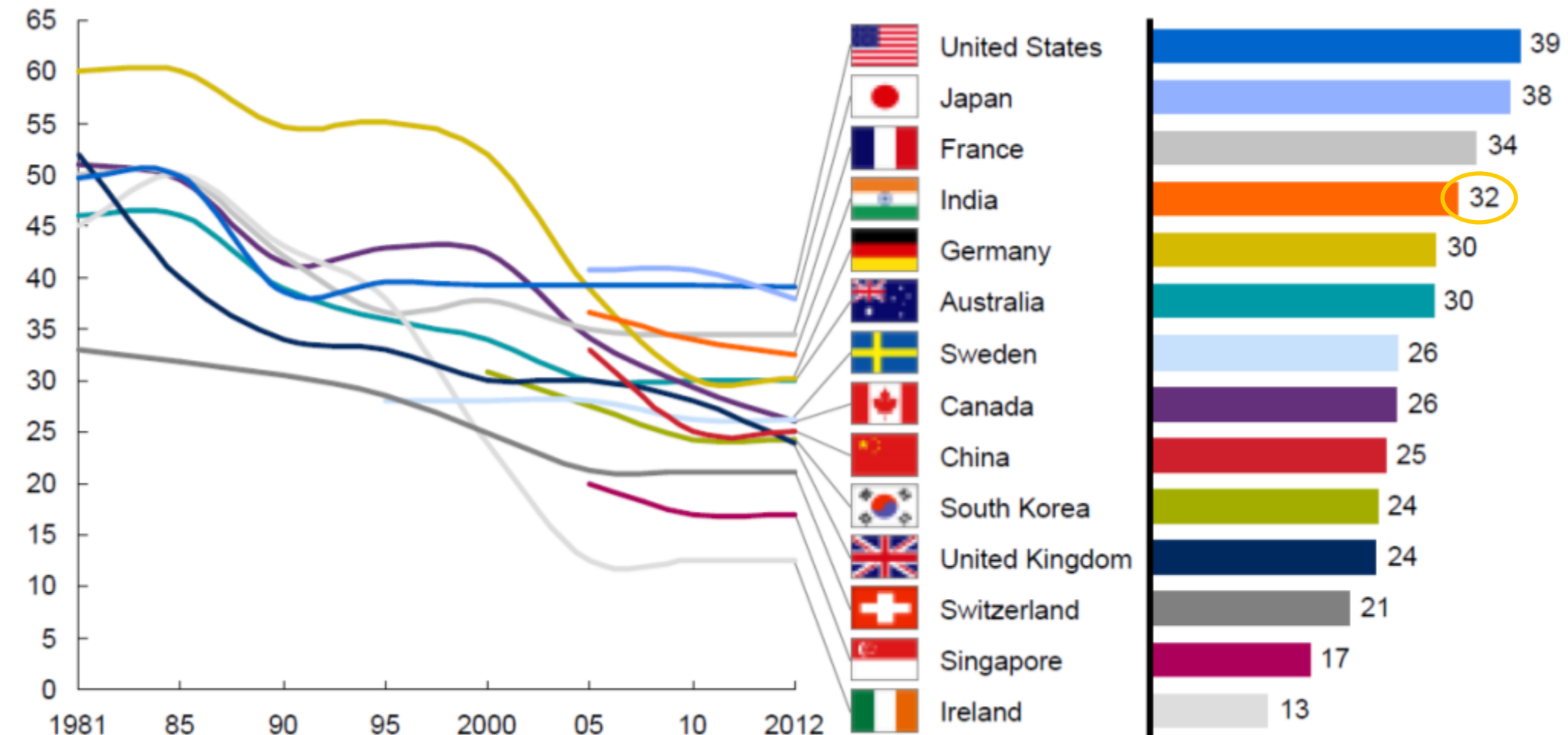


Source: www.tradingeconomics.com; Central Banks

Challenges: High Combined Corporate Tax Rates

Total (national and state/local) statutory corporate tax rates have declined over the past 30 years in most large manufacturing countries

Basic combined central and sub-central (statutory) corporate income tax rates



Source: McKinsey Global Institute

Comparison Of Factors Affecting Competitiveness of LCCs

	Design & Engg. skills	Mfg. Skills	Manpower cost	Domestic Demand	Commercial environment	Supplier base	Raw Material	Infra-structure
Korea	1	1	7	9	1	3	2	1
China	4	4	1	2	12	3	1	4
Thailand	8	11	7	8	1	6	11	2
Indonesia	8	7	3	9	5	7	11	11
Vietnam	13	13	7	14	5	12	15	11
Czech	1	1	7	9	5	1	6	3
Romania	13	13	7	6	10	14	13	15
Poland	8	9	15	8	3	8	13	6
Slovakia	11	4	7	14	5	10	6	5
Russia	5	11	3	1	10	14	3	8
Hungary	3	9	7	2	12	13	10	8
Turkey	13	7	6	9	3	6	5	8
Brazil	6	4	7	2	15	3	9	6
Mexico	12	13	3	6	5	10	4	13
India	6	3	1	2	12	1	6	13

Legend

- India is more competitive
- India is comparable
- India is less competitive

Note:

- *Nr. indicates country ranking*
- *Rankings based on country performance in selected indicators. e.g. Manpower cost is a function of two indicators labor rate and productivity.*
- *Data for such indicators is sourced from World Economic forum and World Bank.*

- India is more competitive than most LCCs except China and Czech Republic. India is currently more competitive in **manpower cost, manufacturing skills, local market size and an established supplier base.**
- Over the next few years, as income level rise within India, **manpower costs will escalate**
- One of the Key area that affect India's competitiveness is the **commercial environment and infrastructure.**

Source: ACMA

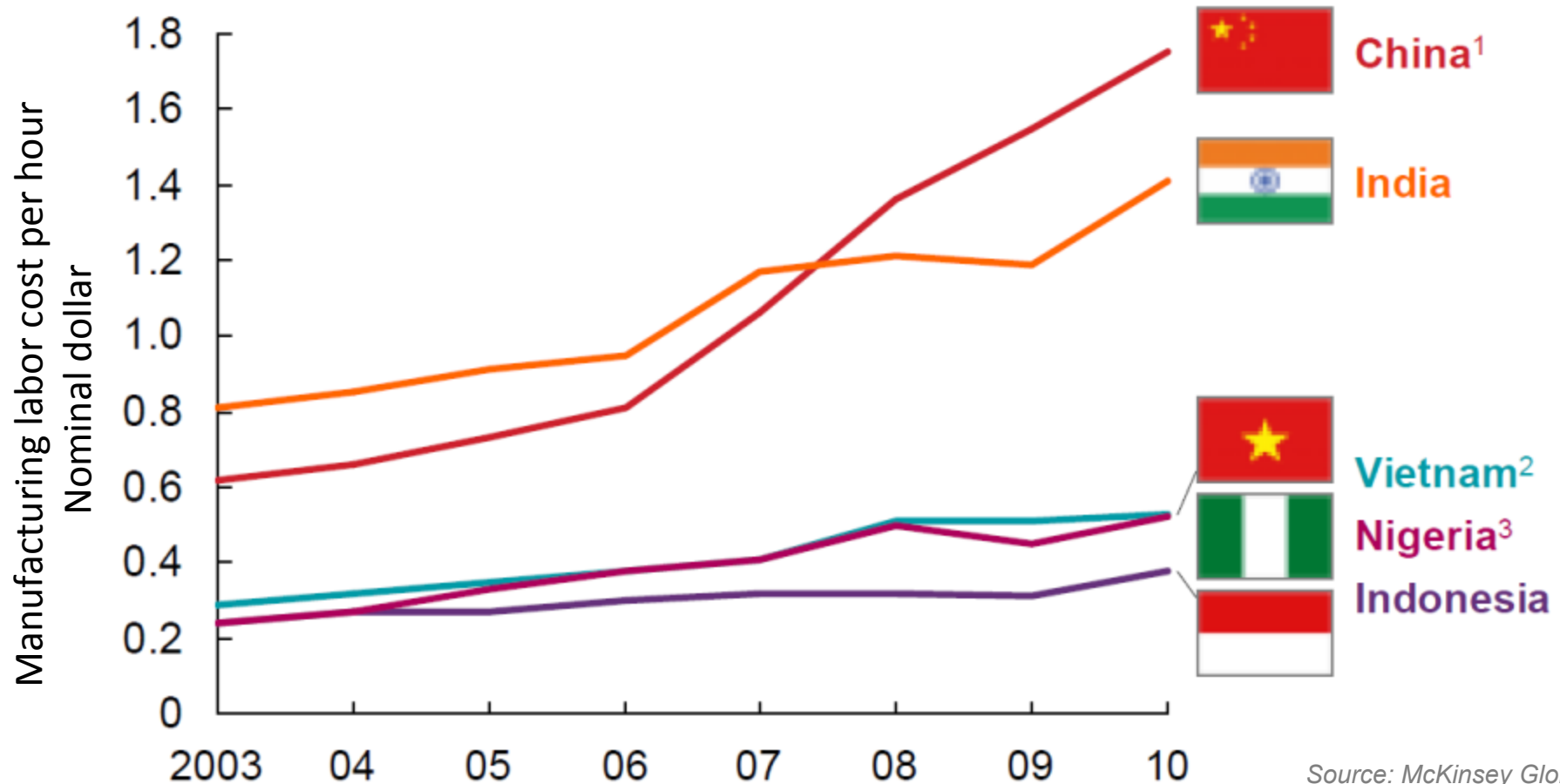
Challenges: Rising Wages

With wages rising in China as well as India, other developing economies have an opportunity to gain share in the labour intensive industries

Compounded Annual Growth Rate (2003-10) %

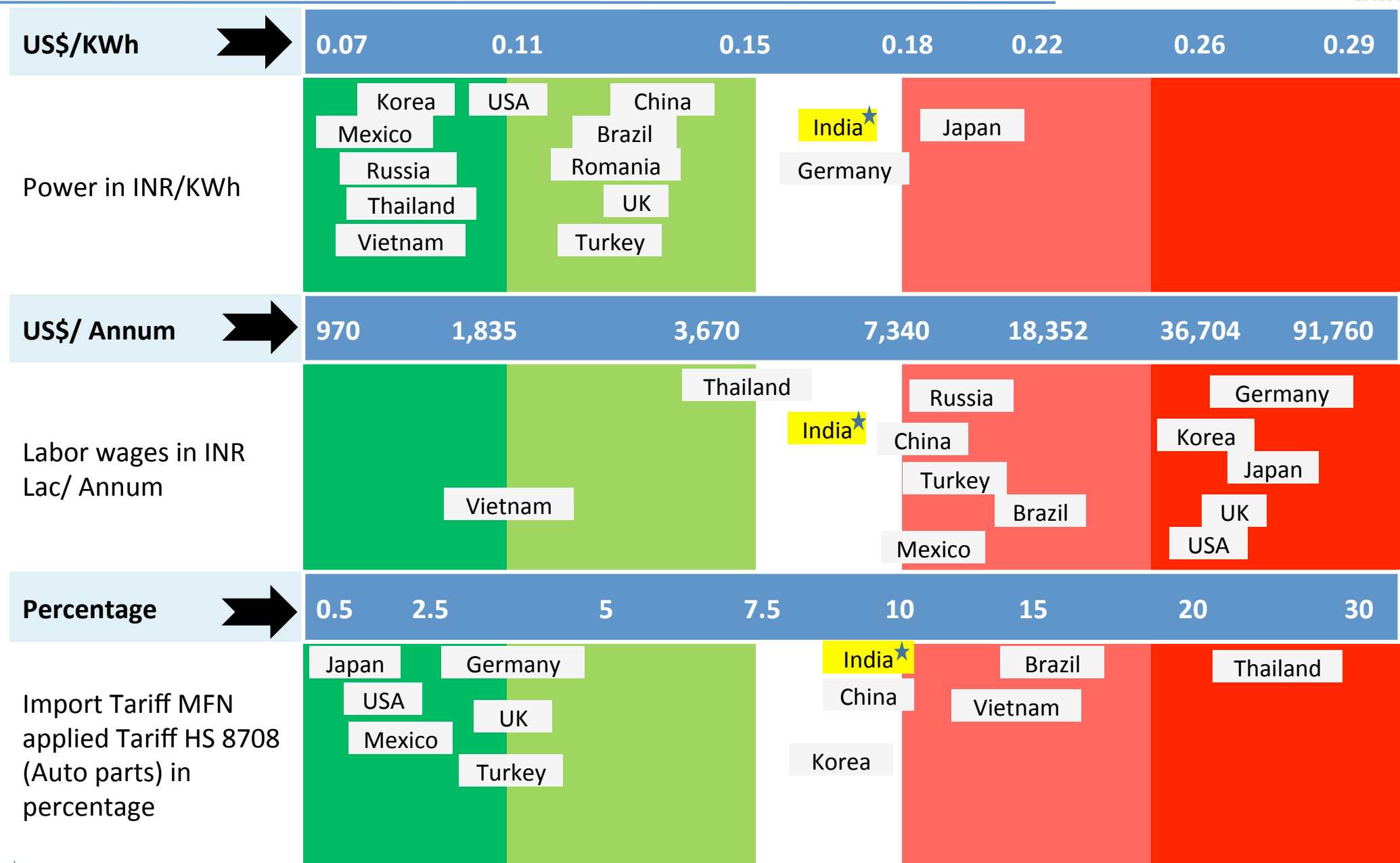
Increase in labor cost/ Hour

Increase in value added/ employee



Source: McKinsey Global Institute

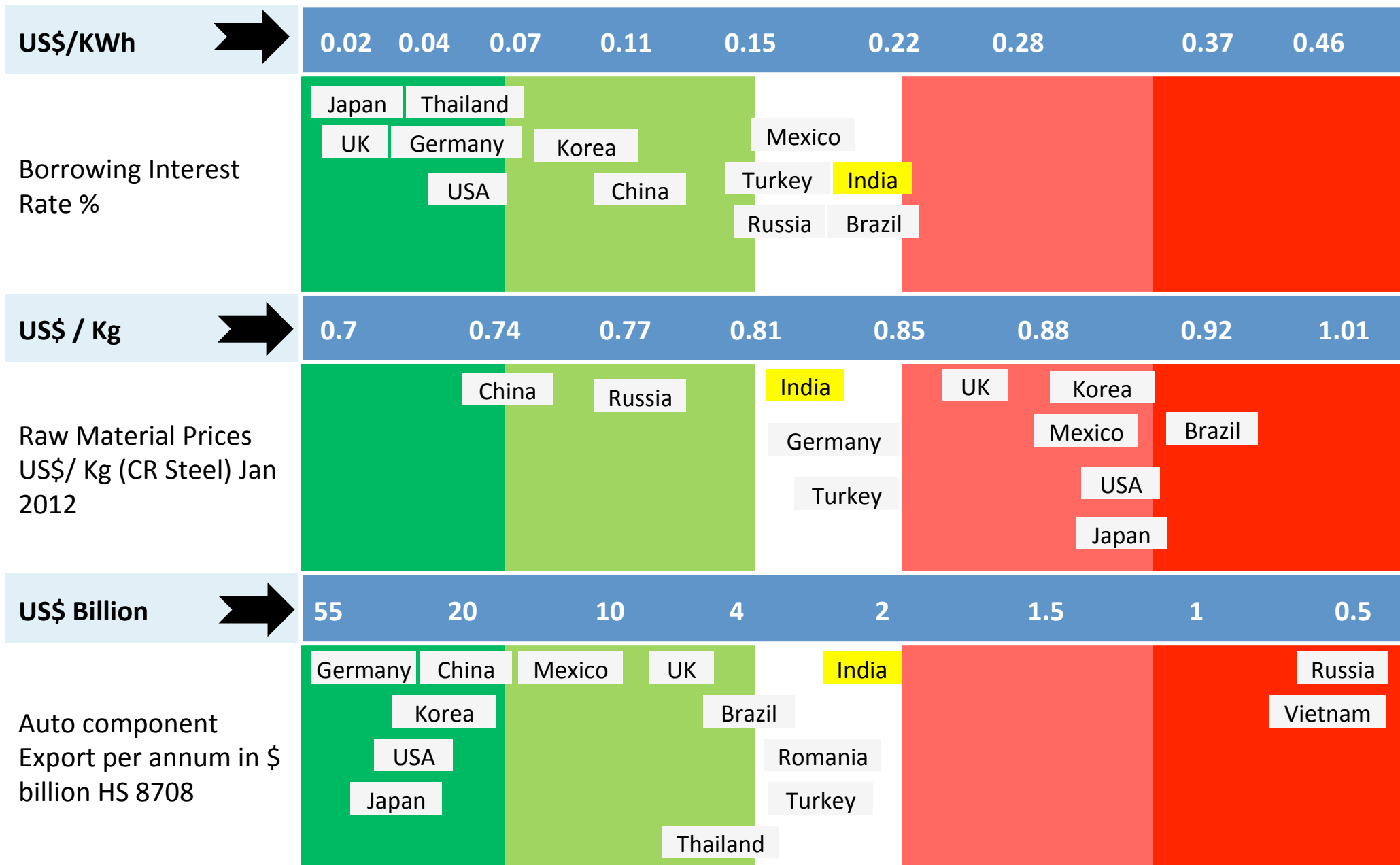
Competitiveness Comparison For Various Countries



★60% as State Electricity price and 40% as Genset Electricity cost

Source: ACMA

Competitiveness Comparison For Various Countries



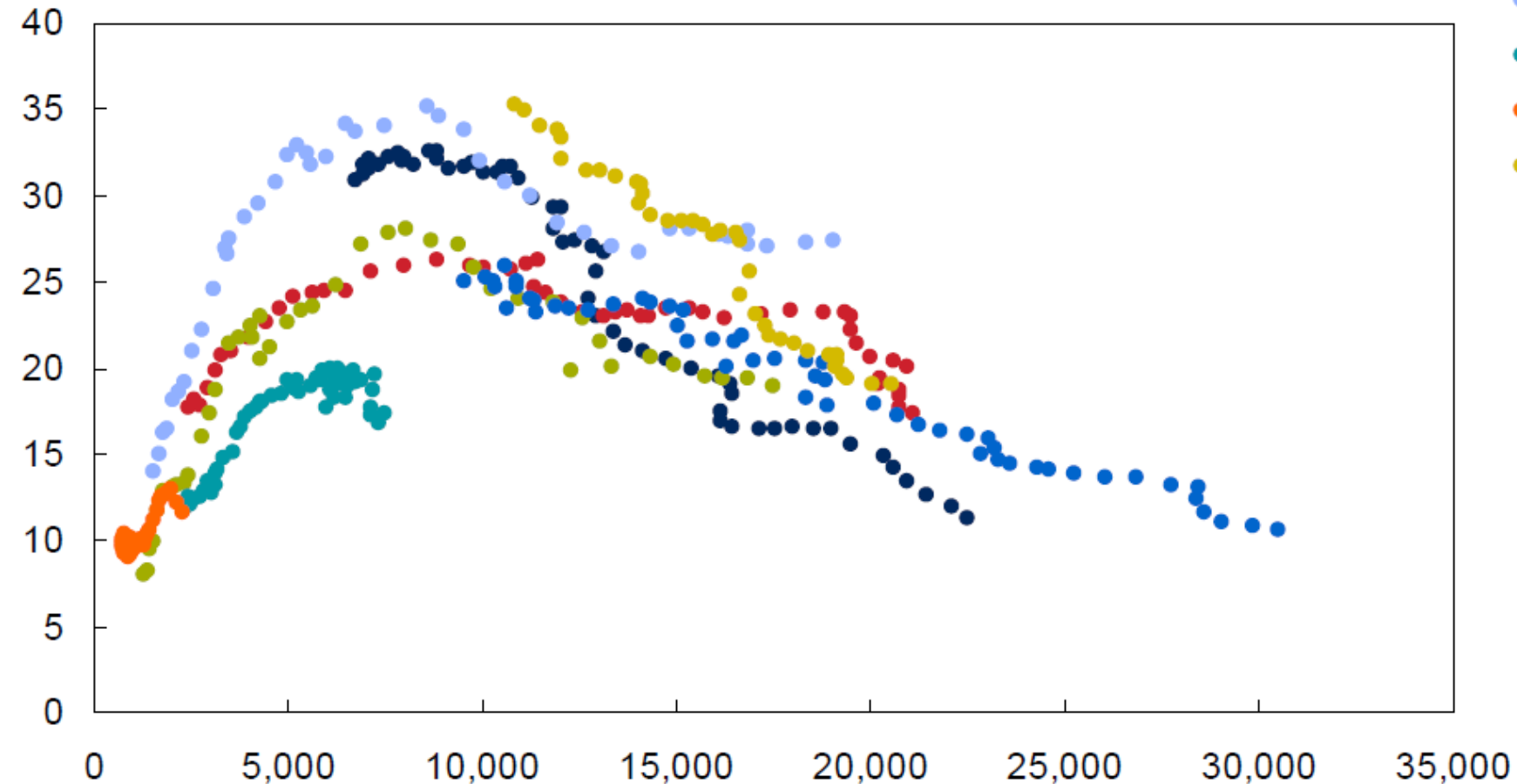
Source: ACMA

Challenges : Generation of Employment

Manufacturing's share of total employment falls as the economy grows wealthier, following an inverted U pattern

- United Kingdom
- Japan
- South Korea
- United States
- Taiwan
- Mexico
- India
- Germany

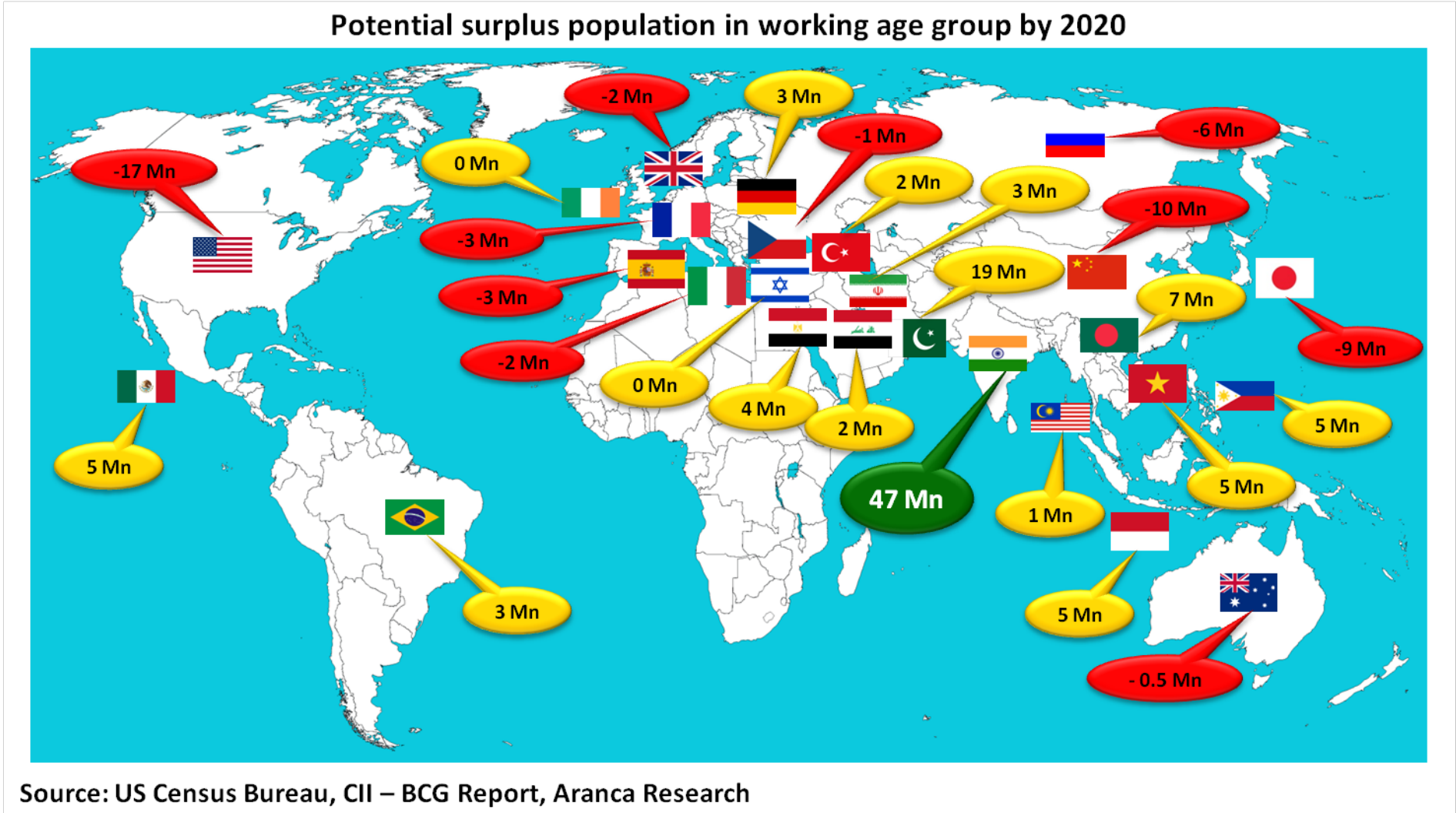
Manufacturing employment
% of total employment



Source: Mckinsey Global Institute

Potential Surplus Population In Working Age Group By 2020

India is a young country with over 60% of population in the working age group of 15-59 years. India will have to create 220-250 million jobs between now and 2025 if it has to exploit its demographic dividend. There is a need to lay larger emphasis on building strong human capital.



Challenges : Constraints in Material Flow

- Materials need to flow in and out of manufacturing plants, and in and out of the manufacturing sector.
- These flows need infrastructure – roads, the cold supply chain, an information infrastructure, etc, – to aid the supply chain. While gains have been made in the road infrastructure to aid truck movement, it is to be noted that this is the most expensive mode of transportation, that also adds congestion and pollution.
- In any case, India has a reprieve only till 2020 for increasing carbon pollution on grounds of economic growth so the window for developing badly-needed rail and water-based infrastructure is not large.
- The current tax system in India distorts and constricts supply chain flows. To this extent, the government hopes to implement the two-layer Goods and Services Tax (GST) to further simplify the current value-added-tax (VAT) while at the same time, creating more uniformity and scope of products.

Challenges : Constraints in information Flow

- Manufacturing sector needs the information flow for orders, order status, and deliveries. Although the rest of the world depends on India for many IT needs, there is very little evidence of IT use within the country especially in the micro, small and medium enterprises.
- Many Indians now have Google Mail, Facebook and Twitter accounts, but these are not enough for manufacturing.
- The quality of Internet access is poor and cost is high relative to the developed countries
- Indian software vendors and system integrators have an important role to play for Indian manufacturers. They can support Indian manufacturers innovative standardized software given the massive scale in India.
- Cloud Computing would become tangible as a delivery mechanism of cheap standardized solutions for information storage and exchange.
- Large IT vendors/system integrators can create virtual information exchange zones around the supply chains of major original equipment manufacturers (OEMs) or, in cooperation with state or central governments, around clusters of SMEs.

Challenges : Constraints in Cash & Finance Flow

- Inadequate credit holds back many SMEs, investment as well as to working capital.
- In the past, the State Bank of India sought to creatively improve the lot of many small manufacturers through a mix of consulting and credit. Other public and private sectors should take note.
- The government can create conditions where supply-chain finance becomes a reality, whereby the small suppliers to big OEMs or their suppliers can get short-term credit against the supplies while they await payment.
- The government can also encourage credit rating or facilitate foreign banks to step in as competition to domestic banks.
- Enterprising banks such as the SBI can seek to emulate the **Grameen Bank** model of giving a loan to only one out of four-or-five micro-entrepreneurs in a cluster, and funding the others when the first one has repaid the loan.
- Over time, private sector entrepreneurs may join in with other operational models.

Challenges : Availability of Required Skills

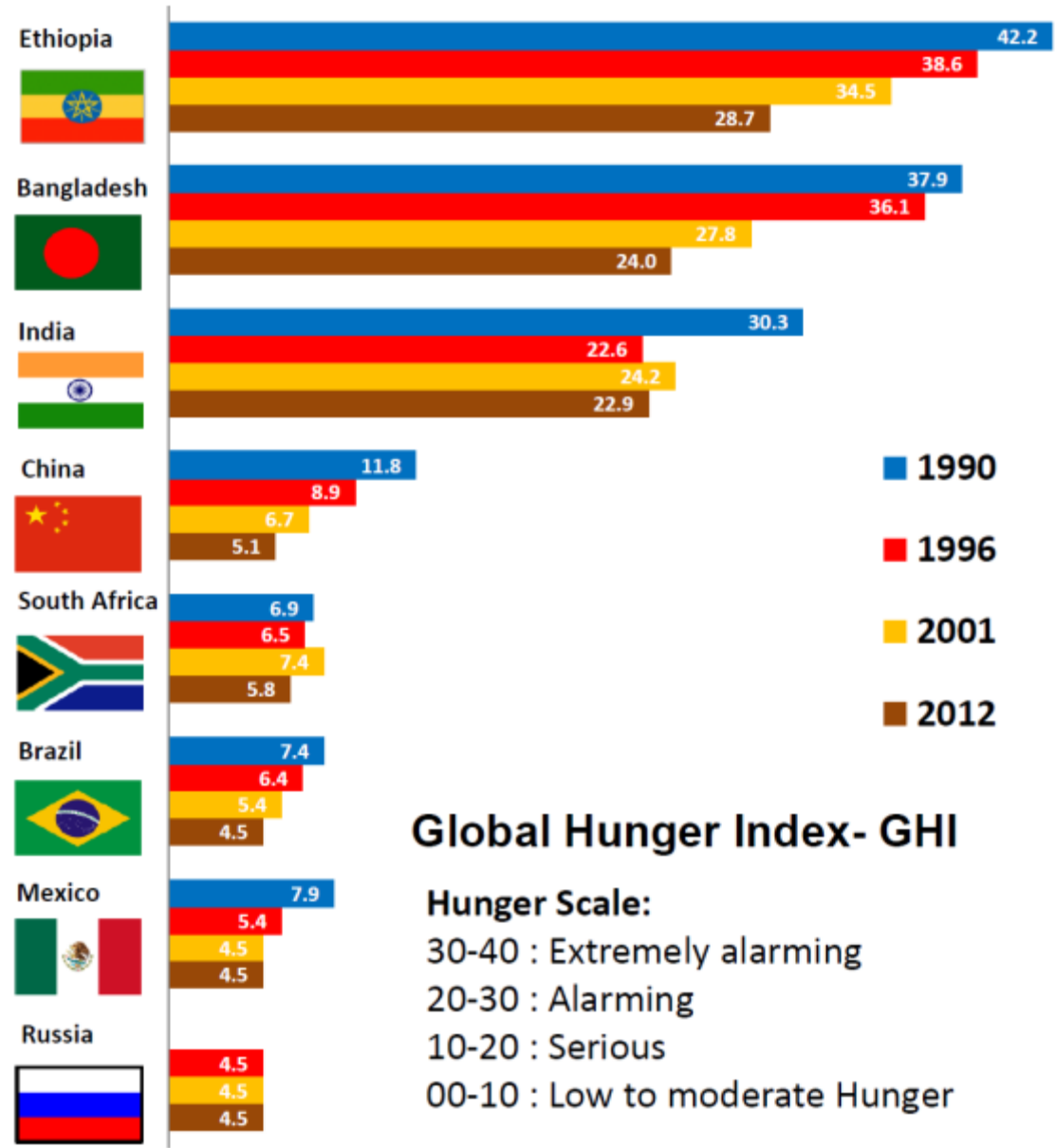
- India will need to create 200-250 million additional (net) jobs over the next 15 years if it is to employ the children currently in school. The demographic dividend will come from the flow of these children into the workforce. This requires an education policy consistent with the country's changing needs over these 15 years.
- New National Manufacturing Policy takes this into account with its emphasis on vocational education with “farm-to-work” and “school-to-work” programmes, and on seeking to add 100 million manufacturing-related jobs by 2022.
- The reasons are deeply intertwined: Salaries for many workers even in the OEMs are the government-mandated minimum wage; rigid labour policies ensure most workers are hired only on contract (and at minimum wage);
- There is little incentive for manufacturers to train contract workers; and union unrest at major OEMs seems always close at hand.

Challenges : Availability of Land

- Land ownership seems to block any reform or initiative in India, whether it is Tata Motors' experience in Bengal, or it is the Special Economic Zone (SEZ), or the government attempting to widen roads in Uttar Pradesh.
- The huge increases in price of land in the past years are a huge detriment to sale of land and only encourage non-use or even crime. Has given rise to the so called "land mafia".
- Even industrialists sometimes buy land, ostensibly for industrial development, but then hold on to it with the expectation that the returns by selling the land in the future will be higher than they could make with manufacturing.
- Tenants can be a nightmare, the going rate to get the tenant to vacate is supposedly half the value of the property.
- The government, central and state, has to work on the tighter implementation of existing laws. Moreover, creative use must be made of ownership by way of legally valid (and enforceable) medium-term, say 10-15 year leases that offer both owners and tenants some security. This way, help manufacturing not only in the NIMZs but also in the rest of the country.

Challenges : Inclusive Growth

- Notwithstanding the tremendous progress and globalization in India, the country is ranked close to the bottom on this index, below many sub-Saharan African countries.
- 43.5% of Indian children below the age of five are undernourished .These are the very children for which the manufacturing policy aims to create the 200-250 million jobs by 2025.
- These children are in danger of being underdeveloped, not only physically but also mentally.
- Without intervention, the demographic dividend will turn into a demographic burden in the coming decades.



Global Hunger Index- GHI

Hunger Scale:
 30-40 : Extremely alarming
 20-30 : Alarming
 10-20 : Serious
 00-10 : Low to moderate Hunger

$$\text{GHI Score} = \frac{\text{Proportion of population that is undernourished (in \%)} + \text{Prevalence of underweight in children under age five (in \%)} + \text{Mortality Rate of children under age five (in \%)}}{3}$$

Challenges : Laws and Regulations

- The cost of compliance is quite high in India, which is further compounded by the multiplicity of inspections, delayed clearances & approvals that add further burden on the manufacturer.
- The new **National Manufacturing Policy** would rationalize and simplify business regulations through various path-breaking initiatives such as:
 - Doing away with irrelevant acts
 - Encouraging self-certification and third-party inspection.
 - Systemizing inspection and introduction of joint annual inspections with prior intimation.
- Delegating power to a single body such as the **Special Purpose Vehicle (SPV)**
- **Exit Mechanism:**
 - Currently, a sick unit cannot be shut down very easily as the current exit mechanisms for sick units are complex and time consuming. This leads to locking of funds and assets.
 - The National Manufacturing Policy has taken a balanced approach by suggesting progressive exit mechanisms and also providing a safety net for workers at the same time.
 - It has proposed measures such as job loss policy and alternative option of sinking funds, asset redeployment options, provisions for providing suitable worker compensation, clearing debt and reinvestment of income generated from the disposal of assets, etc.

- Indian Automotive Sector

Indian Automotive Industry 2020- An Overview

India is expected to witness strong growth in production till 2020 across all segments:

- **Passenger vehicles:** Projected to be 5 million units by 2015 and over 9 million by 2020 driven by domestic demand and as a global hub for export of small cars.
- **Commercial vehicles:** Volumes of over 1.4 million by 2015 and over 2.2 million by 2020. Small commercial vehicles (SCV), a relatively new segment, expected to grow 28% annually over the next few years.
- **Two and Three wheelers:** Expected to double to 22 million units by 2015 and reach 30 million by 2020 driven by low penetration levels, expanding rural sales and growth in exports.
- **Tractors:** Projected to be over 0.7 million by 2015 and over 1 million by 2020 with steady growth expected in domestic and export volumes
- **Construction equipment:** Likely to grow 2.5 times to 0.1 million units by 2015 and almost double to 0.18 million by 2020 driven by the infrastructure sector.

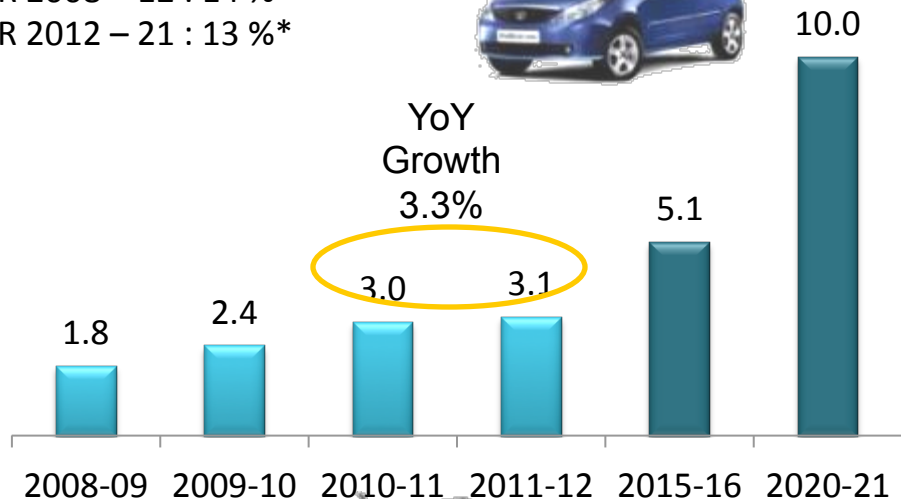
Achievement of these production volumes will position India as one of the top 5 vehicle producing countries in the world.

Source: ACMA

Indian Vehicles Production Figures (In Millions)

Passenger Vehicles

CAGR 2008 – 12 : 14 %
CAGR 2012 – 21 : 13 %*

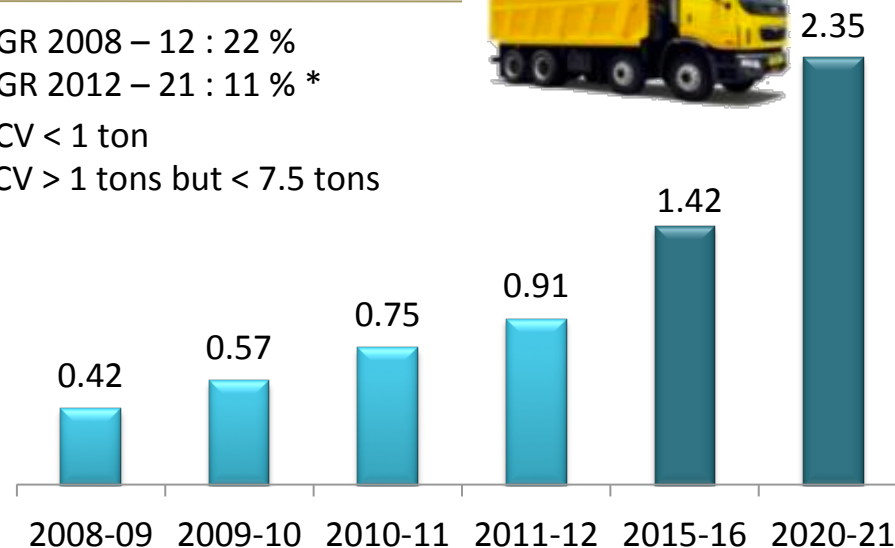


Commercial Vehicles

CAGR 2008 – 12 : 22 %
CAGR 2012 – 21 : 11 % *



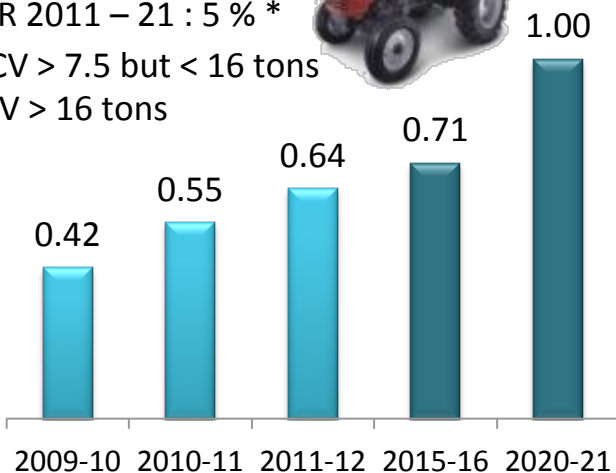
- SCV < 1 ton
- LCV > 1 tons but < 7.5 tons



Tractors

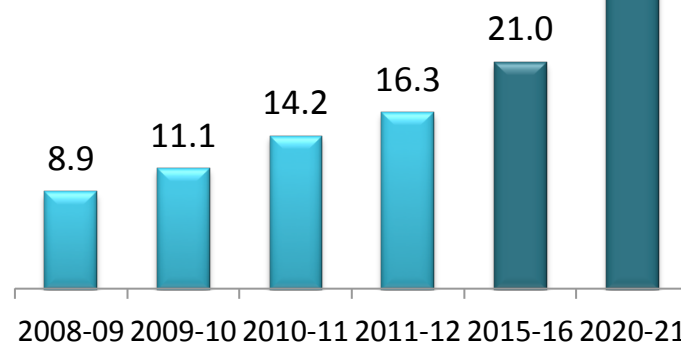
CAGR 2011 – 21 : 5 % *

- MCV > 7.5 but < 16 tons
- HCV > 16 tons



2 & 3 Wheelers

CAGR
2008 – 12 : 16 %
2012 – 21 : 7 % *



Construction Vehicles

CAGR 2011 – 21 : 14 % *



SCV – Small Commercial Vehicles;
MCV – Medium Commercial Vehicle;

LCV – Light Commercial Vehicle;
HCV – Heavy Commercial Vehicle.

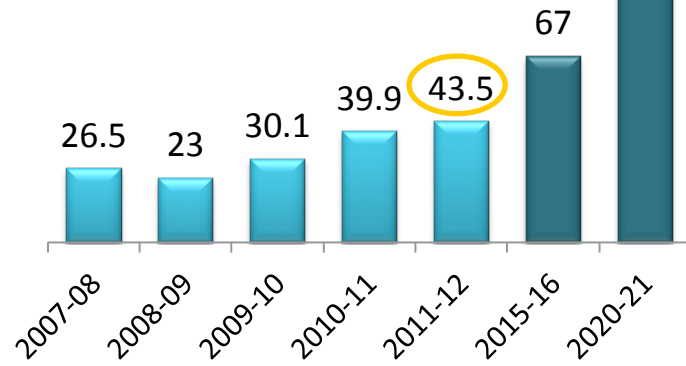
Figures for financial year –April to March (* Estimates)

Source: ACMA

Indian Auto Component Industry

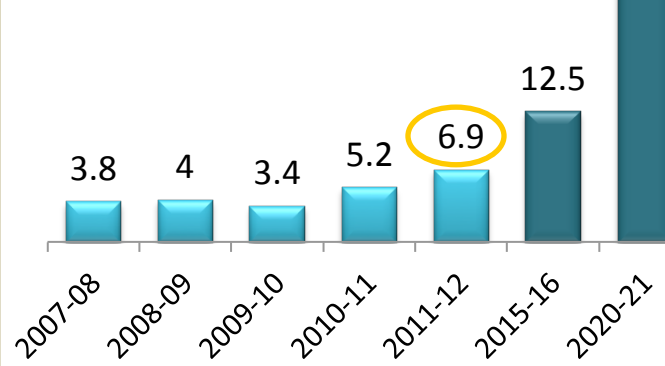
Turnover USD Bn.

CAGR 2007-12: 13%
CAGR 2012-21: 11%*



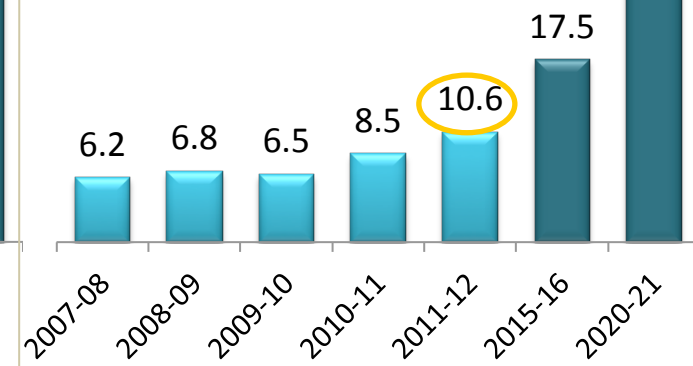
Exports USD Bn.

CAGR 2007-12: 16%
CAGR 2012-21: 17%*

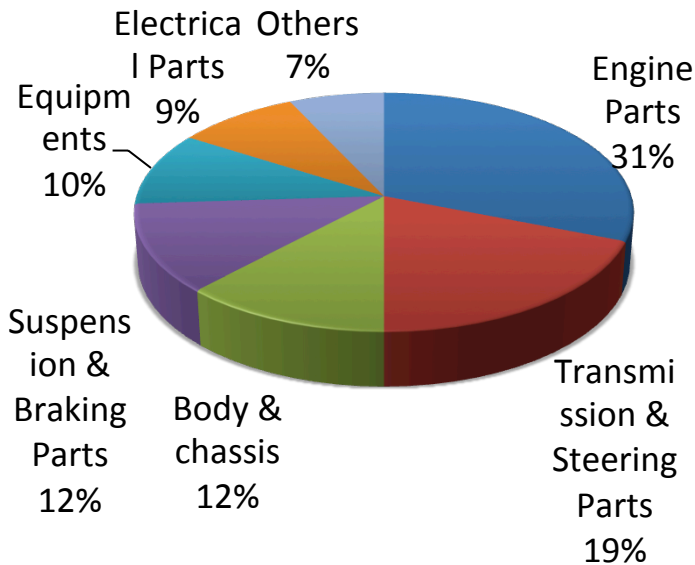


Imports USD Bn.

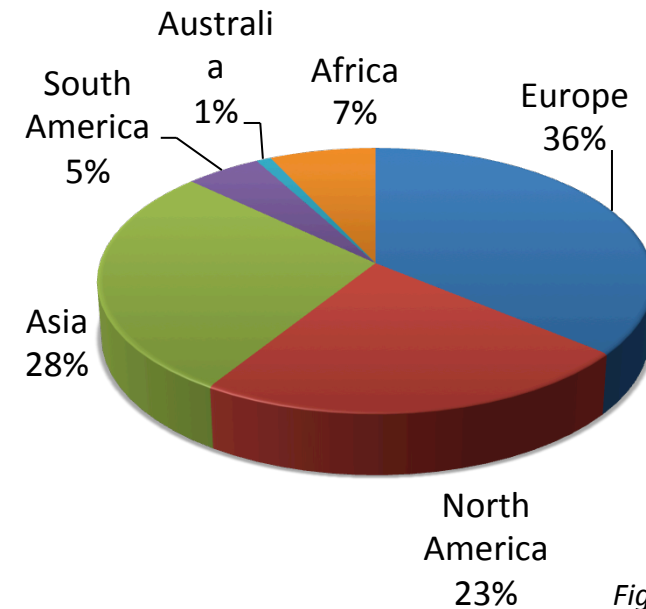
CAGR 2007-11: 11%
CAGR 2011-21: 15.2%*



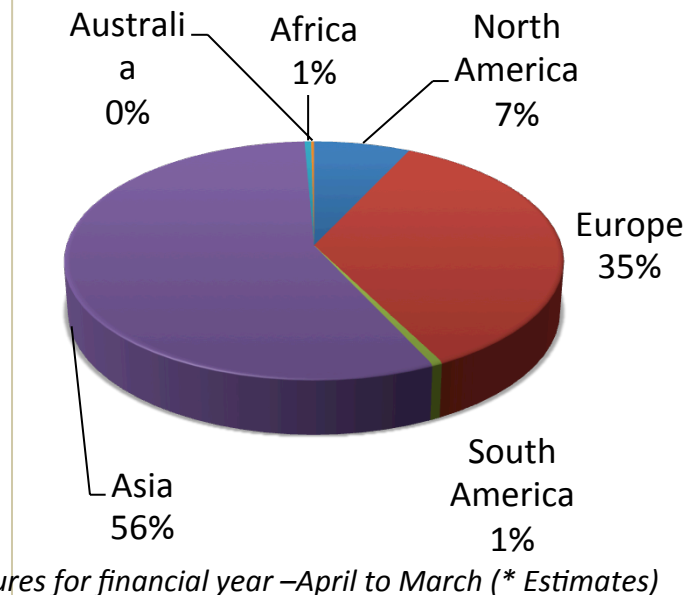
Comprehensive Product Range



Export Destinations



Sources of Imports



Figures for financial year –April to March (* Estimates)
Source: ACMA

Megatrends In Automotive Industry- Impact

	Mega Trends	Key Expectations	Technologies
REGULATIONS	Emission	NOx, SOx, HC, PM, Soot, CO, CO ₂ , Vehicle Life Cycle Assessment -LCA	Pre-Ignition Systems Ignition Systems Post- Ignition Systems
	Fuel Efficiency	Fuel required to cover 100 km & CO ₂ generated by vehicle kerb weight basis	Light Weighting , Turbochargers Use of Electronics & Electricals
	Safety	Safety of all occupants in car as well as pedestrians	Active/Passive Safety of all occupants Safety of pedestrians
	Recyclability	At least 85% of material should be recyclable	Natural fibers Plastics, Composites
CHANGING CUSTOMER BEHAVIOR	Perceived Quality	Stylish Exteriors, Touch & Feel -Interiors; better NVH	Haptics, Aerodynamic Exteriors Advance Interiors
	Infotainment	Vehicle to provide home like comfort	Navigation Assistance Wi-Fi, 3G, Downloading, Music, LED Screens
	Functionality	Higher Power, convenience, minimized efforts, etc.	Advance Human Machine Interface, Automatic transmission, Voice control
	Frugal Engineering	More for less, Small cars to have advanced features with lowest cost	HVAC, Plush looks, Noise reduction, Advanced Interiors, right price points
URBANIZATION	Connected Cars	Bluetooth, GPS, Internet functionality. Social networking on the go.	Black box system, Advanced Telematics Sensors, cameras, GPS,
	Innovative Concepts	Unique features, Cost effective.	Alternate materials Park assistance, Auto driving
	Mobility Services	Effective Traffic Management System.	Self Driven Car, Near-field and remote vehicle communications

Key Megatrends In Automotive Industry

EMISSION REDUCTION



- Stringent Government regulations across the world
- Global warming and Growing environmental awareness as initiators
- India follow European roadmap with the lag of 5 years.
- Need to leapfrog the gap will take priority.
- Contribution of exhaust systems in vehicle is expected to increase by 100% from current level.

FUEL EFFICIENCY



- Enforced by Government regulations linked with vehicle kerb weight
- Implementation with penalties and/or incentives
- Increasing importance as buying criterion & hence major product differentiator.
- Oil scarcity and increasing fuel prices as initiators
- Overlaps with achieving emission reduction.

SAFETY



- Urbanization, High traffic density and increasing road fatalities as initiators
- Already introduced safety regulations showing some effect-further regulations upcoming (also with regards to pedestrian safety)
- Important buying criterion

COMFORT



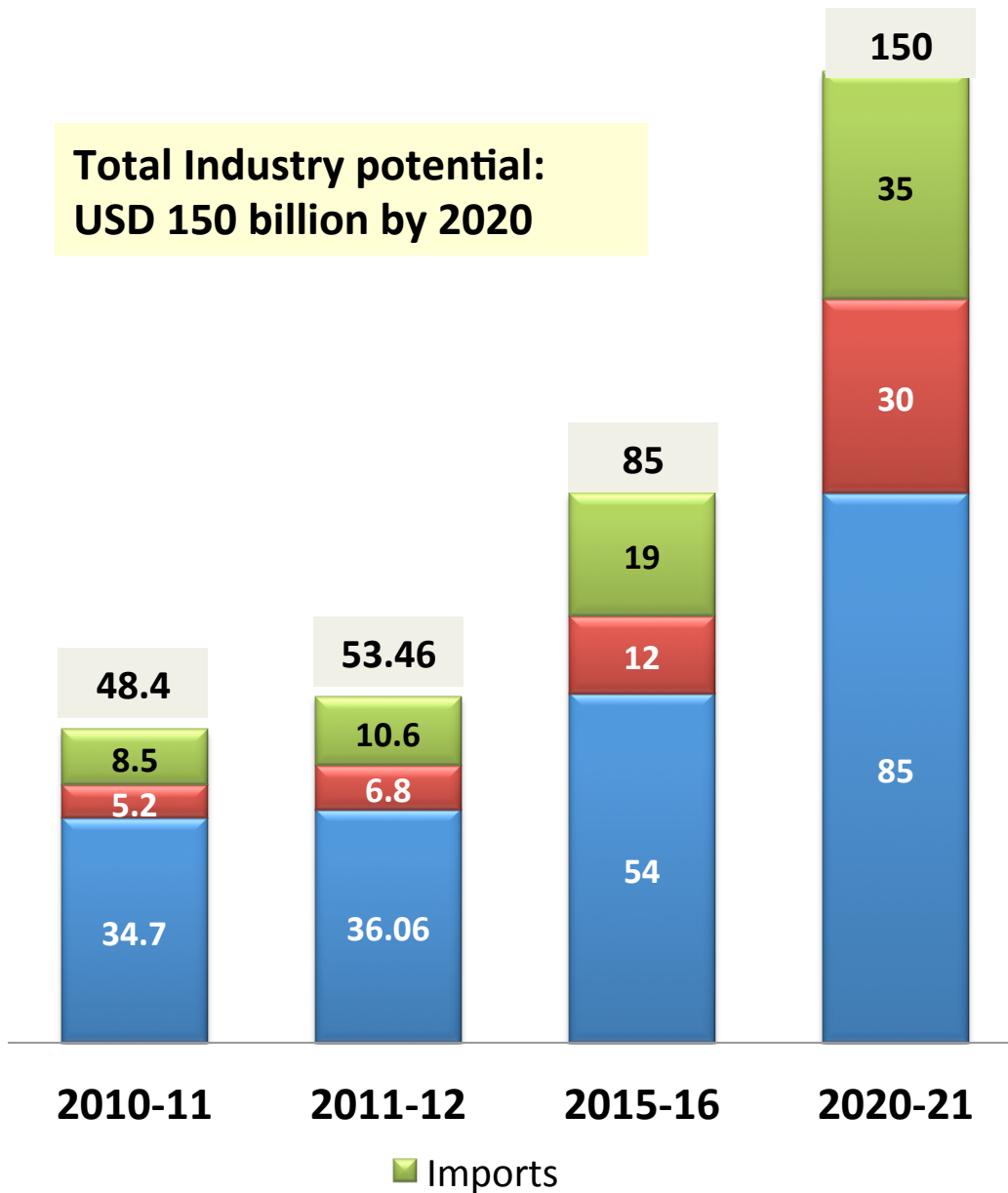
- Growing wealth, reducing buyer's age and increasing time spent in vehicle as initiators
- "Living room atmosphere" and "always-on" attitude require new approaches.
- Expectation to have premium car features in A/B segment cars.
- One of the key buying criteria



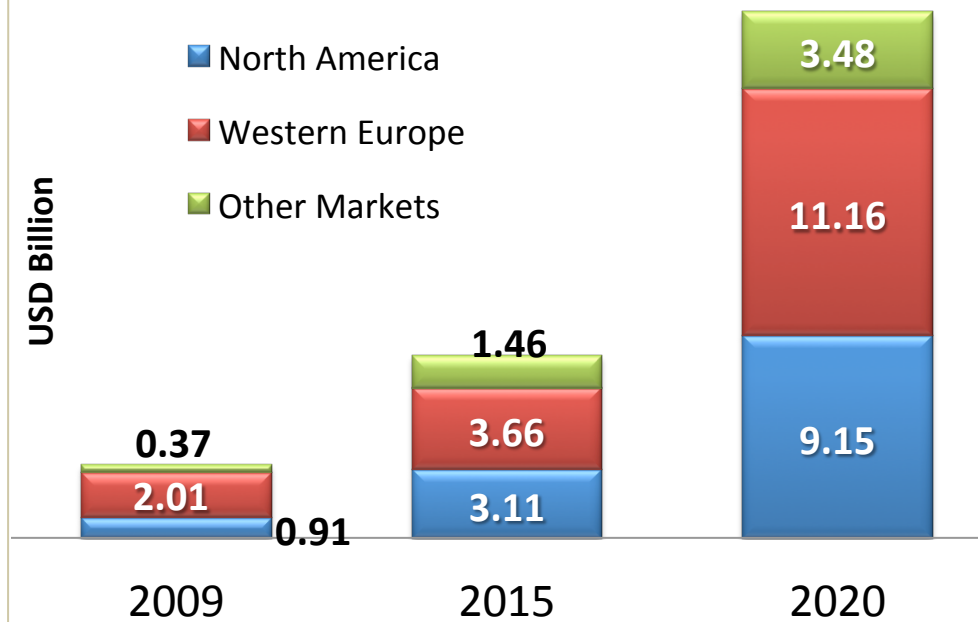
AFFORDABILITY- FRUGAL ENGINEERING

Indian Auto Component Industry Vision 2020

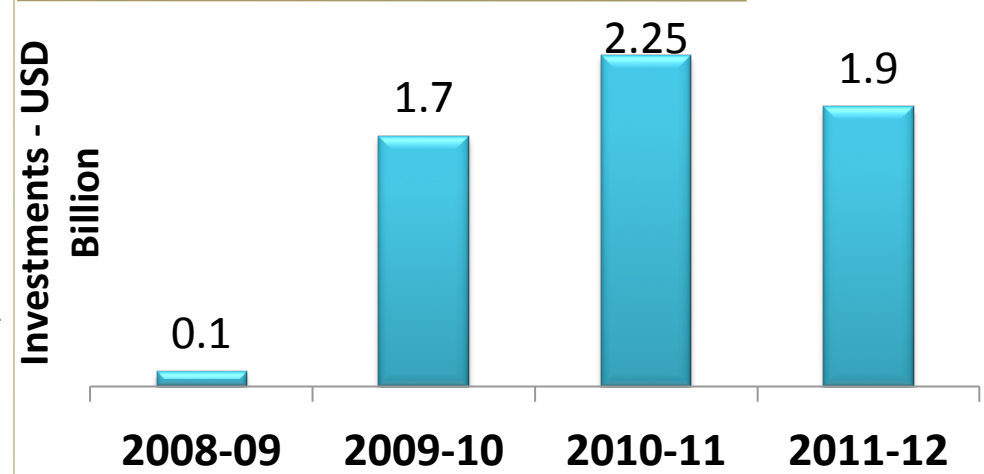
**Total Industry potential:
USD 150 billion by 2020**



Geography-wise Export Potential:



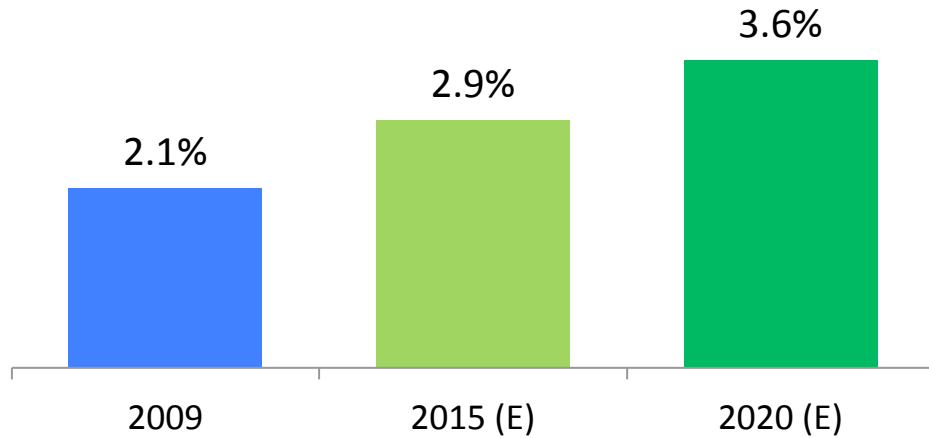
Capacity Addition : 2011-12



Source: ACMA -EY Vision 2020

Indian Auto Component Industry

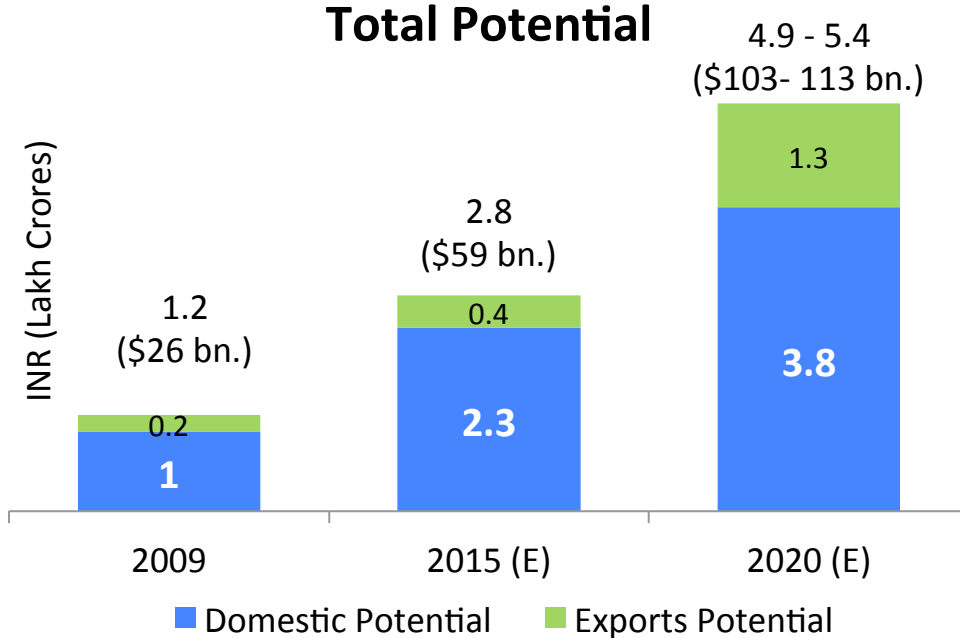
Auto Component Industry's Contribution To GDP



Employment In The Auto Component Industry



Total Potential



Potential Strategic Positions of Indian Automotive Suppliers

Year 2010

All Figures in Billion US\$

Year 2020

Mega

> 4.6

Large

0.92-4.6

Medium

0.18-0.92

0.18-0.92

Small

0.05-0.18

0.05-0.18

Mini

0.01-0.05

0.01-0.05

Micro

< 0.01

< 0.01

Diversified global

- System integrators
- System/ Module/ components
- Diversified product portfolio
- Global development network

Focused global

- Systems/ component suppliers
- Focused product portfolio (e.g. engine/transmission components)
- Global footprint

Domestic tier-1

- Mix of diversified and focused
- Sub-assemblies/components
- Includes Aftermarket specialist
- Exporters

Domestic tier- 2/3

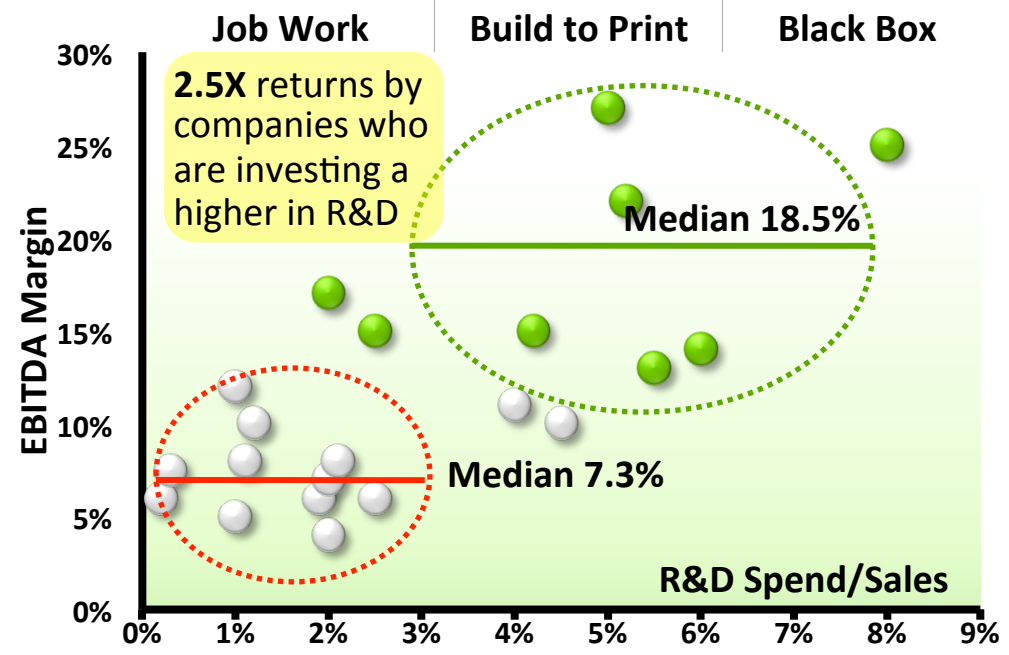
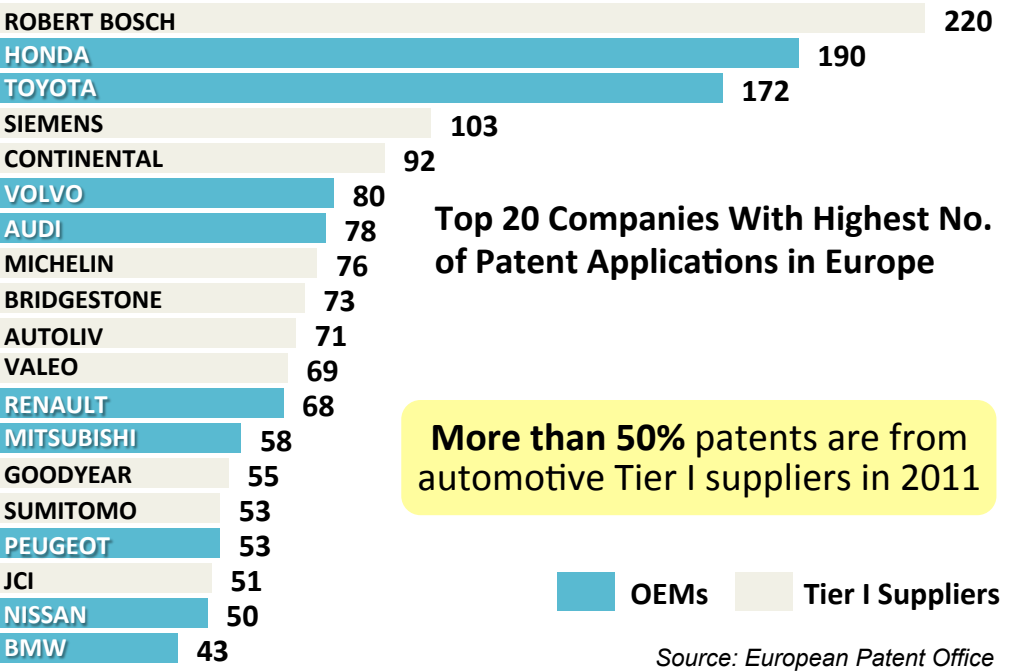
- Commodity type components/ sub -assemblies
- Includes Aftermarket specialist
- Exporters

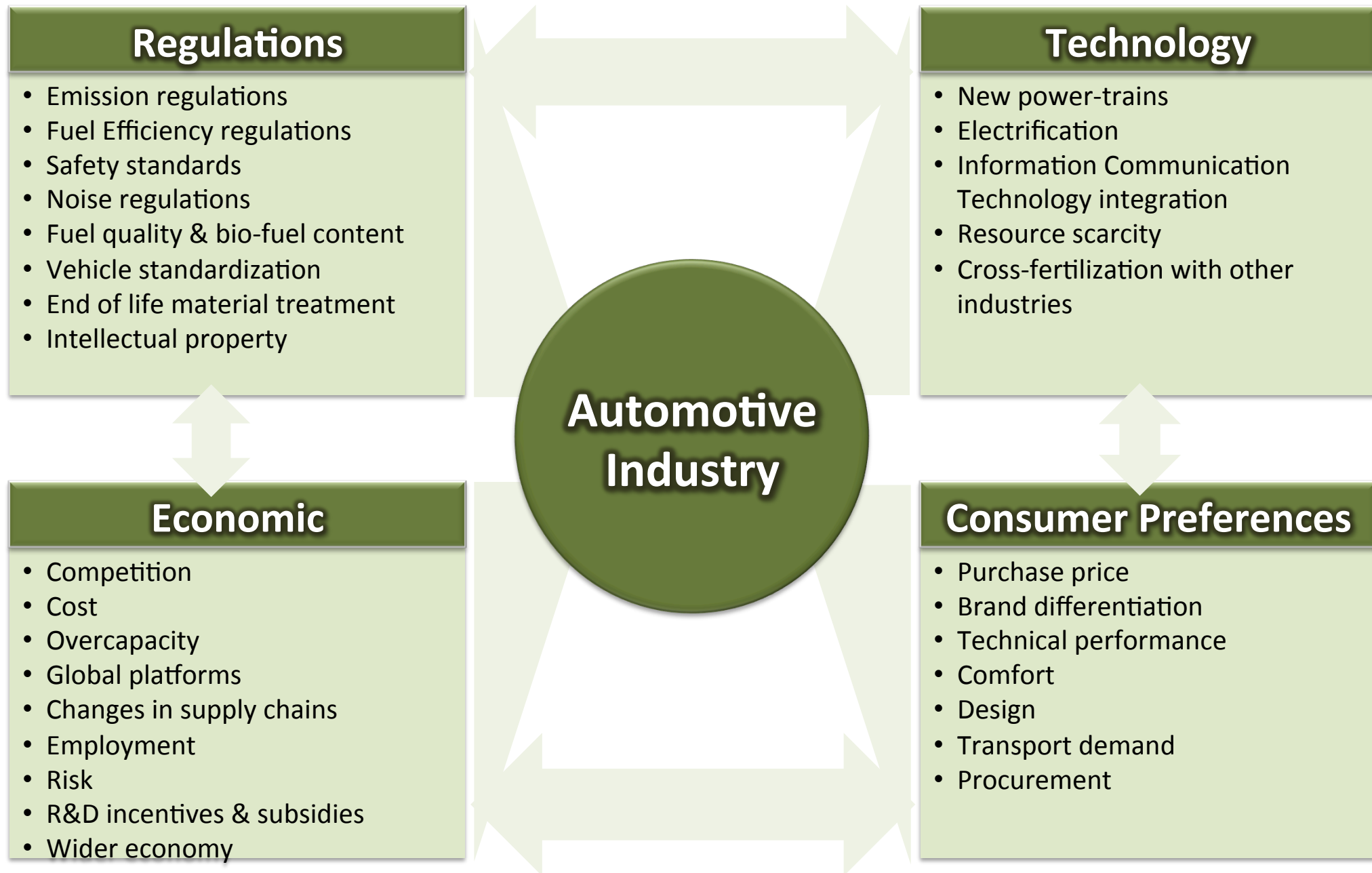
Niche Innovator

- Includes new entrants
- Knowledge-intensive components/ systems
- Customized product with special technology

Automotive Component Suppliers:

- Strong consolidation in the automotive supply sector lead the creation of so called 'Mega-suppliers', some even bigger than OEMs with more advanced specific R&D capabilities.
- Suppliers typically engineer around 75% of a vehicle and account for 60% of all R&D spending.





Automotive Emission Regulatory Trends in India

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Europe	Euro IV					Euro V				Euro VI	
China	Euro II		Euro III			Euro IV				Euro V	
India	BS 2 (=Euro II)					BS 3/ BS 4 (= Euro III/ Euro IV)					

Pollutant	Phase	Source	Control Device	Control Device - Light Duty				Control Device - Heavy Duty					
				EU-IV	EU-V	EU-VI	EU-VII	EU-IV	EU-V	US'07	EU-VI/ US'10	EU-VII	
CO	Gas	Engine	DOC	DOC	DOC	DOC	DOC	DOC	DOC	DOC	DOC	DOC	DOC
HC	Gas	Engine	DOC	DOC	DOC	DOC	DOC	DOC	DOC	DOC	DOC	DOC	DOC
HC	Gas	AFT system	DOC	NA	DOC	DOC	DOC	NA	DOC	DOC	DOC	DOC	DOC
PM-Soot	Solid	Engine	DPF		DPF	DPF	DPF		DPF	DPF	DPF	DPF	DPF
PM-Sulfate	Solid	AFT system	Fuel Quality	NA	50 ppm	10 ppm	ww S control	NA	50 ppm	10 ppm	10 ppm	10 ppm	ww S control
NOx	Gas	Engine	EGR	EGR	EGR	SCR/NAC	SCR/NAC	EGR	SCR or EGR	EGR	SCR & EGR	SCR & EGR	SCR & EGR
Ammonia	Gas	AFT system	DoC-Slipcat	NA	NA	Slip CAT	Slip CAT	NA	SLIP-CAT	NA	SLIP-CAT	SLIP-CAT	SLIP-CAT
CO ₂	Gas	Engine	Engine efficiency			engine eff.	engine eff.						TBD

NA Pollutant does not exist

Engine meets regulatory requirements

Device name Engine meets regulatory requirement as-it, yet the device helps further improve

Device name Device required; cost drives purchasing choice

Device name Technology bottleneck; Technology drives purchasing choice

Fuel PPM Mandated fuel S content, to maintain catalyst performance

DOC Diesel Oxidation Catalyst

DPF Diesel Particulate Filter

SCR Selective Catalytic Reduction (urea)

NAC NOx adsorption catalyst

EGR Exhaust Gas Recirculation

SLIP-CAT Ammonia Slip Catalyst

AFT system After treatment system

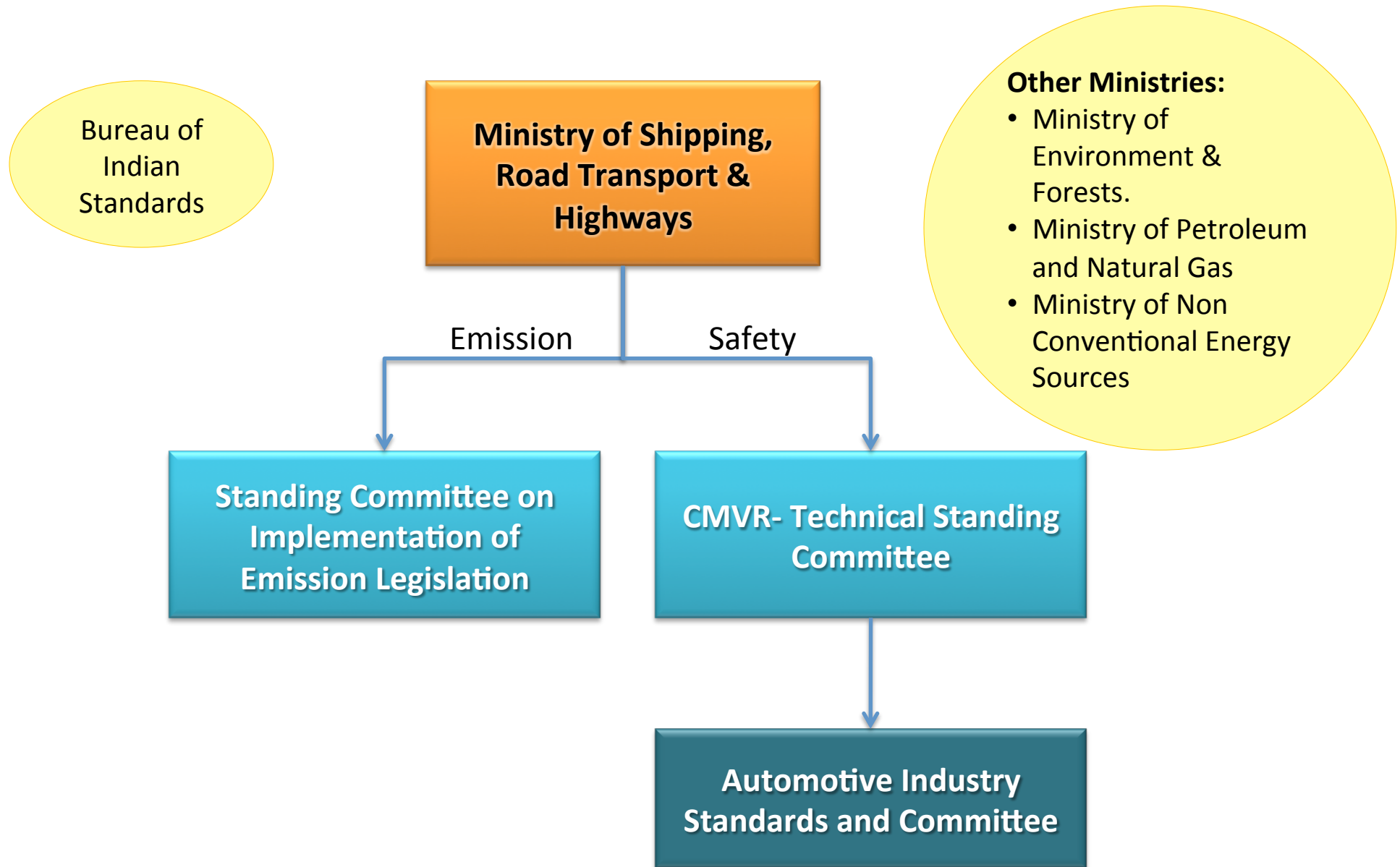
PM Particulate Matter

HC Hydro-carbons

Several technology combinations will be pursued in parallel to meet new Fuel Economy Standards:

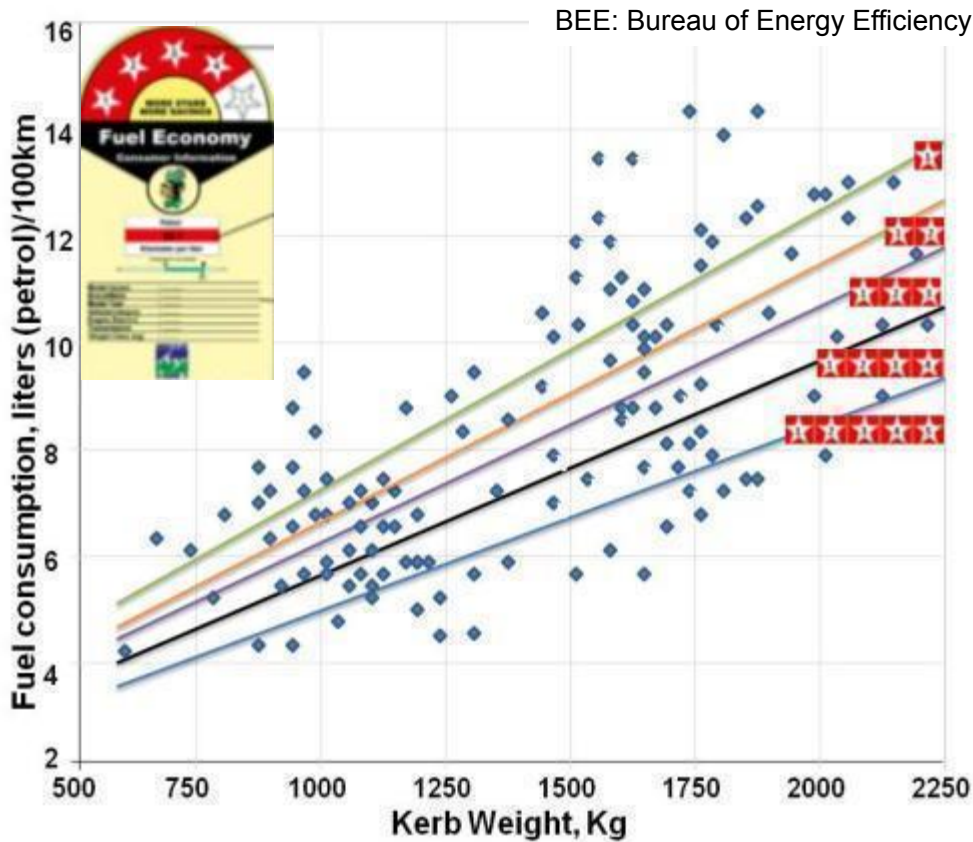
- Mix will include *more than* just hybrids
- **Downsized** engines and **advanced** transmissions have a role to play
- Continued development in **aerodynamics, light-weighting** and **Reduced rolling Resistance**
- Compression ratios could be increased without necessarily increasing fuel octane rating.
 - Use of gasoline direct injection (**GDI**) system with turbocharged engines and charge air cooling also reduces the fuel octane requirements for knock limited combustion and allows the use of higher compression ratios
 - Variable valve timing can be used to alter and optimize the effective compression ratio.
- Ministry of Road Transport and Highways (**MoRTH**) will calculate the Company Average Kerb Weight (**CAKW**) and Company Average CO₂ Production (**CACP**) for each manufacturer after 2015-16 and 2020-21
- The calculated CACP should be less than the CACP for the same CAKW on the standard line & Non compliance will lead to penalty under the Energy Conservation (**EC**) Act.
- Immediate voluntary Bureau of Energy Efficiency (**BEE**) labeling; Mandatory from 1-April-2013.

Framework for Regulations in India:

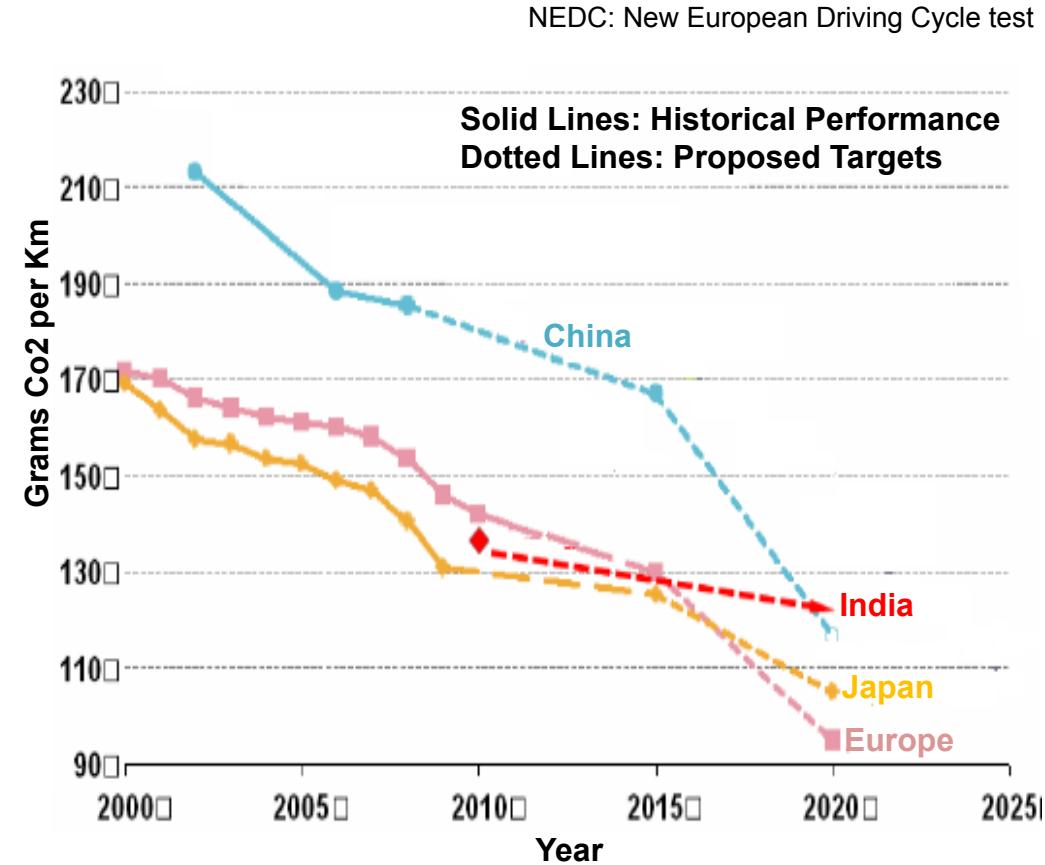


Fuel Economy Regulation in line with Europe

BEE Star Levels & Fuel Consumption



Carbon Emission Vs Fuel Consumption

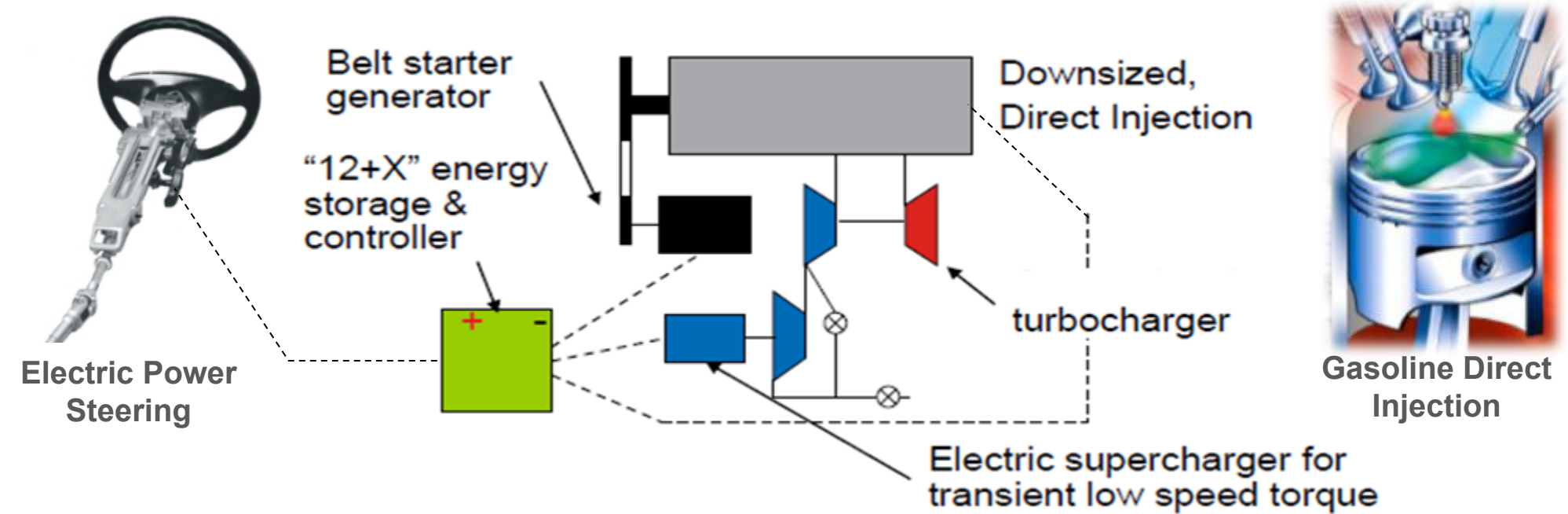


Per year reduction rate (~2% per year) lower than developed country markets, but more strict target compared with China.

Source: BEE Document: Passenger vehicle fuel economy standards & labeling program

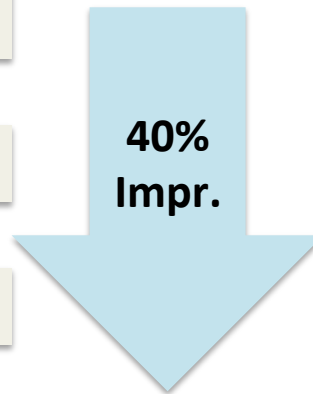
Intelligent Electrification Concept- An Example

Downsizing + Electric Supercharger + Brake Energy Recovery/ Stop/ Start + Electric Power Steering



Fuel Economy Improvement/CO2 Emissions Reduction (Europe, next 5 years)

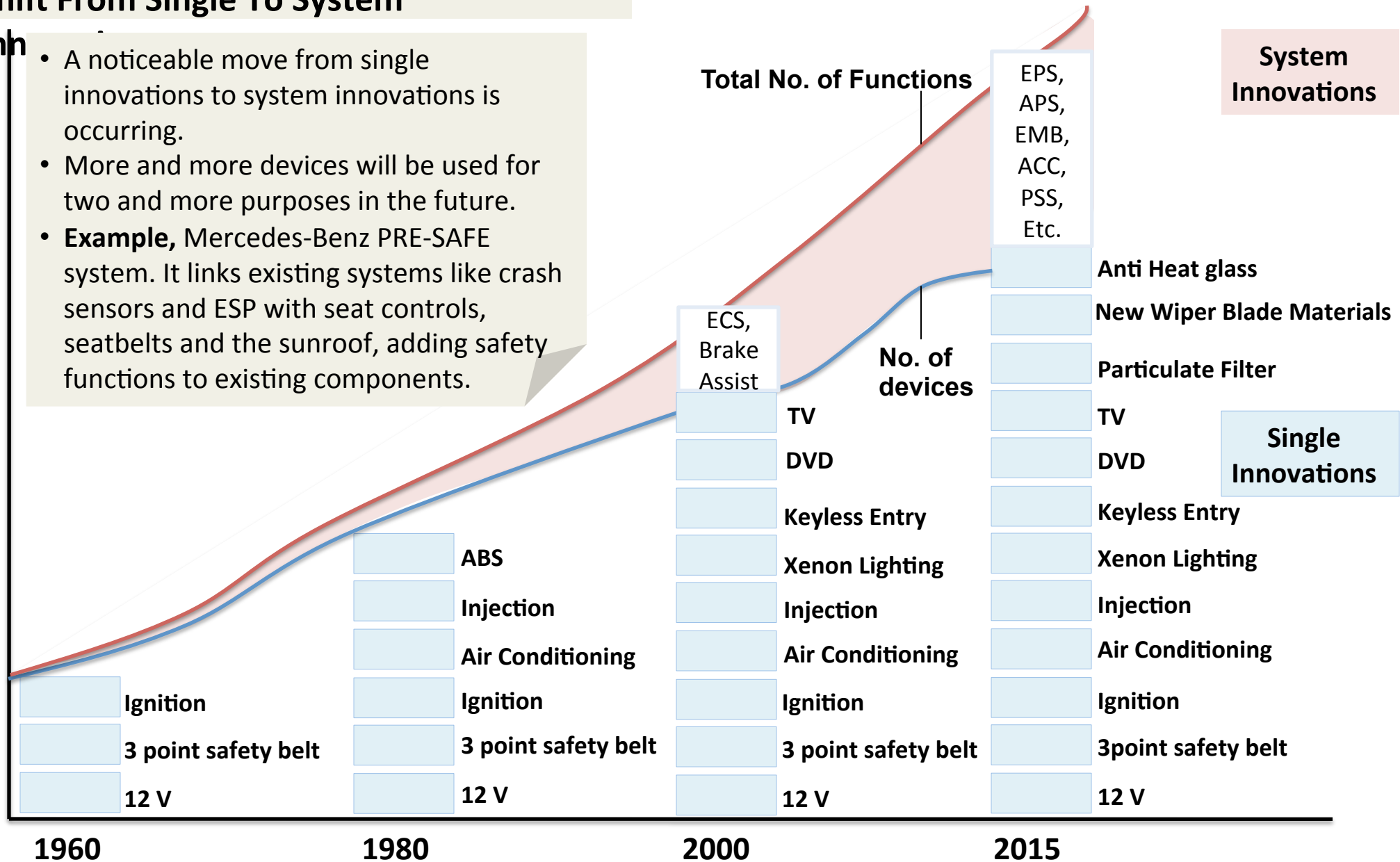
Base vehicle (2.0 liter, Gasoline) 107 kW	169 g/km
50% downsized 1 liter, Boosted DI, low friction 105 kW	25%
Add stop-start and 6kW re-generation during deceleration	8%
Add cooled EGR + e-supercharger + Electric Power Steering	5%
Automatic Transmission	2%
Improved vehicle CO2 emissions	101.4 g/km



Electronics...Behind 60% of Future Vehicle Innovations

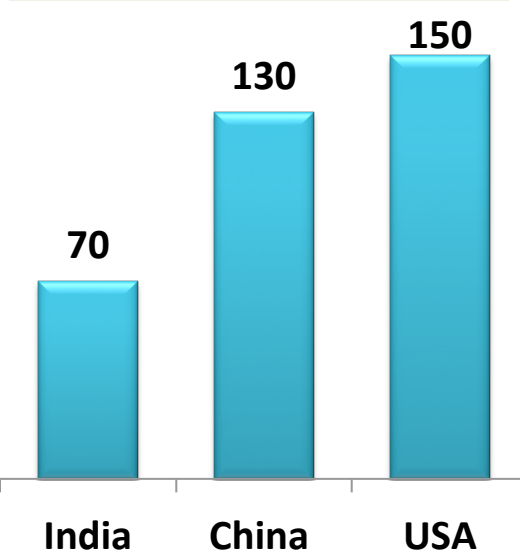
Shift From Single To System

- Inh
- A noticeable move from single innovations to system innovations is occurring.
 - More and more devices will be used for two and more purposes in the future.
 - **Example,** Mercedes-Benz PRE-SAFE system. It links existing systems like crash sensors and ESP with seat controls, seatbelts and the sunroof, adding safety functions to existing components.

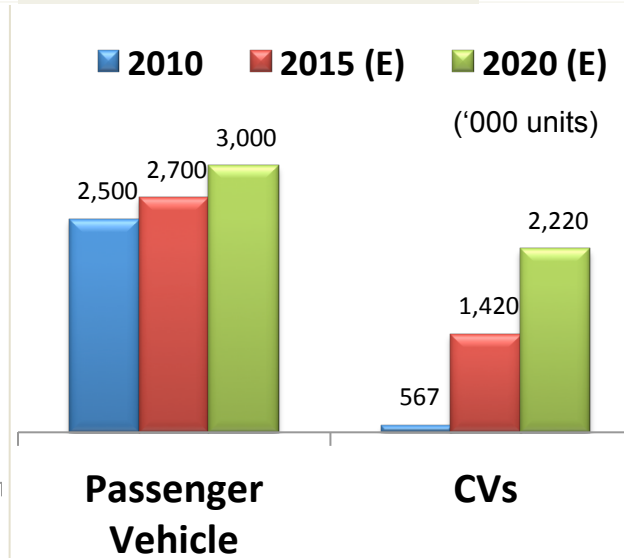


Vehicle light Weighting: Plastics & Composites

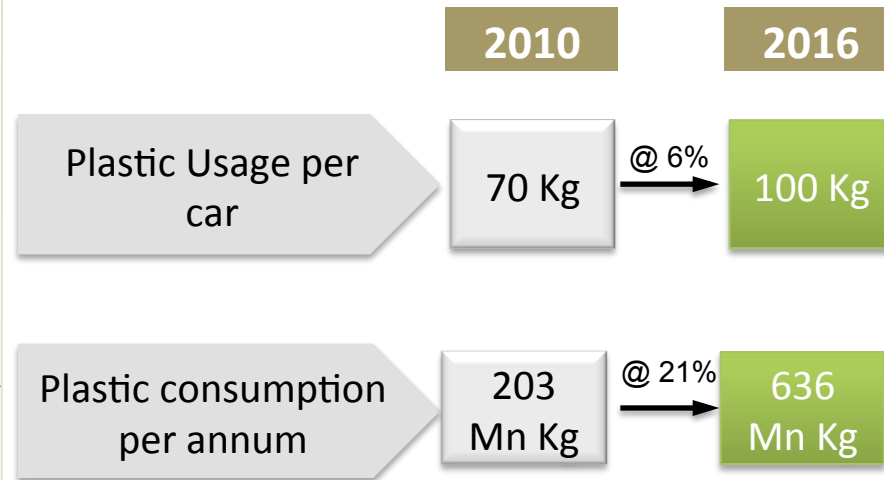
Plastic Usage in Kg/Car



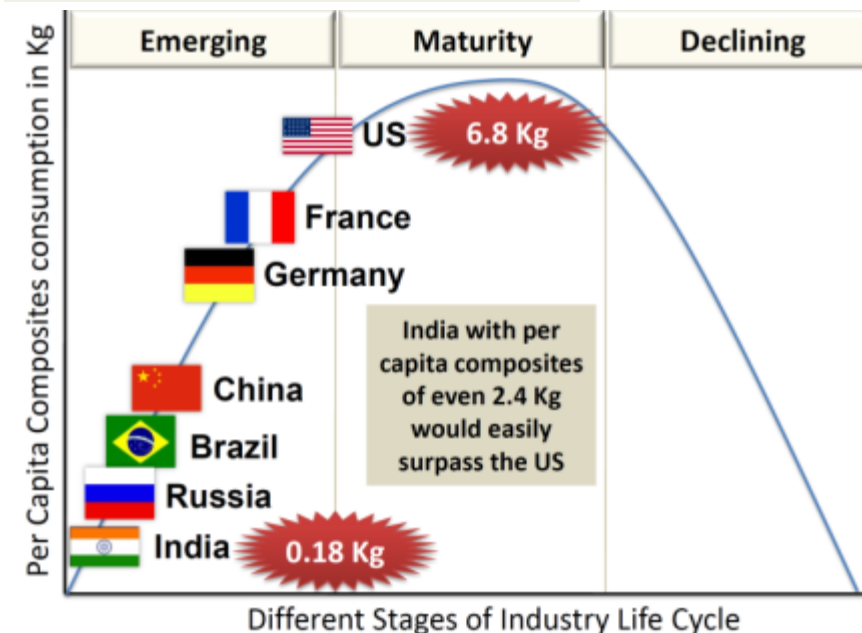
Vehicle Prod. in India



A Forecast Of Plastic Usage



Composites Usage :

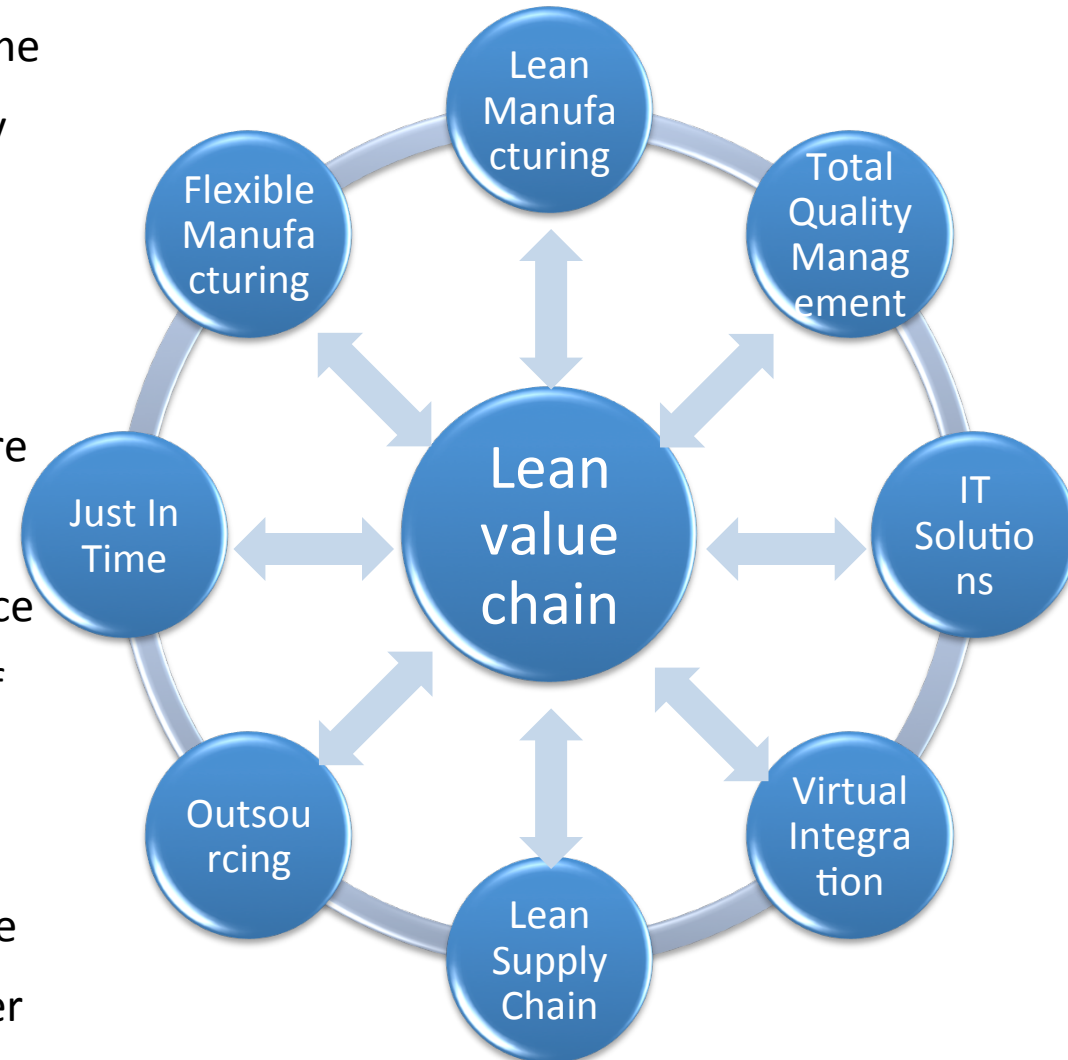


Weight Reduction of vehicles for fuel efficiency and CO2 emission reduction will drive the use of Plastics & Composites in automotive parts

Operational Excellence in Indian Manufacturing

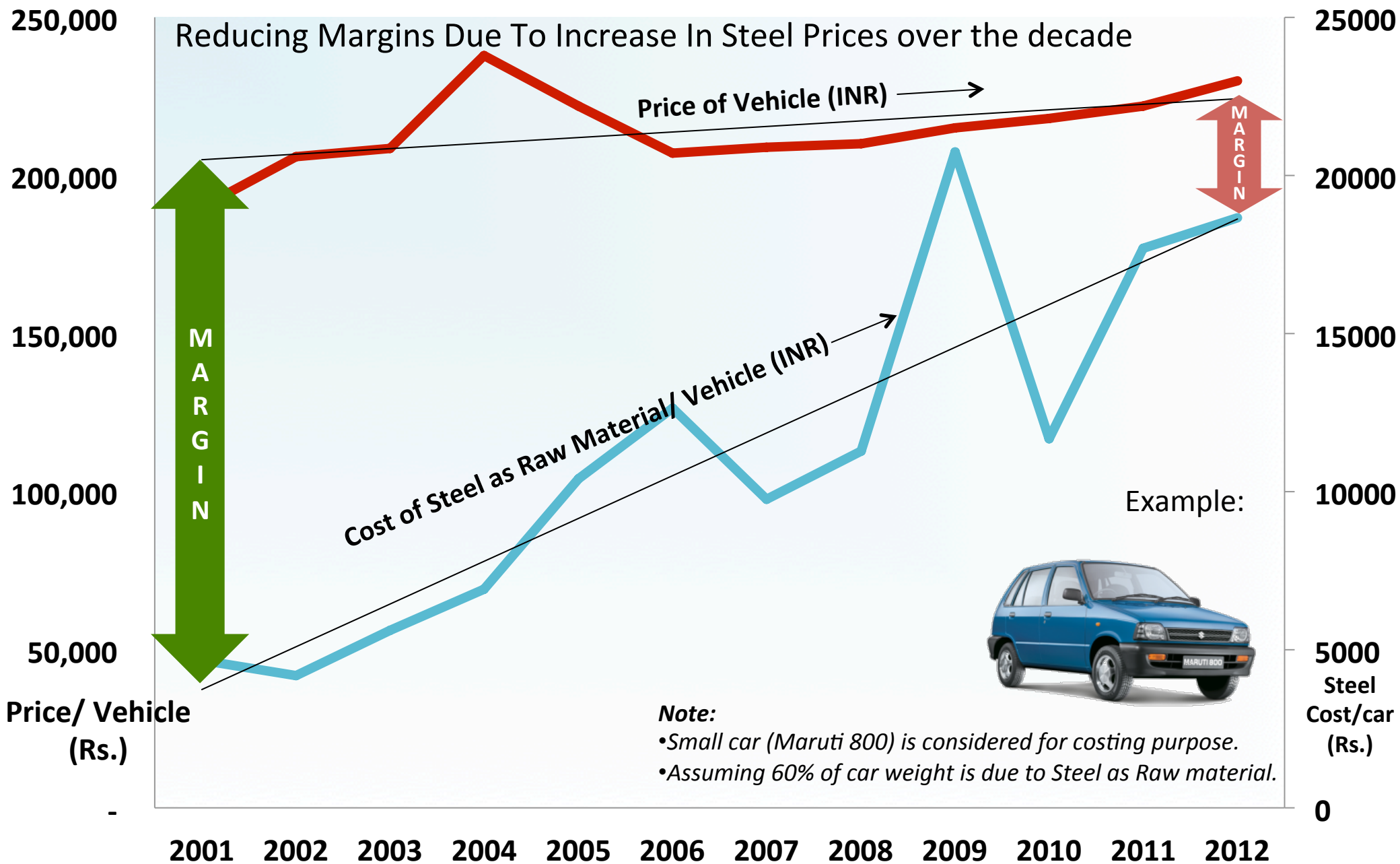
- In the past, India's manufacturing exporters thrived primarily on the back of low input costs. However, the low-cost story no longer is the prime driver of growth due to rising wages, high energy costs, and increasing cost of capital.
- The nation is currently second only to Japan in terms of hosting companies awarded for quality excellence. These include 21 companies that were awarded the Deming Excellence Award and 153 companies with the Total Productive Maintenance (TPM) Excellence Award by the Japan Institute of Plant Maintenance (JIPM).
- Of the 165 Indian companies that were awarded the CII-EXIM Bank Awards for Business Excellence since its inception in 1994 till 2010, around 80 per cent are in the manufacturing sector.

Key Features Of A Lean Production System



- Challenges for the Automotive Sector

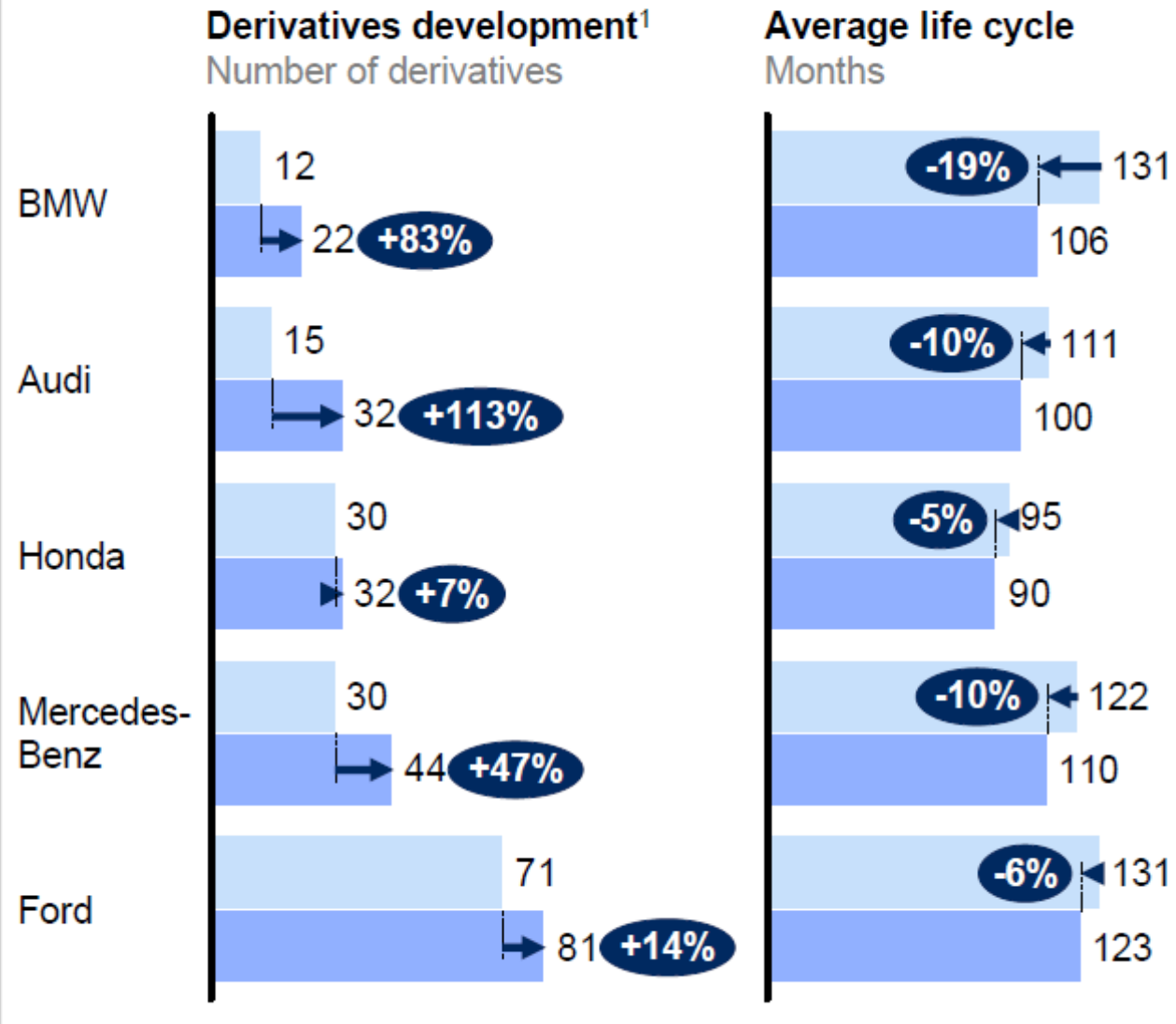
Challenges In Automotive Sector: Commodity Prices On The Rise



Challenges in Automotive Sector

Fragmentation of demand: More consumer options and shorter product cycles (automotive example)

2002
2011



With addition of 1.8 Bn consumers globally by 2025 and entry of newer players, associated fragmentation will increase.

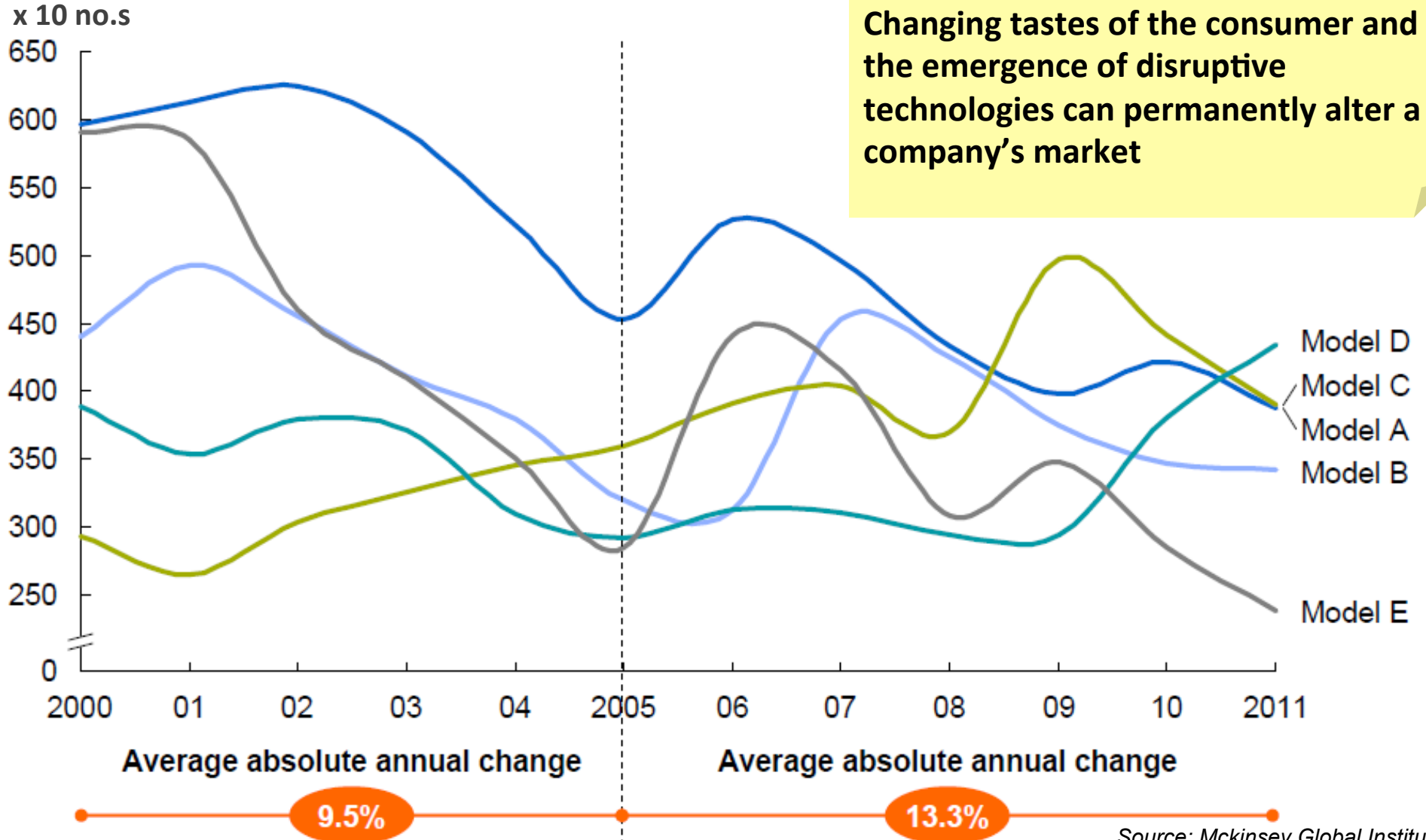
- Greater number of models requires higher inventories or longer lead times
- Lower volumes per model mean greater exposure to demand volatility due to scale issues
- Production line and supply-chain complexity increases
- Shorter life cycles require faster production/product ramp-ups

Source: McKinsey Global Institute

Challenges in Automotive Sector

Auto demand is becoming more volatile

Monthly Sales of selected vehicles in individual market segment



Source: Mckinsey Global Institute

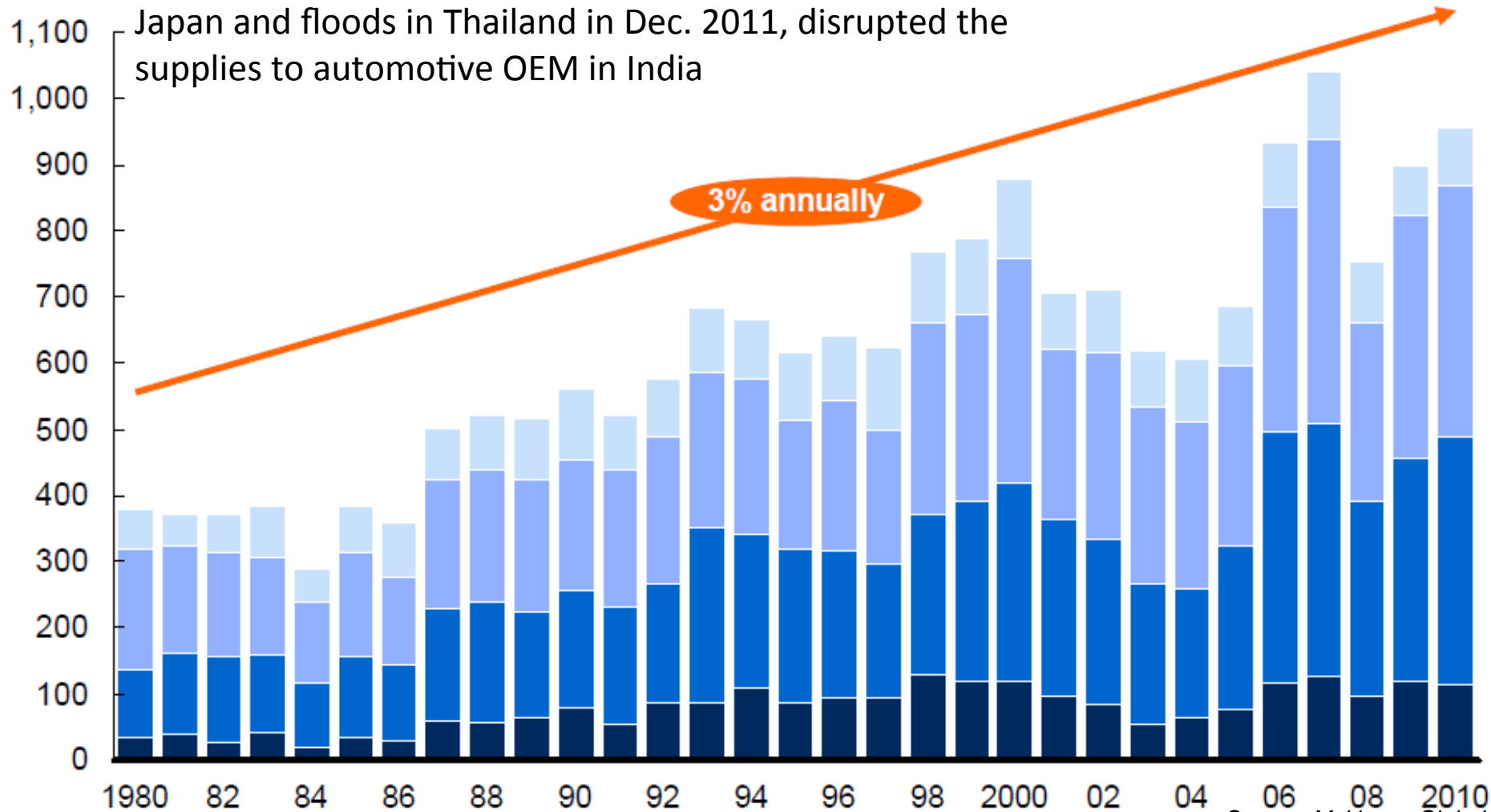
Challenges in Automotive Sector

The number of disruptive natural events has risen over the past three decades

Number of catastrophes worldwide

- Climatic catastrophes
- Hydrologic catastrophes
- Meteorological events
- Geophysical events

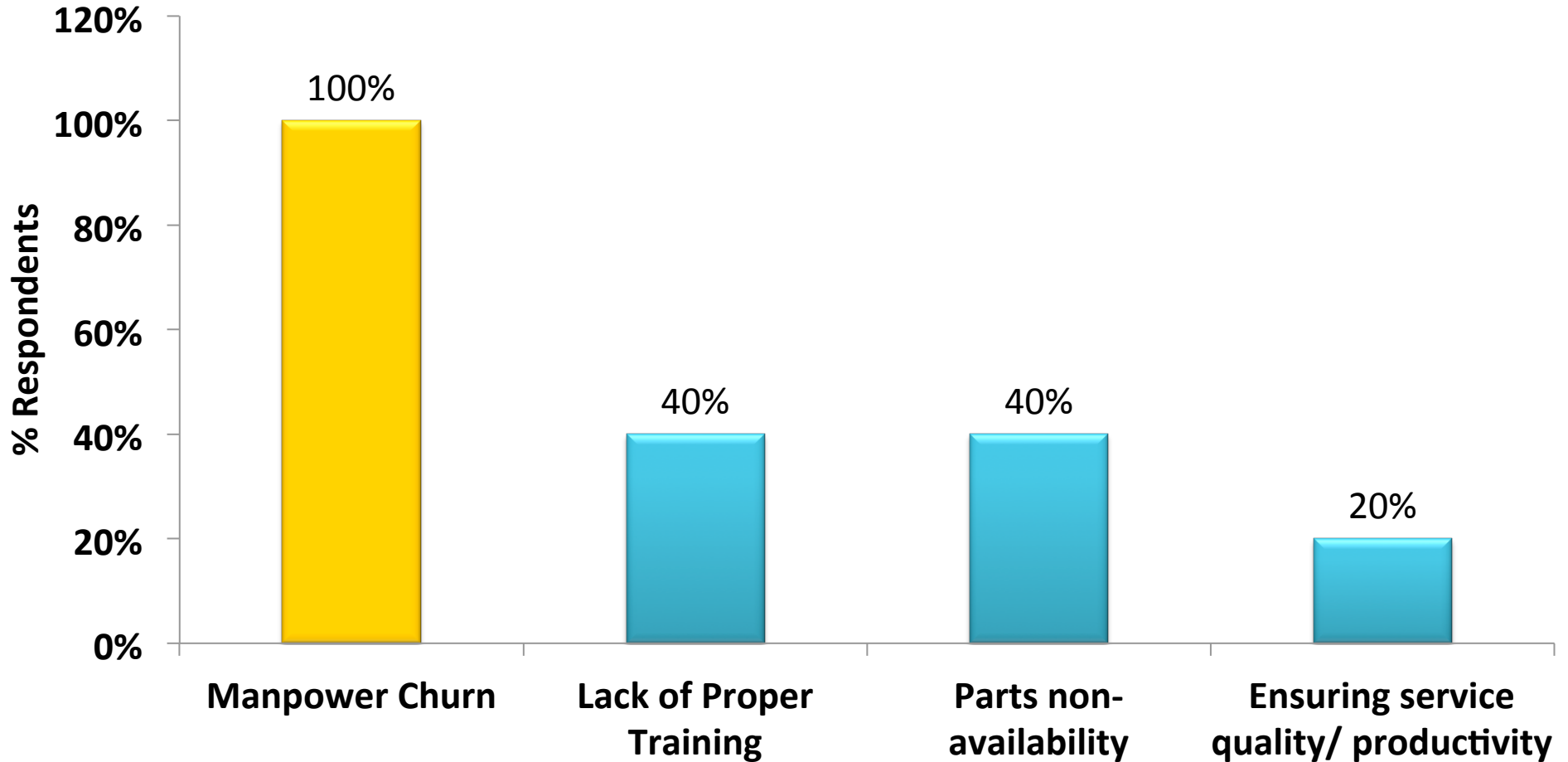
The earthquake and subsequent tsunami in March, 2012 in Japan and floods in Thailand in Dec. 2011, disrupted the supplies to automotive OEM in India



Source: Mckinsey Global Institute

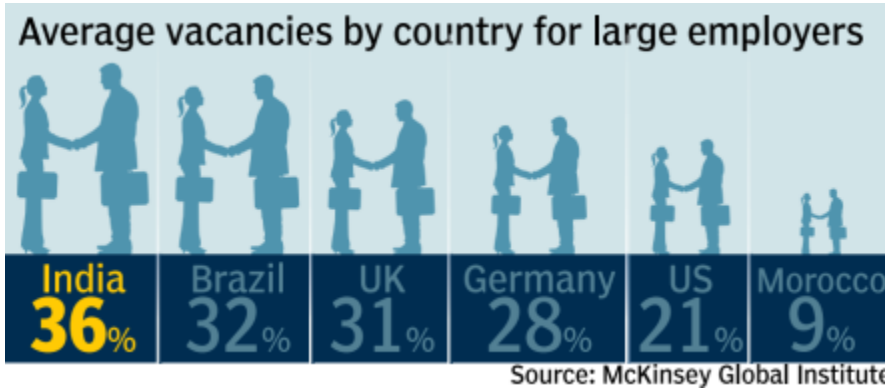
What Are The Key Challenges In Automotive Servicing Today?

Outcome of a survey of 806 executives at senior and middle management levels in Indian Automotive Sector. All of them agree on the serious issue of attrition. Some of the Automotive tier one/two companies are witnessing attrition as high as 34% in a year



Challenges in Automotive Sector

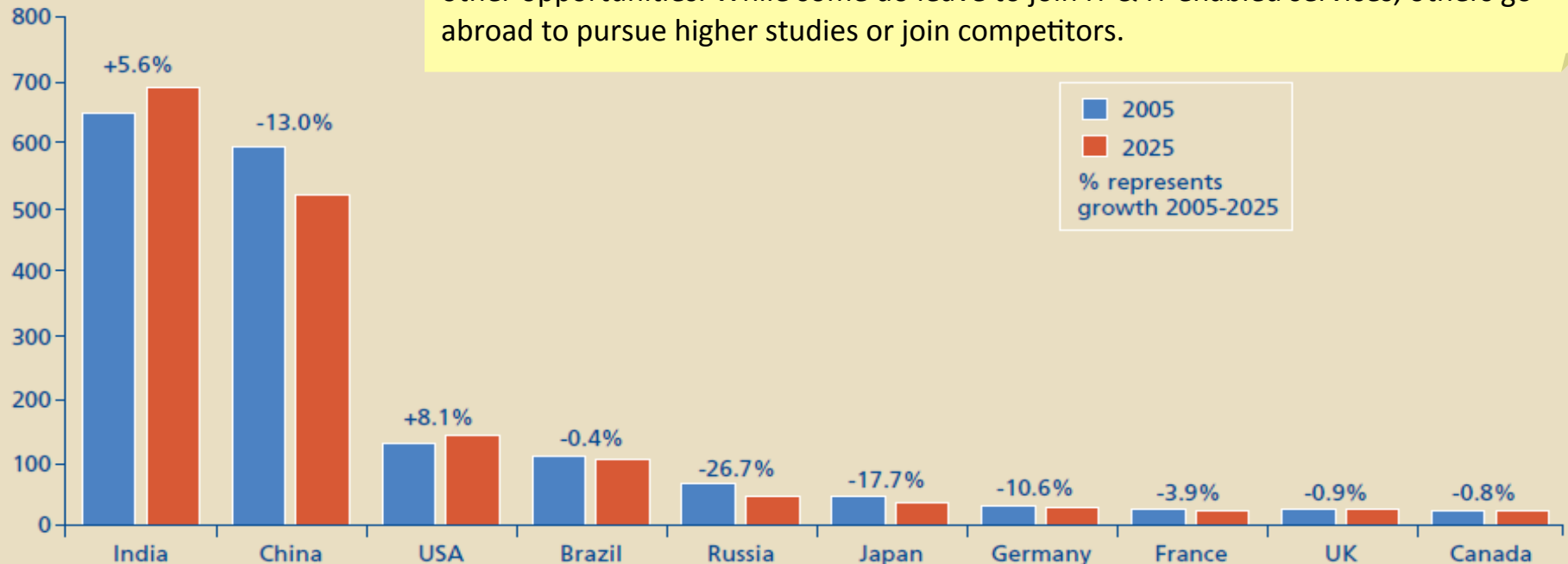
Up to 36% of available jobs remain vacant for want of candidates with requisite skills.



Top firms, specially those from IT, banking, finance & automotive sectors, spend \$2,000~ \$5,000 per candidate just to make them job-ready. Includes the costs related to training, infrastructure, accommodation and stipends.

Figure 2. World's Talent Pools of Younger People (Under Age 30)
Shrinkage in most countries between 2005 and 2025 except India and the United States

Population in millions
(Under the age of 30)

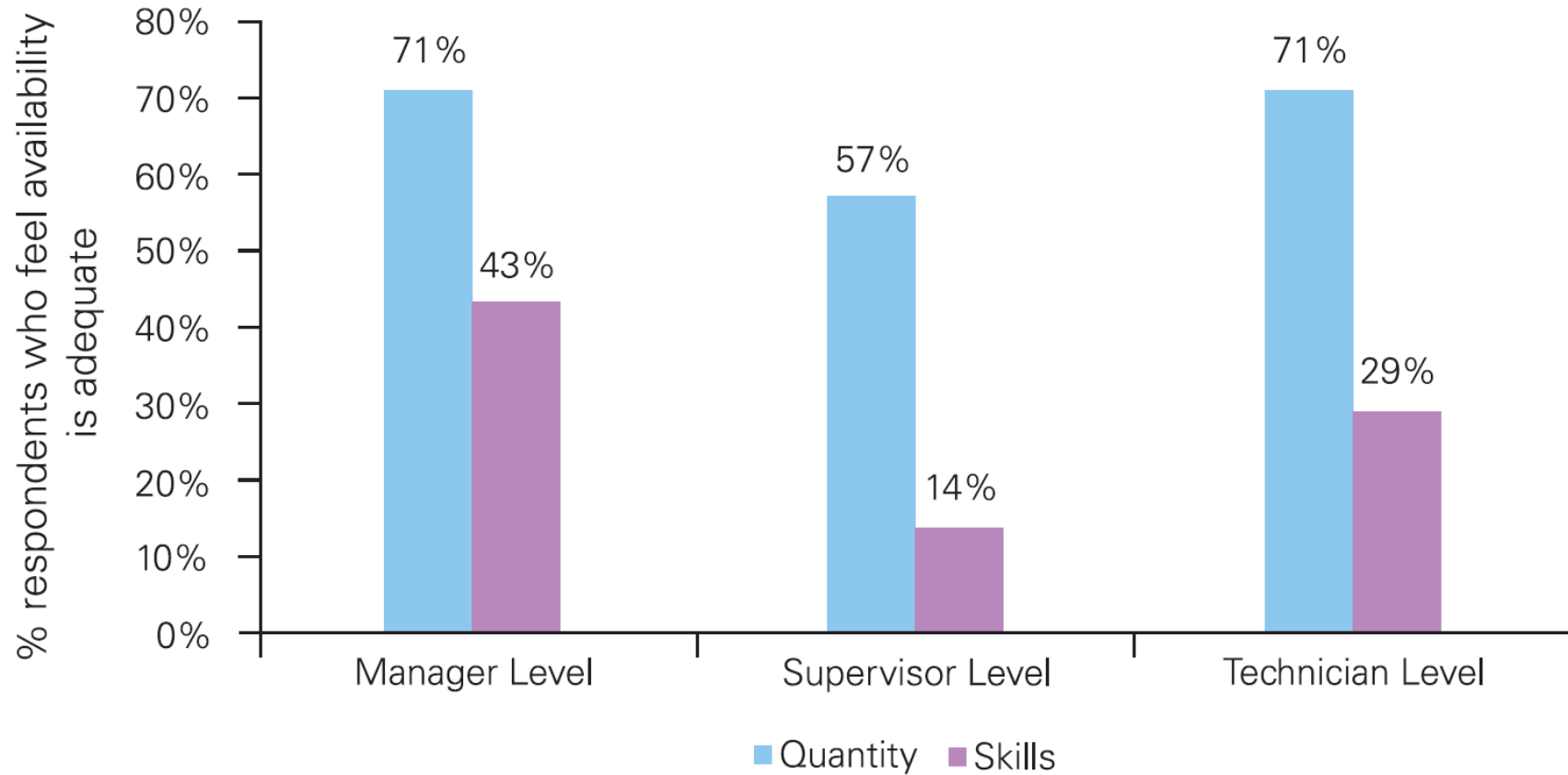


Most players have seen trained manpower with a few years of experience leaving for other opportunities. While some do leave to join IT & IT enabled services, others go abroad to pursue higher studies or join competitors.

Challenges in Automotive Sector: Attracting Young Talent

A failure to effectively attract and engage the new young talent entering the work force for the first time from their colleges, institutes and universities will therefore significantly hamper manufacturers' competitiveness in the long run.

Manpower availability to support growth



MES – Modular Employable Skill at Tata AutoComp Systems Ltd.

Objectives:

- Develop multi skilled personnel for automotive industry through NCTVT (national council for training in vocational trades).
- Meet obligations towards affirmative action by developing employable skilled personnel specifically from SC/ST, economically weaker sections of the society & from industrially backward & disturbed areas (target 25%).
- Qualification & age of students – 10th pass & 18 years.

Reimbursement Expected from Government:

- Under the MES scheme, the Training Institute will get Reimbursement from State DGET @ Rs.15 per student per hour of training, who successfully complete a module in the Path Line of skills
- This amount is expected to cover most of the staff, teaching aids & infrastructure maintenance expenses of the Automotive Skills Development Centers at Pune, Pantnagar & Jamshedpur.
- The Institute can get Tax Exemption certificate from Commissioner of Income Tax



- Initiatives by Government for Manufacturing Sector

Objectives:

- Increase the sectoral share of manufacturing in GDP to at least 25% by 2022
- Contribute to the national objective of creating 100 million additional jobs by 2022
- Increase the level of domestic value addition and technological “depth” in manufacturing
- Enhance global competitiveness of manufacturing and make the country an international manufacturing hub.
- Ensure skill development/ skill upgradation
- Ensure sustainable development

Policy Instruments

A. National Investment and Manufacturing Zones (NIMZs)

Conceptualized as integrated industrial townships with state-of-the-art infrastructure and land use on the basis of zoning; clean and energy efficient technology and requisite social infrastructure managed by an SPV.

B. Policy instruments for manufacturing industry – applicable generally including in NIMZs

- i. Rationalization/simplification of business regulations
- ii. Simple/expeditious exit mechanism for non viable units
- iii. Technology development, including green technologies
- iv. Industrial training and skill upgradation measures
- v. Incentives for MSMEs

C. Special Focus Sectors:

D. Leveraging infrastructure deficit and Government procurement

E. Trade Policy

NATIONAL INVESTMENT and MANUFACTURING ZONES (NIMZs)

- Integrated industrial townships – at least 5000 hectares.
- State-of-art infrastructure
- Land use – based on zoning
- Clean, energy efficient technology
- Social infrastructure
- Skill development facilities
- Ownership: State Government to adopt a workable model
- At least 30% total land area – manufacturing units
- Management by SPV
- Declaration as an industrial township under Article 243Q (c) of the Constitution of India

FISCAL INCENTIVES UNDER NATIONAL MANUFACTURING POLICY

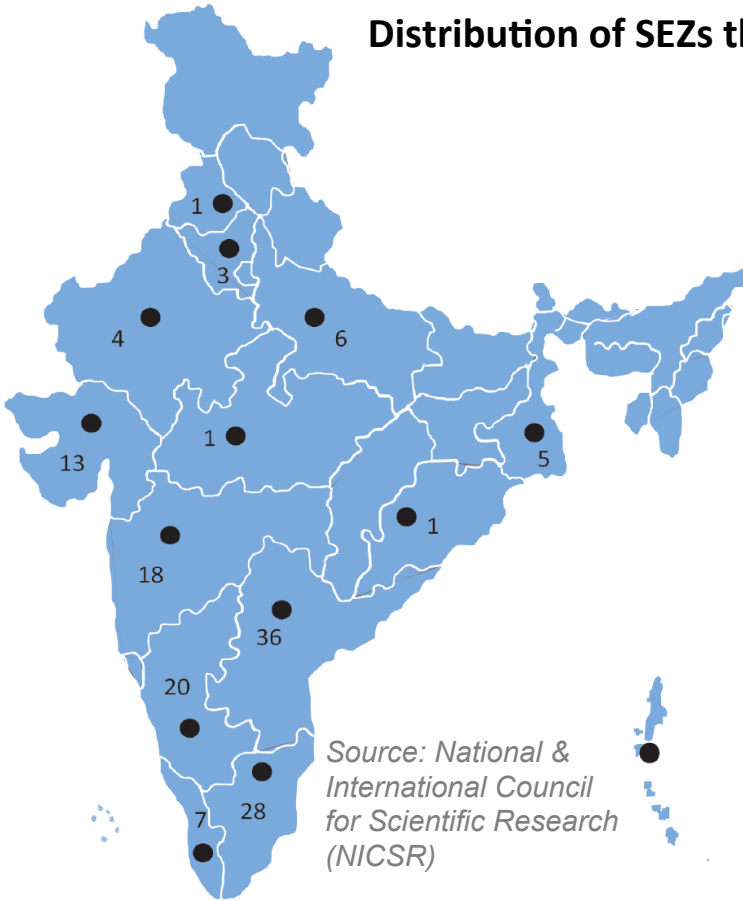
- Venture Capital Funds with a focus on SMEs in the manufacturing sector, will be granted tax pass-through status;
- A separate fund will be created with the Small Industries Development Bank of India (SIDBI) using the shortfalls against MSE credit targets for commercial banks;
- Rollover relief from long term Capital Gains Tax will be provided to individuals on sale of a residential property whenever such sale consideration is invested in the equity of new start-up SME company in the manufacturing sector for the purchase of new plant and machinery;
- Liberalization of banking norms for banks investing in Venture Capital Funds with a focus on SMEs in the manufacturing sector will be taken up in consultation with the RBI;
- Liberalisation of IRDA guidelines for insurance companies investing in Venture Capital Funds with a focus on SMEs in the manufacturing sector will be taken up in consultation with the IRDA;
- Cost of placement cells in an ITI set up in a NMIZ will be provided by the Central Government for the first five years;
- Polytechnics and SPV in NMIZ will be provided Viability Gap Funding by the Central Government for covering the capital costs as per VGF guidelines of the Ministry of Finance

FISCAL INCENTIVES UNDER NATIONAL MANUFACTURING POLICY

- The Government will provide weighted standard deduction of 150% of the expenditure incurred on PPP projects for skill development (such as private institutions, ITIs) in coordination with the National Skill Development Corporation.
- All buildings with more than 2000 sq meter of built up area in a NMIZ which obtain green rating under the Indian Green Building Council (IGBC)/ Leadership in Energy and Environmental Design (LEEDS) or Green Rating for Integrated Habitat Assessment (GRIHA) systems will be eligible for an incentive of Rs 2 lakhs.
- Units practicing zero water discharge will be eligible for 10% one time capital subsidy on the relevant equipment/systems subject to actual usage for one year and third party certification.
- The SMEs will be provided 25% of expenditure incurred on water environmental audit subject to a maximum of Rs 1 lakh.
- SMEs will be able to access the patent pool and/or part reimbursement of the technology acquisition costs up to a maximum of Rs 20 lakhs for the purpose of acquiring patented technologies.
- Incentives consisting of five percent interest reimbursement of the nominal interest charged by lending agency and ten percent capital subsidy will be provided for production of equipment/ machines/ devices for controlling pollution, reducing energy consumption and for water conservation out of the Technology Acquisition and Development Fund (TADF).

Special Economic Zones (SEZs)

Distribution of SEZs throughout India

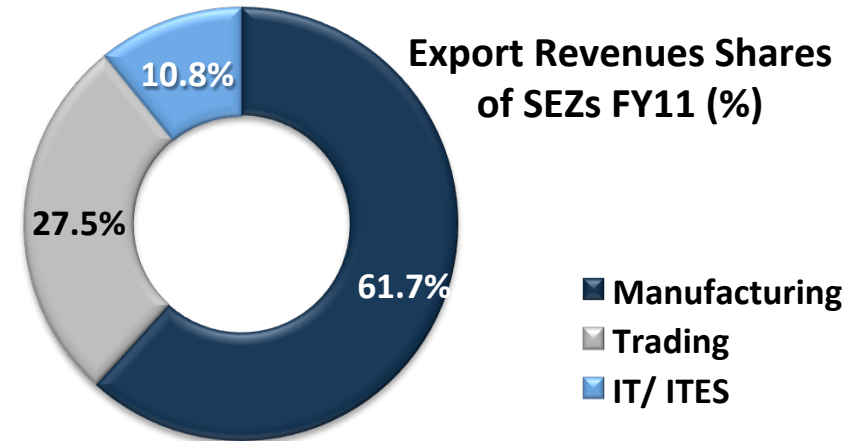
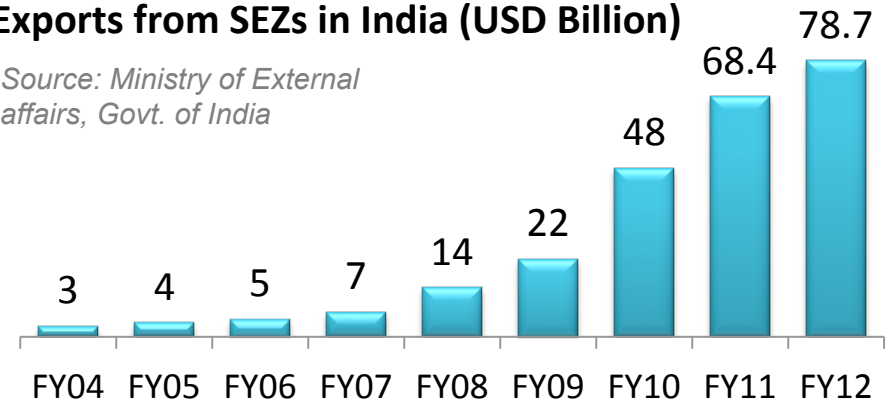


Source: National & International Council for Scientific Research (NICSR)

- Andhra Pradesh- 36
- Tamilnadu- 28
- Karnataka- 20
- Maharashtra- 18
- Gujarat- 13
- Kerala- 7
- Uttar Pradesh- 6
- West Bengal- 5
- Rajasthan- 4
- Haryana- 3
- Himachal Pradesh-1
- Madhya Pradesh-1
- Orissa-1,
- Andaman & Nicobar-1
- Islands -1

Exports from SEZs in India (USD Billion)

Source: Ministry of External affairs, Govt. of India



- Duty free import/ domestic procurement of goods for development, operation and maintenance of SEZ units.
- 100% Income Tax exemption on exports for first 5 yrs, 50% for next 5 yrs & 50% of export profit for next 5 years.
- Exemption from Minimum Alternate Tax (MAT).
- External Commercial Borrowing by SEZ units up to US\$500 Mn/ yr without any maturity restriction through recognized banking.
- Exemption from Central Sales Tax & Service Tax, State sales tax & other levies as extended by the resp. State Govts.
- Single window clearance for Central and State level approvals.

Delhi Mumbai Industrial Corridor (DMIC) Project Overview

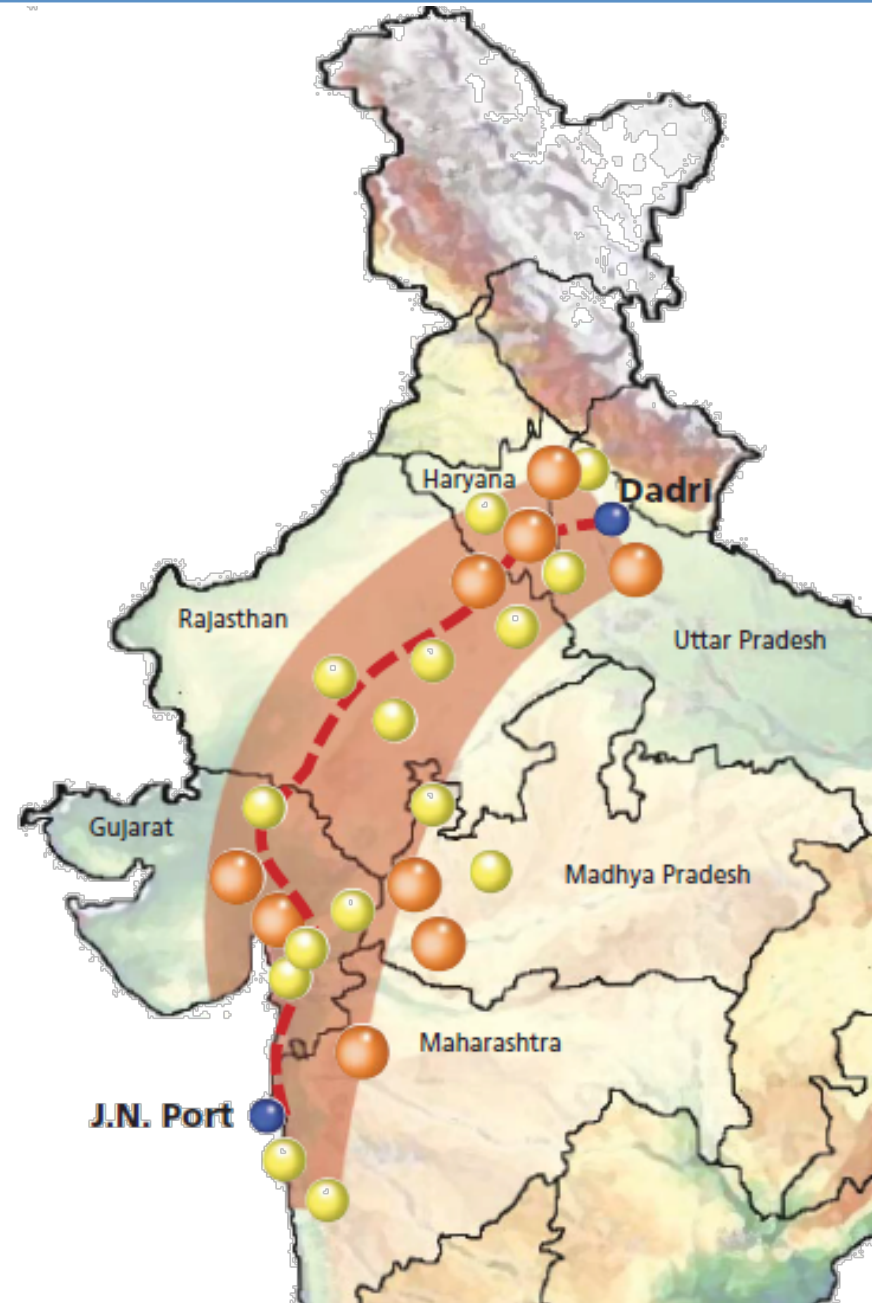
Government of India plans to develop Multi-modal High Axle Load Dedicated Freight Corridor (DFC) between Delhi and Mumbai, covering an overall length of 1483km, which constitutes 13.8% of geographical area of overall India. Estimated project deadline is 2016 - 17.

The project goals for DMIC are:

- Double employment potential in 5 years (14.87% CAGR)
- Triple industrial output in five years (24.57% CAGR)
- Quadruple exports from the region in 5 yrs (31.9% CAGR)

This project incorporates Nine Mega Industrial zones of about 200-250 sq. km., high speed freight line, three ports, and six air ports; a six-lane intersection-free expressway connecting the country's political and financial capitals and a 4000 MW power plant.

Several industrial estates and clusters, industrial hubs, with top-of-the-line infrastructure would be developed along this corridor to attract more foreign investment.



Dedicated Freight Corridors (DFC) Project Overview

Dedicated freight corridors along the Eastern and Western Routes to allow longer and heavier trains to ply .

Benefits

- Accelerate nationwide economic development.
- Expansion and improvement of the market for farmers in the region as well as forestry and fisheries.
- Clean energy transportation system, Green House Gas Emission Reduction by 477 million ton CO2 over a period of 30 years.



Golden Quadrilateral (GQ) Project Overview

- Largest highway project connecting 4 metros , Delhi, Mumbai, Chennai & Kolkata.
- Top ten other metropolis such as Bangalore, Pune, Ahmadabad and Surat are also served.
- Construction of 5,846 km + 7300 km of four/ six lane express highways.

Current Status of GQ

- In Sept-2009, it was announced that the existing four-lane highways would be converted into six-lane highways.
- As of Aug 2011, Rs. 30,858 crore (5.7 Bn US\$) cost incurred by Indian Government.
- Eight contracts in progress worth Rs. 1,634 crore (0.3 Bn US\$)
- By Jan 2012, four lane highway network of 5,846 km completed.



- Strategies to Expand Manufacturing Base in India

Seizing the future by

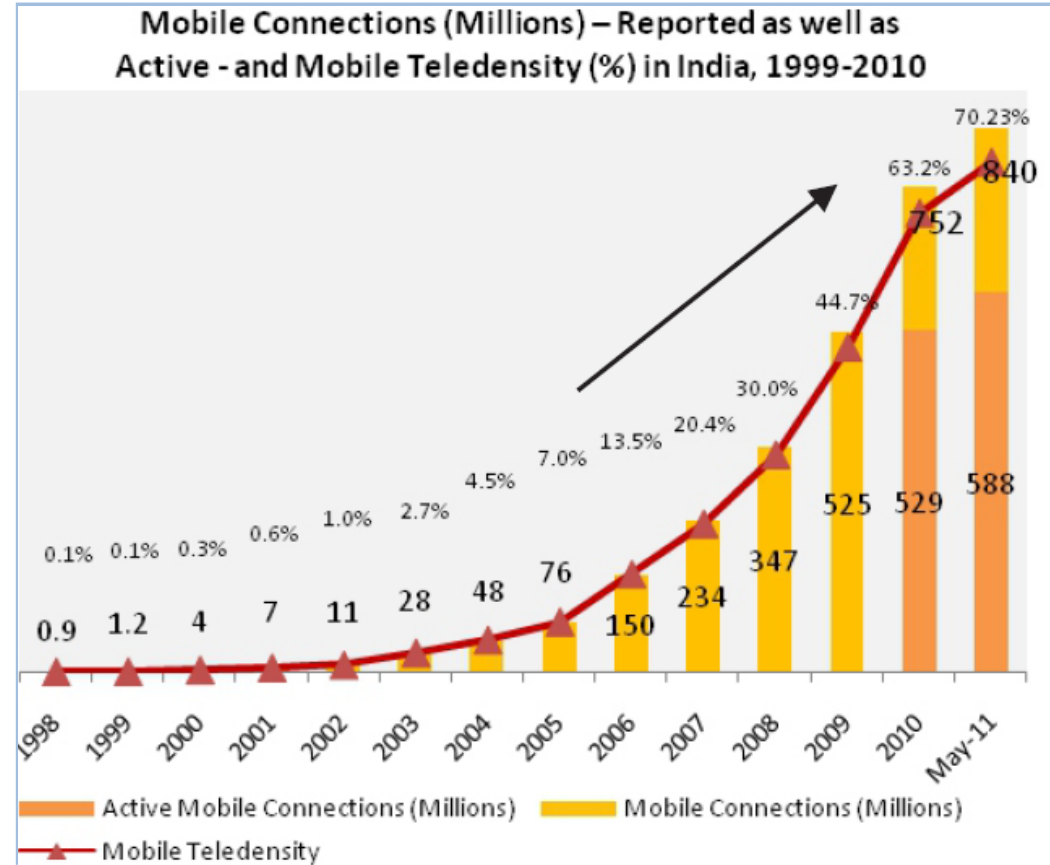
Leapfrogging

- **India will change geometrically, not arithmetically**
- **Invest ahead of the curve**

India Will Change Geometrically And Not Arithmetically

1. Political evolution
2. Economic evolution
3. Deregulation effect
4. Telecom revolution

Leapfrogging



What got you here will not get you there: look for leapfrogging opportunities



Technology adaptation more important than quick returns



Dreamliner, is a revolutionary product that had its share of struggle

Doing and Learning more important than knowledge acquisition



Nano: The plastic door designed for Nano could not be commercialised but a step in the right direction

Imagining the future is more important than forecasting it



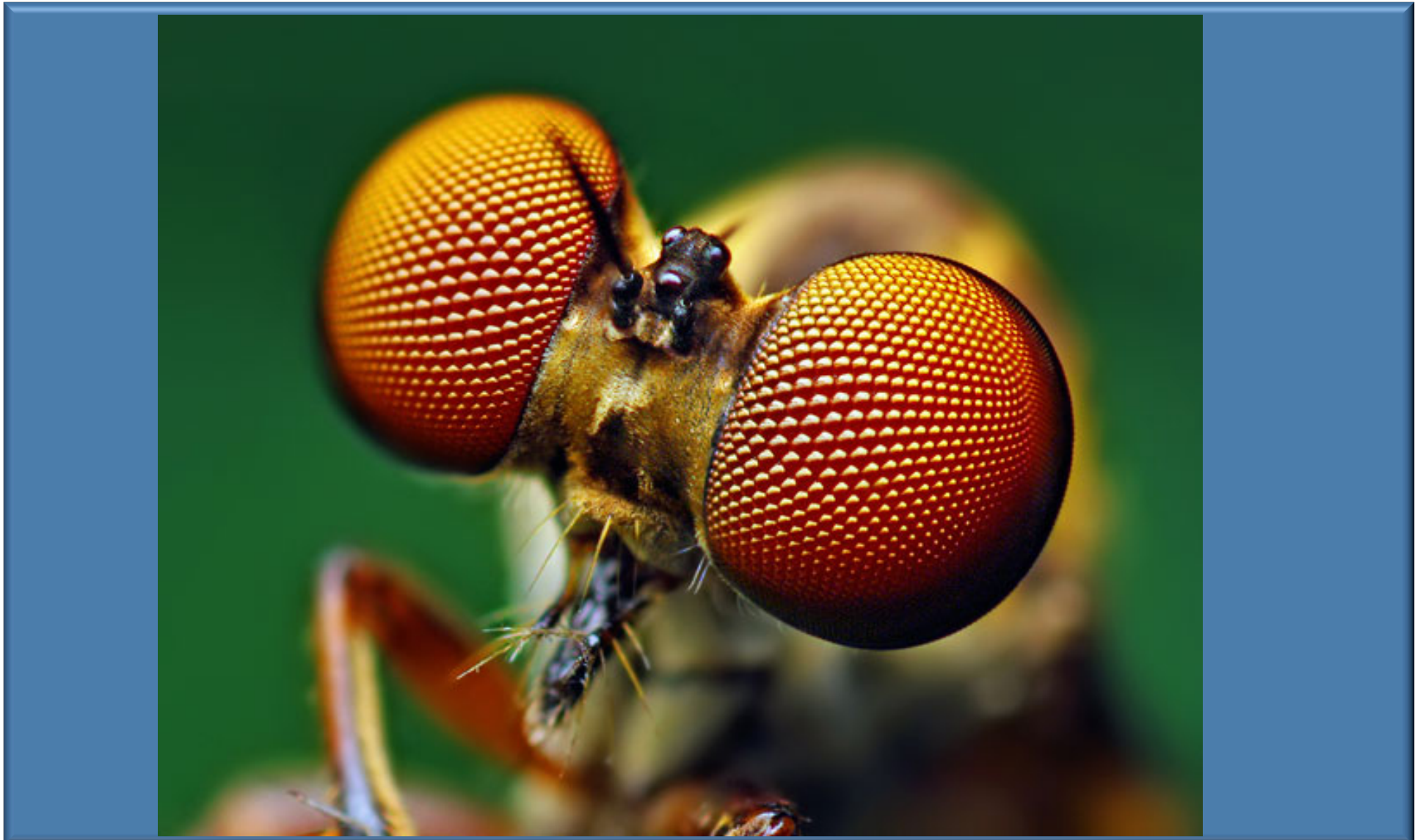
***UNCERTAINTY IS THE NORMAL
STATE IN NATURE***

EFFICIENCY versus EFFECTIVENESS

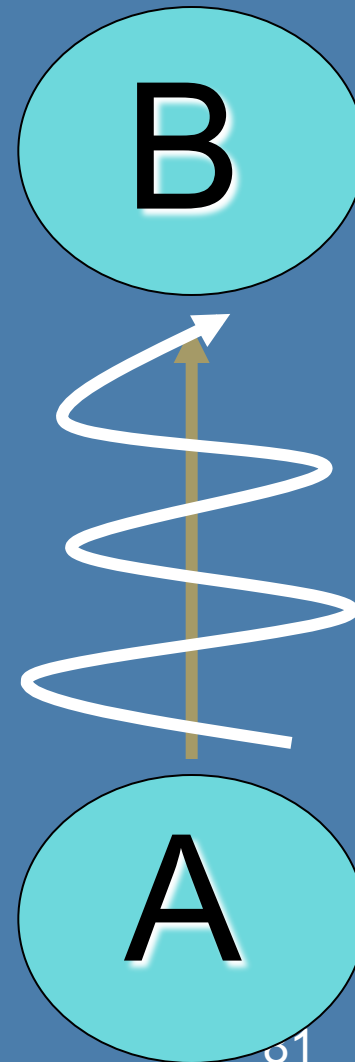
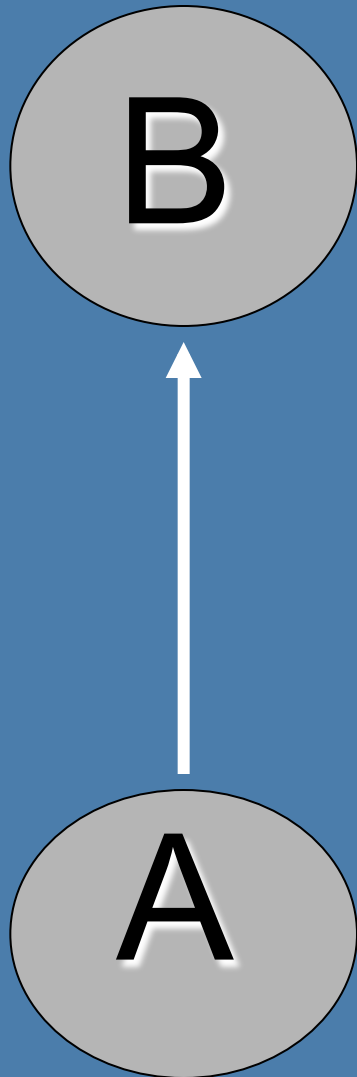
- You work on things you understand quite well
- You plan in detail and review actions against that plan
- You impose a process and responsibility
- You expect completion as per an agreed time table
- You throw resources to accomplish the tasks

- You work on things you don't quite understand
- You find it difficult to plan as the way forward is unclear
- You try out approaches and adjust your plans flexibly
- You expect progress, but are not sure of completion
- You generate options continuously, and don't just increase resources

Why the Fly cannot fly straight



The spiral is central to life. The straight line does not work quite often. Evolved decisions work

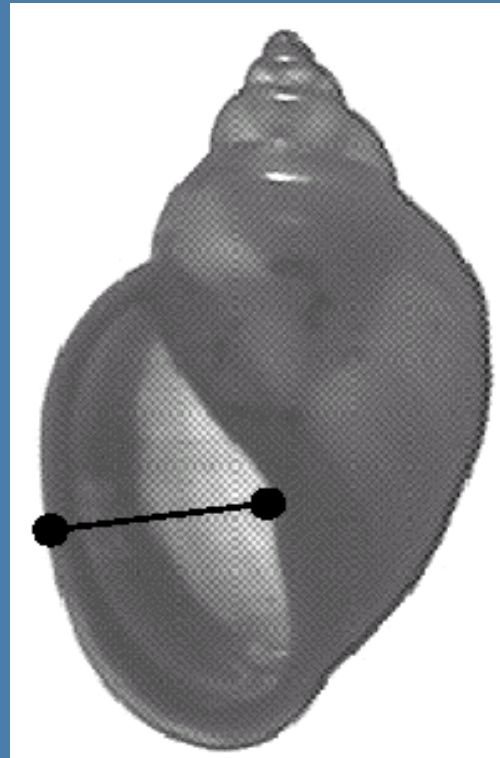
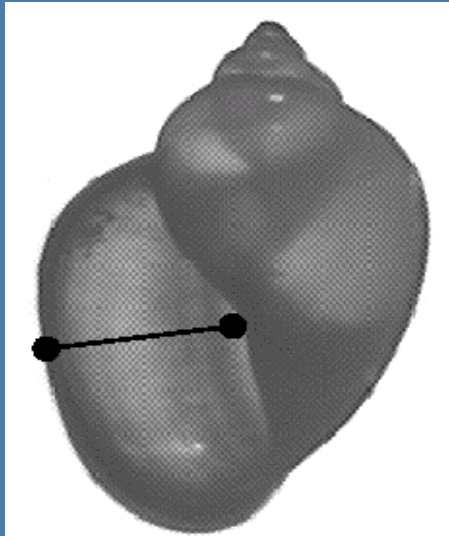


***ORGANIZATIONS HAVE
“COMPOUND EYES”***

LEVERAGE (not control)
TURBULENCE

Nature example How the snail keeps alert in the presence of the crayfish

The Snail And The Crayfish



PRACTICAL IMPLICATIONS (1)

Use the compass, not the map

PRACTICAL IMPLICATIONS (2)

Learn demand creation

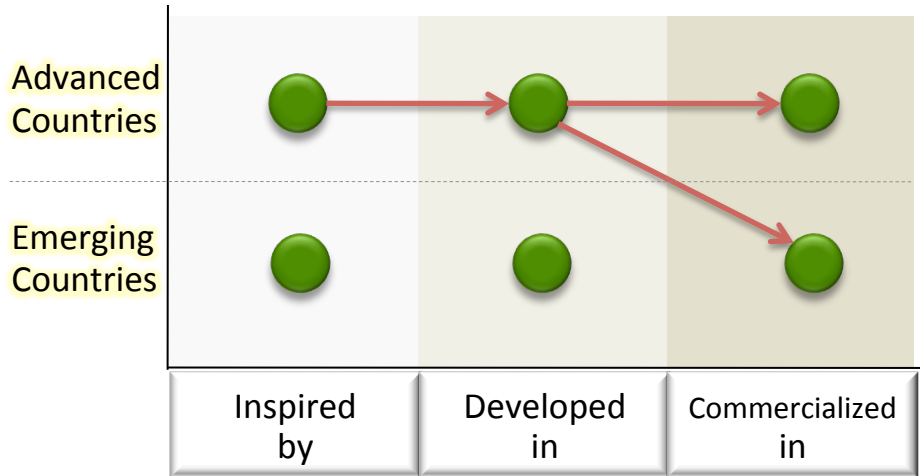
PRACTICAL IMPLICATIONS (3)

Innovate with small bets

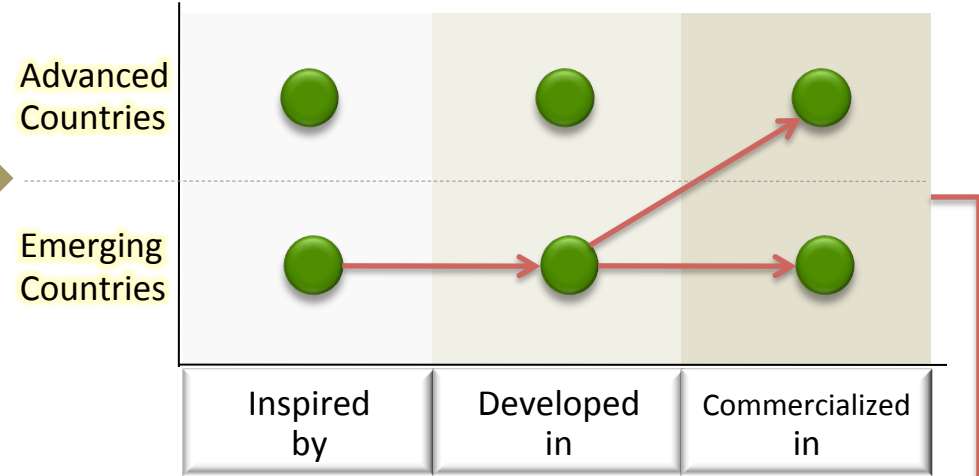
Emerging Trends In Innovation – Polycentric Innovation

Global Network To Co-create Solution

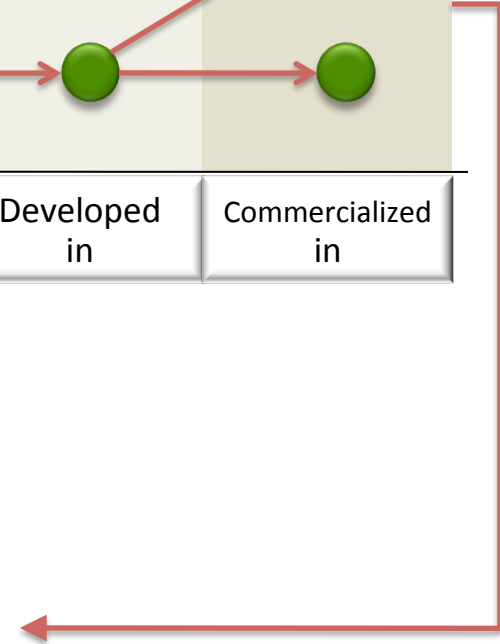
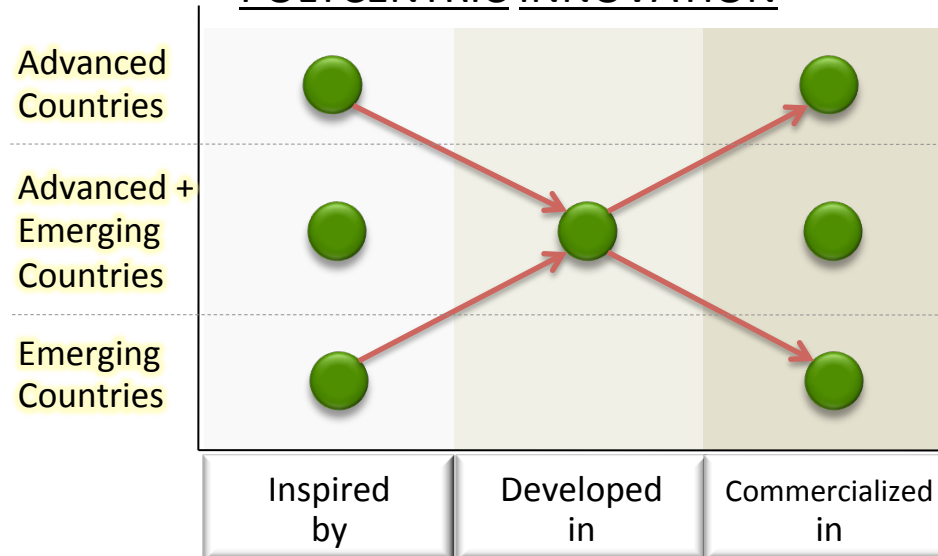
Traditional Innovation Model



Reverse Innovation Model



POLYCENTRIC INNOVATION



PRACTICAL IMPLICATIONS (4)

***Functionality x Emotion = WOW
Factor***

- Conclusion

Conclusion

- For India, it is extremely essential to localize as much as possible. The risk of exchange rate fluctuations can be mitigated. In recent times the depreciation of rupee has eroded bottom lines of many automotive component supplier as well as vehicle manufacturers.
- Fluctuating crude oil prices is further adding to the rupee volatility factor .
- In India you cannot just expect QUALITY from engineers and professionals. One has to explain the it's application and implications; otherwise people wont accept from their heart and they may take a shortcut, many a times with absolute ease.
- Leapfrogging will definitely happen. In India the laws/ regulations are actually abided by OEMs.
- In India, the biggest hurdle for any manufacturer to start is LAND. Specially for a large industry. Its a complicated process. Also because of corruption, it becomes very difficult.
- Government should intervene in this so that OEM's can buy land directly from government. It has been done in many states like Gujarat, Tamilnadu, etc. Other states are not so successful like Maharashtra.

Conclusion

- Incentives for industry are likely to come in India. They cannot give incentive on excise duty because it is central. But there can be incentive on sales tax which are at state level.
- But Auto industry needs huge amount of manpower. These incentives are useful for process industry where more automation and less manpower is utilized.
- For Skill development, Government has set up ITI. Gujarat is putting lot of money in ITI. So OEMs are going to them to get the talent. Now Governments will be giving incentives for skill development centers of private industries. You get reimbursement from government for training.
- In India, fundamentals of economy are strong; uncertainty will be there due to social & political climate.
- On the long run the Indian Economy will grow and India should have its rightful place in world economy by 2022, so on these 10 years horizon, one needs to think to invest in India.
- Spending time and energy on skill development is the key.
- Modifying products for Indian market is important.
- Put process and systems from day one in new plants to help achieve sustained growth.