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India – Pushing the right levers

Game changers for the Indian economy in the coming decade

April 2018

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Message from the CEO

Anu P Mathai
CEO
India Brand Equity Foundation

India – The emerging paradigm

One of the prominent buzzwords being used in the context of the Indian economy of late is 'structural transformation'. This is largely due to the range of policy initiatives being undertaken to ensure that the economy is primed for long term growth. The India Economic Survey 2016-17 also asserts that India is not only one of the fastest growing economies in the world, led by "a stable macro-economy with declining inflation and improving fiscal and external balances", but is also one of the few economies that are carrying out "major structural reforms". In particular, the emphasis on digital payments, along with the introduction of GST, India's most significant tax reform, can bring about a paradigm shift in the Indian economy.

With strong growth drivers including a favourable demographic profile, a skilled workforce, an emerging middle class, a strong entrepreneurial culture, rising productivity, a resilient private sector, etc. coupled with major policy initiatives to improve efficiencies and spur holistic progress, India has immense potential. For instance, since India's growth requires massive investments in infrastructure, in the Union Budget 2017-18, the Government of India announced a 25% increase in capital expenditure that also included an investment of US$ 60 billion in infrastructure. While the digital era provides massive opportunity for businesses in general, it is also showing huge potential for improving governance outcomes from the Centre to the states and even further to the last mile. Morgan Stanley has predicted in its report 'India's Digital Leap – The Multi Trillion Dollar Opportunity', that India will be a US$ 6 trillion economy by 2030, with digitisation expected to boost GDP growth by 50-75 basis points.

The policy impetus has also been making a visible difference in a host of other critical areas that include improving the business environment (Make in India, Merchandise Exports from India Scheme, Services Exports from India Scheme, Government e-Marketplace, etc), support for futuristic urbanisation (Smart Cities), greater financial inclusion (JAM Trinity), boost to entrepreneurs (Startup India), cleanliness (Swachh Bharat), etc. These initiatives are significant as they recognise India's current context and future potential as an economy and the growth drivers and areas that merit urgent intervention.

India, due to its economic size and growth trajectory, plays a key role in critical global dialogues on issues such as climate change and trade liberalisation today. In case of the former, India has committed, under the Paris Accord, to reduce the greenhouse gas intensity of its emissions by 33-35% below 2005 levels, build 40% of its power capacity through renewables and create an additional carbon sink of 2.5 to 3 billion tonnes of CO_2 equivalent through additional forest and tree cover by 2030. When it comes to trade, India has been a strong votary of open trade in the face of the tendency towards protectionism and insularity. India has been a hotspot for global investors in the recent past, and this is further bolstered by its jump by 30 points on the World Bank's Ease of Doing Business ranking for 2017 to reach 100.

This exclusive IBEF-Grant Thornton study titled 'India – Pushing the right levers' highlights 15 themes that are expected to play a defining role in India's growth story in the next decade and even beyond. As the Indian economy increasingly takes centre-stage in the global framework, this study provides invaluable insights on the roadmap that the country is expected to take in the coming years.

Preface

Rahul Kapur
Partner
Grant Thornton India LLP

The might of India is visible from the fact that it is the fourth largest economy in the world and houses one sixth of humanity. After a decade of policy turnaround, India is ready to strengthen its position in the world, both economically and politically.

The impact of the first sweeping majority since independence being mandated to form the government has resulted in strong policy initiatives across the pillars forming the foundation of our economy. The government has rolled-out economic reforms across 30 diverse areas, few of the key ones are mentioned below:

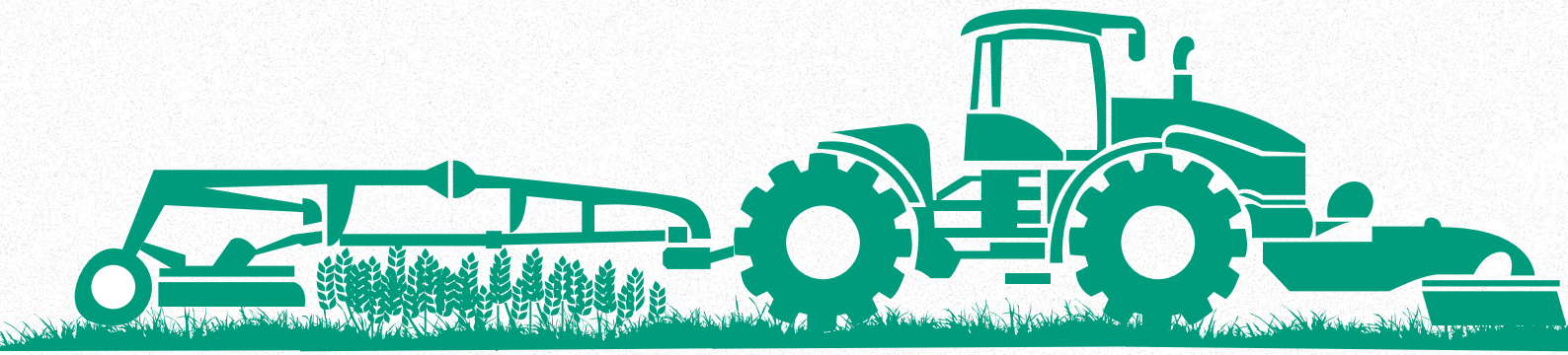
- Clean India (Swachh Bharat Abhiyan) – is an initiative by the government to clean the country's streets, villages, cities and infrastructure ensuring healthy citizens
- Skill India – is an endeavor to ensure that the country's manpower has access to training to acquire skills which can lead them to be part of an active skilled workforce and earn livelihoods for their families as well as contribute towards the nation's growth
- Make in India – promotes India as a manufacturing destination for overseas companies thereby boosting investment into the country as well as transfer of technology in areas where we need the boost ensuring independence from imports in critical areas
- GST – Launched by the federal government on July 1, 2017 it is by far the most significant step in the field of indirect tax reforms in India. By amalgamating a large number of Central and State taxes into a single tax, it aims to mitigate cascading or double taxation to pave the way for a common national market enabling Indian products to be competitive in the domestic as well as international markets and aid economic growth positively in the process
- Digital India – To make India a digitally empowered society, several e-governance initiatives have been rolled out
- Relaxation of FDI norms and single window clearances – India has relaxed FDI norms for historically closed sectors such as defense, insurance, railways, retail, coal, construction etc.

Other measures such as lending to priority sectors, land reforms, fast track access to essential services, crackdown on corruption, retrospective tax reforms, financial inclusion and access through payment banks and digital platforms, increased accountability for local bodies as well as bureaucracy has led to not just an easier access for the common man but also boosted investor confidence multifold along with sustainable GDP growth, controlled inflation and higher industrial output. An additional indicator of India's recent success lies in its jump from 139th position in 2010 to 100th position in 2017 in the World Bank's Ease of Doing Business ratings. Harvard analysis predicts the GDP growth for India to continue to outstrip China for another decade.

Our report, in collaboration with IBEF, is a deep dive analysis of the key facets of the Indian economy and the impact of the various existing as well as new policies on the key industries and sectors. The report is also supported by the thoughts of leaders representing different sections of the industries. We trust this report will prove useful to encourage discussions on the positive impact of the reforms being undertaken by the government to encourage business confidence of in India.

Delivering farm to fork sustainability

Agribusiness is a practice of activities, with backward and forward associations related to production, processing, marketing, trade, and distribution of raw and processed food, feed and fiber, including supply of inputs and services for these activities. With structural transformation of the economy, the share of agricultural production (farming) is decreasing, and that of processing, distribution and trade is increasing. With rising disposable incomes reflected in the augmented purchasing power and growing nuclear families, the demand for processed foods is witnessing a substantial surge. These factors are further inducing the need for sophistication in various segments of agribusiness such as procurement, storage, transportation, distribution, etc. The demand to feed the growing population and tap emerging global market opportunities shall provide additional thrust to the sector.



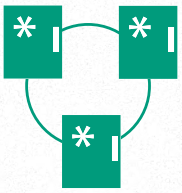
Snapshot: Agribusiness

Mega Food Park

8 mega food parks functional currently. The Ministry of Food Processing Industries (MOFPI) has a plan to establish **42** mega food parks across the country by 2018.

The Government of India has set a goal to increase the level of processed food from the current **10%** to **20%**. Target is to raise the processing level of perishables from **6%** to **20%** and raise India's share in the global food processing industry from **1.5%** to **3%** (by 2020).

Cold Chain Industry



CAGR of cold chain industries (2014–16): **20%**

The Government of India has approved **138** integrated cold chain projects.

The value of cold chain industry is expected to reach **Rs 624 billion** by 2017.

India had **6,300** cold storage facilities with a total capacity of **30.11 million metric tonnes** (March 2016).

The Government of India has allocated a budget of **Rs 1,872.23 billion** for rural, agriculture and allied sectors (Union Budget 2017-18).

The Government of India has imposed "Krishi Kalyan Cess" of **0.5%** on all taxable services.

Coverage of the National Agricultural Market (e-NAM) is to be expanded from 250 markets to 585 APMCs (Agricultural Produce Marketing Committees). Assistance of up to Rs 75 lakh will be provided to every e-NAM.

Micro Irrigation

Dedicated Micro Irrigation Fund in NABARD announced to achieve 'per drop more crop' with an initial corpus of **Rs 5,000 crore** (Union Budget 2017-18).

Micro Irrigation is expected to result in an overall saving of irrigation water by **20-38%**, fertilisers by **28.5%** and energy by **30.5%**.

Farm Mechanization

Size of the Indian farm equipment industry: **US$ 6.5 billion** (FY-15).

Current level of mechanization: **40-45%**.

Government initiatives such as **National Rural Employment Guarantee Act** (NREGA) will increase quantum of mechanisation.

Crop Protection

Area of about **273.69 lakh hectares** has been covered under pest monitoring and **53,452.68** million bio control agents were sent to different states for control of different pests and diseases (1994-March 2017).

17,234* Farmers Field Schools organised by Department of Agriculture & Co-operation

5,17,260* farmers have been trained on Integrated Pest Management (IPM) technology

*Directorate of PPQ&S, under DAC, All data from 1994 to March 2017

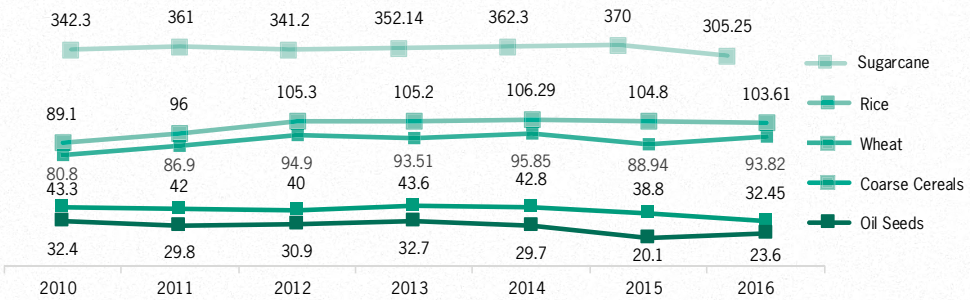
Introduction

The agriculture sector in India is a prominent sector of the economy as it contributes significantly to the overall growth and sustainability. Cultivation of land is the primary source of income for almost two-third of agricultural households. India ranks among the top countries in the world in production of a number of crops including rice, wheat, sugarcane, fruits and vegetables. India ranks third in farm and agriculture output globally. In the realm of plantation crops, India is the world's largest producer, consumer and exporter of spices, and also ranks prominently in the production of tea and coffee.

Some of the interesting facts about the Indian agriculture sector include:

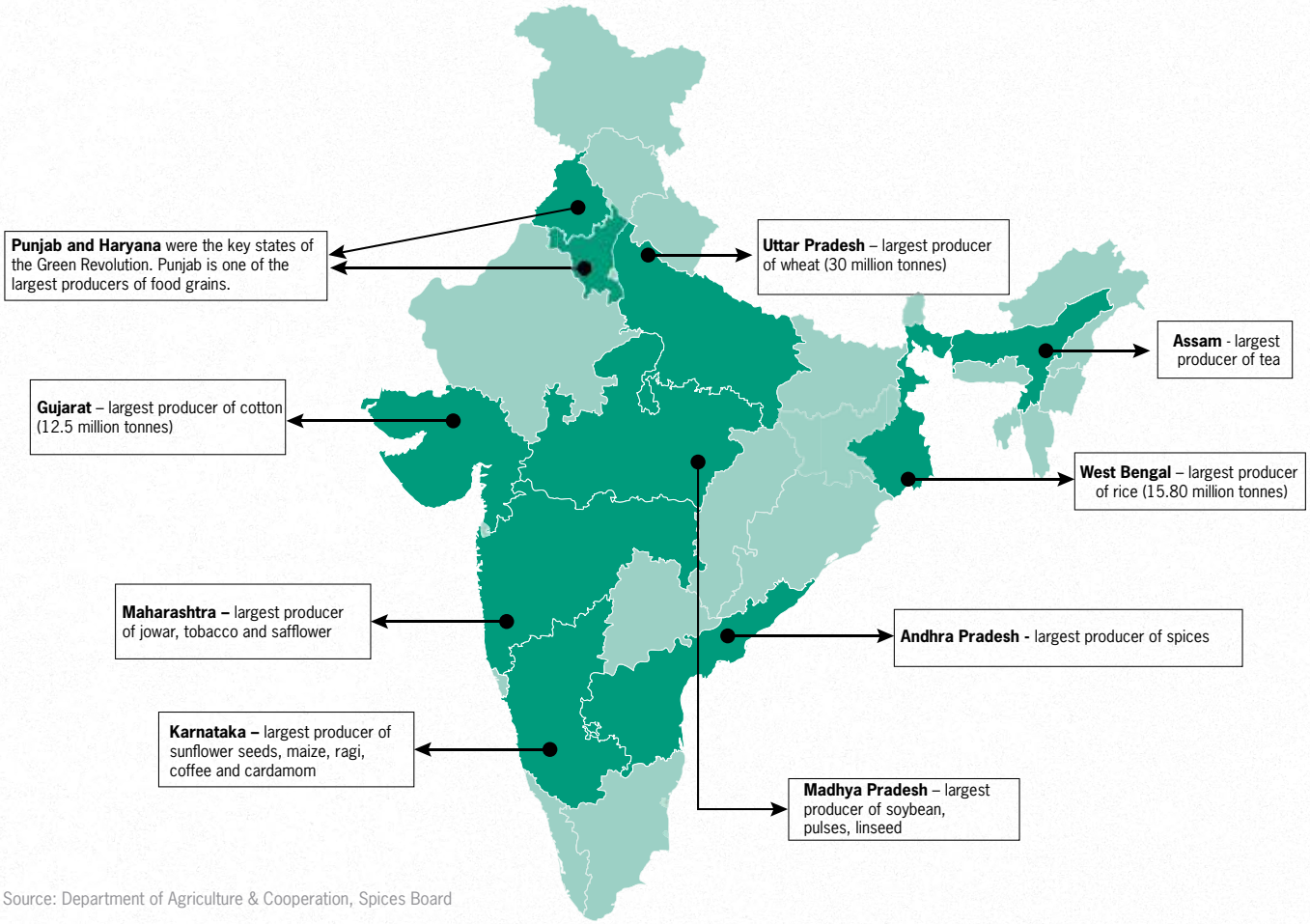
At 157.35 million hectares, India holds the second largest agricultural land area in the world.
The share of agriculture and allied sectors (including agriculture, livestock, forestry and fishery) was around 15.35% of the gross value added (GVA) during 2015-16 (at 2011-12 prices).
In FY 2015, total food grain production in India was recorded at 252.68 million tonnes, which increased to 253.16 million tonnes in FY'16.
GDP of agriculture and allied sectors in India was recorded at US$ 244.74 billion in FY'16.
According to the advanced estimates of MOSPI, agriculture and allied sector recorded a CAGR rise of 6.64% during FY 2007-16.
Farming represents 65% of the total contribution of agriculture and allied sectors and livestock represents 23% of the same (as of 2016).
Over 58% of rural households depend on agriculture as their principal means of livelihood (as of 2016).
India is the largest producer, consumer and exporter of spices and spice products. India is the largest producer of black tea in the world.
India is the second largest producer of fruits and vegetables in the world. It is also the second largest producer of rice and wheat.
Agricultural exports constitute 10% of the country's exports and agriculture is the fourth-largest exported commodity (as of February 2017).
With an annual output of 146.31 MT, India is the largest producer of milk, accounting for 18.5% of the total world production (as of 2016).
India is the second-largest producer of sugar with a share of 14% in the global output and is also the sixth largest exporter of sugar (as of February 2017).
India is a leading country in coconut production and productivity in the world, with an annual production of 2,044 crore coconuts (as of 2016).

Production of major crops in India (in million tonnes)



Source: Department of Agriculture and Cooperation, Ministry of Agriculture

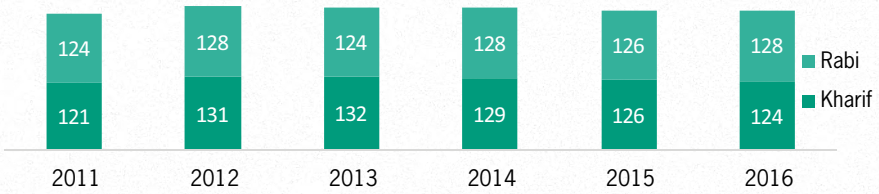
Key agricultural states and their contributions (September 2015)



Source: Department of Agriculture & Cooperation, Spices Board

India's cropping pattern is divided as per two seasons – kharif season and rabi season. While key crops grown during the kharif season are rice, sugarcane, maize and cotton, the key crops grown during the rabi season are wheat, gram, potato and jowar.

Production of food grains (in million tonnes)



Source: Ministry of Agriculture, Industry reports

Farms in India are categorised on the basis of the area. Marginal farms constitute 66% of the total farms in India followed by small farms constituting 17% of the total farms.

Category of farms	Size of farms
Marginal farms	Less than 1 hectare
Small farms	1-2 hectares
Semi medium farms	2-4 hectares
Medium farms	4-10 hectares
Large farms	More than 10 hectares

Factors that shall trigger the growth of agriculture sector in India

The agriculture sector in India is expected to grow manifold primarily due to the following factors:-

- **Increase in the demand for food items-** With the rising population, (India's projected population in 2030 would reach 1.5 billion) there has been a steady increase in the demand for food items such as milk, vegetables, fruits, rice, wheat and pulses, among others. The projected demand for food grains is mentioned in the table below:

Types of food items	Demand in year 2000 (in million tones)	Projected demand in year 2030 (in million tones)
Milk	76	182
Vegetables	93	180
Fruits	43	110
Food grains	192	335
Rice	81	156
Wheat	64	95
Cereals	33	102
Pulses	14	30

Source: Industry reports

- **Increase in agricultural exports-** There has been an increase in agricultural exports at a CAGR of 16% during the period 2011-16. Increase in export market opportunities has further triggered the growth of the agricultural sector in the country. The agricultural export value over the past few years has been mentioned below in the table:

Year	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Agricultural exports from India (amount in US$ billion)	15.6	24.7	29.2	29.6	38.7	32.08	33.38

- **Increase in farm power availability –**The farm power availability has increased over time which has led to growth of agricultural production.

Year	1990-91	2000-01	2010-11	2012-13	2013-14
Farm power availability in India (in kW per hectare)	0.9	1.4	1.7	1.8	2.02

- **Increased yield per hectare –** As demand for food items increased, subsequent increase in yield per hectare (YPH) was also witnessed. The same has been depicted below:

Year	2000-01	2006-07	2011-12	2012-13	2013-14	2014-15
Food grain yield in India (kg per hectare)	1,626	1,757	2,078	2,125	2,101	2,070

- **Farmer-market connect** - Government of India is undertaking initiatives to ensure better linkages between the farmer and the market. National Agricultural Market (NAM), the pan-India electronic trading portal set up to network existing APMC mandis has made significant progress. By the end of March 2017, 417 mandis across 13 states had been integrated with the e-NAM Portal. As of May 15, 2017, 83.57 lakh tonnes of agricultural produce worth Rs. 19,802.98 crores had been traded on the platform. Furthermore 45,45,850 farmers, 89,934 traders and 46,411 commission agents were registered on the platform.

Importance of agribusiness in India

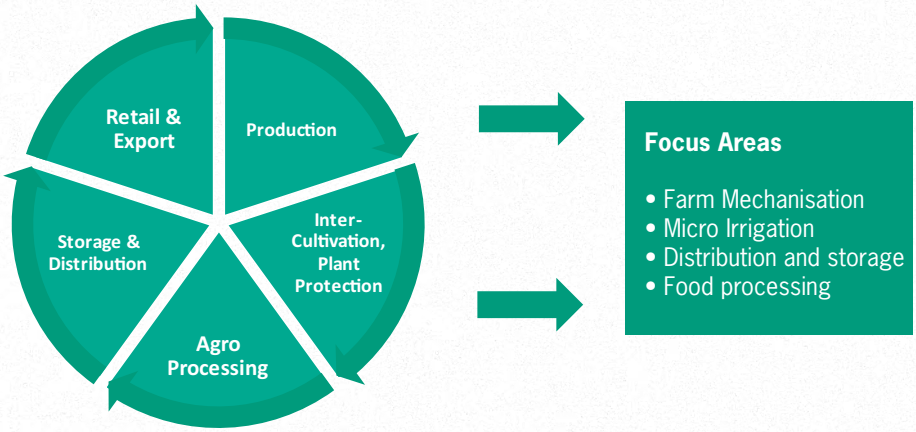
With structural transformation of the Indian economy, the share of agricultural production (farming) in the economy is decreasing, and that of processing, distribution and trade is increasing. Further, with the increase in backward and forward linkages, the distinction between agriculture and agro-industry is blurring. Farm production, processing and trade continue to integrate further. The requirement of a robust supply chain is gaining momentum.

With rising disposable incomes reflected in the augmented purchasing power and growing number of nuclear families, the demand for processed foods is witnessing a substantial surge. These factors are further inducing the need for sophistication in various segments of agribusiness such as procurement, storage, transportation, distribution etc.

Composition of segments in Agribusiness in India

Various segments of Agribusiness and their composition

The value chain of Agribusiness



Production

Production involves sowing, planting & harvesting the produce that is to be channelised in the agribusiness value chain. It is crucial to ensure high quality of crop production while also having higher levels of outputs per unit of agricultural land area. Good product techniques can help increase productivity and also make costly product cheaper.

Inter-cultivation and plant protection

Adequate crop protection is essential to produce high quality crops with optimal use of scarce resources such as land and water. This is also suitable for economy as it helps deliver food to the market at cheaper prices. If we were to stop practicing common protection methods with our fruit and vegetable crops, there would be a lot less choice in the food available for consumption. Global yields would drop by approximately one-third. Some food products which we have in abundance currently, will only be available in specific regions and due to the shortage in supply, prices would rise and quality would also be compromised.

Agro-processing

This refers to the activities carried out for conversion and handling of raw materials and intermediate products derived from the agricultural sector. This component covers all the operations involved from the stage of harvesting till the finished material reaches its end user. According to the survey, developed economies employ up to 14% of the total work force in agro processing directly and indirectly, while in India, only 3% of the workforce engage in agro-processing. Focus on this component is important because of its large potential for growth and likely socio-economic impact it can have specifically on employment and income generation.

Storage and distribution

The storage component involves preserving and holding goods from the time they were produced till they are consumed. This sector makes sure that there is continuous flow of goods to the market and there is no gap in that. It also plays an important role in goods which have seasonal demand and also helps in stabilising prices by maintaining the demand and supply. Distribution in agriculture businesses is one of the major factors as it could be expensive or could reduce the quality of the goods owing to delays. Therefore, there are usually less intermediates in this sector. Choice of channel which will result in the most optimal level of sales volumes and costs ensures maximum profits, while considering perishability of products.

Retail and export

India ranks second worldwide in farm output and accounts for 7.68% of total global agricultural output. The country exports several agricultural products such as basmati rice, dry fruits, spices etc. and it earns 10% of its export earnings from agricultural products. Total agricultural exports from India increased to US$ 33.38 billion in FY17 from US$ 24.7 billion in FY12.

Agribusiness growth & future potential

Agribusiness growth

Over 52% of India's land can be cultivated, compared to the global average of 11%. India is among the highest ranking countries in terms of output for various commodities like rice, cotton and dairy goods. On the other hand, there is a need for sustained efforts to improve productivity through measures such as simplification of regulatory processes, enhancement of efficiencies in the food distribution system, spreading awareness on modern agricultural practices and tackling unpredictable weather patterns.

To this end, the government took various initiatives such as establishing of mega food parks, initiating easier access to credit for farmers, creating a long-term irrigation fund, introducing Krishi Kalyan Cess and the National Cold Chain Development Scheme, among others.

Over the years, India has developed export competitiveness in certain specialised products, making it the world's 15th largest agricultural, fishery, and forestry product exporter. In 2015, India accrued a US$ 9.4 billion trade surplus of agricultural, fishery and forestry goods. Leading exports consisted of basmati rice, beef/meat, frozen shrimp and prawns, cotton, and refined sugar.

Sub-segments & their growth

Farm mechanisation

To feed the ever-growing population that stands at approximately 1.3 billion (today), India needs to continuously support and develop its agriculture sector. Growing output of farm produce is further challenged by a number of factors:

- Sluggish growth of total cultivable land in the country.
- India will soon become a leading services and manufacturing hub. This is evident from the increasing contribution of services and the manufacturing sectors to the GDP.
- Rapid urbanisation has further led to migration of farm workers.

The best way to overcome these challenges would be through the evolution of farm mechanisation. This would lead to increase in the agricultural yield and reduce the manual efforts to a large extent.

Indian farm equipment industry is valued at approximately US$ 6.5 billion and has shown strong growth in recent years. The agricultural machinery market in India is estimated to grow at a CAGR of over 10% during the period 2013-18. India is currently at a level of 40-45% in terms of mechanisation. Tractors account for most of the farm mechanisation in India which is also the largest market in the world for tractors. Other major segments include threshers, rotovators and power tillers.

The agriculture sector in India has witnessed a considerable decline in the use of animal and human power. This has resulted in a shift from the traditional agricultural practices to more mechanised processes. Though the level of mechanisation in India is lower as compared to other developed countries, it is certainly showing an upward trend. The table below highlights the extent of mechanisation at various levels of the value chain:

Levels of value chain	Extent of mechanisation
Soil working and seedbed preparation	40%
Seeding and planting	29%
Plant protection	34%
Irrigation	37%
Harvesting and threshing	60–70%
Overall	**40–45%**

Source: Department of Agriculture and Cooperation, Ministry of Agriculture

The use of farm equipment can increase the farm productivity by ~30% and reduce the input cost by about 20%. The government is therefore promoting farm mechanisation by subsidising purchase of equipment as well as supporting bulk buying through front-end agencies.

Micro irrigation

With increasing population and plummeting land holding sizes, the problem of feeding the masses emerges as a major challenge. Here irrigation plays an important and critical role. Given the dependence of Indian agriculture on natural water resources and monsoons, the efficient use of available water resources becomes more crucial. Hence, the concept of micro irrigation under Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) was re-introduced in 2015, which will go a long way in addressing the issues faced by the country and the agricultural sector.

Benefits of micro irrigation are:

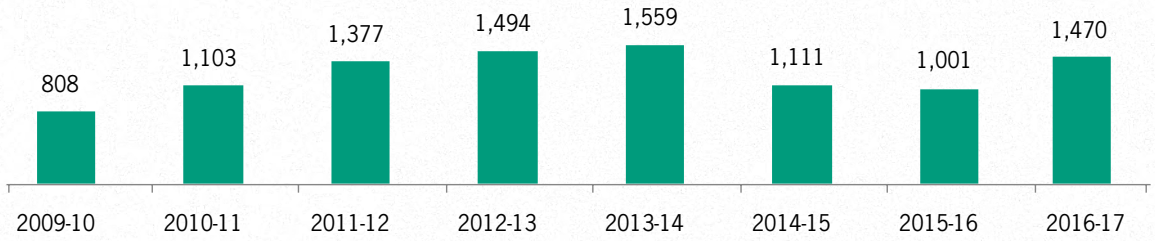
- Overall saving of irrigation water by 20-38%
- Overall saving of fertilisers by 28.5%
- Overall saving of energy by 30.5%
- Ease of implementation (within months)

The total potential of micro irrigation in India is estimated at around 69 million hectares, however, the coverage of micro irrigation was only 7.73 million hectares in FY 2015-16 (drip irrigation coverage being 3.37 million hectares and sprinkler irrigation coverage being 4.36 million hectares). Hence, there is still a lot of untapped potential for micro irrigation.

With the use of micro irrigation systems, conveyance loss will be minimal. Evaporation, runoff and deep percolation are also reduced by using micro irrigation methods. Another water saving advantage is that water sources with limited flow rates such as small water wells can also be used. Micro irrigation provides significantly higher water usage efficiency due to proximity and focused application.

Allocation of funds released under micro irrigation schemes in India over the period 2009-10 to 2015-16 is depicted in the graph below:

Allocation and funds released under micro irrigation schemes in India (in Rs crore)



Source: Industry reports, Secondary sources

Distribution and Storage

India is the leading producer for many of the agricultural commodities such as fruits, vegetables, spices, milk and other fishery products. Still the share of India's exports in these segments is comparatively low. The prime reason for the same is lack of appropriate cold chain infrastructure facilities which includes both storage and transportation facilities. However, with increasing urbanisation and growth of organised retail, food servicing and food processing sector, there has been a boost in the growth of the cold chain industry.

India's cold chain sector is a combination of surface storage and refrigerated storage. The industry has grown at a CAGR of 20% in the last 3 years (2014-16). The cold chain market in India is expected to reach Rs 624 billion by the end of 2017. The biggest source of revenue for the Indian cold chain industry are the cold stores. There are around 6,300 cold storage facilities in the country, with an installed capacity of 30.11 million tonnes (March 2016). Major players in this market include ColdEx, Bhramanand Himghar, Dev Bhumi Cold Chain, Gati and Snowman Logistics, among others.

Some interesting facts about the cold chain industry in India are (as of 2016):

- Organised players contribute only 8 to 10% of the cold chain industry market
- 36% of cold storages in India have capacity below 1,000 MT
- 65% of India's cold chain storage capacity is contributed by the states of Uttar Pradesh and West Bengal
- At the current capacity less than 11% of what is produced can be stored

Factors that have accelerated the growth of Indian cold chain industry are:

- **Growth in organised retail –** Over the last few years, organised retail and food service industries have emerged as new segments of cold chain, mainly due to changing consumption patterns. There is an increased demand not only for capacity addition of cold storage facilities for a set of highly perishable products, but also for a wide variety of vegetables, fruits and grains.
- **Growth in end user segments -** With growth in the end user segment, cold chain infrastructure is expected to get a boost and help in reducing the wastage.
- **Demand from pharmaceutical sector –** The growth in the pharmaceutical industry has created an incidental demand for the increase in cold chain facilities in the country.

Food processing

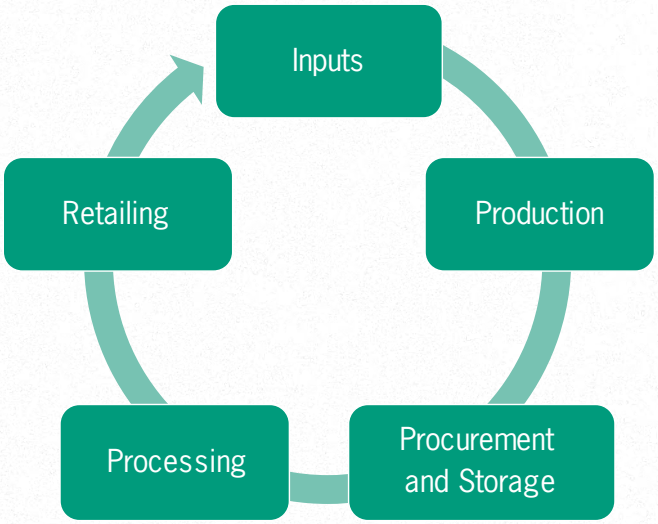
Food processing industry serves as a vital link between the agriculture and manufacturing sectors of the economy. The food industry in India was valued at US$ 39.71 billion (as of 2013-14) and expected to grow at a CAGR of 11% to US$ 65 billion by the end of 2018. The Indian food processing industry accounts for 32% of the country's total food market, one of the largest industries in India and is ranked fifth in terms of production, consumption, export and expected growth. Total agricultural exports from India increased to US$ 33.38 billion in FY17 as compared to US$ 24.7 billion in FY12.

Gross value added by food processing industries at current prices is given below:-

Year	FY12	FY13	FY14	FY15	FY16
Gross value added – Food processing industry (*Amount in INR lakh crore*)	1.47	1.33	1.35	1.52	1.62

Source: Ministry of Food Processing Industries

Value chain in food processing sector has been explained below:



Some of the factors that have contributed towards the growth in the food processing sector are:

- **Increase in the number of food processing units -** There has been a significant increase in the number of registered food processing units in the country i.e. from 26,219 units in 2007-08 to 36,871 units in 2015.

Year	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
Number of registered food processing units	26,219	27,220	27,479	35,838	36,881	37,175	37,450	36,871

Source: Secondary sources

- **Increased FDI inflows –** 100% FDI is permitted under the automatic route in food processing industries. As a result of this, the sector has witnessed an increase in FDI inflows which has directly led to the acceleration of the growth of this sector.

Year	FDI inflows in food processing (Amount in US$ million)
2001-02	219.39
2002-03	36.88
2003-04	109.22
2004-05	43.98
2005-06	41.74
2006-07	102.00
2007-08	70.17
2008-09	102.71
2009-10	278.99
2010-11	188.67
2011-12	170.21
2012-13	401.46
2013-14	3,982.89
2014-15	515.86
2015-16	505.87
2016-17	727.22

Source: Department of Agriculture and Co-operation; World Bank.

Mega Food Parks Scheme -As a result of the government-led initiative Mega Food Park Scheme, 42 mega food parks are being established in the country with a total investment of Rs 155 billion. The primary objective of the scheme is to facilitate establishment of integrated value chain, with processing at the core, supported by requisite forward and backward linkages. The scheme now covers 22 states of India.

- **Recognition as priority sector -** Food processing sector has been recognised as a priority sector in 2011. This was done to ensure greater flow of credit to entrepreneurs for setting up food processing units and attracting investment in the sector.
- **Creation of food processing fund -** In Budget 2015-16, a corpus of Rs 2,000 crore (approximately US$ 300 million) was set up for creation of a special fund called "Food Processing Fund" under National Bank for Agriculture and Rural Development (NABARD) to provide cheaper credit to the food processing industry. Excise duty on plant and machinery for packaging and processing was brought down to 6% from 10%.

Policy Initiatives to support the growth of Agribusiness in India

There have been a lot of government initiatives and measures to propel growth of agriculture sector in the country. The government targets to double the income of farmers by 2022, from that in 2016. To achieve this the government has undertaken the below mentioned initiatives:

- **Increased importance for micro irrigation –** The Government of India has allocated a sum of Rs 5,300 crore for micro irrigation, watershed development under **'Pradhan Mantri Krishi Sinchai Yojana' (Union Budget 2015-16).**
- **Increased allocation of Budget -** The agriculture sector was allocated a budget of Rs 47,912 crores for the year 2016-17, which is 84% more than the budget allocated for the year 2015-16. The total budgetary allocation for rural, agricultural and allied sectors is Rs 187,223 crore in 2017-18.
- **Establishment of Mega Food Parks -** The Ministry of Food Processing Industries (MOFPI) has undertaken an initiative to establish 42 mega food parks across the country, with a goal to increase the level of processed food from the 10% in 2015 to 20% in the next few years. Attractive incentives have been introduced by central and state governments to include capital subsidies, tax rebates, and reduced custom and excise duties. The government is also encouraging disbursement of loans under priority sector lending scheme to ensure that entrepreneurs have access to credit to set up food processing units.

- **Cold chain sector initiatives**:
  - GoI has recognised cold chain industry as a sub-sector of infrastructure in the Union Budget in 2015 and investment in cold chain has been opened under the automatic route for 100% FDI participation.
  - There has been viability gap funding of up to 40% of the cost.
  - 5% concession has been provided on import duty, service tax exemption and excise duty exemption on several items.
  - Subsidy of over 25 to 33.3% on the cold storage project cost
  - The central government has approved 138 integrated cold chain projects. To develop the cold chain supply and to increase storage capacity, a **National Cold Chain Development** office has been established. Foreign Agricultural Service in New Delhi has been collaborating with the Global Cold Chain Alliance (India chapter) to identify areas where US technology and expertise can help develop the cold chain sector in India.
- **Easier access to credit -** The government has helped initiate easier access to credit on behalf of farmers. These farmer-friendly policies and the new and growing trend of collaborative farming in India have encouraged the farming community to embrace mechanisation, leading to a structural shift in demand towards high-powered agricultural machineries. Some state governments, with support from the central government, have embarked on a public-private partnership (PPP) model to start custom hire centres to provide agricultural machinery on a rental basis to farmers, thus opening opportunities for used equipment exporters.
- **National agriculture market (NAM):** NAM was set up as a pan-India electronic trading portal to network existing APMC mandis. By the end of March 2017, 417 mandis across 13 states had been integrated with the e-NAM Portal. As of May 15, 2017, 83.57 lakh tonnes of agricultural produce worth Rs. 19,802.98 crores had been traded on the platform. Furthermore 45,45,850 farmers, 89,934 traders and 46,411 commission agents had registered on the platform.
- **Creation of long-term irrigation fund -** The government has created a dedicated long-term irrigation fund in NABARD with an initial corpus of about Rs 20,000 crore and raised the agriculture credit target to Rs 9 lakh crore for 2016-17 as against the target of Rs 8.5 lakh crore during 2015-16. **In 2017-18**, target for agricultural credit has been fixed at Rs 10 lakh crores.
- **Introduction of Krishi Kalyan Cess -** In order to finance initiatives to improve the agriculture sector, the government has imposed 'Krishi Kalyan Cess' of 0.5% on all taxable services.
- **Introduction of new projects and measures –** Some of the other measures that have been introduced to help farmers in increasing their income through farming and allied activities are:
  - Pashudhan Sanjivani - Animal welfare programme and provision of animal healthcare cards.
  - E-Pashudhan Haat- E-market portal for connecting farmers and breeders; National Genomic Centre for indigenous breeds
- **Increase in land to be brought under irrigation –** Budget 2016-17 proposed to bring around 2.85 million hectares of land under irrigation so as to improve agriculture and increase farmers welfare. The government has started work on 99 major and medium irrigation projects, slated to be completed by 2019.
- **In Budget 2017-18**, the Long Term Irrigation Fund already set up in NABARD has been proposed to be augmented by 100% to take its total corpus to Rs 40,000 crores. Furthermore, a Dedicated Micro Irrigation Fund has been planned under NABARD to achieve 'per drop more crop' with an initial corpus of Rs 5,000 crore.
- **100% rural electrification –** GoI has planned for 100% village electrification by May 1, 2018. Rural electrification is a must-have in rural areas as this helps in meeting various energy needs including basic lighting, irrigation, communication, water heating etc. The availability of power will further improve the farm productivity as a result of substitution from manual tools to power-based equipment.
- **Small Farmer Agribusiness Consortium (SFAC):** Department of Agriculture and Cooperation commissioned Small Farmers Agri-business Consortium (SFAC) in 2011-12 to promote the formation of Farmer Producer Companies which was considered as a key strategic goal under the 12th five-year plan. A farmer producer company is an amalgamation between a private company and a cooperative society which addresses the rising need of an institutional structure that consists of ethos of cooperation on one side and business resilience on the other side. Formation of FPCs leads to collectivization of farmers which helps in bringing down the input costs, enabling better bargaining power at the hands of the farmer and magnifies their voices. India currently has around 600 FPCs, of which a third are in Maharashtra alone. On January 1, 2014, SFAC launched a Central Sector Scheme "Equity Grant and Credit Guarantee Fund Scheme for Farmers Producer Companies" to support the Farmer Producers Organizations in terms of strengthening their capital base. The two main components of the schemes are:
  a) **Equity Grant Scheme:** Every registered Farmer Producer Company (which is registered under the special provision of the Companies Act) is provided a grant of upto Rs 10 lakh with an objective to enhance the equity base of the FPC and enable it to approach financial institutions for raising working capital.
  b) **Credit Guarantee Fund (CGF):** The CGF offers a cover of 85% (up to a maximum of Rs 1 crores) to loans extended by banks to Farmers Producer Companies without collateral.

Conclusion

India has a population of 1.3 billion of which youth population (15-34 years) is estimated at 450 million as of 2016 and is expected to be 464 million by the end of 2021. The rising youth population is likely to increase India's overall food consumption. Some of the other factors such as rising income levels and wealth, growing middle class, nuclear families and working couples and increased urbanisation will result in India being a fast-emerging hub for processed foods. India's exports of processed food products have increased steadily from US$ 1,352 million during 2006 to US$ 3,981 million in 2016.

The food industry, which was valued at US$ 39.71 billion as of 2013-14, was expected to grow at a CAGR of 11% to reach US$ 65.4 billion by 2018. Indian food service industry is expected to reach US$ 78 billion by 2018. India's organic food market is expected to increase three times by 2020, as compared to 2017. In the year 2012-13, there were 1.6 million people engaged in the registered food processing sector. This number is expected to increase to 9 million by the year 2024.

However, for improving the efficiency of the entire value chain, there is a need for substantial investment in infrastructure development. Some of the investment needs and opportunities for investors are as follows:

Production

- Production of high-yielding seeds
- Production of high-quality planting material, including use of tissue culture methods of micro-propagation
- Nurseries including hardening nurseries
- Organic farming
- Production of microbial cultures and vermi-compost, and
- Floriculture

Processing

- Fruit and vegetable processing, including dehydration, canning, aseptic packaging, processing of underutilized fruits, and processing for other products like grape raisin, osmo air-dried fruits, fruit toffee, bleached dry ginger and spices' powders
- Processing of maize for starch and feed through improved mini/small mills and dry milling plants
- Processing of millets for various purposes, including malt from finger millets and RTE (ready-to-eat) products
- Processing of sugarcane for various jaggery products like spiced jaggery, powdered jaggery, and jaggery cubes
- Processing of herbal and medicinal plants
- Processing of dairy products
- Processing for poultry products, including poultry dressing, and
- Processing of livestock products and livestock wastes

Infrastructure

- Cold chain infrastructure, including cold stores
- Storage and warehousing
- Specialised transport services
- Packaging infrastructure, including pack houses, and
- Agri-clinics and service centres

Trade and Others

- Procurement through contract arrangements, including contract farming
- Retailing
- Supply chain management.
- Capacity building, including human resource development in agribusiness.

Micro-irrigation is considered to be one of the most efficient solutions to overcome the water management challenges faced by the agriculture sector. With the government focus on providing rural electrification, the country is expected to witness a growth in the level of mechanisation in agriculture production. Mechanised agriculture will reduce the operational cost and time by improving post-production agricultural activities and promoting conservation of water. Government initiatives in several areas like promotion of farmer producer companies, organic farming, better soil management (through soil health cards) and better farmer-market linkages (through e-NAM) are expected to further propel the sector.

Mega Food Park Scheme will create centralised infrastructure to take care of processing activities which require cutting edge technologies and testing facilities, besides the basic infrastructure for water supply, power, environmental protection systems, communication etc. The Indian food processing industry will serve as a vital link between the agriculture and the manufacturing sectors of the economy which would further enhance the production, consumption and export in the food market. The food processing industry is expected to grow at a CAGR of 13% during 2015-2020.

Expert perspective

Dr A Didar Singh
Former Secretary General, FICCI

"With over 7% economic growth annually over the last three years, India is the fastest growing major economy. This has been enabled by various measures taken by the government in the last few months. Make in India has resulted in one of the strongest country brands ever thereby boosting the country's image and investor confidence. Record FDI equity inflow during April 2014 to December 2016 at US$ 52.6 billion has strengthened our external account position. The manufacturing gross value added has also seen a healthy growth of 10.6% and 7.7% in 2015-16 and 2016-17 respectively.

Manufacturing has to be the future for our economy as we look at ways to absorb a large section of our young and rural population for employment. The sector has the potential to contribute more to the GDP of our country from the current share of over 17%. Recent reforms in various areas and measures to address ease of doing business concerns have improved the investment climate. The government needs to continue the reform push and also consolidate on what has been done so far. Private sector is supporting and responding to the government's efforts to make India's manufacturing sector more competitive. The efforts are to adopt new technologies that would shape the future of manufacturing."

Towards a future-ready manufacturing sector

The growth prospects for India look optimistic and India is gearing up to become a global manufacturing powerhouse as the manufacturing sector forms the backbone of the Indian economy. The manufacturing sector supplies quality products to consumers across the supply chain, thereby fueling the growth and productivity of other sectors in the process. As per the RBI, the sector contributed gross value addition (GVA) of Rs 16,670 billion and Rs 18,219 billion in 2014-15 and 2015-16, respectively. Buoyed by the Make in India programme, India is expected to become the third-largest economy of the world by 2030, thereby providing a huge opportunity for the Indian manufacturing sector to grow. The manufacturing sector shall definitely play a crucial role in driving incremental growth along with various reforms/polices like that of GST implementation and IT enablement as an assurance for a favourable economic environment.

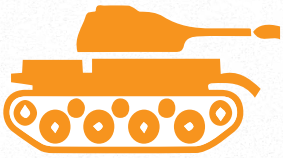
The sector has evolved through several stages which started with industrialisation in 1950s, followed by the license raj from 1965-80. Later it witnessed economic liberalisation during the 1990s. Now, the Indian manufacturing sector is growing towards the vision of becoming competitive on a global scale. The industry is expected to be further fed by rising demand coming from the domestic market. In addition, MNCs are now able to diversify their production capabilities to include low cost manufacturing, thereby driving sustainable growth for the sector.

The manufacturing sector is expected to reach US$ 1 trillion by 2025 and will contribute about 25% to India's GDP. Under the Make in India programme, indigenous manufacturing is expected to increase by 12-14% per annum over the medium term. As per the World Bank, manufacturing contributed about 16% to the country's GDP in 2016. This is on the higher side when compared with the global average of about 15% in 2015.

Manufacturing is expected to create 100 million additional jobs by 2025, considering that the country has become one of the most attractive destinations for investments in this sector. Many of the leading companies including those of mobile phones and automobile brands have established or are looking to set up their manufacturing base in the country, which will have a positive impact on job creation.

Snapshot: Manufacturing

US$ 40 billion is expected to be spent on procuring defence items by 2020



Defence

Food processing sector is expected to grow at a CAGR of **13%** during 2015-2020

Food Processing

India is one of the largest automobile producers with an annual production of **24 million** vehicles (FY2016)

Automobile components

Pharmaceuticals sector is expected to grow at a CAGR of **15%** (2015-2020)

Pharmaceuticals

50% of India's leather business comes from international trade.

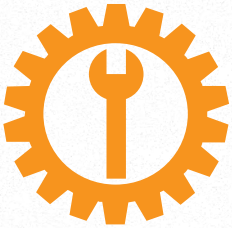
Leather

Textile industry is expected to grow at a CAGR of **16%** (2016-2021).

Textile

India is a global pioneer in engineering R&D and design outsourcing.

India is also the largest producer of sponge iron in the world



Engineering

India has the world's largest tractor industry and accounts for one-third of the global production.

Electronics market is expected to grow at a CAGR of **19%** (2012-2022)

Electronics

India is the world's **3rd** largest consumer of polymers and **4th** largest producer of agrochemicals

Chemicals

The gems and jewellery sector contributes ~ **6%** to the nation's GDP

Gems and Jewellery

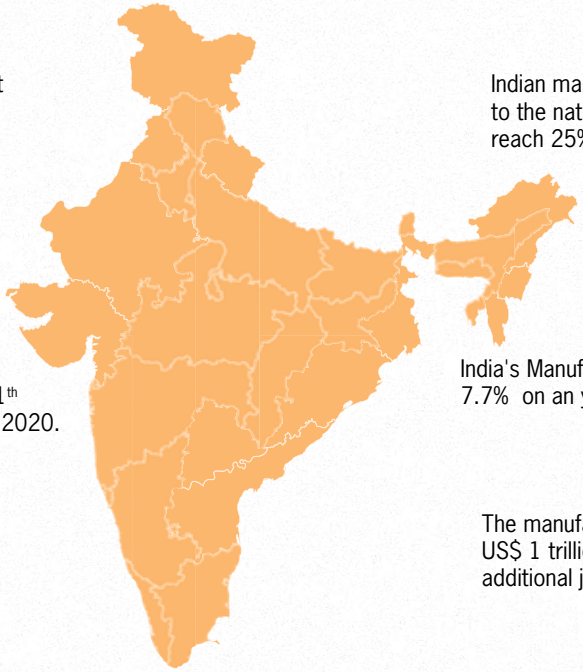
India is expected to become the third-largest economy of the world by 2030, thereby providing a huge opportunity for the Indian manufacturing sector to grow.

Ranking

India ranks 6th among the world's 10 largest manufacturing countries in terms of volume and is expected to reach 5th rank by 2020.

According to the Global Manufacturing Competitiveness Index 2016, India ranks 11th and is expected to reach 5th position by CY 2020.

India is the world's 2nd largest two wheeler manufacturer (2016)



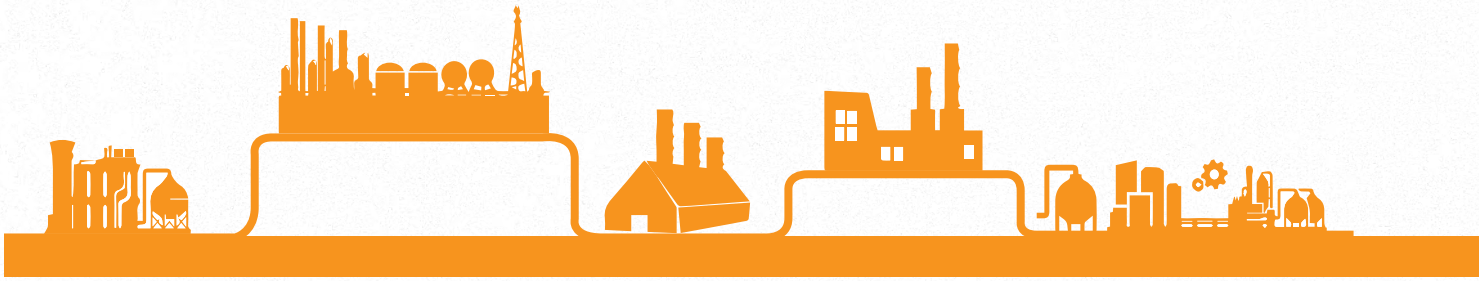
Contribution

Indian manufacturing sector contributes 16% to the nation's GDP (FY 2016) and aims to reach 25% by 2025.

India's Manufacturing Value Addition increased by 7.7% on an year-on-year basis (2016-17, CSO)

The manufacturing sector is expected to reach US$ 1 trillion and to create 100 million additional jobs by 2025.

Note: Manufacturing value added (MVA) of an economy is the total estimate of net-output of all resident manufacturing activity units obtained by adding up outputs and subtracting intermediate inputs.

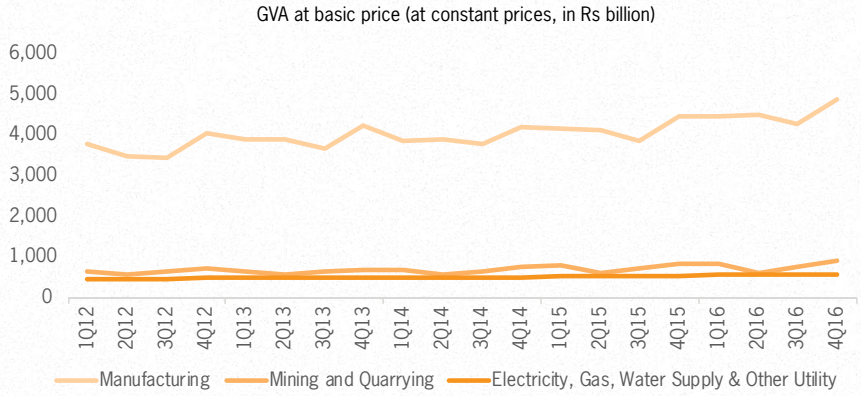


Growth witnessed in the manufacturing sector

The Indian manufacturing sector has been treading a path of robust growth. The annual rate of Index of Industrial Production (IIP), which measures the quantity of change in the industrial production in an economy, increased by 2% in FY' 16 and 2.3% in FY' 15. This indicates that the country is witnessing growth in its annual manufacturing output. Also, the GVA (as per the RBI) by the manufacturing sector, has stayed consistently above 4,200 during Q4, 2015 to Q4, 2016. Growth rate of GVA at basic prices for the manufacturing sector was projected at 8.1% in H1, 2016-17 and 6.7% in H2, 2016-17. The growth in manufacturing has been driven by a gamut of factors. These include:

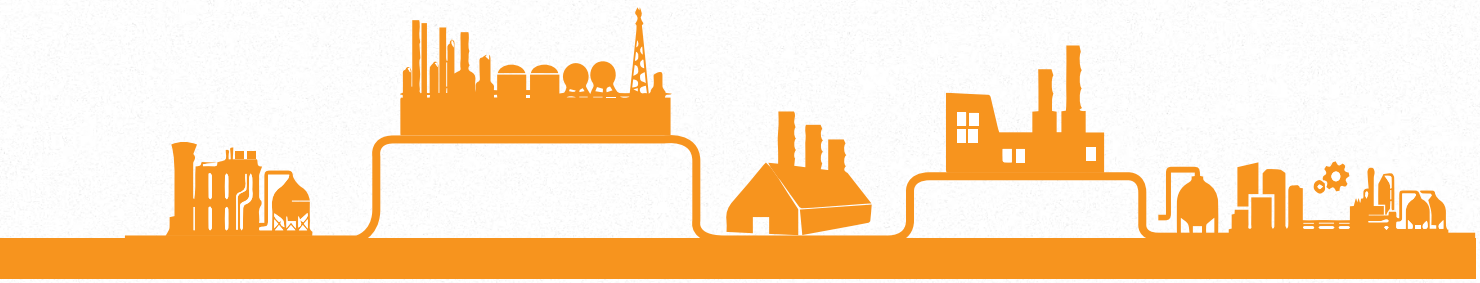
- Comparative decline/stabilisation in prices of some important raw materials such as steel and copper has led to lower manufacturing costs. However, prices for finished products have not seen a decline. This has led to higher margins for the manufacturers. Manufacturers have either invested this capital in R&D or have passed it on to consumers as discounts or to shareholders as dividends or have retained with themselves. In either of the cases, the manufacturing sector has been consistently able to contribute significantly to the GVA of the country.
- China's dominance has declined as companies are now looking beyond China and are investing in other prospective manufacturing destinations. This is primarily due to the increase in wages in China on account of consistent inflation and strengthening of the Yuan as a currency in the international scenario (due to large exports from China).
- Eastern Africa and Vietnam among others have emerged as manufacturing destinations where labour cost and electricity are cheap, and governments have policies that favour setting up of manufacturing facilities. Also, economies such as the UK are attracting more manufacturing investments by offering incentives and tax breaks. Thus, manufacturers are now looking at these alternate manufacturing destinations. In such a scenario, the Make in India programme is seen as well-timed and appropriate initiative. Considering the growing domestic demand, cost competitiveness and favourable manufacturing policies, India can become a manufacturing destination of choice for global manufacturers.

GVA trends at basic price (at constant prices; Base: 2011-12)



Source: RBI

On considering the IIP, we see that the growth in the manufacturing sector has been broad-based with 16 of the manufacturing sub-sectors showing positive growth in FY 2015-16. Sectors such as textiles and apparels, and electricity infrastructure have witnessed more growth. Some sectors such as automobiles are consistent performers and have reported



growth in 2016 as well. Consumer demand arising from domestic markets has driven the growth within these sectors. The Nielsen Consumer Confidence Index was at a high of 136 during Q4 2016, an increase of three points from the previous quarter. This indicates higher confidence about local employment prospects, personal finances and immediate spending intentions among the residents of the country. country. The combined Index of Eight Core Industries stood at 118.6 in April, 2017, a growth of 2.5 % over April, 2016. Cumulative growth during April to March, 2016-17 was 4.8%.

Also, there has been improvement in the fundamentals and the infrastructure situation in the country. The last few years have seen significant capacity additions in power generation. A huge push in the transportation sector has been witnessed along with key reforms which have also been implemented in the energy, coal and mining sectors.

Growth of Index of Industrial Production (IIP)

Groups	Weightage	Annual		Cumulative
		2015-16	2016-17	April - September 2017-18
Mining	14.373	4.3	5.3	3.9
Manufacturing	77.633	2.8	4.4	1.9
Electricity	7.994	5.7	5.8	5.7
General Index	100	3.3	4.6	2.5
Use-Based Classification				
Primary goods	34.05	5	4.9	3.7
Capital goods	8.22	3	3.2	-0.2
Intermediate goods	17.22	1.5	3.3	0.4
Infrastructure/construction goods	12.34	2.8	3.9	2
Consumer Durables	12.84	3.4	2.9	-1.5
Consumer Non - Durables	15.33	2.6	7.9	7.4
Other non-metallic mineral products	43	5	2	1

Performance of Eight Core Industries (Base Year: 2011-12=100)						
Sector	Weight	2012-13	2013-14	2014-15	2015-16	2016-17
Coal	10.3335	103.2	104.2	112.6	118.0	121.8
Crude Oil	8.9833	99.4	99.2	98.4	97.0	94.5
Natural Gas	6.8768	85.6	74.5	70.5	67.2	66.5
Refinery Products	28.0376	107.2	108.6	108.8	114.1	119.7
Fertilizers	2.6276	96.7	98.1	99.4	106.4	106.6
Steel	17.9166	107.9	115.8	121.7	120.2	133.1
Cement	5.3720	107.5	111.5	118.1	123.5	122.0
Electricity	19.8530	104.0	110.3	126.6	133.8	141.7
Overall Index	100.0000	103.8	106.5	111.7	115.1	120.5

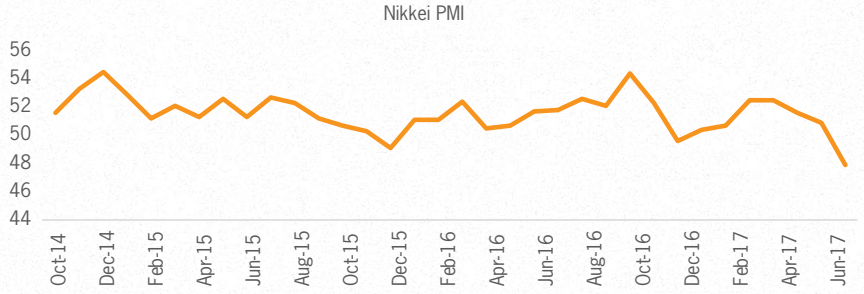
Source: PIB, Economic Advisor, DIPP

Month-wise manufacturing IIP

Source: Index of Industrial Production (IIP) Statistics, MOSPI, GOI

The Nikkei India Manufacturing Purchasing Managers Index (PMI) has remained largely positive in the first six months of 2017. The month of July saw the index fall sharply to 47.9 compared to 50.9 in June. The decline, however, is attributed largely to the short term impact of the introduction of GST and Nikkei affirms a positive outlook for output over a 12-month period with expectations of greater clarity on GST, new projects in pipeline and improved product quality.

Manufacturing PMI statistics for India, October 2014–June 2017



Source: Markit PMI data

Why is India expected to grow in manufacturing?

Sub-sector wise opportunities

India has a well distributed demography which drives a consistent demand, thereby providing a huge market waiting to be tapped on a recurring basis. In addition, it also has a significantly huge tech-savvy and educated population and skilled labour workforce. Now, the government is also favouring regulated liberalisation. Thus going ahead, India is expected to emerge as a strong manufacturing destination. Below are some of the sub-sector wise growth expectations which could drive the growth of the manufacturing industry in India.

Defence sector: India has become the fourth largest country globally in terms of defence spending, with an increase of 13.1% in its 2016-17 defence budget. In addition, the Make in India programme allows the foreign defence original equipment manufacturers (OEMs) to enter into strategic partnerships with Indian defence manufacturers. These partnerships could increase their manufacturing capability in India and help them cater to global markets. Defence manufacturing has recently witnessed a lot of interest. The government has now allowed foreign companies to own up to 100% equity in the local defence sector through the government approval route in cases where it is likely to result in access to modern technology, thus driving foreign investment beyond the previously stipulated 49%. The move is expected to allow

foreign companies to start manufacturing in India and make the country their manufacturing base. Going ahead, they could supply weapons not only to Indian establishments but also abroad. In addition, the DIPP has previously (in 2015) granted permission to 19 private companies to manufacture a range of defence products. These include services such as manufacturing, maintenance and overhaul of torpedoes, missiles and mines for large platforms operations such as tanks, off road military vehicles and hovercrafts. It has also allowed well-known domestic players of established repute to invest in the sector and develop infrastructure. Players such as Tata group, Mahindra group, Hero group and Reliance are entering the market and making the most of the opportunity. For example the Tata group has ramped up operations and has an in-house ballistic test facility, used to test ammunition.

Engineering: It includes a number of areas such as infrastructure, power, steel, oil & gas, consumer durables etc. It has seen significant growth in the last few years primarily driven by high investments in infrastructure and industrial production. The engineering sector is of strategic importance to the country's economy and domestic players are starting to compete globally in this sub-sector. For example Power Grid, the country's national transmission utility is planning to bid for engineering, procurement and construction jobs overseas in partnership with foreign entities.

India is a global pioneer in engineering R&D and design outsourcing. The country's engineering process outsourcing sector is expected to reach US$ 40 billion by 2020, around 30% of the global market. The country's space programme is a huge success, and it has launched 180 satellites for 23 countries as of February 2017. The Indian electrical machinery industry is expected to double in sales to US$ 100 billion between 2012 and 2022. The country produces around 4.5 million pumps annually and exports pumps to nearly 100 countries. It is almost self-sufficient in pumps for nuclear power and completely self-sufficient in pumps for captive power generation, pulp & papers, energy efficient pumps in utilities and in agriculture sector.

Abundant raw material availability is another key driver for India's manufacturing sector. The Indian steel industry has seen rapid growth since 2007-08, driven by a fast growing economy and rising demand for steel. India became the second largest producer of crude steel in FY 2016, while producing 91.46 million tonnes (MT) of finished steel. Additionally, India is also the largest producer of sponge iron in the world. Growth in demand for steel has continuously outpaced growth in supply since 2012. Going ahead, domestic demand is expected to reach 104 MT by 2017 and 300 MT by 2025. With the government easing out FDI norms in the steel sector, huge investments are expected to enter the sector and India is expected to become the second largest producer of crude steel by 2020 after China from the current ranking of 3.

Food processing industry: The Indian food processing industry is expected to grow significantly from about US$ 258 billion in 2015 to about US$ 482 billion by 2020. The food processing industry is one of the largest industries in India and ranks fifth in terms of production, consumption and exports. In FY15, the food processing industry constituted 14% of India's GDP through manufacturing, and the organised sector is estimated to have a 70% share in the sector. India's exports of processed food and related items rose at a CAGR of 21.5% during FY 2011–16, accounting for US$ 19,337.4 million in FY 2016.

Automobile components manufacturing and assembling: India is expected to be the third largest automobile industry by 2020. According to Society of Indian Automobile manufacturers (SIAM), India is one of the largest automobiles producers in the world and produced about 24 million and 23.5 million vehicles in 2014-15 and 2015-16, respectively. The country has also seen an increase in exports during the period 2014-16 mainly in passenger, commercial and two wheeler segments. For example, manufactured in India, Suzuki Ertiga has been launched in foreign markets such as South Africa and Philippines. Between April 2000 and March 2017, the Indian automobile industry attracted foreign direct investment (FDI) of around US$ 16.67 billion.

Leather: India's leather industry has transformed from being a supplier of raw materials to being an exporter of value-added finished products. Currently, about 50% of India's leather business comes from international trade. It exports largely to countries such as Germany, US, UK, Italy, France, Hong Kong, Spain, etc. Being the fifth-largest exporter of leather goods and accessories in the world, the industry is expected to grow as the government has identified it as a focus sector in the Foreign Trade Policy.

Pharmaceuticals: The Indian pharmaceutical industry accounts for about 2.4% of the global industry in value terms and 10% in volume terms. It is expected to grow from US$ 20 billion in 2015 to US$ 55 billion by 2020 at a CAGR of about 15.9%. India has the largest number of pharmaceutical manufacturing facilities registered with US Food and Drug Administration (FDA) for any country outside the US. The number stood at 201 as on March 2016. The Indian government allows 100% FDI under the automatic route in the

drugs and pharmaceuticals sector. As per DIPP, drugs and pharmaceuticals sector has attracted an FDI of US$ 14.71 billion during the period, April 2000 to March 2017. India has a total of 24,000 pharmaceutical companies, of which around 250 fall under the organised category, controlling nearly 70% of the market. Some of the major Indian private companies are Alembic Chemicals, Aurobindo Pharma, Ambalal Sharabhai Limited, Cadila Healthcare, Cipla, Dr. Reddy's, IPCA Laboratories, Kopran, Lupin Labs etc. As per a report by The Economic Times in 2016, the Indian pharma industry is expected to grow to US$ 55 billion by 2020. This will make the market comparable to developed markets such as Japan, China and the USA. Going forward, private sector participation is expected to increase and many global manufacturers could invest in India.

Textiles manufacturing: The Indian textiles industry was valued at US$ 108 billion in 2016 and is expected to reach US$ 223 billion by 2021. The industry provides employment to about 45 million people directly and 60 million people indirectly. It is for this reason that the textile industry is the second largest employer after agriculture. It has the potential to further reach US$ 500 billion by 2025. Of this, US$ 315 billion is expected to come from domestic consumption and the remaining US$ 185 billion is expected to come from exports. In June, 2016, the government approved a special package for employment generation and promotion of exports in the textile and apparel sector. This could lead to a cumulative increase of US$ 30 billion in exports and investment of Rs 74,000 crore over the period from 2016-19.

Electronics: The Government of India launched National Policy on Electronics in 2012 (NPE 12) with the aim of making India an investor friendly and growth market that can attract domestic and international players to invest in the country's electronics manufacturing sector. The government also focuses on promoting electronics manufacturing in the country with a target of NET ZERO IMPORTS by 2020. The Indian electronics market is one of the largest in the world. At a CAGR of about 19.1% during 2012-2022, it is expected to grow to US$ 400 billion in 2022 from US$ 69.6 billion in 2012.

Chemicals: The Indian chemical industry is a major player in terms of the volume of chemicals produced. It could grow at 14% per annum to reach a size of US$ 350 billion by 2021. India currently produces 7% of global dyestuff and dye intermediates. It is the world's third largest consumer of polymers and fourth largest producer of agrochemicals.

Gems and Jewellery: The gems and jewellery sector contributes nearly 6% to India's GDP. It is a highly export oriented and labour intensive sector. The sector generated US$ 38.6 billion of revenue from exports in FY 2016. The Indian jewellery market is expected to grow at a CAGR of 15.9% during 2014-2019. By 2022, the Gems and Jewellery Skill Council of India plans to provide training to more than four million people to fulfill the existing skill gap.

Policy impetus for business: Make in India

The government has remained focused on enhancing the situation of the manufacturing sector in the country. For this, it has brought in key policy changes and introduced initiatives including tax incentives and breaks. A key initiative in this respect is the Make in India project launched in September 2014, as a part of a wider set of nation-building measures. The programme is aimed to transform India into a global hub for manufacturing, research & innovation and an integral part of the global supply chain. Here is a list of various initiatives being taken by the government under the Make in India programme. These are expected to accelerate the growth of the 25 sectors that the programme covers.

The first ever public-private collaborative process to finalise Action Plans for 21 focus sectors and state governments was undertaken in December 2014. In all, 118 Action Plan Points for 21 focus sectors are being monitored; and 78% of the short-term action points had been implemented as of May 2017.

Improvement in Infrastructure:

- The Government of India is developing industrial parks so as to develop manufacturing hubs in the country. For example, National Investment and Manufacturing Zones (NIMZs) are being set up which is a combination of production units, public utilities, logistics, residential areas and administrative services. The zones will have manufacturing facilities along with processing areas, associated logistics and other required infrastructure. The non-processing areas will include residential, commercial and other social and institutional infrastructure. There are eight industrial and manufacturing zones which are planned to be set up inside the DMIC (Delhi Mumbai Industrial Corridor) and 14 are planned to be built outside the DMIC. Out of these, the NIMZs at Prakasam in Andhra Pradesh and Medak in Telangana have been granted final approval. The first phase of NIMZ is expected to be complete by 2020.

- More special economic zones (SEZs) are being set up. These zones are considered as foreign territory for development of industry, services and trade. Special relaxations are provided in customs duties. Liberal regime is followed in foreign investment and other levies.
- The Government of India is developing industrial corridors like the Delhi-Mumbai Industrial Corridor (DMIC). The first phase of development is expected to be completed by December 2019. It uses the high-capacity western Dedicated Railway Freight Corridor (DFC) through which the goods are transported. Other industrial corridors being developed are the Bengaluru-Mumbai Economic Corridor (BMEC); Amritsar-Kolkata Industrial Development Corridor (AKIC); Chennai-Bengaluru Industrial Corridor (CBIC) and East Coast Economic Corridor (ECEC).
- Clusters of specific industries are being set up such as electronic manufacturing clusters, mega food parks etc.
- Country specific zones are being set up where all players from a particular country are allowed to set up operations. For example, the Neemrana Japanese Zone has been set up to help companies from Japan to set-up base and production.

Incentives under Income Tax Act:

- The Government of India in the Union Budget 2014-15, has provided investment allowance of 15% to the manufacturer who invests more than US$ 4.17 million in a particular year in new plant and machinery.
- Higher deductions of up to 200% have been provided for expenditure related to R&D (subject to fulfillment of stipulated conditions).
- Export incentives have been provided under the Foreign Trade Policy. Several incentives such as duty drawback, duty remission schemes etc have been provided. The FTP for 2015-20 has notably simplified the various incentive schemes by merging them into one scheme each for merchandise and service exports, namely Merchandise Exports from India Scheme (MEIS) and Services Exports from India Scheme (SEIS).
- State specific incentives for industries are also being provided apart from the above. Some of the states also have separate policies. Incentives such as land at rebated cost, relaxation in stamp duty, exemption on sale/lease of land, power tariff incentives, concessional rate of interest on loans, investment subsidies/tax incentives etc are being provided over the above mentioned centre-specific incentives.
- Additional deductions are being provided. For example, 30% of additional wages paid to fresh regular employees employed over and above 50 workmen, are deductible.

Incentives offered for manufacturing:

- Sector specific subsidies for promoting manufacturing are being provided. For instance, the Government of India is providing capital subsidy of up to 25% for 10 years for manufacturing of electronics.
- Incentives are provided for units in SEZ/NIMZ as specified in respective acts. In addition, projects in special areas such as the North East Region, Jammu & Kashmir, and Himachal Pradesh & Uttarakhand are also eligible for incentives.

Ease of Doing Business: The following policies have been announced for ease of doing business in the country.

- The rate of corporate tax for Indian registered companies will go down from 30% to 25% of the net profit over the next four years starting from FY 2016-17 in a phased manner.
- The government paved the way for roll out of the Goods and Services Tax (GST), a new tax regime, from July 1, 2017. GST is focused on ironing out the creases left by the predecessor tax regime and enhancing ease of doing business.
- The process for applying for Industrial License (IL) and Industrial Entrepreneur Memorandum (IEM) has been made easy and online.
- Initial validity period of IL has been increased from two years to three years. In addition, two extensions of two years each are allowed taking the total time up to seven years. This would give enough time to licencees to procure land and obtain all the necessary clearances/approvals from respective authorities.
- Through an eBiz portal, a business user can fill the eForms online/offline, upload the attachments, make payment online and submit the forms for processing to the concerned department.
- In the Union Budget 2017-18, the Finance Minister announced reduction of income tax for MSME companies with annual turnover up to Rs 50 crore to 25%.

These efforts shall enhance the ease of doing business in the country. India's global ranking on the World Bank's Ease of Doing Business Index improved from 142 in 2014 to 134 in 2015 and finally to 130 in 2016. In 2017, the country witnessed a spectacular jump of 30 points to reach a rank of 100 on the index.

Labour reforms:

- A dedicated Shram Suvidha Portal has been set up to allot Labour Identification Number (LIN). This would also allow filing of online compliance for 16 out of 44 labour laws.
- Universal Account Number (UAN), a Provident Fund account number which is universally accessible, was initially issued to 4.17 crore employees. As of December 2016, UAN number was allotted to nearly 8.11 crore members of EPF out of a total of about 15 crore EPF members.
- A random inspection scheme has been established to bring in transparency in labour inspection and envisage that serious matters are to be covered under the mandatory inspection list and a computerised list of inspections will be generated randomly based on pre-determined objective criteria. Also, uploading of inspection reports has been made mandatory within 72 hours of inspection.
- A number of components on the defence products list have been removed from the purview of industrial licensing.
- The process application for industrial license and industrial entrepreneur's memorandum has been eased.
- The validity period of the industrial license and security clearance from Ministry of Home Affairs has been increased.
- The process of registration with Employees' Provident Fund Organisation and Employees' State Insurance Corporation has been made online, easy and real-time.
- Process of obtaining environment and forest clearances has been made online.
- 14 services of Government of India have been integrated with an online, single window eBiz portal.
- Foreign Direct Investment (FDI) -
  - The government has now allowed foreign companies to own up to 100% equity in the local defence sector through the government approval route (beyond 49%) in cases where it is likely to result in access to modern technology. The current foreign direct investment (FDI) regime permits foreign companies to own 49% in Indian units through the automatic approval route.
  - FDI grew by 46% during the period of October 2014 and May 2016 amounting to US$ 61.58 billion.
  - FDI inflows reached US$ 60.08 billion for FY 2016-17, an all-time high and a rise of 8% over last year's figure. Furthermore, in the 30-month period between October 2014 and March 2017, FDI reached US$ 100 billion, compared to US$ 61 billion during the 30-month period from April 2012 to September 2014.
  - The Government of India allows 100% FDI under the automatic route in sectors like drugs and pharmaceuticals, agriculture & animal husbandry, mining, selective plantation crops, petroleum & natural gas, broadcasting etc.
  - The government heavily promotes foreign investment in the automobile industry by allowing 100% FDI, under the automatic route.

Skill India:

- The government has launched a multi-skill development programme to make the labour workforce job-ready and fit for pursuing entrepreneurship. Its mission is to create a workforce which is more mobile and more employable. The programme aims at fulfilling the skilling needs of approximately 800 million citizens of the country by incentivising skill training and providing financial rewards to candidates who successfully complete approved skill training programmes. Emphasis is being given on new areas like real estate, construction, transportation, textile, gem industry, jewellery designing, banking, tourism etc. where demand for skill development is high.

IPR norms have been amended to spur innovation:

The Patent Amendment Rules 2016 provides for:

- Timelines imposed for speedy disposal
- 80% rebate in fees for start-ups,
- Expedited examination on certain grounds
- Refund of fees and withdrawal of application
- Hearing through video conferencing

The Trademark Amendment Rules 2017 provides for:

- Number of Trademark Forms reduced from 74 to 8
- Online filing fees 10% lower than physical filing
- Reduction in fees for individuals, start-ups and small enterprises
- Expedited examination extended up to registration stage
- Service of documents through electronic means.

Private participation in developing the Indian manufacturing sector

To sustain India's economic growth, it is necessary to increase the share of manufacturing to 25% of India's GDP by the end of year 2025. Now, with the government bringing in favourable policies, focusing on developments of NIMZs and SEZs, providing incentives and tax breaks and developing trade corridors, the manufacturing sector provides a huge opportunity for private companies and institutions to invest in the sector. Also, India offers a cost competitive market along with skilled workforce at reasonable cost, thus making it easier to sustain manufacturing operations in the country. Domestic demand along with the opportunity to export is providing private players an opportunity to cater to all of these markets.

The manufacturing sector is also experiencing development of many economic corridors which is a key enabler for private sector participation. The development of manufacturing sector and urban clusters within the corridor occurs up to 50 to 75 km on either side of the corridor. Such corridors covering key manufacturing hubs and urban centres have been planned across India and are in various stages of implementation.

A major portion of the investment in developing the infrastructure for connectivity, utilities, power etc is supposed to be met by the states falling within the corridor. Here lies the opportunity for private companies. These states invite private companies for financing, development, operation and maintenance within these corridors. Thus, private players can either enter as investors in manufacturing facilities or as investors involved in infrastructure development. While investors in manufacturing facilities are expected to set up factories within the designated zones, investors in infrastructure could focus on the following:

- Development and maintenance of industrial parks with the required amenities and developing plots for industries.
- Development and maintenance of townships comprising housing for various categories of residents. Also development of commercial, cultural and entertainment areas.
- Development of educational centres, skill development institutions, hospitals, healthcare facilities and other social infrastructure.
- Highways and expressways in corridor areas.
- Greenfield airport development and operations within corridor through public-private-partnership (PPP) mode.
- Greenfield port development and operations within corridor through PPP mode.

- Desalination plants in PPP mode for industrial water supply for nodes in proximity to coast.
- Waste treatment plants in PPP mode.
- Power generation plants within corridor for supply within corridor areas.
- Warehousing and logistics facilities within nodes and along corridor etc.

The current framework and the initiatives launched by the government under the Make in India programme are catching a significant level of attention from the private companies. Going ahead, the private sector is being seen as a major developer in collaboration with the government to take Indian manufacturing competitiveness to the next level.

Some recent projects/initiatives

- The Make in India week held in Mumbai between February 13 and 18, 2016, received an overwhelming response from investors. The fair closed with Rs 15.2 trillion (US$ 225.32 billion) in investment commitments.
- In September 2016, Huawei, the China-based smartphone manufacturer, entered into an agreement with solutions provider Flextronics Technologies (India) Private Limited to manufacture its smartphones in India. Flextronics would start by making 3 million smartphones at its facility in Chennai and is expected to generate an additional 1,500 jobs by year 2020.
- Zopo Mobile, a China-based smartphone manufacturer, plans to invest Rs 100 crore (US$ 15 million) to set up a manufacturing plant in Noida by FY 2017, which will have a monthly production capacity of 100,000 units.
- In May 2016, Honda Motorcycle & Scooter India announced its plans to invest around Rs 600 crore (US$ 88.94 million) to add a new line at its Narsapura facility at Karnataka, and launch at least 10-15 products during FY 2016-17 in the country.
- In June 2016, Boeing Company, an American plane maker, and Tata Advanced Systems Ltd (TASL), a fully owned subsidiary of Tata Sons, entered into a joint venture to set up a new facility in Hyderabad to manufacture Boeing AH-64 Apache helicopter fuselages.
- As a outcome of World Food India held in November 2017, 13 companies (global and domestic) committed to invest a total of Rs 68,000 crore in food processing over the next few years.

Conclusion

The manufacturing sector historically has been contributing about 16% to the GDP of the country. Going ahead, this is expected to increase to about 25% by 2025 to sustain the existing pace of growth. With the government now providing significant incentives, tax breaks and favourable policy under the National Manufacturing Policy and subsequently the Make in India programme, the investment and initiatives from the private firms, both foreign and domestic, are expected to increase. With development of NIMZ, country specific zones, SEZs, industrial clusters and special economic corridors for rapid transport of goods and introduction of GST, the country provides a robust development infrastructure for the manufacturing sector. The impact of the *'Make in India'* initiative is already visible in terms of FDI inflows into the country. India retained the position of the number 1 destination for greenfield FDI for the second consecutive year in 2016. FDI inflows by capital investment for the year 2016 stood at US$ 62.3 billion across 809 projects. During April-September, 2017-18, FDI reached US$ 25.35 billion, an increase of 17% year-on-year (DIPP).

Special attention is being given to the development of the 25 sectors selected under the Make in India programme. For example, defence manufacturing has recently seen investments from both foreign as well as domestic investors. Significant developments in other sectors such as pharmaceuticals, textiles, food processing, chemicals etc. are expected to boost the manufacturing sector as a whole.

This is expected to create 100 million additional jobs by 2022. As per media articles, placement firms are bullish on the employment that the Make in India programme would generate. As per estimates, India is expected to employ 2.9 million flexi staff by 2018, thereby becoming the third largest country to employ contract employees globally. This would add 8 to 13% to the current pool of jobs in the country.

Expert perspective

Mr. Shanmugh Natarajan, Managing Director, Adobe Systems India & Vice President (Products), Adobe

"India's transformation into a global R&D hub is epitomised by the strides the country is making in attracting R&D investments in technology and manufacturing industries. Undoubtedly, India's mobile revolution story, increasing penetration of data services, and skilled millennial population coupled with GoI's commendable Digital India focus and 'Make in India' vision have accelerated this trend faster than ever before. As a result of these factors, India has become among the world's leading markets especially in segments such as electronic systems, electrical machinery and automobiles."

Mr Munesh Makhija, CEO - GE India & GE China Technology Centers and CTO - GE South Asia & GE China

"GE stands committed to India. The country is home to some of the best technology talent that works on designing innovative technology solutions, for India and the world. GE's global vision is to work closer with our customers and design and develop technologies that drive innovation locally.

The John F Welch Technology Centre (JFWTC) in Bengaluru, and our technology centres in Hyderabad, Chennai, Mumbai, and Noida are at the heart of it. GE is driving three broad themes globally, and India is at the centre of these themes. These are Digital Industrial, driving innovation for local and global markets, and working horizontally and vertically."

New avenues driving services growth

The services sector is the fastest growing sector of the country and has remained resolute in the face of global headwinds. It plays a significant role in the growth trajectory of India's economy with its contribution to national and state income, trade flows and FDI. It is a major source of employment whereby around 28% of the workforce derives its livelihood from this sector. India is also among the top 10 services exporters in the world. With technology and innovation driving the global economy and transcending borders, undoubtedly the Indian services sector is poised to move from strength to strength, further enhancing India's overall competitiveness in the global arena.

India was largely an agrarian economy prior to independence and continued to be predominantly agriculture-driven even after three decades of independence in 1947. The country witnessed growth in the services sector for the first time in the mid-1980s. Later in the 1990s the growth of services sector started to accelerate due to the introduction of a series of economic reforms, becoming the fastest growing sector of the Indian economy. The services sector's share of the GDP of the country increased to over 50% in the 2000s from 30% in 1950s.

Snapshot

IT-BPM

8.8%
Estimated growth in services sector in 2016-17

US$ 132 billion
Revenue contribution for IT & BPM sector in FY 2015-16

64%
Contribution to the country's GDP

US$ 65.21 billion
India's trade surplus in services during 2016-17

US$ 350-400 billion
Expected size of IT-BPM services sector by 2025 at a CAGR of 12% (since 2016).

Key government initiatives:

- The Government of India has introduced initiatives like Digital India, E-seva centres and made investments in technological centres and hubs resulting in expansion of operations of international IT-BPM companies in India like Google, Microsoft, SAP Labs etc.
- Software Technology Parks of India Scheme (STPI) was initiated by the Government of India to improve infrastructure facilities and enhance the growth of IT-BPM services. As of September 30, 2016, over 2,500 units were exporting under STP scheme. During April-September 2016-17, estimated IT/ITeS export earnings from STP had reached Rs. 16,725 crore.
- Government of India has initiated the "Digital India' campaign with a focus to digitise existing government functions which will lead to integration of people and bring transparency into government operations. India has partnered with different countries for the vision of transforming India into a digital nation. For example, India has collaborated with the US for Rs 1.13 trillion of investment.
- The Ministry of Communication and Information Technology has also announced the setting up of 100,000 additional E-seva centres up from the existing 150,000 centres that will connect villages across the country.

The Ministry of Railways plans to integrate technology with its services by providing real time passenger information and improve railway infrastructure by ensuring:

- Wifi facilities at 40 railway stations
- 1,780 automated ticketing systems
- Expanding e-catering system to 408 railway stations from 40 railway stations
- 20,000 high definition screens across 2,000 railway stations

Research & Development

- The Indian research and development industry was worth around US$ 20 billion in FY15. It is further expected to grow to US$ 38 billion by FY20, registering a CAGR of 17%.
- India is fast emerging as a hub for R&D services. Bengaluru is ranked fifth among the top ten destinations in the world for its innovation centres.
- Players in Indian R&D services specialise in sectors like automobile, biotech, pharma and electrical.
- The talent base available in India has helped the country evolve into a global R&D and innovation hub. This evolution has been strongly supported by a number of higher education institutes in the country which include 318 state universities, 45 central universities, 129 deemed universities and 185 state private universities.
- With an objective to provide thrust to the sector, existing schemes like Research and Development by Industry (RDI), Programme Aimed at Technological Self-Reliance (PATSER), Scheme to Enhance the Efficacy of Transfer of Technology (SEETOT), and Asian and Pacific Centre for Transfer of Technology (APCTT), were combined into a single scheme i.e. Technology Promotion Development and Utilisation (TPDU) Programmes in 2009. The objective was to promote R&D across industry segments. Another objective was to bring technological change and advancements in the other industries.

Summary of ER&D centre announcements by countries during April-December, 2015

Country	No. of centres	Key examples
India	57	Rolls-Royce, Michelin, Foxconn, BASF, Bosch, Coolpad, Daikin, Danfoss, Delta, Ericsson, LeEco, Vivo, Sandvik, Sinon
US	34	Alcoa, Boeing, Didi Kuaidi, GM, Honda
China	13	Acer, BASF, Ford, Dell, Kone, Mercedes-Benz
Singapore	13	3M, Alcatel, DuPont, Grab Taxi
France	7	Bosch, Cisco, Facebook, Michelin, Salesforce
Israel	7	Facebook, PayPal, Marketo, Visa, SanDisk
UK	6	Arcelik, Geely, Royal Enfield
South Korea	5	Henkel, Mitsubishi, Samsung
Ireland	4	Dell, Huawei, Intel
Others	44	-
Total	190	

Source: Industry reports, Secondary sources

Recent initiatives by the private sector :

- Chinese telecom gear-maker, Huawei, launched an R&D campus in Bengaluru at an investment of US$ 170 million. The campus has a capacity to accommodate 5,000 engineers and has generated employment for 2,700 Indians.
- Broadcom, an American chipmaker has established an R&D centre based in Bengaluru, tapping into the potential of internet of things and successfully providing employment to 1,100 people in the year 2015.
- Uber Technologies plans to make its Bengaluru technology centre a hub of product innovation for India as well as for global markets with a target of introducing new products on payments, vehicle intelligence and mapping.
- The Tata Group has entered into collaborations with the world's leading academic institutions, which include Harvard University, Yale University, the Indian Institute of Technology, Madras, and the Royal Society, United Kingdom, in order to fund research and development opportunities in those institutions.
- India's largest two wheeler manufacturer, Hero Motocorp, has established an integrated R&D centre on the outskirts of Jaipur with an investment of Rs 850 crore (US$ 126.74 million).

The Union Cabinet approved the National Intellectual Property Rights (IPR) Policy in May 2016 to prepare the future roadmap for intellectual property in India. It aims to create and exploit synergies between all forms of intellectual property (IP), concerned statutes and agencies. The Policy lays down the following seven objectives:

i. IPR Awareness: Outreach and Promotion - To create public awareness about the economic, social and cultural benefits of IPRs among all sections of society.

ii. Generation of IPRs - To stimulate the generation of IPRs.

iii. Legal and Legislative Framework - To have strong and effective IPR laws, which balance the interests of rights of owners with larger public interest.

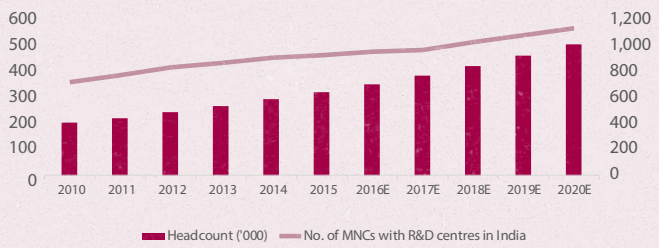
iv. Administration and Management - To modernize and strengthen service-oriented IPR administration.

v. Commercialization of IPRs - To get the value for IPRs through commercialization.

vi. Enforcement and Adjudication - To strengthen the enforcement and adjudicatory mechanisms for combating IPR infringements.

vii. Human Capital Development - To strengthen and expand human resources, institutions and capacities for teaching, training, research and skill building in IPRs.

Trend in R&D talent growth in MNCs in India



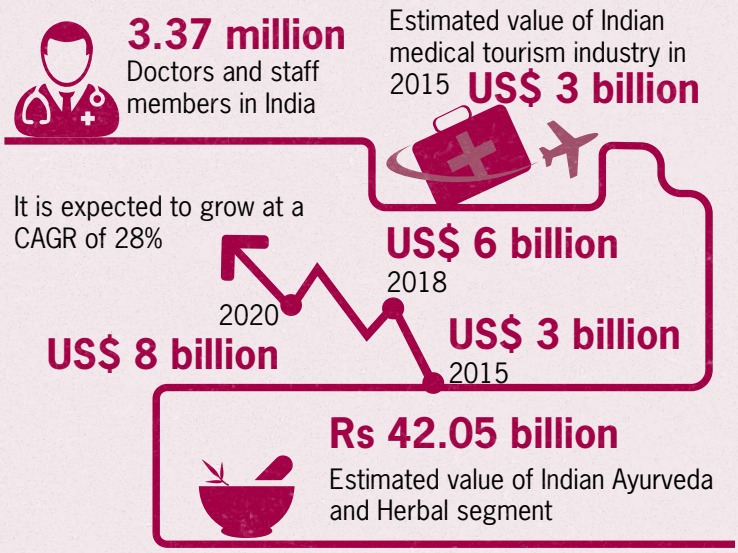
R&D talent growth in MNCs in India (2016)

Top 5 verticals		Top 5 locations	
Software/ internet	121,650	Bengaluru	155,000
Electrical & electronics	33,057	Pune	40,300
Telecom & networking	31,043	NCR	31,000
Automotive	30,757	Hyderabad	30,700
Semiconductors	23,333	Chennai	27,900

Source: Industry reports, Secondary sources

Wellness and Medical tourism:

- With 3.37 million doctors and staff members in India, the Indian medical tourism industry was valued at US$ 3 billion in 2015. It is expected to grow to US$ 6 billion by the end of 2018 and US$ 8 billion by the end of 2020 with a CAGR of 28%.
- The Indian Ayurveda and Herbal segment has an estimated value of Rs 42.05 billion with exports worth Rs 4.4 billion. The industry size is expected to grow to Rs 70 billion by 2020.
- Yoga, an ancient practice of physical, mental and spiritual being, originated in India. Recognising the universal appeal for yoga, United Nations proclaimed June 21 as International Yoga Day by resolution 69/131 in December 2014.
- Yoga contributes approximately around Rs 120 billion towards the wellness segment. Also, with respect to exports pertaining to AYUSH (Ayurveda, Yoga, Naturopathy, Unani, Siddha and Homeopathy) its contribution was around Rs 22.7 billion, as of 2014. Exports of herbal raw drugs, including extracts was estimated at 1,34,500 MT in 2014-15 and valued at Rs. 3,211 crore).
- Other than medical tourism, the Government of India is also focussing on making India a preferred destination for foreign tourists from the United States, Europe and Asia Pacific among others.
- The Ministry of Tourism had provided e-Visa facilities for three categories as of December 31, 2016 - 'e-Tourist Visa', 'e-Business Visa', and 'e-Medical Visa'. This facility is available to nationals of 161 countries.



The story of services industry in India goes like...

Average sectoral share in India's Gross Domestic Product by decade (%)

Sector	1951-1960	1961-1970	1971-1980	1981-1990	1991-2000	2001-2010
Agriculture	55.3	47.6	42.8	37.3	30.9	21.8
Industry	14.8	19.6	21.3	22.3	23.3	24.5
Services	29.9	32.8	35.9	40.4	45.8	53.7

Source: NITI Aayog

The Indian services sector has grown at a CAGR of 8.6% during the period 2010-2014, which is way ahead when compared to the world services sector which is at a CAGR of 2.5% for the same respective period. India during this period witnessed the highest growth rate, surpassing China which had a CAGR of 8.4%.

As per WTO data, India's commercial services exports increased from US$ 51.9 billion in 2005 to US$ 155.3 billion in 2015. Services exports reached US$ 160.68 billion in 2016-17, and the services trade surplus stood at US$ 65.21 billion.

The share of services in employment was around 24% in 2001 which increased to 28.7% in the year 2014. The sub sector share of services during 2014 was as follows:-

Services sector share in employment

Services sub-sector (2014)	Share in employment (%)
Trade, hotels and restaurants	11.7 %
Transport, storage and communication	5.3 %
Financial, insurance, real estate and business services	2.5 %
Community, social and private services	9.2 %
Total services sector	**28.7 %**

Source: Industry reports, Secondary sources

The first Global Exhibition on Services (GES) was organised by the Government of India in 2015, to enhance trade in services between India and the world. Two more exhibitions have been held since. The highlights of the third edition held in 2017 are as follows:

- Coverage increased to 20 sectors
- 400 foreign buyers and participation from 73 countries
- Over 5,000 B2B meetings
- 573 exhibitors and 25,000 visitors

Composition of services sector

Services sector includes financial, banking, insurance, non-financial/business, outsourcing, research and development, courier, tech, testing and analysis. However, for the purpose of this study services sector has been taken as all services except banking, finance and transport and logistics services (which forms part of a separate theme). This particular theme focuses on the following sub-components of services:

- IT-BPM
- Medical and wellness tourism
- Research and development

Current scenario

According to the first advance estimates of CSO, growth rate of the services sector was projected at 8.8% in 2016-17, almost the same as in 2015-16. It contributes around 64% to the GDP of the country. India's commercial services exports reached a share of 3.3% of global services exports in 2015 from 3.1% in 2014.

April-Mar 2016-17	Export	Import	Net
Services Total	163,123	95,668	67,455
Travel	23,244	16,427	6,817
Transportation	15,851	14,132	1,719
Insurance	2,206	1,496	710
G.N.I.E *	588	600	(11)
Miscellaneous, of which	121,234	63,014	58,220
1. Software services	73,651	3,587	70,064
2. Business Services	32,946	32,254	692
3. Financial Services	5,099	5,852	(754)
4. Communication Services	2,375	910	1,465

*Government not included elsewhere

Amount In US$ million

Source: RBI, Industry reports, Secondary sources

Sub-sector wise contribution in the services sector is as follows:-

Name of Sector	Percentage share
Trade, hotels and restaurants	**23%**
Trade & repair services	21%
Hotels & restaurants	2%
Transport, storage and communication	**13%**
Railways	1%
Road transport	6%
Water transport	0%
Air transport	0%
Services incidental to transport	1%
Storage	0%
Communication & services related to broadcasting	3%
Financial, insurance, real estate and business services	**39%**
Financial services	11%
Real estate, ownership of dwelling & professional services	27%
Community, social and private services	**25%**
Public administration & defence	12%
Other services	13%
Total services sector	**100%**

Source: RBI

Share of services sector in India

Year	2014-15	2015-16	2016-17
Share of services sector (%)	51.8%	52.9%	53.8%
Growth % (yoy)	9.7%	9.7%	7.7%

Source: RBI, Industry reports; Figures for 2016-17 are provisional

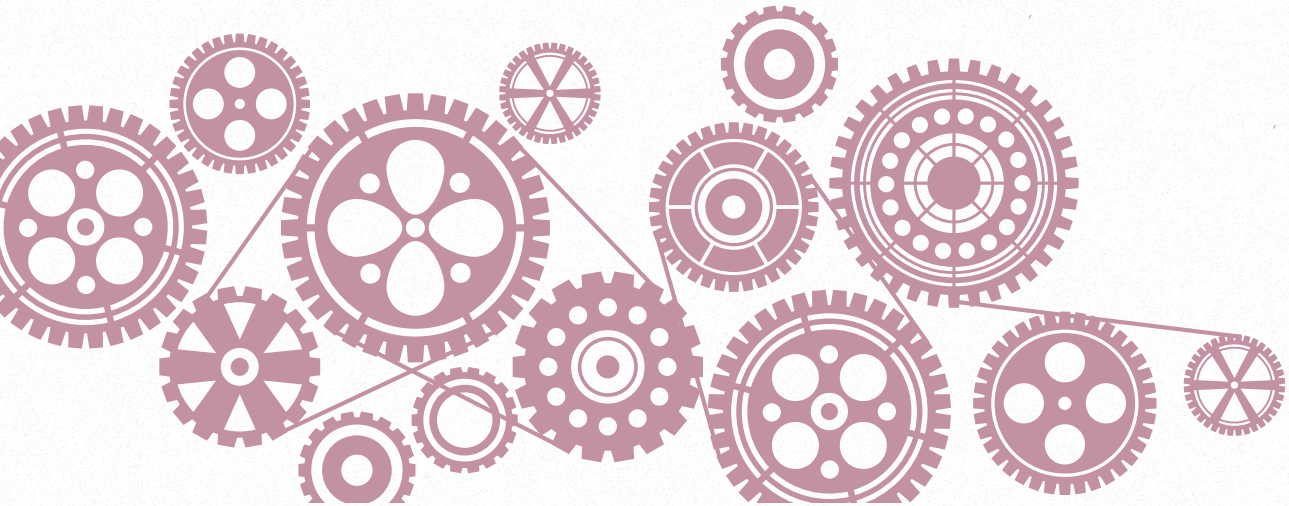
The gross value added at current prices for the services sector has significantly increased over time. The major factors that have accelerated the services sector in India have been enlisted below:-

Advances in technology: With the introduction of new and advanced technologies, India is now on the path of becoming the fastest growing services economy. The era of digitalisation has transcended global borders which has resulted in the expansion of India's international services trade. This has led to the emergence of different aggregators which function on technology and rendering services.

Rise in per capita income: With the rise in per capita income of the Indian population, there arises a need and expectation to avail better services. This acts as a growth driver for the services sector as service providers thrive to offer better services to their consumers.

Young demographic profile with high literacy rate: With approximately 65% of the population in the working age group of 15-65 years and literacy rate for this population growing to 72.14%, India now prides in being the nation with the fastest growing services sector. The young literate population acts as a much wanted manpower pool for all sub-sectors within the industry from IT-BPO to banking and financial services.

FDI: The fast growing services sector due to its other growth drivers has seen an increasing trend of FDI inflow. The Indian services sector has attracted the highest amount of FDI equity inflows in the period April 2000-March 2017, amounting to about US$ 59.48 billion, which is about 18% of the total foreign inflows.

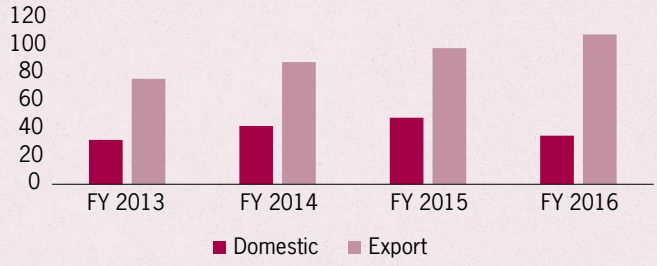


IT- BPM

India continues to be the leader in the global IT- BPM sector and underlines its distinctive position as one of the countries that offers strong capabilities in hardware and software manufacturing as well as IT services. India's strong competitive advantage can be gauged from the fact that the market share for the global services sourcing industry for India increased to 56% in the year 2015 as compared to 52% in the year 2012. The sector in India is largely privately managed employing more than 3.7 million of workforce in the country. The sector has a share of 9.5% of GDP and over 45% in total service sector exports in FY 2015-16.

The IT –BPM sector was estimated to have grown at a rate of 8.5% yoy in 2016, contributing US$ 143 billion in 2016 as compared to US$ 132 billion in 2015. Revenue is estimated to have grown by 8% to US$ 154 billion in FY 2017. The sector is poised to reach US$ 350 billion by 2025.

Revenues from Indian IT sector (US$ billion)

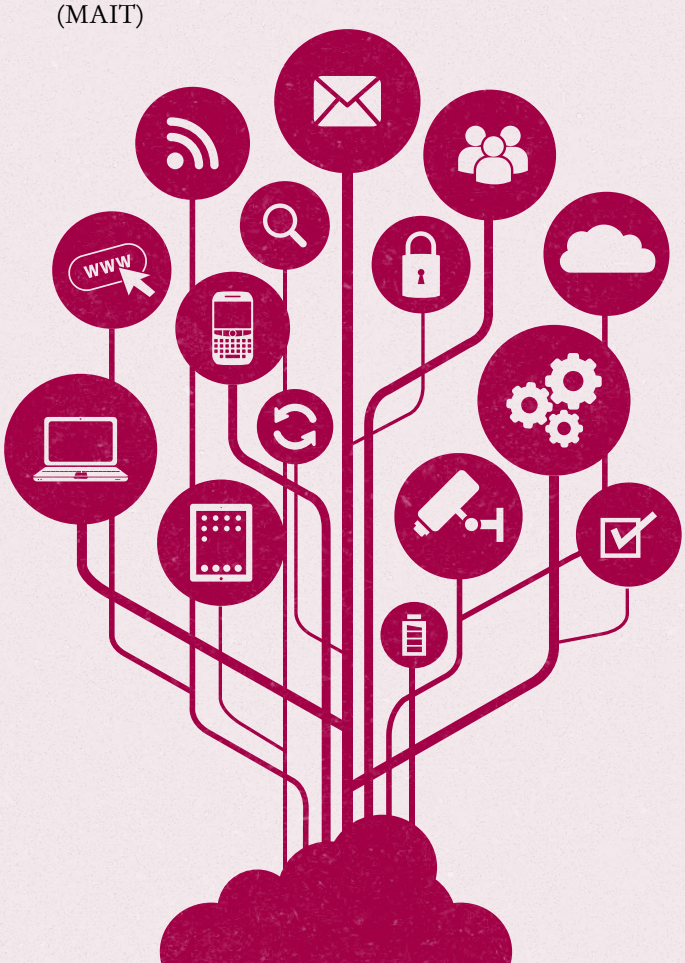


Source: Industry reports, Secondary sources

India's IT- BPM exports increased from US$ 88 billion in 2014 to US$ 108 billion in 2016 at a CAGR of 10.7%. IT services exports contributed US$ 61 billion, BPM exports stood at US$ 21 billion, ER&D and packaged software exports were recorded at US$ 22 billion and hardware exports reached US$ 0.4 billion. The major markets for IT software and services exports from India are United States, United Kingdom and Europe, accounting for about 90% of the total IT exports.

The technology sector in India is one of the regulated sectors in the country, where the Department of Electronics and Information Technology, Ministry of Communication and IT plays an imperative role. Some of the industry bodies and trade associations which represent the Indian IT sector at the global level are:-

- National Association of Software and Services Companies (NASSCOM)
- Confederation of Indian Industry (CII)
- Federation of Indian Chambers of Commerce and Industry (FICCI)
- Electronic Industries Association of India (ELCINA)
- Electronic and Computer Software Export Promotion Council (ECSEPC)
- Manufacturers' Association for Information Technology (MAIT)



India is the world's largest sourcing destination for the information technology (IT) industry, accounting for approximately 67% of the world's market. India's unique value proposition as the world's leading outsourcing destination rests on 4 pillars:-

Connected economy – India is a digital ready market: With a vast and growing population of 1.2 billion people, India is expected to house a middle-class of 475 million people by 2030. India has more than 1 billion mobile phone subscribers and more than 300 million people with access to mobile internet. This presents a hard-to-ignore end user market for the world. The Government of India is expected to invest US$ 19 billion in digital investments during the period FY 2015-20.

Maturity - India provides excellence in business delivery. Over the years of its existence, India's IT-BPM sector has been successful in creating a worldwide presence – onshore, offshore, nearshore – for its customers. It has widened its presence in over 78 countries through about 670 offshore development centres; this industry boasts of more than 75 percent of Fortune 500 enterprises as its customers. The sector consists of more than 16,000 firms ranging from multi-billion dollar firms to new start ups.

Highest volume of diverse, employable talent - India has more than six million graduates. The country's IT-BPM sector for the year 2016 employed about 3.7 million people. It is the largest private sector employer in the country.

Digital Hub for the world - There are about 250,000 digitally skilled employees in India, specialising in promising fields like analytics (90,000), mobility (70,000), cloud & social media (70,000) – making India the Digital Hub for the world.

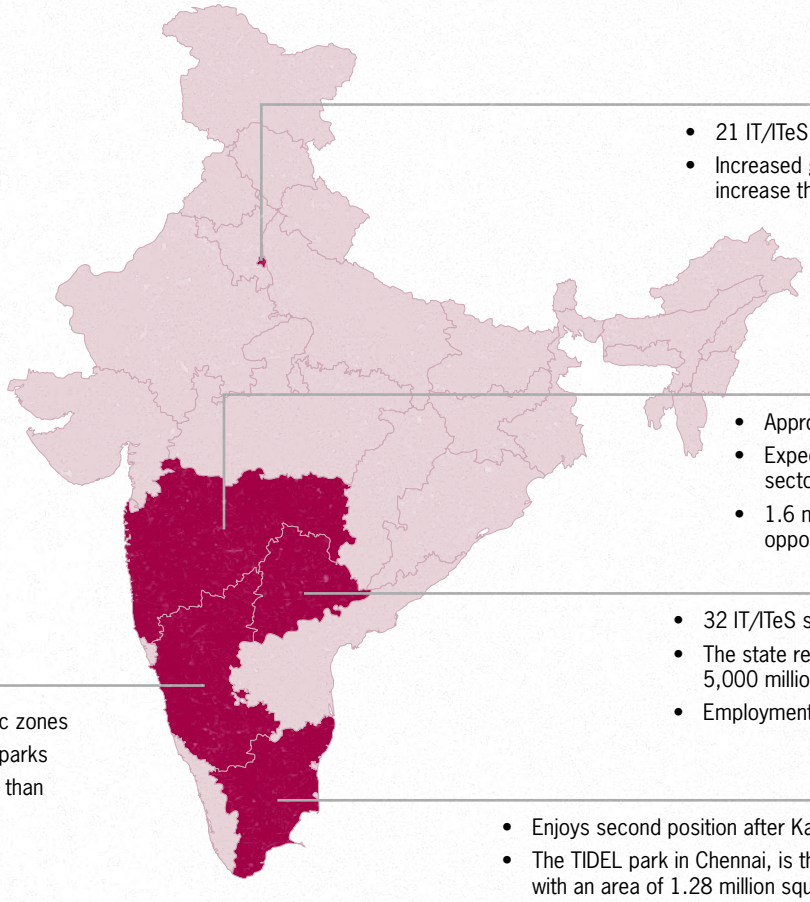
Innovation -

- **Product innovation:** India has the third largest base in the world, with more than 4,200 startups out of which 1,200 startups were set up in 2015 itself. The funding in the B2B sector has seen a 250% growth over the last year.
- **Business innovation:** Firms are using different business strategies like implementing alternate business models through an increased emphasis on time to market, business outcomes by customers etc. and differentiated pricing strategy. A shift has been seen from size to business agility.
- **Process innovation:** The Indian IT industry is all set for transformation with the introduction of business process alignment, technology advancement and process driven services.

Some of the strengths and opportunities of the Indian IT-BPM sector are:-

- Government of India has supported numerous start-ups by facilitating investments in the sector and introducing initiatives like Start Up India. A number of tech-cities are being developed that serve as dedicated homes to these startups.
- With initiatives like Make in India and Digital India, the Government of India welcomes both domestic and international private investors to invest in various projects. Through these initiatives, the Government of India plans to concentrate on new emerging technologies like internet of things, smart manufacturing, 3D printing, smart urbanisation etc.
- Keeping in mind India's competitive edge in the global IT- BPM industry, the government is now focused on developing these IT-BPM centres in rural areas to ensure equal distribution of development. The government plans to achieve this objective by undertaking various skill development initiatives in these rural areas which will not only educate locals but also increase the industry's overall output.
- India ranks as the third largest nation in terms of the total number of startups. With more than 10,000 start-ups (including technology based and non-technology based) after the United States with over 83,000 and China with over 10,000 total start-ups.
  - Approximately 47% of total start-ups are tech businesses and the remaining 53% are non-tech based businesses.
  - Total tech start-ups are expected to increase to 11,500 in 2020 from the current 4,300 in 2015.
  - Close to 800 new technology-based businesses emerged in 2015 and it is expected that India will have around 2,000 new tech businesses by 2020

Some of the major IT/ITeS clusters in India are:-



Delhi NCR

- 21 IT/ITeS special economic zones
- Increased government incentives to increase the number of IT parks

Maharashtra

- Approval for 451 private IT parks
- Expected investment in the sector of around US$ 2 billion
- 1.6 million employment opportunities

Telangana

- 32 IT/ITeS special economic zones
- The state reports approximately US$ 5,000 million in revenue from this sector
- Employment to 3 million professionals

Karnataka

- 47 IT/ITeS special economic zones
- Three software technology parks
- Direct employment to more than 1 million people

Tamil Nadu

- Enjoys second position after Karnataka in software exports
- The TIDEL park in Chennai, is the largest IT facility in India with an area of 1.28 million square feet

There is a surge in the domestic demand for IT services in the country as well, and the same can be attributed to the following factors:-

- Shift towards e-governance
- Emergence of digital platforms in net banking
- Penetration of mobile phones
- Increased automation and digitisation
- Emergence of startups in the technology segment
- Increase in the number of colleges/institutes offering technology courses
- Government initiatives such as Digital India
- Collaboration of Indian companies with foreign companies for IT infrastructure management
- Emergence of new paradigms such as Internet of Things (IOT)
- Creation of big data centres in India by companies to support their IT operations
- Collaboration between India and US to jointly explore opportunities for Digital India
- Launch of the national web portal to promote national apprenticeship scheme and to provide opportunities for practical trainings.
- Focus on increasing number of incubators: For instance, T-Hub, which is India's largest startup incubator in Hyderabad is planning to roll out its second phase of around 350,000 square feet. This will make it the world's largest incubator.

Select government initiatives to provide a thrust to the sector:

- Allowing 100% through the electronic route in the IT sector.
- In an initiative of cross-border partnerships, the Government of India and Vietnam signed two MoUs that shall provide a boost to the information, communication and technology (ICT) segment.
- The Government of India and USA have agreed to jointly explore the opportunities available through the 'Digital India' initiative of the Government of India.
- The Indian government has set up Software Technology Parks of India (STPI's), Special Economic Zones (SEZs) and Information Technology Investment Regions (ITRIs) with various incentives like tax holidays for providing thrust to the sector.
- The Government of India has also removed the condition of minimum land area requirement of 10 hectares for SEZs effective August 2013.
- The Government of India plans to relax its visa regime, including allowing multiple-entry business/tourist visa which is likely to provide a boost to exports and investments.
- Centralised registration under service tax is no more applicable under GST. Maximum number/types of services have been kept at 18% GST, whereas essential services have been exempted. For e.g. various services namely education, health, public conveniences, charitable activities are outside the ambit of GST with 0% rate. Industry specific services such as air transport, small restaurants, etc. are kept in the tax bracket of 5-12% rates. Standard rate of 18% will be applied on residual services such as telecom, IT, financial services, etc. Luxury services such as 5 star hotels, movie theatres, amusement parks, gambling, etc. come under 28% GST.
- The Department of Commerce now organises Global Exhibition on Services (GES) annually in collaboration with industry stakeholders to promote India's strengths in the sector. The third GES was held during April 17-19, 2017 at Greater Noida. The event witnessed 400 foreign buyers and participation from 73 countries.

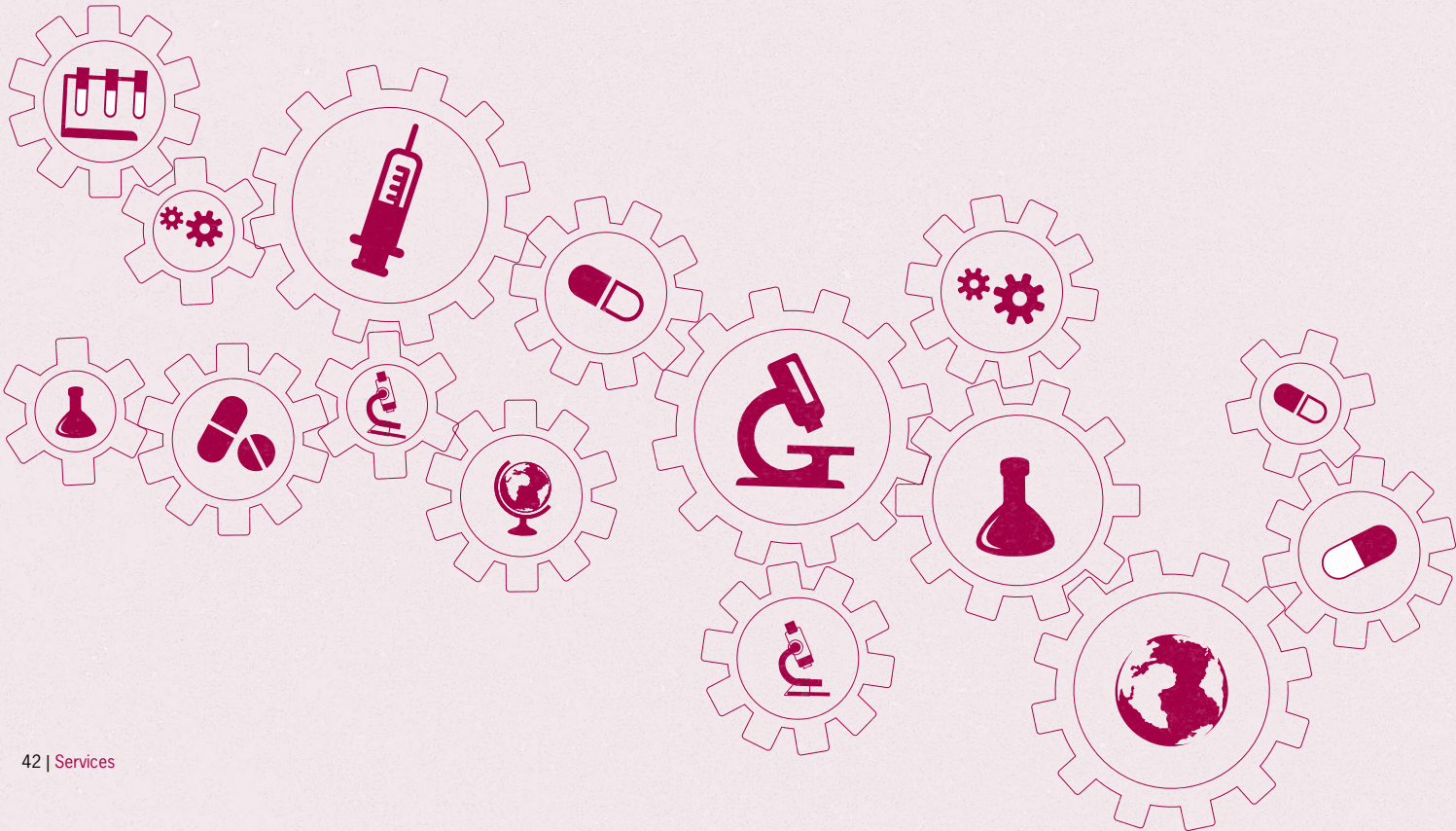
Wellness and medical tourism

India's rich history in Ayurveda and Yoga along with world class hospitality and recreational services has established a significant share of tourism sector in the economy. The tourism sector offers various rejuvenation and curative treatments through meditation, Yoga and Ayurveda and recreational services. These cater to approximately 5 million foreign travellers and 562 million domestic travellers anually through restaurants and hotels.

Wellness and medical tourism is an upscale form of tourism which has recently emerged in India. With advanced technology and a deep wellness heritage, India has emerged as a successful services provider for healthcare needs. Medical tourism comprises of two segments: one is of people who travel to other countries for wellness and health rejuvenation and the other is the people who travel to other countries for curative purposes as those facilities are not present in their country or are extremely expensive. While travel for rejuvenation is a luxury oriented segment, travel for curative purposes is more price sensitive. With rise in incidences of chronic diseases, increase in birth rates, unhealthy lifestyle of people and increase in disposable income of people, the need for healthcare services has risen periodically.

India has one of the fastest growing wellness and medical tourism industries. The Indian medical tourism industry was valued at US$ 3 billion in 2015, (the total healthcare market of India is valued at US$ 100 billion), which is expected to reach US$ 7-8 billion by 2020.

More than 51% of healthcare tourism comes from SAARC regions and the remaining from European countries and American states. Factors like affordability, quality healthcare, proximity, direct air connectivity and cultural and linguistic advantages have fuelled India's ascent as a healthcare destination of choice.



A quick look at the healthcare infrastructure of the country will indicate why India is a preferred destination for medical tourism:

Healthcare infrastructure in India (2015)	
Hospitals	196,312
Sub-centres	153,655
Primary health centres	25,308
Community health centres	5,396
Medical colleges	404

Source: Industry reports, Secondary sources

Some of the major factors that have led to the growth of the sector are as follows:-

Availability of expert professionals - With total number of 3.37 million doctors and staff members, the Indian healthcare sector is equipped with qualified doctors in various specialisations. The paramedic staff is well trained to use advanced technologies.

Technology - India holds expertise in complicated surgeries like heart bypass, eye surgery, bone marrow transplant, etc.

Quality treatments - The Indian healthcare industry is known to operate at global standards. 21 Indian hospitals have been accredited joint commission internationally. This reflects the compliance of the healthcare industry with international quality standards.

Medical packages - The tourism and healthcare industry has adapted well to the increasing influx of wellness and medical tourism as there are several packages available at hospitals and treatment centres which combine flight tickets, travel, accommodations and post surgery check-ups.

Cultural and linguistic advantage - India with its rich cultural heritage makes a comfortable home to patients travelling from South Asian regions due to cultural and linguistic mutuality. Tourists travelling from the European countries and American states are also able to adapt due to India's vast English speaking population.

Cost advantage – India enjoys a great cost competitiveness in major surgeries which makes India the most preferred medical destination. Prices of treatment in India are around 30-70% lower as compared to other healthcare destinations. Please refer to the table below for cost comparison between major countries for surgeries:

Cost comparison for surgeries for major countries (2016)

Procedure cost (US$)	US	Thailand	Singapore	Malaysia	UAE	South Korea	Mexico	Costa Rica	India
Heart bypass	1,30,000	11,000	18,500	9,000	40,900	31,700	27,000	24,100	7,000
Heart valve replacement	1,60,000	10,000	12,500	9,000	50,600	42,000	30,000	30,000	9,500
Hip replacement	43,000	12,000	12,000	10,000	46,000	10,600	13,900	11,400	7,020
Knee replacement	40,000	10,000	13,000	8,000	40,200	11,800	14,900	10,700	9,200

Source: Industry reports, Secondary sources

Major Indian hospital chains like Apollo, Max, and Fortis among others have plans to add more facilities to attract foreign tourists.

There is a steady growth in the number of foreign tourists preferring India for medical treatments. For instance, Apollo caters to around 35,000 patients from Africa every year.

Similarly, Jaipur has become a major dental care destination for foreign tourists. This is primarily for the fact that quality treatment services are offered at affordable prices. For example, a dental implant in Jaipur would cost somewhere around US$ 1,000 which is almost half the price in the US and a root canal treatment would cost around US$ 70 as compared to US$ 500 in the US.

Government thrust through policies – The Government of India has provided a great boost to the healthcare sector of the country through various policy level support measures which include 100% FDI in drugs and pharmaceutical sector under the automatic route as well as establishment of biotechnology and pharmaceutical SEZs across the country. FDI inflows during the period of April 2000 to March 2017 for hospitals & diagnostics centres, and medical & surgical appliances stood at US$ 4.34 billion and US$ 1.58 billion, respectively. Also under the new tourism policy, there is provision of a Medical Tourism Board which shall work along with tourism and healthcare industries to promote medical tourism in the country.

Emerging new segment of tele-medicine – The tele-medicine market in India is valued at US$ 7.5 million and is expected to grow at a CAGR of 20% to reach US$ 18.7 million by 2017. To support the cause, Government of India had allocated US$ 50 million for tele-medicine in the 11th Five Year Plan and connected tele-medicine facilities with 382 hospitals of the country.

In July 2016, the government entered into an MoU with ISRO to take tele-medicine to remote places. By August 2016, the number of tele-medicine centres had reached 105.

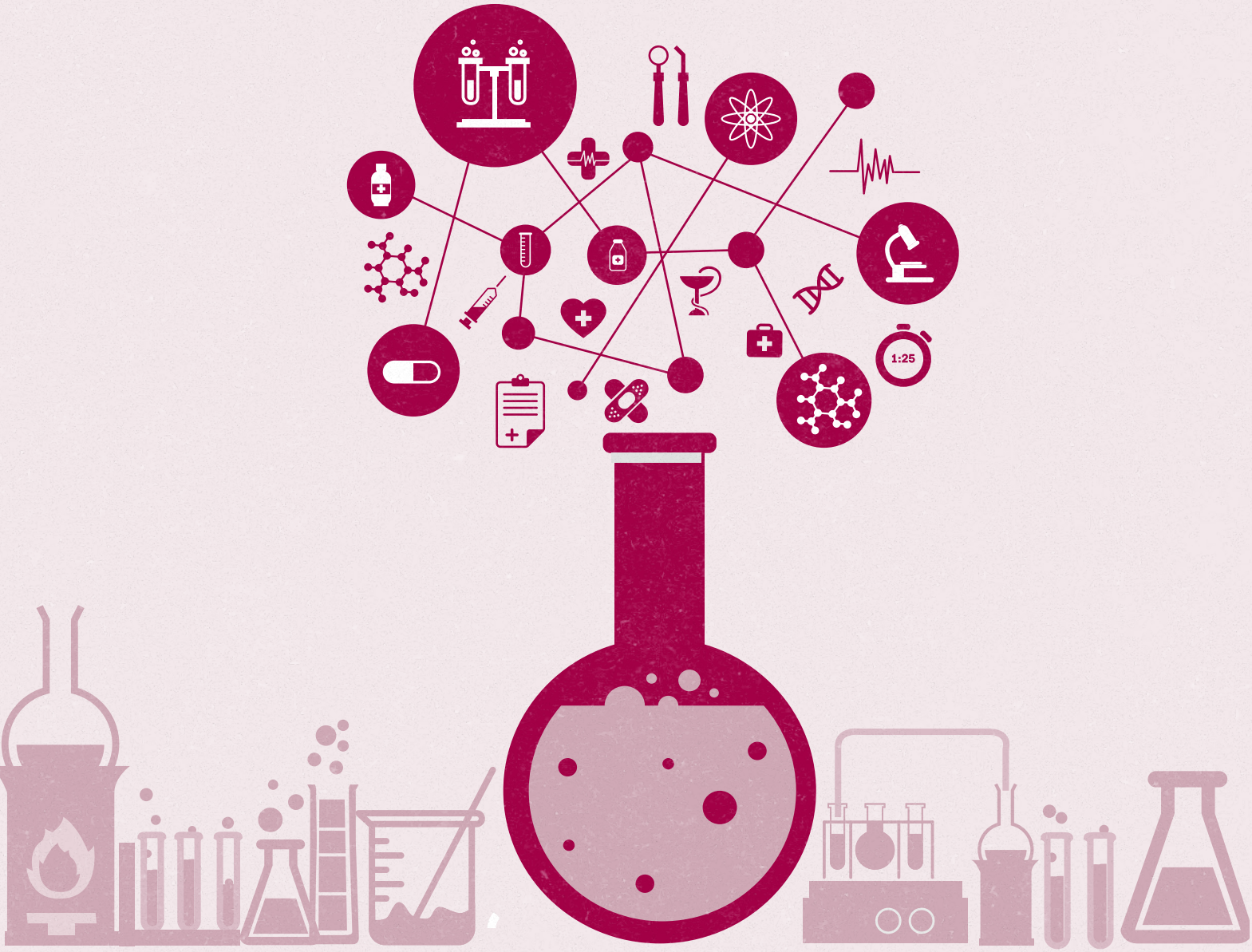
In addition to this, a number of initiatives have been taken up by the central and state governments to promote the medical and wellness tourism industry in the country. Some of them are as follows:

- Introduction of m-visa by Government of India which is only awarded to tourists travelling to India for medical purposes.
- Ministry of Health and Family Welfare has formalised a National Accreditation Board for Hospitals, to control and maintain the quality of healthcare services under the Quality Council of India for accreditation of hospitals.
- Government of India has provided fiscal support to various medical tourism facilitators i.e. travel agents and tour operators.
- Maharashtra Infrastructure Development and Support Act (MIDAS) has conferred the medical and wellness sector with the status of an industry, with an objective to provide the sector with all the incentives and advantages granted to other industries.
- State governments of Kerala and Goa have initiated many ayurvedic treatments and spiritual centres making use of the flora which is present in abundance in these regions.

Research and development

India's research and development industry was pegged at around US$ 20 billion in 2015. This comprises of US$ 7.76 billion of R&D services and US$ 12.25 billion of R&D globalisation market (captives). It is likely to reach US$ 38 billion by 2020. R&D spending in India accounts for 2.7% of the global R&D spending in a year.

The R&D industry is a very crucial and vital segment for a developing and emerging country like India. It provides other industries with advisory to produce goods efficiently and introduce new products with available resources. This reduces cost of production and saves time. Furthermore, path-breaking research, if successful has the potential to disrupt existing paradigms across industries and bring an economy ahead of the curve. Globally, the defence industry incurs the maximum expenditure on R&D services, along with electrical and electronics, metallurgical and chemicals.



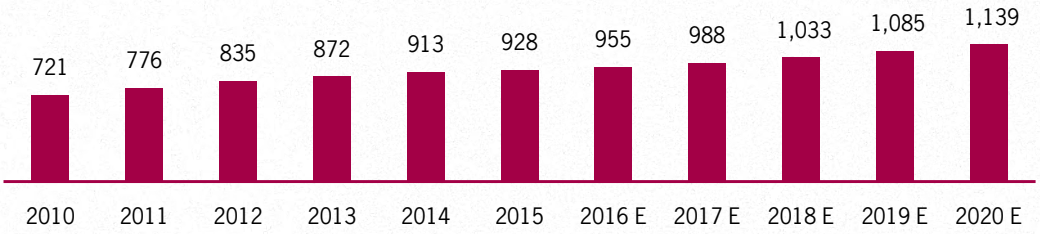
The R&D industry aims to achieve the following objectives:

- **Operating efficiency –** Organic growth is achieved by a productive R&D function. Proper operational planning can cut down expenses and increase profit margins. Through research and development, a company can apply simple concepts of operations management to everyday activities in order to eliminate waste and significantly improve operating speed.
- **Product development –** A proper R&D department enables a company to conceptualise and develop new products. With the help of the research and development department companies are able to market their products successfully. Marketing innovations like improved packaging or small quantity packaging have increased the demand in the market.
- **Competitive advantage –** R&D is a process that creates or improves technology that provides a competitive advantage to the business. Even though the rewards can be very high the procedure is very complex and risky at the same time. A majority of projects fail to deliver the expected financial results, but R&D has to be ingrained as part of a long term strategy for sustainable growth.
- **Technological advancement –** Industries that are typically associated with rapid technological improvements benefit from high R&D expenditures. On the other hand, services industries may not reap as much benefit from high investments.

Key growth drivers for R&D sector development in India

India is one of the emerging destinations for research and development as the expenditure in the sector amounts to be approximately US$ 44 million. Government of India concentrates on the importance of R&D to bring new technologies and services. As a result, government expenditure in R&D sector is expected to grow from 0.9% of GDP in 2015 to 2% by 2017. This promotes foreign institutions to carry out R&D activities in India as 30% of the 1,000 largest R&D organisations have a base in India. India also accounts for 40% of the total globalised engineering R&D (US$ 12.3 billion out of US$ 31 billion). India's ER&D services market is expected to reach US$ 15-17 billion by 2020. This segment is mainly structured across PES companies like Cyient, QuEST, eInfochips and the larger IT companies with a PES play such as Wipro, TCS and HCL. India has research and development clusters in seven cities namely Delhi & NCR, Ahmedabad, Mumbai, Pune, Bengaluru, Chennai and Jamshedpur.

Number of MNCs with R&D centres in India



Source: Zinnov Analysis

The number of MNCs with R&D centres in India has increased from a level of 721 in 2010 to 928 in 2015 and the same is expected to reach 1,139 by the end of 2020.

- India on an average successfully receives 5,000 patents every year.
- Maximum number of these patents are received in the mechanical sector followed by chemical, computer/electronics, drug and electrical.

In the next decade, India is likely to get into the list of the top 25 nations in the Global Innovation Index

There are numerous global companies that have already invested in India for setting up R&D facilities. These include BASF, GE, Siemens, Groupon, Expedia, Unilever, Panasonic, Ricoh, Abbott, IBM, Microsoft, Pfizer, among others.

The talent base available in India makes the country a global R&D and innovation hub. This can be supported by the number of higher education institutes in the country which include 318 state universities, 45 central universities, 129 deemed universities and 185 state private universities. The centrally funded technical institutions in the country like that of Indian Institutes of Technology (IITs, 16 in number), Indian Institutes of Management (IIMs, 19 in number), Indian Institutes of Information Technology (IITs, 4 in number) add to the talent base and hence to the R&D sector.

The research and development industry in India is regulated by the Department of Scientific and Industrial research (DSIR), which comes under the Ministry of Science and Technology. Some of the other organisations which form part of DSIR are; Council of Scientific and Industrial research (CSIR), Consultancy Development Centre (CDC), Central Electronics Limited (CEL), National Research Development Corporation (NRDC) and Asian and Pacific Centre for Transfer of Technology (APCTT).

Some of the major initiatives taken by the government for the development of the sector are:-

- **Encouraging more scientific innovation -** The Government of India established National Institution for Transforming India (NITI) Aayog in January 2015. The NITI Aayog, being a premier think-tank of the government, provides critical knowledge, innovation and entrepreneurial support to increase contribution of entrepreneurs, researchers and others to nurture scientific innovations. For e.g. The Atal Innovation Mission (AIM), set up under NITI Aayog, is an innovation promotion platform consisting academics, entrepreneurs, and researchers drawing upon national and international experiences to foster a culture of innovation and R&D in India.
- **International collaboration -** India is collaborating with various countries like Japan in the field of research and development which would include segments like artificial intelligence, energy, ocean sciences, marine instrumentation, high skill development and analysis of Big Data, and bio information.
- **Creation of funds -** The government had announced the creation of a fund of Rs 100 crore to help set up R&D units with participation from industries and the government in 2014.
- **Ease in regulatory procedures -** In order to encourage innovation and entrepreneurship in the country, Department of Industrial Policy and Promotion (DIPP) has taken measures to lower the time taken to clear pending IPRs (Intellectual Property Rights).
- **The measures have shown results as well** - A total of 45,449 patents were filed in 2016-17 as compared to 42,951 in 2013-14. Out of these, 9,675 patents were granted in 2016-17, a huge increase as compared to 4,227 patents granted in 2013-14. Similarly, the number of trademark filings and registrations stood at 281,868 and 250,070 respectively in 2016-17 as compared to 200,005 and 67,796 respectively in 2013-14 (DIPP).

- **Training programs –** During the year 2016-17, 28 training programmes were planned under "National Programme for Training of scientists and technologists working in the Government Sector" and a total of 700 scientists benefited from these training programmes.
- Union Cabinet has given an "in principle" clearance for the location of a Laser Interferometer Gravitational-Wave Observatory (LIGO) facility in India which will be the third of its kind in the world. Twelfth Five Year Plan (2012-17) of the Government of India had plans to achieve the following:
- Increase R&D expenditure to 2% of the GDP (an increase from the current level of 0.88%)
- Raise India's share in global patent filings to 5-6% from the current level of 2%.
- Provide thrust to increase the number of full-time researchers/scientists from the current level of 0.15 million to 0.25 million. This will also help improve the country's overall global ranking (from the current 9th position).
- Enhance the share of publication outputs thereby increasing the global share from 3% to 5% and improving the global ranking in the segment from 8th to 6th by the end of the Five Year Plan.

Some initiatives taken up by the private sector to boost R&D in the country are as listed below:

- The Cisco Global Development Centre in Bengaluru is the largest R&D centre for Cisco outside of the US. It develops disruptive business models for Cisco to create new go-to-market channels, markets, processes and technologies for emerging markets (source: www.cisco.com).
- To fund research and development, the Tata Group has entered into collaborations with the world's leading academic institutions, that include Harvard University, Yale University, the Indian Institute of Technology (Madras) and the Royal Society (United Kingdom).
- GE's John F Welch Technology Centre in Bengaluru has contributed significantly to the company's global R&D outcomes in sectors like healthcare and energy.
- With a goal to drive India centric innovations, German automotive firm, Bosch Gmbh has signed a memorandum of understanding (MoU) with Indian Institute of Science (IISc), Bengaluru. The focus of this partnership would be to strengthen the company's research and development in areas, which include mobility and healthcare.
- Adobe's India R&D centre has significantly contributed to creating, developing and supporting products and innovations across Adobe Experience Cloud, Adobe Creative Cloud and Adobe Document Cloud.
- Intel announced a planned investment of Rs 1,100 crore in its upcoming R&D centre in India in June 2017. This is in addition to the US$ 2 billion invested by the chipmaker till 2016.

Conclusion

The contribution of the services sector to India's GDP has increased rapidly. This can be attributed to the country's pool of highly skilled, low cost and educated manpower. Increasing number of foreign companies are outsourcing their work to India especially in the area of business services, including business process outsourcing and information technology services. This has in-turn made India one of the fastest growing services economies in the world.

The government recognises the importance of promoting this sector. As a result, they are making persistent efforts to create an enabling environment. This will give further push to sectors such as healthcare, tourism, communications and information technology. Encouraging regulatory framework and easing of trade barriers at both domestic and international levels will further enhance India's standing globally in the services sector.

The overall growth in the services sector will lead to the following benefits:-

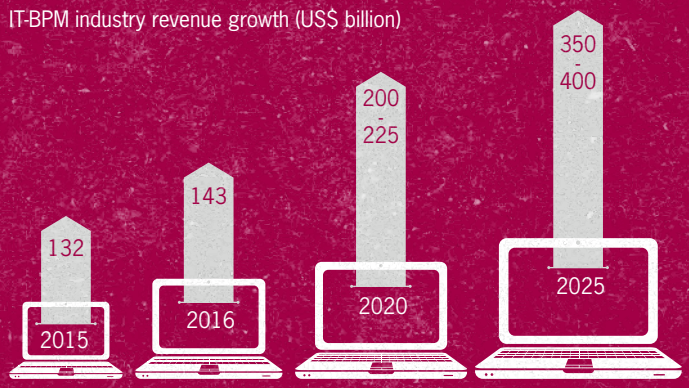
- Increase in GDP of the country – The growth in the services sector will have an incidental impact on the growth of GDP of the country.
- Employment generation – Production of services tends to require relatively less natural capital and more human capital in comparison to agricultural or industrial goods. As a result, there would be creation of job opportunities in the country, which would eventually help in absorbing the abundant workforce.
- Favourable balance of payments – Increase in the export of services will increase the amount of foreign currency inflow, leading to a favourable balance of payment situation for the country.
- Increased investment on education- The growth in services sector will create a direct demand for more educated workers, prompting greater investment in education.
- Rapid economic development – The growing services sector will have ancillary demand for banking and finance, urbanisation, and other related sectors of the country. This will have a combined impact on the socio-economic development of the country.

The growth in the services sector is bound to have a multiplier effect on other ancillary industries. As a result there have been conscious efforts to engage with other nations to give a further fillip to the services sector. As a result of the efforts, the projections for some of the key sectors are as follows:-

IT-BPM

The Indian IT- BPM sector's total revenue is projected to reach US$ 200-225 billion by the end of 2020 and between US$ 350-400 billion by the end of 2025. Digital technologies will continue to define the sector and revenue from these is likely to have 23% share by 2020 and more than 38% share by 2025.

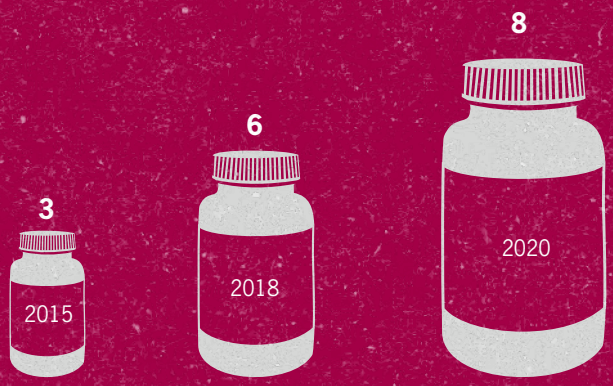
IT-BPM industry revenue growth (US$ billion)



Wellness and medical

The Indian wellness and medical tourism industry is expected to grow to US$ 6 billion by the end of 2018 and US$ 8 billion by the end of 2020. The industry is expected to grow at a CAGR of 26% during the period 2015-18 and at a CAGR of 15% during the period 2018-20. The numbers of medical tourists are expected to increase at a CAGR of 20% during the period FY 2015-20.

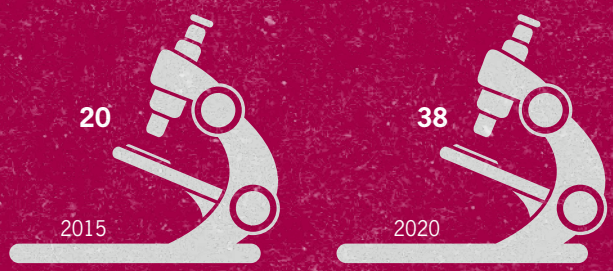
Wellness and medical industry growth (US$ billion)



Research and Development

The research and development sector is expected to grow to US$ 38 billion by the end of 2020 from US$ 20 billion in 2015.

Research and Development sector (US$ billion)



Expert perspective

Mr. Vijay Shekhar Sharma, Founder & CEO, Paytm

"Now all the attention is happening in India. The amount of innovation, amount of business models that are coming out of India are incredible. The best part is that what has been built earlier is definitely not going to serve the next billion consumers that are coming. And there is no better country to build that but India because we have technology, talent and even resources now. So entrepreneurs out there have a great opportunity in India and then in taking what you build here to the rest of the world."

Mr. Deep Kalra, Owner, MakeMyTrip

"I think from an entrepreneurial ecosystem point of view, there has never been a better time for India. Indians are fundamentally entrepreneurial and the internet and the mobile are providing great platforms. The market is very ripe, there is a lot of consuming power… For the next decade, I don't think there's a better place to invest than India."

Mr. Shashank ND, Co-founder & CEO, Practo Tech.

"I am very bullish about the Indian start up ecosystem. When I started in 2008 it was early days and I have seen it grow from a few people meeting in coffee shops to the entire country talking about startups. So it's been great to see an entire industry grow from being a small industry many years back."

Mr. Girish Mathrubootham, Founder & CEO, Freshworks Inc

"Definitely, there is lots of mentorship available (in India), there are lots of great organisations like iSpirit or Nasscom, which are playing a key role in helping the young entrepreneurs who need mentorship or access to funding or access to good talent, or mergers and acquisitions with larger companies. So they are doing all the right things in terms of building the eco-system."

Mr. Deepinder Goyal, Founder & CEO, Zomato

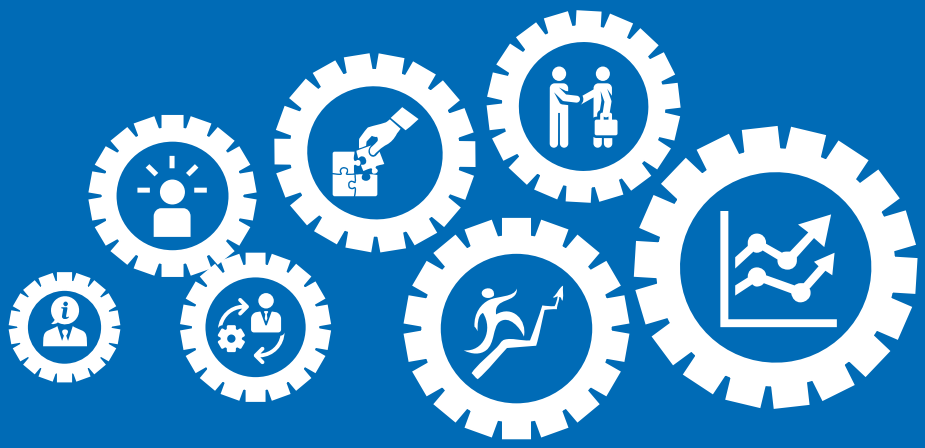
"Startups form an integral part and are key drivers of growth for the Indian economy - the value created and the tremendous growth in employment opportunities driven by startups across industries over the last decade is a testament to that. With initiatives such as Startup India coming to place, it is great to see the government playing the role of a catalyst to create a strong startup eco-system. The onus is on the startups to do the hard work and make the best use of resources available to unlock value from untapped markets."

Strengthening the Indian startup ecosystem

Young entrepreneurship is considered a key engine of societal change, economic expansion and innovation for an economy. Young people are considered as a major human resource for development because they have more courage to take risk. India is one of the youngest nations with over 65% of its population under the age of 35 years. This means that the country has higher potential to increase its economic growth by promoting entrepreneurship. Startups contribute towards economic development for the reasons stated below:

- Startups generally have the potential to provide a new product or service that is not currently in existence in the market
- Startups help in creating jobs for the country
- Startups promote trade, commerce and regional integration
- They can have a disruptive influence across sectors where they operate.
- Startups promote competition in the market and bring in efficiency.

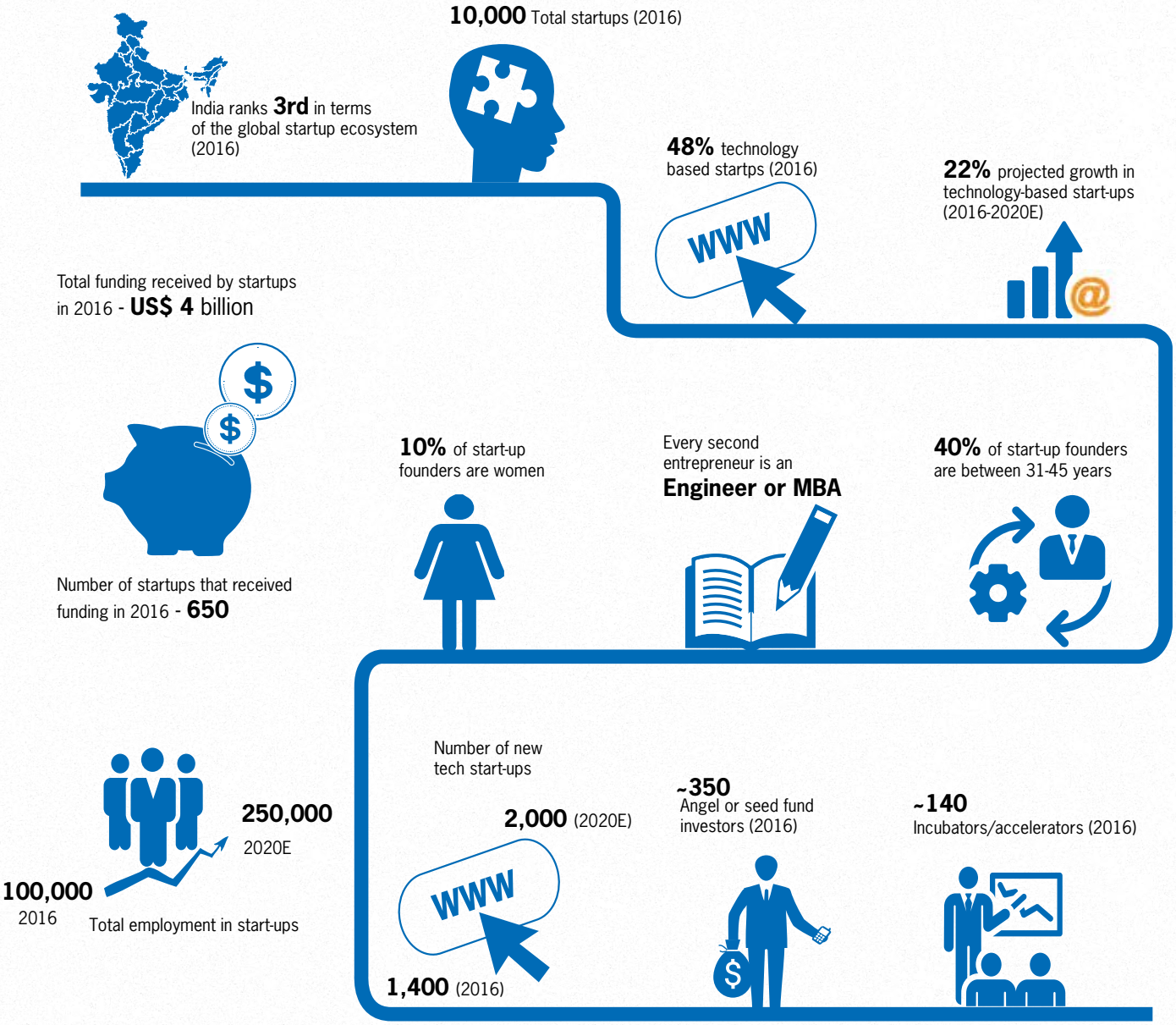
It is important to note that by 2016, India ranked third in terms of the total number of startups with more than 10,000 startups. This phenomenon is gaining momentum and is likely to become a game changer and key contributor to the economic growth of the country.



Note – As per the Startup India website, a startup is defined as "an entity, incorporated or registered in India :
- Not prior to seven years, however for Biotechnology Startups not prior to ten years,
- With annual turnover not exceeding Rs 25 crore in any preceding financial year, and
- Working towards innovation, development or improvement of products or processes or services, or if it is a scalable business model with a high potential of employment generation or wealth creation

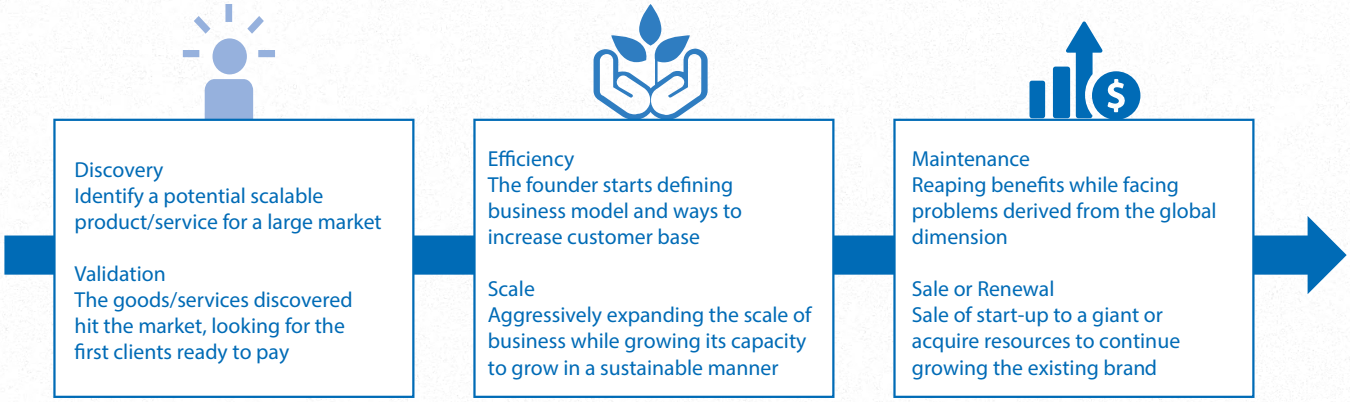
Provided that such entity is not formed by splitting up, or reconstruction, of a business already in existence. Provided also that an entity shall cease to be a Startup if its turnover for the previous financial years has exceeded Rs 25 crore or it has completed 7 years and for biotechnology startups 10 years from the date of incorporation/ registration. Provided further that a Startup shall be eligible for tax benefits only after it has obtained certification from the Inter-Ministerial Board, setup for such purpose".

Snapshot: Indian Startups



Stages for startups

Every business passes through the startup phase but only a few are able to scale up their operations and reach to SME and/or large establishment stage. Numerous definitions are available for startups. "A startup is a young company in its first stages of operation, and financed by an individual or a small group of individuals" or "A startup is an entrepreneurial venture or a new business, a partnership designed to search for a repeatable and scalable business model". There are a few common parameters which really define any startup such as a commercial idea, innovation, scalable market, business model and uniqueness among others. A startup can be categorised as tech and non-tech startup. Tech startups are businesses which offer technology driven products or services, whereas the rest of the startups are categorised as non-tech startups. There are three stages that a startup typically passes through:

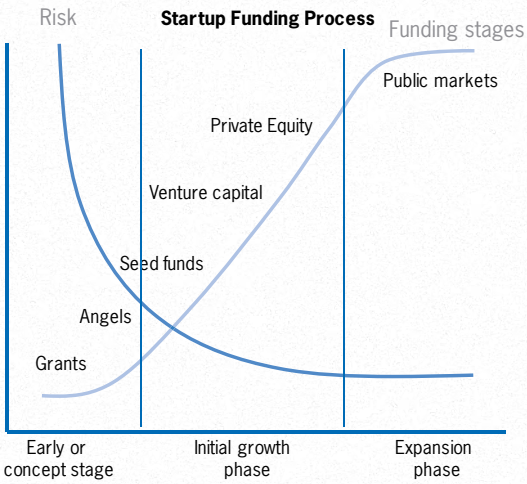


Source: Industry reports on Startup India

Funding channels for startups

Startups are typically financed through various informal funding sources including self-funding. The respective funding patterns are as follows:

- **Early and concept stage**: Startups rely on angel and seed funding channels, where investors invest in the idea or concept.
- **Initial growth phase**: In this stage, venture fund and private equity investors invest in the business model and focus on building the scale of operations.
- **Public market**: In this stage, startups seek investment from private equity investors or public market[1] for their business expansion.



[1]Note - Private equity generally invests in the second and the third stage. However, public market is the third stage of funding.

In CY 2016, Indian startups received a total funding of US$ 4 billion as compared to US$ 4.9 billion in CY 2015. Nearly 650 Indian startups were funded in CY 2016.

Funding received by Startups – 2016

Number of companies funded **650**

Total funding received **US$ 4** billion

Seed	Early	Growth	Expansion
62-64%	22-25%	7-9%	4-6%
70-72%	12-15%	8-10%	4-6%

Source: NASSCOM, Industry reports, Secondary sources

Startup segmentation

With more than 10,000 startups, in 2016, India ranked third in terms of the total number of startups. United States ranks first with over 83,000 startups followed by China with over 10,000 startups. Out of the above mentioned startups, India has 48% tech-based businesses and the remaining 52% are non-tech based businesses. The tech and non-tech startups can further be segmented basis their service offerings:

Segmentation of Indian startups

48% Tech startup

E-commerce	33%
B2B	24%
Consumer internet	12%
Mobile applications	10%
SaaS	8%
Others	13%

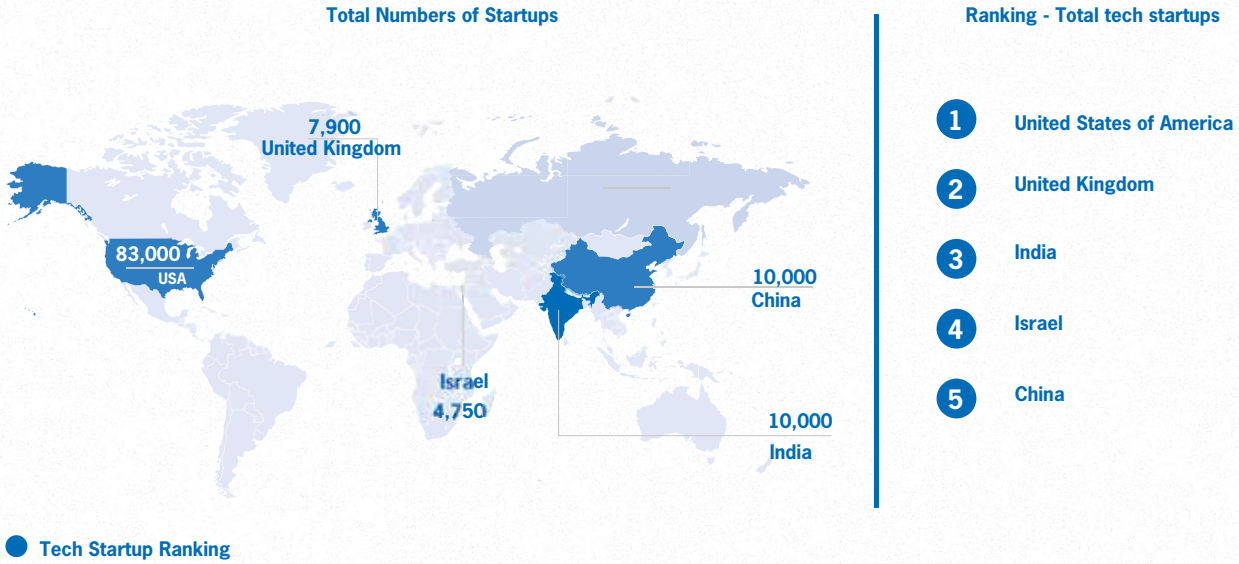
52% Non-tech startup

Engineering	17%
Construction	13%
Agri products	11%
Textile	8%
Printing & packaging	8%
Transport & logistics	6%
Outsourcing & support	5%
Others	32%

Note: Non-tech based startups' sector concentration is an outcome of a survey conducted by CRISIL on ~20% sample of micro, small, and medium enterprises during 2013-14

Source: NASSCOM, Industry reports, Secondary sources

According to a Nasscom report, India is one of the youngest startup nations with more than 70% of the total startup entrepreneurs being under 35 years of age. In terms of tech-based startup businesses, the United States and the United Kingdom are the top two countries with over 47,500 and 4,800 startups respectively. India is ahead of China in terms of tech-based startups. Below is an overall comparison of startups globally:



Source: NASSCOM report on Startup India.

A majority of domestic tech-based startups and investors are located in large metropolitan cities of India, with Bengaluru accounting for 26% of tech startups, followed by Delhi-NCR with 23%, Mumbai with 17% and others with 34%. Hyderabad with 8%, Chennai with 6% and Pune with 6% are the new emerging destinations for tech startups.

Evolution of Indian startups

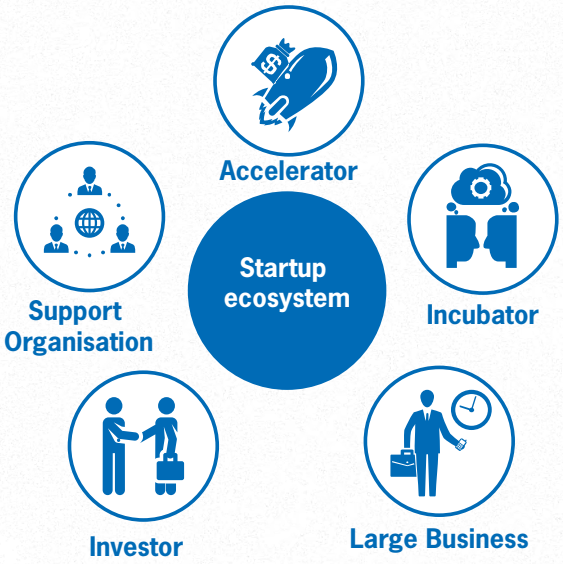
Until economic liberalisation (1990's), India's startup space was largely dominated by the manufacturing companies. These businesses were generally financed through seed capital and soft loans provided by the development financial institutions. Entrepreneurs looking to set up factories or manufacturing units were getting support from the public and private sector.

In the last decade (2005-2016), the country has seen a proliferation of startups with a growing number of sustainable business models coming into existence and getting funding through informal channels such as angel, seed and venture capital. The growth of internet and smartphones has given birth to a number of new businesses with innovative technology-based solutions.

We have witnessed a number of home grown unicorns across sectors such as Flipkart (retail), Myntra (fashion), Paytm (financial services), Magicbricks (real state), MakeMyTrip (online travel), Foodpanda (food aggregator), PolicyBazaar (banking and insurance) etc. To further accelerate the growth of startups in India, the Government of India came out with a landmark mission for startups called "Startup India" in 2016. This has set in motion a formal dialogue between the startup ecosystem and policy makers in the country. This type of focused startup initiative has not even been witnessed in other well-recognised startup friendly nations such as Israel.

Key stakeholders - Startup ecosystem

A startup ecosystem consists of various stakeholders such as industry experts, academic institutions, startups across stages and other types of physical and virtual organisations interacting as a system to create and nurture a new startup company. These stakeholders can be further categorised into internal and external stakeholders.



Accelerators: These organisations aid startups in advancing from one point to the other in terms of business development. Accelerators often provide shorter and more intense programmes to enhance the business model (market opportunity) and the product. Accelerators often work for profits and are funded by early stage investors. Accelerators often provide investment to startups in exchange for an equity share in the business. A few of the leading startup accelerators in India are Catalyzer, GSF, IAccelerator, Microsoft Accelerator, TLabs Accelerator and Y Combinator etc.

- According to the NASSCOM' Indian Startup Ecosystem Maturing report, there was a 25% growth in the number of incubators and accelerators, which were approximately 140 in CY 2016 against 110 in CY 2015.
- A number of international players have been launching accelerators in India to form partnerships with Indian startups. For e.g. Amazon has come up with Amazon Launchpad which will offer online and offline products and subscription services.

Incubators: Incubators are organisations that nurture disruptive business ideas with the intent of building a business model or a new company through their Indian mentoring and structured services. Incubators directly work with startups in developing their entrepreneurial skills, such as creating and testing a prototype and understanding the market. Incubator programmes are generally long-term with a duration of more than a year. They offer entrepreneurs or new businesses with invaluable support in their early stages of operations. Generally incubators provide non-financial support but in some cases offer financial investments as well. These incubators could be set up by the governments, universities, educational institutions and large private organisations etc. Some of the leading Indian startup incubators are Amity Innovation, AngelPrime, IIM Ahmedabad's Centre for Innovation Incubation and Entrepreneurship (CIIE), Indian Angel Network (IAN) Incubator, Nadathur S Raghavan Centre for Entrepreneurial Learning (NSRCEL) and Society for Innovation and Entrepreneurship (SINE) etc. Tier-II/III cities have established 66% of the new incubators in CY 2016. Globally, there are roughly 5,000 startup incubators, with around 2,000 in the United States and 1,000 in China. As of June 2016, India had 65 incubators. The government is trying to increase the number to 1,000.

Large businesses: Established corporates generally focus on innovation, performance excellence and risk management in order to compete in the dynamic global business environment. Many large corporates are now shifting their focus from investments in research and development to investmenting in multiple sources of innovation, particularly on technology-based startups. Therefore, these businesses have been scouting for startups in search of diverse information, creative people and processes.

India witnessed a total of 123 M&A deals in the startup sector and a total deal size of US$ 534.9 million (disclosed value) during CY 2016. A majority of the deals (52) were witnessed by domestic market startups based out of Delhi-NCR, followed by Bangalore (26) and Mumbai (16) with others at 29 deals in total.

- The large scale acquisitions included Myntra's acquisition of Jabong, Quikr's acquisition of CommonFloor, Titan Industries' acquisition of CaratLane, Yatra's acquisition of Mgaadi etc.
- There were a few startup deals where the buyer acquired more than 1 startup to scale up its growth. For e.g. Quikr acquired online real-estate portal CommonFloor and job portal Hiree.

Investors: Usually, startup founders end up looking for informal funding channels such as funds from family or friends. These other institutional investors, such as angel investments and seed funding, invest in the initial phase of a new business. For e.g. Indian Angel Network (IAN), a network of angel investors, provides funding support to early stage businesses with growth potential. IAN also provides its constant support in terms of high quality mentoring, vast networks and building of business strategy. The network generally invests up-to US$ 1 million, with an average ticket size of US$ 400-600K for a period of 3 to 5 year. In addition, there are a lot of domestic and international investors who want to take part in the Indian startup growth story and are willing to invest huge amounts of capital in the startup ecosystem. Some instances are as follows:

- During March 2014-16, Mr. Ratan Tata invested in 29 startups in the country, and acquired minority stakes in 22 companies in FY 2016.
- Reliance Jio has set aside Rs 50 billion of venture capital which will be invested in startups to encourage young entrepreneurs in India during 2016-2021.
- Warburg Pincus, a US-based private equity player, has shown its interest to invest US$ 8 billion in India over the next 10 years (2017-2026).
- Mr. Nandan Nilekani is investing US$ 1-2 million in startups across various sectors including telecom, aerospace, publishing, logistics etc.
- Oil and Natural Gas Corporation (ONGC) and Oil India (leading Indian oil and gas companies) have announced their startup focussed funds amounting to Rs 1 billion and Rs 0.5 billion respectively to foster, nurture and incubate new ideas related to the oil and gas sector.
- During 2015-16, Ford Smart Mobility invested US$ 24 million in the Indian car rental startup called ZoomCar.
- Singapore-based venture capitalists and PEs are planning to invest an average of US$ 1 billion per year in Indian startups.

Support organisations: There are industry associations which also provide their support in nurturing startup businesses. For example, NASSCOM (National Association of Software and Services Companies) is an association of the IT and BPO industry which facilitates trade and development in the software and services sector in India. Under the "10,000 Startups" mission, NASSCOM decided to incubate and provide funding support to 10,000 technology startups in India by 2023. As of 2016, the program has seen 1,380 startups supported by 8 incubation centres.

Policy thrust for startups

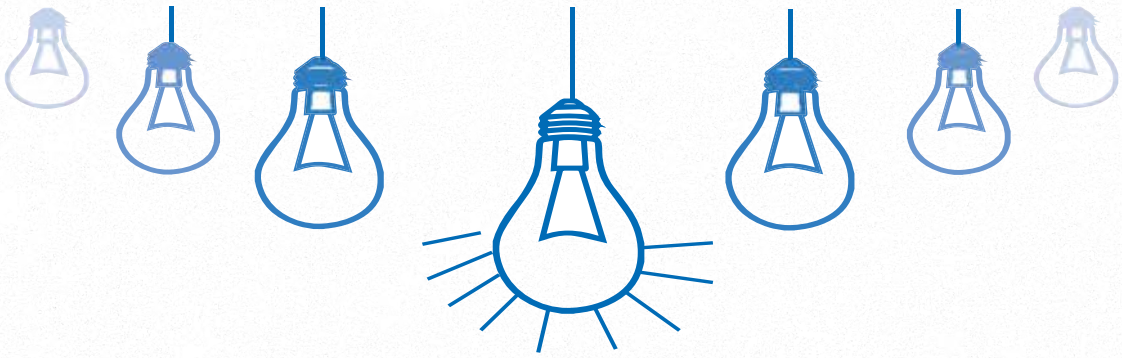
With an aim to accelerate the startup ecosystem and drive the economy, there have been various measures undertaken by the Government of India to create a conducive environment for startups. In this direction, missions like "**Startup India, Stand up India**" (Startup India aims to boost the entrepeneurial ecosystem of India, and Stand up India aims to provide financial support to SC/ST borrowers) were announced by the Government of India. Under these programmes, numerous benefits were announced which are segmented into the following three broad categories:

- Simplification of procedures
- Funding support and incentives
- Industry-academia partnership and incubation

Simplification of Procedures

Self-certification: The government has allowed self-certification with respect to nine labour and environment laws (through a mobile app) and there shall be no inspection requirement for the first three years. The overall objective of the program is to reduce the regulatory burden on startups, thereby allowing them to focus on their core business and keep compliance costs low.

Startup India hub: The government has come up with Startup India hub, a single point of contact for all startup foundations (stakeholders). The overall objective of the programme is to create a single point of contact for the entire startup ecosystem and enable knowledge exchange and access to funding. Anyone can contact with any type of issue related to new business. The Startup India hub provides information regarding the certificate of recognition as a 'startup', certificate of eligibility to avail tax benefits, incubators and even funding. In addition, the hub will be a central source of information that will ensure that startup ecosystems across the country have much desired access to the right knowledge, tools and expert guidance.



Registration through an app: The government has come up with an online platform in the form of a mobile application to facilitate startup founders with registration. The objective behind this move is to cater to startups through single platform for interacting with the government and regulatory institutions for any kind of business assistance. This single mobile app provides on-the-go accessibility to a startup. Various facilities of this app include:

- **Registration of a startup:** This mobile app provides information about relevant agencies and relevant documentation required for registration. This site/app is integrated with MCA (Ministry of Corporate Affairs) and ROC (Registrar of Firms) for easy processing of application.
- **Tracking:** Startup founders are able to check the status of their application anytime and anywhere (real time tracking mechanism).
- **Information venue:** The app provides information on compliance filings and various clearances/approvals/ registrations required.
- **Collaborative ecosystem:** The mobile app provides an online channel to interact with various startup stakeholders including venture capital firms, incubators, accelerators, mentors etc.

Patent protection: Intellectual property rights (IPRs) act as a strategic tool for any business to enhance its competitiveness in the market. Therefore, it is required that a startup should protect its IPRs (Intellectual Property Rights) to remain sustainable. The government has decided to have a fast-track system for patent & trademark filing and its examination at lower cost. It has also launched a Startup Intellectual Property Protection (SIPP) scheme that will facilitate filing of patents, trademarks and designs with the objective to increase awareness and adoption of IPRs by domestic startup founders. Various measures being taken by the government for fuelling innovation by startups include:

- Fast-tracking of patent applications;
- Panel of facilitators to assist in filing of IP applications;
- Central government shall bear the entire filing charge for patents, trademarks or designs;
- Startups shall be provided an 80% rebate in filing of patents vis-à-vis other companies.

Faster exit: Most startups are innovative ventures and there is a significant risk of failure that exists in their early period. In case of a business failure, it is very difficult for them to reallocate resources to more productive avenues and follow wind-up process regulations. Therefore, the government has decided to ease out processes to enable faster exit options for new businesses. Now, if a startup fails, the government will assist its founders to find suitable solutions for their issues and provide an easy way out option. This move has provided creative minds with the opportunity to experiment with innovative ideas without the need for a complex and long-drawn exit process.

Public procurement norms: In March 2016, public procurement norms were relaxed by the Government of India to provide more opportunities to competent startups in the manufacturing sector, except for goods that might have implications on public safety and health. The government exempted startups from the criteria of previous work experience and turnover without any relaxation in quality standards. With effect from April 1, 2015, the central government, state governments and public sector units have to mandatorily procure at least 20% goods from MSMEs (micro small and medium enterprises).

As of November 2016, the Government of India has opened up 300 offices for patent filing facilitation. In addition, it is in process of setting up 500 tinkering labs and 100 new incubators to further catalyse the proliferation of startups across the country.

Funding Support and Incentives

Funding support: Capital arrangement or access to finance has been one of the key challenges faced by most startups. Therefore, the government decided to provide funding support to startups and has approved the setting up of a fund of funds of Rs. 100 billion with an initial corpus of around Rs 25 billion.

- The corpus will be invested directly into new businesses.
- These funds will provide support to various sectors including manufacturing, agriculture, health and education, among others.
- The Life Insurance Corporation of India will play an important role in developing the corpus.
- A National Credit Guarantee Trust Company is being created with an overall investment of Rs 5 billion per year for the next four years (2016-2020) to support the flow of funds to new businesses.

As of July 2016, SIDBI had shortlisted eight venture funds to invest in startups and decided to support them with a corpus amount of Rs 4.3 billion. The government is planning to categorise startup funds into early-stage and growth-stage funds for an effective deployment of capital.

Credit Guarantee: The government is in the process of setting up a Rs 20 billion credit guarantee fund in order to provide funding facilities to startups. The investment corpus will provide upto 80% risk coverage for collateral free credit given by banks. The objective is to facilitate entrepreneurship by offering credit to innovators across all sections of society.

Tax Exemption: The Government of India has also announced few tax exemption benefits for an eligible startup, these include:

- **Exemption from tax for a period of 3 years:** To promote the growth of business and address their working capital requirements.

- Removal of the angel investment tax on investments above fair market value*: To encourage angel and seed-capital investments into new ventures.
- Exemption from long term capital gains tax on investments to individuals and Hindu Undivided Family (HUF) on investment in eligible startup.

The objective of the government is to promote investments into startups by mobilising the capital gains arising from the sale of capital assets. These are a few incentives provided to investors for investing in Indian startups.

Industry-Academia Partnership and Incubation

Atal Innovation Mission (AIM): The government launched Atal Innovation Mission (AIM) with Self-Employment and Talent Utilization (SETU) program in February 2016. The AIM consists of two core functions:

- Entrepreneurship promotion: Entrepreneurs would be supported and mentored through Self-Employment and Talent Utilization (SETU) to become successful in their fields:
  - Establishment of sector specific incubators including in PPP mode
  - Establishment of 500 tinkering labs
  - Pre-incubation training to potential entrepreneurs in various technology areas in collaboration with various academic institutions having expertise in the field
  - Strengthening of incubation facilities in existing incubators
  - Seed funding to potentially successful and high growth startups
- Innovation promotion: To provide a platform where innovative ideas would be generated
  - Provide innovation awards
  - Provide support to state innovation councils for awareness and organising workshops and conferences
  - Launch of grand innovation challenge awards for finding ultra-low cost solutions

The objective of the program is to offer a platform for innovation and promotion of self-employment activities in technology-driven areas.

In July 2016, the NITI (National Institution for Transforming India) Aayog signed a statement of intent with Intel India to set up Atal Tinkering Laboratories (ATL) under AIM. The objective of ATL is to enhance adaptive learning and innovation skills among young minds in India.

- Initially 10 laboratories will be established as part of total 500 laboratories.
- Intel India, subsidiary of US technology company Intel will invest US$ 15 million for building and managing these 500 ATLs.
- These labs will foster young minds in adaptive learning, physical computing and developing a design mindset among students.
- They will also build relevant sets of skills among young minds and provide them access to technology that will enable solutions.
- These labs intend to impart innovation skills and skills for the future to 2.5 lakh youths across 500 communities and schools.

Startup Fests: The government launched another program called Startup Fests to spur the confidence of startups and to provide national and international visibility. These startup fests would offer a platform to new businesses to showcase their talent and work with a larger audience comprising of potential investors and mentors. Under this programme, the following will be organised:

- One fest at national level annually
- One fest at the international level annually

In October 2015, the first global startup fest was organised in Goa. In September 2016, the government organised startup fests in Hyderabad, Mumbai, Udaipur and other locations with a view to showcase innovation and provide a collaboration platform.

Incubator Setup: India is in the process of setting up more incubation facilities across various states. The government will create a policy framework for setting up of new incubators in public-private partnership to provide support to new businesses in the country. Setting up incubation facilities includes infrastructure, mentorship support, access to networks and markets, etc. The government will provide funding support in setting up public and private sector incubation centres to help with nurturing startups.

The government has also launched an innovation-focused programme for students to foster a culture of invention in the field of science and technology in the country. In addition, the government is also focused on having world class incubators to build an effective startup eco-system in the country. To achieve their objective, the government is planning to have "Incubator Grand Challenge" to identify the best incubators that can be set up in India. The top select 10 incubators that have the potential to become world class would be given Rs 100 million each as financial assistance.

Building Innovation Centres at National Institutes: To supplement startup incubation and R&D in India, the government plans to set up and/or scale up 31 centres of innovation and entrepreneurship at the national level. These will include 13 startup centres and 18 technology business incubators.

In addition to the above mentioned startup focused

*Fair Market Value: It is an estimate of the market value of a property, based on what a knowledgeable, willing, and unpressured buyer would probably pay to a knowledgeable, willing, and unpressured seller in the market.

initiatives, the government is focusing on developing the biotech sector as it is on a strong growth trajectory. The government plans to provide support by building bio-technology incubation centers and university innovation clusters. The Department of Biotechnology has decided to push startups in this sector by promoting over 300 new businesses each year to reach an estimated 2,000 total new biotechnology businesses by 2019-20. To foster the growth of the biotechnology sector, the government has decided to implement the following measures:

- Establishing biotechnology sector-focused incubators, seed fund and equity funding
- Encourage and leverage global partnerships with biotechnology organisations

As of December 2016, 5 new bio-clusters, 50 new bio-incubators, 150 technology transfer offices and 20 bio-connect offices were being set up in research institutes and universities across India.

In October 2016, the Reserve Bank of India announced that a startup can raise up to US$ 3 million in a financial year via external commercial borrowings. Domestic startups will be allowed to raise overseas capital in Rs or any other convertible foreign currency, or a combination of both. Raising foreign capital will ease out interest rate burdens on Indian startups as a result of an easy conversion at reduced costs.

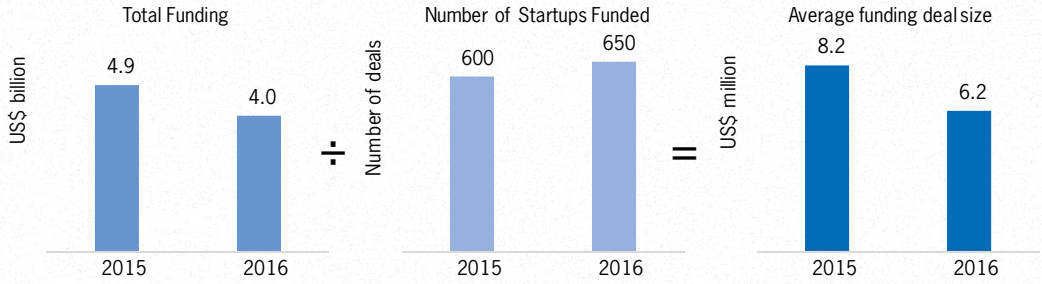
Private sector participation

The private sector (domestic and international investors) plays an important role in the growth and development of the economy as private investors contribute to every sector. This contribution can be in the form of capital for operational and geographical expansion, technical knowhow or efficiency. India has opened up many sectors, e-commerce in particular, for international investors by allowing up to 100% FDI based on certain conditions. On the other hand, domestic and international investors too are counting on the India growth story by investing money in anticipation of higher returns.

There has been a flurry of new startups and innovations in India in recent years. The Indian startup ecosystem has evolved, driven by factors such as growth in number of funds/angels, evolving technology, higher smart phone and social media penetration, growth in incubators and accelerators, younger demographics etc.

Indian startups received a total funding of US$ 4 billion in CY 2016 and US$ 4.9 billion in CY 2015. Nearly 650 startups were funded in CY 2016. The number of startups funded with small ticket size were higher in B2B category as compared to B2C. The charts below illustrate startup funding trends in 2015 and 2016.

Startup funding 2015-2016



Source: NASSCOM, Industry reports, Secondary sources

Despite a growth in the number of start-ups funded during CY 2016, the average funding ticket size has declined to US$ 6.2 million from US$ 8.2 million (2015). Out of the total funding size in 2016, close to 25% of the funding happened in the B2B space, compared to 18% in 2015.

How startups have evolved in the past few years

Smartphone penetration and availability of high speed internet (3G and 4G) have led to change in consumer buying behaviour. As a result, the country is witnessing a number of new businesses offering products and services using online platforms or providing technology-based solutions to their clients. Large corporates too are investing organically or inorganically in technology-based startup businesses. There are a number of web aggregators that have emerged in India.

- The Indian online travel market is expected to grow by 14% during 2015-2020 and reach US$ 16.5 billion by 2020 US$ 8.5 billion in 2015. Key players are Makemytrip, Yatra and Goibibo. The Indian radio taxi market is dominated by Ola, Uber and Meru Cabs. The online real estate classified market is valued at US$ 9 billion in 2015 and is expected to reach US$ 18 billion by 2020. 99acres is the largest player holding 37% share, followed by magicbricks.com, makaan.com, commonfloor.com etc.

- The Indian biotech sector is the 3rd largest in the Asia-Pacific region. The biotech sector is expected to reach the US$ 100 billion mark by FY 2025 from US$ 11 billion in FY 2016. A number of biotech startups have started operations in India. A few of them are Ganit Labs (engages in prevention and cure of diseases through genomics application & informatics technology), Achira labs (it uses micro-fluidics technology to make fast and affordable medical tests and treatment), FIB-SOL (develops technical solutions to resolve challenges in the agriculture and healthcare sectors. There are startups that have been driving innovation in the engineering sector in India. For e.g. Ather Energy builds smart electric scooters. It is the first Indian electric vehicle initiative since Reva. The scooter comes with fast charging, good range (60-80 km) and a top speed of 72 km/hr. Vortex Engineering offers solar-based Automated Teller Machines and associated services for banks in rural India. Techture, on the other hand, provides extensive design, analysis & visualization services leveraging Building Information Modelling (BIM) & associated technologies.

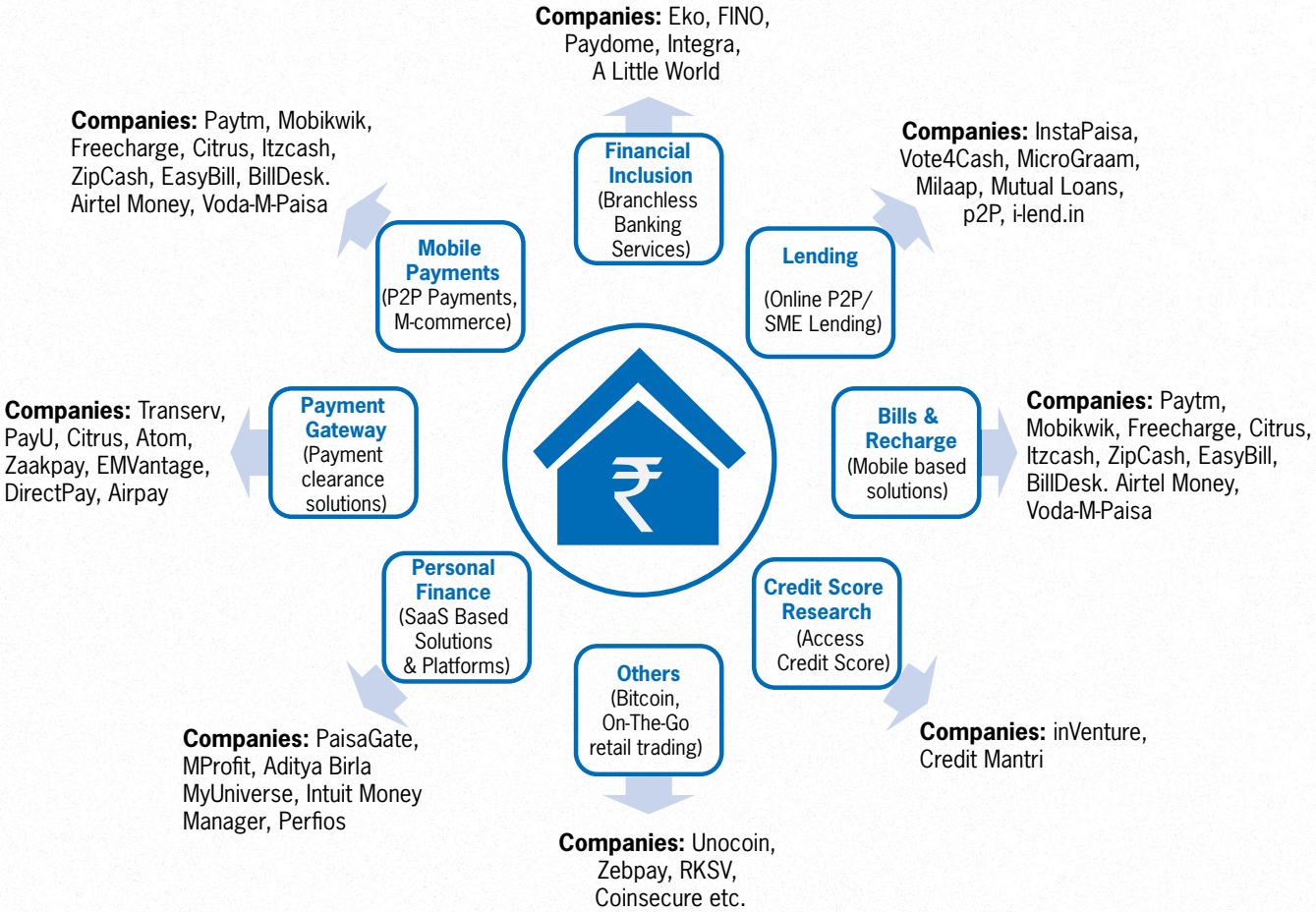
- The rise of mobile phones and internet has spurred a new wave of digital startups covering news on social media/mobile apps. According to research by the Reuters Institute for the Study of Journalism, Indian news startups have been prioritizing mobile-optimised websites for their viewers. For example, Inshorts, UC app, Alibaba Group, and Opera news (American players), figure amongst other mobile applications which are a part of this segment.

- Similar to manufacturing and services sectors, there are a number of innovative start-ups that have emerged in the field of agri-tech. These include CropIn (provides cloud

based farm management solutions such as personalised advisory on inputs, diseases & pest, irrigation etc.), Digital Green (educates farmers in the form of simple videos starring local farmers themselves), AgroStar (an m-commerce platform that provides real time information on agri-inputs), etc. In the last few years, health-tech has been a key buzzword with businesses offering technology based solutions such as hospital management systems, doctor discovery, delivery of medicines, and home healthcare services, etc. A few of them include **Health Care at Home** (provides several key services like home chemotherapy, home ICU services, post-surgical care, psychological counselling, pre and post-natal care etc.), Zoctr (integrates several health services like doctor appointments, home health services, remote monitoring services, laboratory, pharmacy etc.), Care24 (helps individuals through the rehabilitation process), etc.

- Indian fintech firms have changed the face of financial services in the country. According to industry estimates, the transaction value for the Indian fintech sector is approximately US$ 33 billion in 2016 and is expected to reach US$ 73 billion in 2020. Transactions through mobile have become the next big alternative payment method for consumers. Paytm, Zip Cash, Oigen, Mobikwik, PayUmoney, mpurse are some of the leading fin-tech businesses offering virtual wallet and online transaction solutions. In addition, telecom operators have also started offering virtual wallets to their consumers using their services.

Fin-Tech Industry - India



Source: Secondary sources

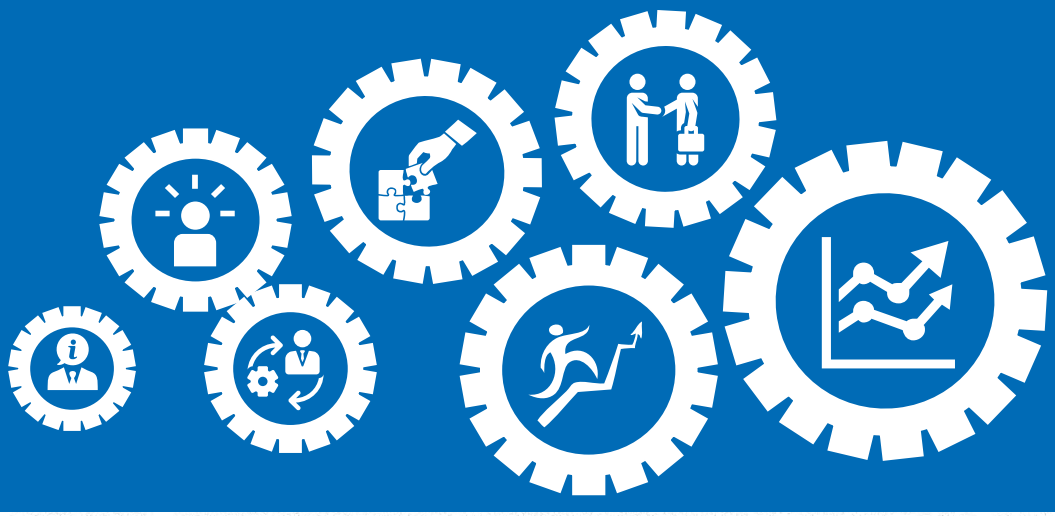
Conclusion

In the current era, India is witnessing a cultural change where increasing numbers of people are getting familiar with advanced technologies. There is rise in per capita income, and an increase in the middle class population. This is resulting in increased focus by entrepreneurial minds on innovation and improved technology. As a result, around 1,000-1,200 new tech-based startups are launching operations every year in India. There are various other factors that are conducive to startup environment in India, these include:

- Emerging nation: India's real GDP stands at Rs. 113.5 trillion and has witnessed robust growth in recent years, having grown at a CAGR of 7.6% during 2012-2016.
- Per capita income: The growing economic activity in India has resulted in growth in per capita income which has grown from Rs 87,000 in 2014 to Rs 103,219 in FY 2017. The per capita income is expected to reach Rs 111,782 in FY 2017-18 (CSO).
- Demographic dividend: It is expected that India will have 464 million young people in the age group of 15 to 34 years by 2021, from 430 million in 2011.
- Urbanisation: India had an urbanisation rate of over 33% in CY 2016, and it is expected that this urbanisation rate shall cross the 40% mark by the end of 2030.
- Rise of middle class: India had a total middle class of around 110 million people 2015, or 5% of its population. This consumer segment is expected to grow to 200 million by 2020 and is further projected to reach 475 million by 2030.
- Internet penetration: India currently is the second largest market in terms of smartphone users. In 2016, internet penetration in India was around 35%, with over one-third contribution from rural India.
- Startup policy initiatives: The government is focusing on providing an enabling environment for startups.

As a result of the above mentioned driving factors, number of new tech-based startups is expected to reach around 2,000 per year by 2020, growing at a CAGR of ~16% during 2015-2020.

Indian startups are set to play a game changing role in the country's future economic outlook. The country's demographic profile offers a huge opportunity for any new enterprise trying to establish itself in this market. Thus, startups and entrepreneurs in India have a huge home advantage and opportunities in this current scenario. It is expected that the total employment in the Indian startups space shall cross the 200,000-250,000 mark by the end of 2020.

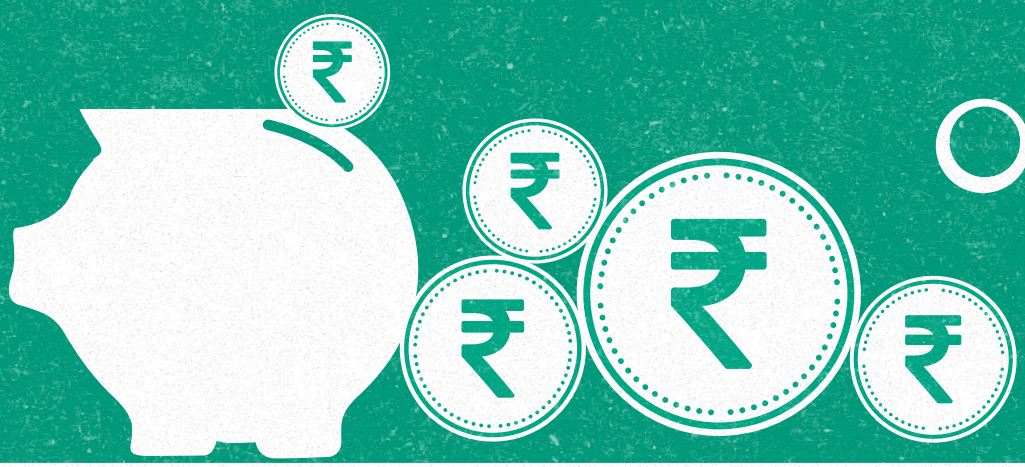


Innovative avenues of 'growth capital'

The Indian economy is the 7th largest economy in the world and is going through an era of revolution as new "disruptive" business ventures are emerging every year. With the objective of capacity expansion, the Government of India is emphasising on self-employment and promoting entrepreneurship among the youth. To fund upcoming business ventures, expansion of micro, small and medium enterprises and upcoming infrastructure projects, there has been a great emphasis on development of new, non-traditional and unconventional, sustainable, economic and innovative sources of finance/funding.

With the growing number of technology-based start-ups (4,750 in CY 2016, expected to reach 11,500 by CY 2020) and ~51% of the working population being self-employed, there is a rising need to modify existing sources of finance and introduce new and innovative ones.

The concept of innovative funding includes non-traditional and tailor-made financial instruments. The concept and functioning of innovative ways of funding runs through capital market instruments and this makes it necessary to understand the Indian capital market. Innovative funding mechanisms are important to the economic growth of the country and the government as well as the private sector are contributing towards making it a game changer in the way funding mechanisms are functioning. Now an increased proportion of funding is received through various channels like venture capitalists, private equity and government funds dedicated to start-ups and small ventures.



Snapshot

Bombay Stock Exchange

Over 5,000
companies are listed with a total market capitalisation of over Rs 100 trillion

National Stock Exchange

Over 1,500
companies are listed with a total market capitalisation of over Rs 75 trillion

Foreign Direct Investment:

A total inflow of
US$ 484.35 billion
during April 2000-March 2017

Top sectors with highest FDI inflows during 2016–17

Services
(US$ 8.68 billion)

Telecom
(US$ 5.56 billion)

Computer software and hardware
(US$ 3.65 billion)

Trading
(US$ 2.34 billion)

326
Number of angel or seed fund investors that participated in Indian tech startup funding (H1, 2017)

Startups received a total funding of
US$ 9 billion
during CY 2015 and CY 2016

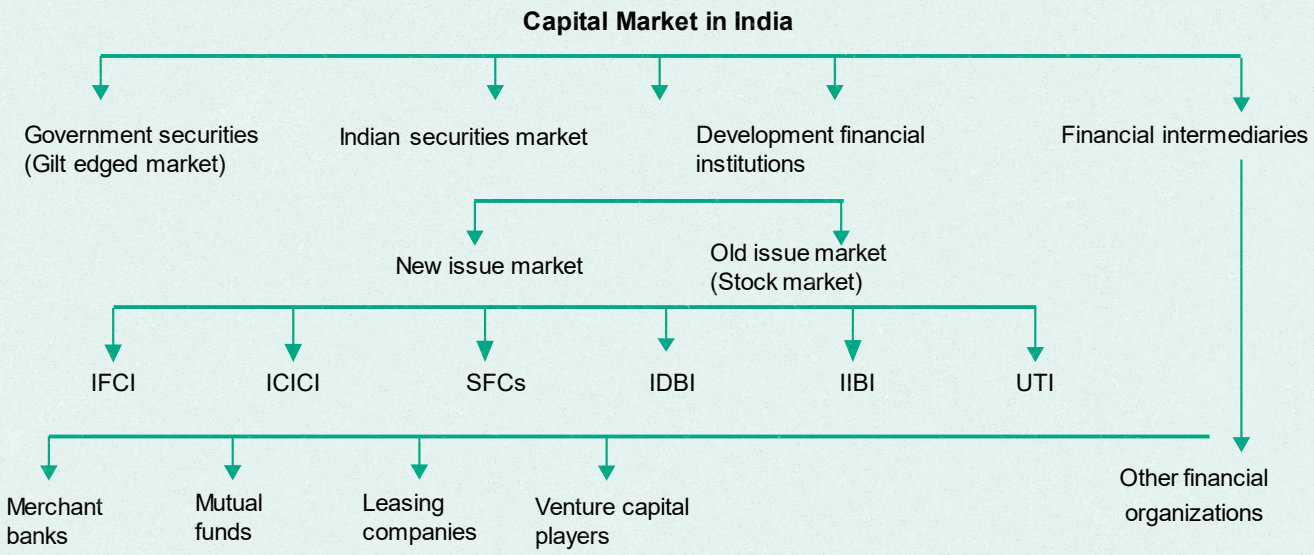
More than
200 venture
capitalists and fund managers are dedicated to India (2016)

Introduction

The concept of innovative funding includes non-traditional and tailor made financial instruments. To understand the concept of innovative funding it is necessary to understand the structure and working of the Indian capital market.

The Indian capital market

The Indian capital market facilitates borrowing and lending of short, mid and long term financial instruments to private corporations, government corporations and the government.



Composition of the capital market

The Indian capital market mainly divides into 4 different branches:

Gilt edged market: It is a market offering government securities and semi-government securities like: treasury bonds, treasury notes, commercial papers etc.

Industrial securities market: The industrial securities market deals with new issues of equity and debentures and trade of existing equity and debentures.

Development financial institutions: These are public sector financial institutions which are set up to provide mid and long term funding to industry, business and agriculture operations.

Financial intermediaries: Financial intermediaries mainly constitute commercial institutions like merchant banks, leasing companies etc. which facilitate deposition of savings and mobilization of funds.

The dynamism in the credit sector and evolution of the capital market have enabled borrowers (households, businesses, trade and industry) to access innovative funding solutions. The capital market offers a bouquet of financial instruments like loans, bonds, debentures, equity, venture capital, short term receivables, etc.

Stakeholders

The capital market functions with interaction of its stakeholders, there are different stakeholders that are involved in the functioning of the capital market.

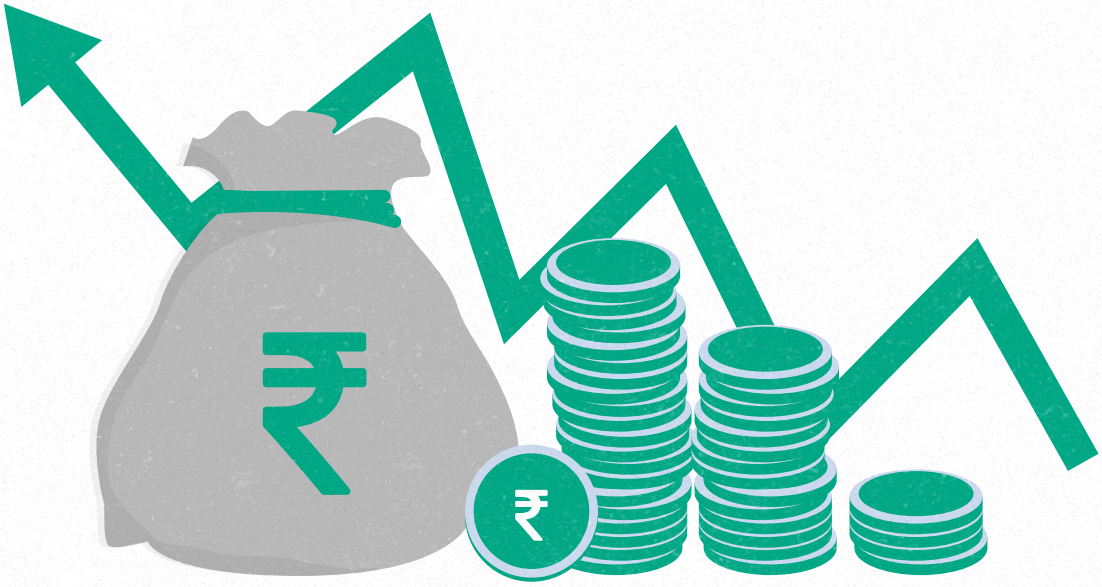
Issuers: Issuers are the companies, multinational organisations and state and central governments which may issue equity shares to raise capital by giving out a percentage share from their ownership. Companies sometimes may issue bonds which are debt instruments where investors receive a certain amount of money with an additional interest at regular intervals of time. The central government and state governments also resort to this type of debt financing to raise capital for their expenditure on infrastructure i.e. for the development of roads, schools, public transport and basic public infrastructure. For example National Highways Authority of India (NHAI) is expected to raise financing worth Rs 55,000 crore through bonds by 2017 to fund its upcoming infrastructure development projects.

Investors: Investors are the parties who invest in money or assets in exchange of securities. These investments can be made directly or indirectly i.e. through pension funds, venture capitalists, private equity funds and so forth ensuring regular returns and profits on their principal investments. There are new investment options that are coming up at a brisk pace. According to Venture Intelligence data, VC firms invested US$ 1.4 billion across 405 deals in 2016. Active VC firms in 2016 include Accel India (29 deals), Sequoia Capital India (26), Blume Ventures (24), Kalaari Capital (22) and Aarin Capital (18).

Exchanges: Exchanges can be explained as a virtual market place providing an exchange platform to securities and financial instruments. There are in total 15 permanent stock exchanges in India, with Bombay Stock Exchange (BSE) and National Stock Exchange (NSE) hosting a majority of the trade. BSE had over 4,700 listed companies and a market capitalisation of Rs 115 lakh crores as of February 15, 2017 showing a remarkable growth from having a market capitalisation of Rs. 6 lakh crore in the year 2001-02. National Stock Exchange (NSE) had more than 1,200 listed companies and had a market capitalisation of over US$ 1.2 trillion by the end of August, 2016.

Regulator: Securities Exchange Board of India (SEBI) was formed in 1992 to safeguard the interests of investors, check trade malpractices and make the overall trade regulated and transparent. SEBI is responsible for the overall supervision, policy reforms, and development of the capital market acting as a regulator and a watchdog.

Other stakeholders: This includes all those market players which are indirectly involved with the capital market. It includes research analysts who conduct and publish various research reports about the market behaviour and give insights to investors about the market forecasts. Other types of indirect stakeholders are intermediaries who enable the exchange between issuers and investors. For example investment banks, accountants, and lawyers help facilitate exchanges between the parties involved.



Evolution of capital market towards innovative ways of funding

The Indian capital market gained momentum in the early 1990s after the introduction of "Liberalisation, Privatisation and Globalisation (LPG)" policy. The nationalised banks were privatised and international banks were allowed to enter the Indian economy. International trade barriers were lifted and the capital market started following the demand-supply mechanism. The increasing investments in the capital market led to the setting up of two organised trade platforms - National Stock Exchange (NSE) and Bombay Stock Exchange (BSE). Also to safeguard the interests of investors and regulate these trades and exchanges, Securities Exchange Board of India (SEBI) was set up which now has evolved as the key regulator of capital markets.

Indian economy post-LPG became stable and showed constant growth as the GDP grew from US$ 274.8 billion in the end of year 1990 to US$ 1.22 trillion in 2008, growing at a CAGR of 9.2%. In 2007-08, the collapse of the US housing mortgage sector resulted in a global economic downfall and recession. The Indian economy was also significantly impacted as international banks and investors pulled back their investments and savings from the Indian economy to fund their overseas operations, thereby exerting pressure on the Indian banking and credit sector. The absence of economical credit facilities and huge demand supply gap in terms of credit for the market, led to fewer sources of finance for domestic businesses and ventures. The Indian economy at this point was passing from a phase of expansion in terms of expansion of manufacturing and services, government increasing its infrastructure expenditure, increase in the number of small, mid and large scale businesses and emergence of startups which during recession had to resort towards new and innovative ways of funding.

Deployment of innovative funding mechanisms

The concept of innovative funding in India evolved due to the dynamism in the Indian capital market. Innovative funding can be defined as a non-traditional and unconventional way to fund mainly non-traditional and unconventional business ventures and their operations and activities. Some of the salient features of innovative funding can be described as follows:

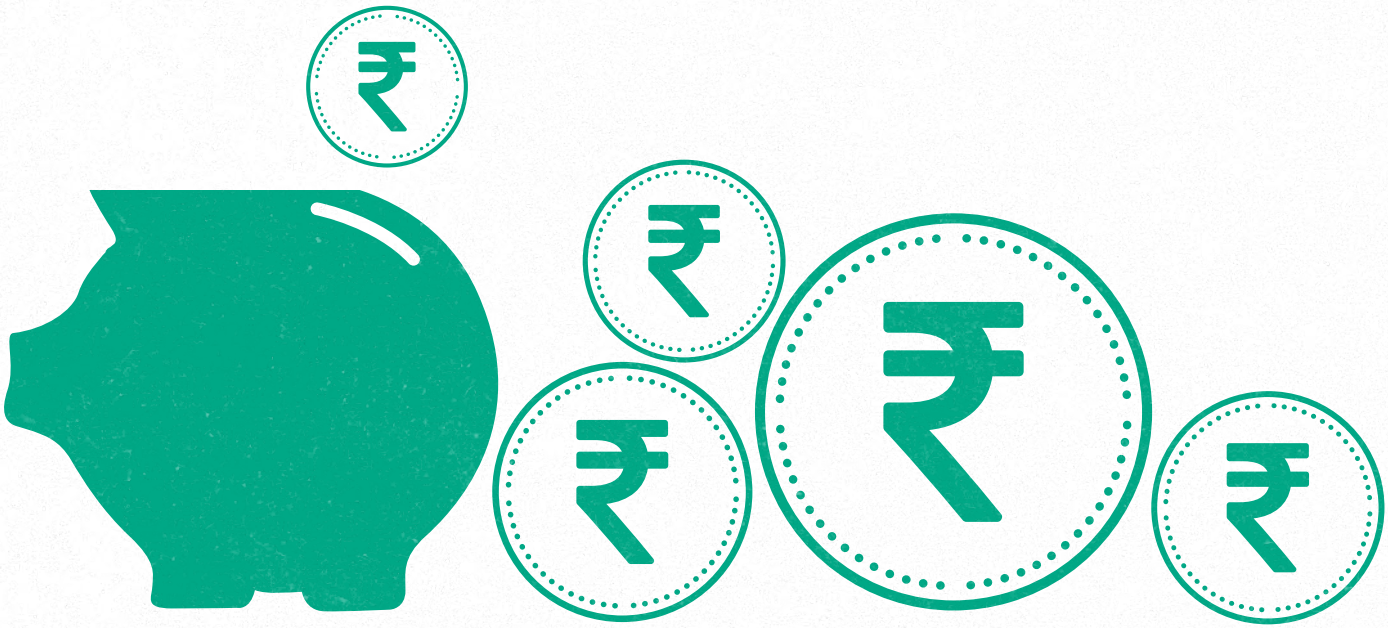
- Non-traditional and unconventional source of finance
- Tailor made and subjective
- Flexibility of terms and conditions
- Cost of finance depends on market demand

Stage I funding: Capital formation is divided into different stages. Stage I funding largely depends upon the prototype of the business idea to be formalised. The purpose of stage I funding is to convert plans and ideas into concrete businesses; this involves developing an idea to the extent where it can be commercialised and made available to users. Majority of the investments at this stage are in the form of intangible assets. Investors at this stage with their market expertise and financial backing invest into these ideas to accelerate the growth of the business ventures. Various types of investors or funding sources available in stage I funding are:

1. Business angels: Business angels are affluent individuals who invest in new, young and growing businesses. They are entrepreneurs who invest into business ventures and markets which have not been tapped by any other institutional investor, helping new businesses to fill the equity gap in their capital structure. With India's increasing focus towards "Consumerisation through Digitisation" and growing market share of IT and ITeS, a number of start-ups and aggregators have emerged in the previous decade. Startups operating in internet, smartphones, e-commerce, and food tech received ~Rs 48 crore or ~42% of the total angel investments in FY16. Angel investment in India by the end of FY 2015-16 stood at Rs 113.6 crore invested in a total of 69 deals, hence showing a rise of ~62% in terms of deal value and ~47% in the deal volume in comparison to FY 2015 (where ~Rs 70 crores was invested across 47 deals). Some of the prominent angel investors in the Indian market are Indian Angel Network, Chennai Angels, Calcutta Angels, Hyderabad Angels and Mumbai Angels. These angel investors play a vital role in a start-up's initial structuring and operation by providing their managerial expertise. Startups prefer to raise their initial funding through business angels as businesses opting for angel investments have witnessed an increase in their average investment valuation by 10% reaching Rs 9.96 crore in FY'16 as compared to Rs 9 crore in FY15, resulting in 24% of the portfolios being valued between the range of Rs 20 crore and Rs 30 crore. Some of the notable start-ups that got angel funding include Dr. Agarwal's Healthcare Limited, Stayzilla, IndiaProperty.com among others.

2. Crowdfunding: Crowdfunding is a concept where investments are received from a number of investors in small token amounts rather than having a single investor. Most of the crowdfunding is received through the internet where an entrepreneur puts forward a project proposal to various investors connected through a common portal. This concept of crowdfunding was initiated in the US and UK. In India, the concept is not new but it is now gaining momentum with changing market dynamics. One of the successful cases of crowdfunding in India during the 1980s was that of Reliance Industries, where Dhirubhai Ambani the founder raised funds from various communities in the state of Gujarat for his textile manufacturing plant. Further, the Government of India has initiated projects, events and campaigns like The Goa Project and Teach India through crowdfunding and has introduced "MILAAP" which is a non-profit microfinance institution providing crowd funding LightSpeed Mobility raised money through crowdfunding to build a e-bicycle company. Another company, Hyperlooop India is looking to raise the funds through crowdfunding platform Ketto, to build this pod in India.

3. Stage II funding: Once ideas have been converted to concrete businesses and product prototyping is successfully completed and tested, there is a need to commercialise and increase the market reach of the business. At this stage, business ventures need capital to prepare market entry strategies, scale up their operations, make advancements and modifications to the product as per the market trends and generate profits. At this stage, businesses may receive investment in terms of funds or managerial expertise. Various types of investors or funding sources available for stage II funding.



Source: Grant Thornton Deal tracker, Secondary sources

4. Venture capital: Venture capitalists are investors who invest in business ventures tracing a positive growth. Venture capital is received by business ventures which show a high growth potential but have a low asset balance sheet, irregular cash flows and absence of a credit history which makes them unable to raise capital through debt financing. Venture capitalists are institutions like pension funds, insurance companies and deep pocketed individuals. In India's scenario, venture capital is one of the most preferred sources of funding and the sector has witnessed a remarkable growth with various international venture capitalists entering into the booming Indian economy. In year 2014, venture capitalists invested around US$ 1.2 billion into various business ventures across 304 deals, which remarkably rose to US$ 1.4 billion (323 deals) by the end of September, 2015. According to Venture Intelligence data, VC firms invested US$ 1.4 billion across 405 deals in 2016, which was 29% lower than US$ 2.0 billion in 2015.

The reason behind the growing deal size of venture capital funds is the increased interest of domestic international fund managers to invest in the Indian economy. Some of the major domestic and international fund managers in the Indian capital market are:

Top 10 domestic fund managers in India

Company	Corp HQ	VC raised in last 10 years (US$ million)	No of VC funds
SIDBI Venture Capital	Mumbai	1,300	5
Nexus Venture Partners	Mumbai	1,024	6
IDG Ventures India	Bangalore	400	2
Kalaari Capital	Bangalore	349	2
Ventureast	Hyderabad	328	6
Crossover Advisors	Mumbai	200	1
WestBridge Capital Partners	Bangalore	200	1
Inventus Capital Partners	Bangalore	158	2
Aavishkaar Venture Management Services	Mumbai	157	4
Morpheus Capital	Mumbai	150	1

Source: Secondary sources

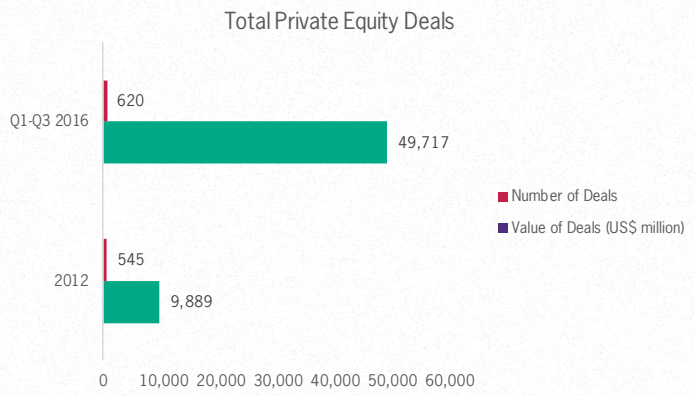
Largest international fund managers in India

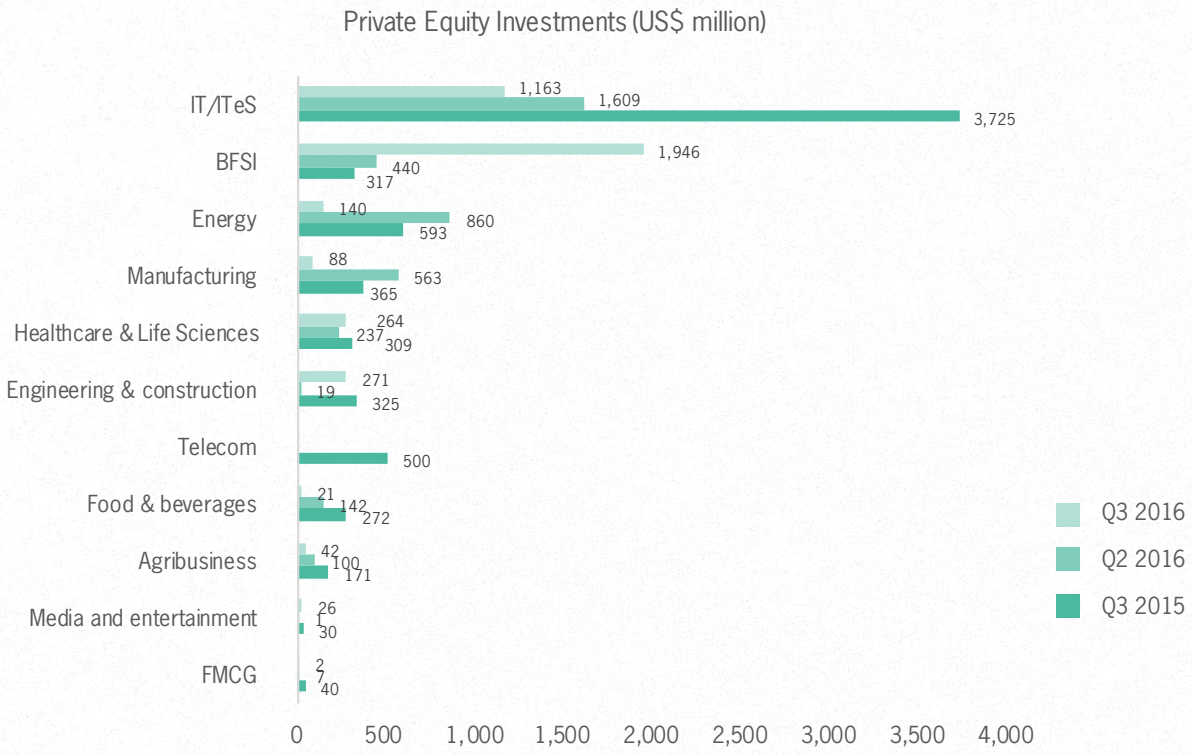
Fund	Firm	Firm HQ	Fund size (US$ million)
Sequoia Capital India IV	Sequoia Capital	US	740
Sequoia India Growth Fund II	Sequoia Capital	US	725
Samridhi Fund	SIDBI Venture Capital	India	718
Matrix India	Matrix Partners	US	450
Sequoia India Growth Fund	Sequoia Capital	US	400
Accel India IV	Accel Partners	US	305
Nexus India Capital IV	Nexus Venture Partners	India	304
Greater Pacific	Capital Greater Pacific Capital	UK	300
Sequoia Capital India III	Sequoia Capital	US	300
Helion Venture Partners IV	Helion Venture Partners	Mauritius	300

Source: Grant Thornton Deal tracker, Secondary sources

5. Private equity: Private equity is a form of asset which is raised through issuance of equity securities and raising of debt and is not traded on stock market platforms. Private equity investments are usually made by venture capitalists, angel investors and private equity firms.

Private equity is one of the most preferred sources of second stage financing. Capital raised through private equity grew from US$ 9,889 million (545 deals) in the year 2012 to US$ 49.72 billion (620 deals) in 2016.





Source: Grant Thornton Deal tracker, Secondary sources

Period	FMCG	Media and entertain-ment	Agribusi-ness	Food & beverag-es	Telecom	Engineer-ing & con-struction	Health-care & Life Sciences	Manufac-turing	Energy	BFSI	IT/ITeS
Q3 2016	2	26	42	21	-	271	264	88	140	1,946	1,163
Q2 2016	7	1	100	142	-	19	237	563	860	440	1,609
Q3 2015	40	30	171	272	500	325	309	365	593	317	3,725

The overall structure of banking in India

Majority of the investments observed were in the IT/ITeS sector as the sector received total investments of US$ 6,497 million followed by the BFSI sector receiving a total value of US$ 2,703 million. Energy and manufacturing sectors have witnessed an increase in investments, as the sectors received a total of US$ 1,593 million and US$ 1,016 million respectively.

- Shares and stock: The stock market is a market place where shares and stocks of companies are traded at a pre-determined price. Business ventures seek to sell their equity stake to raise capital or may raise capital through debt financing i.e. by issuing debt instruments. Businesses new to the stock market first issue securities through initial public offerings (IPO) and later these shares and stocks are traded in the secondary market. There are two main stock exchanges in India where the securities can be exchanged, namely BSE and NSE. BSE's index SENSEX comprises of top 30 companies across various sectors whereas NSE's index NIFTY has top 50 companies across various sectors. As the Indian stock market's growth is influenced by a number of factors like foreign institutional investor (FII) inflow in the country, tax reforms, dynamism in the global markets etc. the markets have witnessed a bullish growth. BSE's market capitalisation by the end of 2001-02 was Rs. 6 lakh crore which grew to Rs. 115 lakh crore by the end of February, 15, 2017 with a CAGR of 22%. NSE on the other hand had a market capitalisation of Rs 102 lakh crores by the end of FY 2011 which grew up to Rs 152 lakh by the end of August 2016, growing at a CAGR of 8.2%. Positive growth rates of both the exchange markets show the capability of these exchanges to tap into upcoming sectors. As India (mentioned in its Twelfth Five Year Plan) wants to increase expenditure on construction, infrastructure, IT/ITeS, communication and so forth these markets can offer numerous opportunities for raising funds.
- Loan and loan syndication: Bank loan is the most common type of debt financing used by businesses to raise capital. A loan is a principal amount of money advanced with the expectation of repayment in stipulated time with additional interest to be paid by the borrower at regular intervals of time. Loans can be secured and unsecured i.e. secured loans are supported by a collateral security guaranteed by the borrower in case of default. And with unsecured loans, the lender has a claim over the assets of the borrower in case of any default. Bank loan is a very common and safe destination for lenders willing to invest their money and gain returns on it. It was observed that total gross savings rate by the end of 2000 was 23.7% which increased to 31% of GDP by the end of 2016. This reflects an increase in investments and an abundance of savings to be advanced as credit loans. The reason behind this is that increasing number of bank accounts and changing credit policies have resulted in availability of funds at cheaper interest rates. Loan syndication is a concept close to crowdfunding as it enables borrowers to procure loans and advances from a number of lenders or a group of lenders instead of one single lender.
- Other upcoming sources of funding: Other sources of funding that are gaining momentum in the current scenario include finance providers offering a mix of debt and hybrid finance services. These are non-traditional sources of finance which are typically not offered by the banks.

Some of the main sources of hybrid finance in India are:

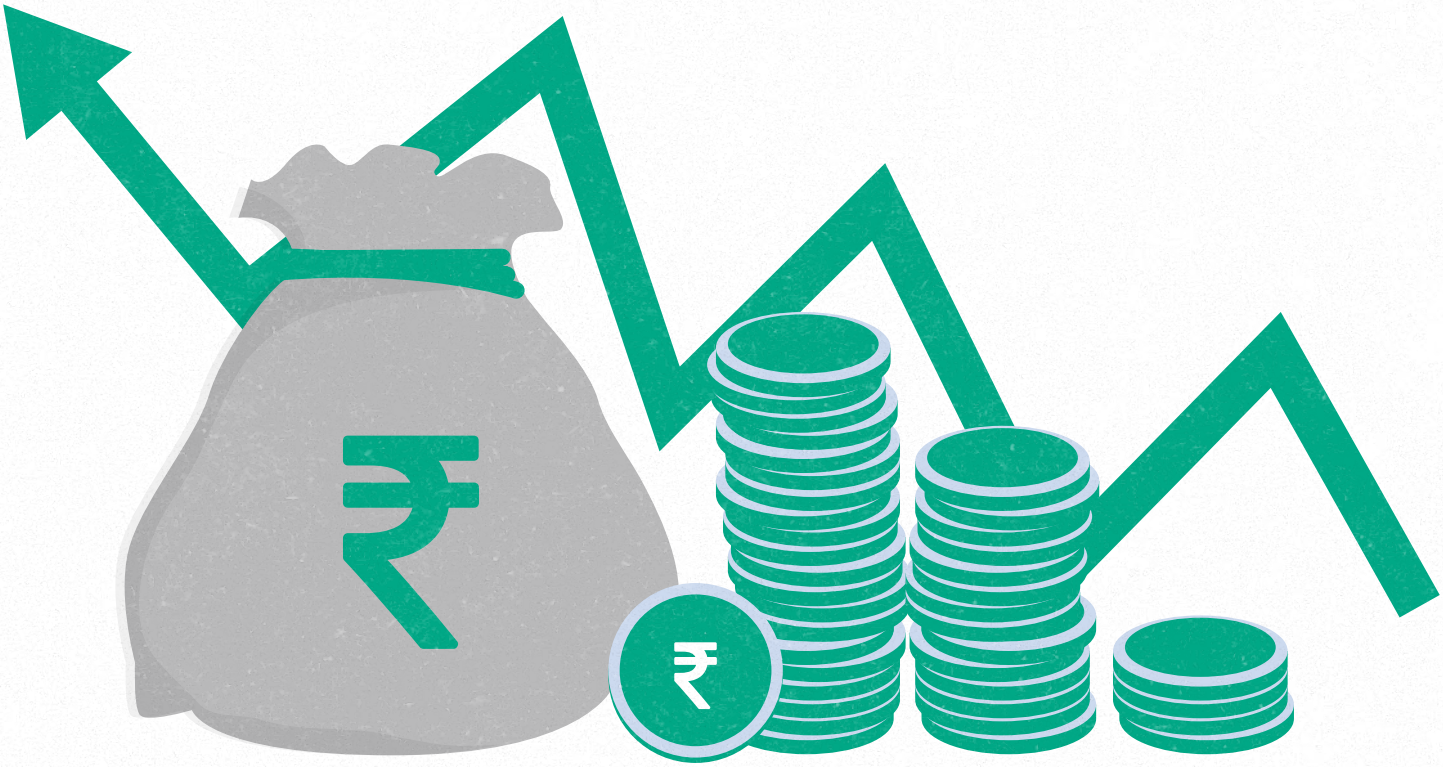
- Mezzanine funding: Mezzanine funding is hybrid funding involving characteristics of both equity and debt. It can be divided into various types such as unsecured debt, debt with detachable warrants, convertible debentures, and convertible preferred shares. This sort of funding is expensive and risky and is usually raised to fund expansion and growth plans.
- Intellectual property (IP) financing: IP financing is a source of financing where an IP asset is leased out by the investor for a period of time and is leased back in exchange for a license fee. This type of financing is provided by companies having knowledge and expertise of dealing with IP.
- Leasing: Leasing is a process of fulfilling a company's financial needs as businesses lease out a part or a complete asset in exchange of rentals for an agreed period of time. This helps businesses to raise cash inflows to fund their working capital needs through internal sources or assets.
- Factoring and invoicing: The concept of factoring has recently emerged where companies can advance their accounts receivables to external third parties at a premium or discount. These accounts receivables can also be guaranteed to banks as a part of collateral for issuing bank loans. Factoring and invoicing is a relatively new platform and is gaining momentum globally by using platforms that are used in crowdfunding.
- Trade credit: The concept of trade credit is very old but is widely preferred and frequently used. Trade credit is prominent in specific industries like retail, manufacturing, logistics, etc. where a supplier allows a buyer to complete the entire process of procurement and sales and then make due payments. This allows small businesses which lack regular cash flows to carry out their operations smoothly where the supplier bears all the risk.

Factors that have accelerated the growth of innovative funding options

- Growing economy: The Indian economy has been growing and comprises of various upcoming sectors which have enabled existing market players to expand their operations and revenue generation. This has motivated new business ventures to come up within the Indian market. India being the 7th largest economy globally, reported a GDP of US$ 834.2 million in 2005 which grew at a CAGR of 10% amounting to US$ 2,251 billion by the end of 2016. The remarkable growth in the economy has resulted in an average inflow of US$ 1,190.70 million per year (from 1995-2016) in the form of foreign direct investments (FDIs) in the country.
- Preference for unconventional sources of finance: Availability of unconventional and tailor made sources of finance is the key driver of innovative funding as these sources provide customised, flexible and cost efficient funding. Availability of innovative finance is directly proportionate to the number of start-ups in the country. With more than 10,000 (in 2016) start-ups sprawling across India, there was US$ 4 billion in risk capital being deployed across 1,040 angel and VC/PE deals (an increase of 3% from 2015) between January and December 2016.
- Growth in related sectors: The increasing drive of consumerism and increased interaction of IT/ITeS with all other sectors has enabled business ventures to test their product prototypes and even commercialise them to generate revenues. As a number of business ventures are service oriented, the services sector is the highest foreign investment receiving sector, which received US$ 8.86 billion during 2016-17 followed by the telecom sector which received foreign capital worth US$ 5.56 billion. Sectors like computer software and hardware and automobile received foreign investment worth US$ 3.65 billion and US$ 1.61 billion respectively. All these sectors for India have interdependent and mutual growth.
- Rise of start-ups and disruptive markets in India: India is witnessing a start-up revolution where new ventures are coming up and are expected to rise from 4,750 in CY 2016 to 11,500 by CY 2020, thereby disrupting various existing markets by tapping into the gaps and making new ones. Sectors like retail, real estate, public transport, food and delivery, apparel, telecom etc. have evolved as a part of this process. Some of the startups which have been able to tap into the existing market and have transformed them into new ones are: Housing.com: A real estate property rental aggregator, Zivame: A women apparel retail app, AdPushup: An advertisement layout platform, Paytm: A mobile commerce and e-commerce platform, Redbus: A transport ticketing portal, Inmobi: A data science based start-up.
- Acquiring and merging of capital and technology: Domestic business ventures opt to merge and acquire or be acquired by foreign and domestic companies to not only raise capital but also partner in the technology sharing, to expand their consumer base, increase geographical base etc. For example, Facebook acquired Bengaluru-based Little Eye Labs for US$ 15 million to improve its mobile development and Snapdeal acquired Freecharge to build one of the largest digital commerce networks in India.
- Focus on SME financing - a key driver for future: The MSME sector is a thriving sector which projects high growth potential as it caters to the domestic market demand and consumers. The MSME sector is budding with the growth of infrastructure in tier 2 and tier 3 cities and currently contributing around 8% to the country's GDP, 45% to the total manufacturing output, 40% to the total exports and is the 3rd largest employer after agriculture in the country. Recognising the contribution of the sector to overall economic growth, the Government of India and the RBI have formalised many initiatives ensuring continuous flow of investments. Few initiatives introduced by the RBI include Trade Receivables Discounting System (TReDS) to resolve issues of delayed payments by introducing an authorised electronic platform for discounting of invoices/bills of exchange. Along with this, the RBI has also launched training programs for MSMEs in the banking sector to ensure capacity maximisation and develop entrepreneurial sensitivity. The Government of India has also structured a framework to revive and redevelop MSMEs. Initiatives like "Make in India", "Skill India Mission" and "Digital India" have been launched with a view to ensure overall development of dependent and autonomous sectors.

Some of the government initiatives include:-

- The Government of India has realised the importance of Intellectual Property (IP) rights for businesses and has initiated a fast track patent application processor with the government bearing the facilitation cost.
- As it is difficult for new and small business ventures to raise capital due to irregular cash flows and lack of collaterals, the government plans to to set up a fund of Rs 10,000 crores with a corpus of Rs 2,500 crores to be invested per year through SEBI registered venture funds (starting from 2016). The government has already provided Rs 500 crore in 2015-16 and Rs 600 crore in 2016-17. In addition to this, the government is set to prepare a credit guarantee mechanism through National Credit Guarantee Trust Company (NCGTC) with a corpus of Rs 500 crores.
- The Government of India has also provided various tax benefits and exemptions to investors and business ventures. New business ventures at the time of issue of their securities above fair market value will be exempted from paying tax under 56(2)(vii)(b) and are also exempted from paying income tax for the initial 3 years.
- Under Budget 2017-18, the Government of India reduced the income tax to 25% for companies with annual turnover less than Rs 50 crore.



Conclusion

The Indian economy is forecasted to reach US$ 3.1 trillion by 2020. The growing number of startups (total startups 10,000+ as of 2016, tech based startups expected to reach a total of 11,500 and employ over 250,000 people by 2020) and the government promoting self-employment have led to the evolution of unconventional sources of finance. Dynamism in the capital market and the growing startup culture have increased the demand for diverse sources of finance like business angels, venture capital, bank loans, private equity etc. and given birth to new concepts like crowd funding, IP financing, factoring and leasing. There is also an increase in the market share of unconventional investors like venture capitalists, private equity firms, etc. which provide investments through domestic and international channels to upcoming ventures. Global FDI investment is expected to be US$ 1.8 trillion by 2018. US, India and China remain top FDI destinations (UNCTAD).

The government and the RBI are emphasising on the growing need of innovative ways of funding by promoting a well-balanced investment structure between "capital intensive" and "labour intensive" companies. The government is acknowledging the contribution of prominent sectors like services sector (which significantly contributes around 54% of the GDP) and growth of skill intensive services like IT/ITeS, e-commerce and professional services as the total revenue generated by IT/BPM services is projected to reach US$ 200-225 billion by 2020. Growth of these interrelated sectors will further trigger the growth of capital markets and demand for innovative financial instruments. In addition, with initiatives like Start-up India, Digital India and Skill Development, the government is concentrating on development of both modern services like e-commerce, communication and finance and traditional services like trade, transport and storage, etc.

Expert perspective

Mr. Sourajit Aiyer,
Business author

"As India's GDP rises, it will open up further opportunities for financial services through banks and capital markets. Efforts to build advisory, manufacturing, and distributing capabilities will feed the supply side for financial inclusion, across these three segments for their specific needs. Efforts to build awareness, education, and marketing will feed the demand side for financial inclusion, apart from broader-based economic growth pushing incomes for more Indians."

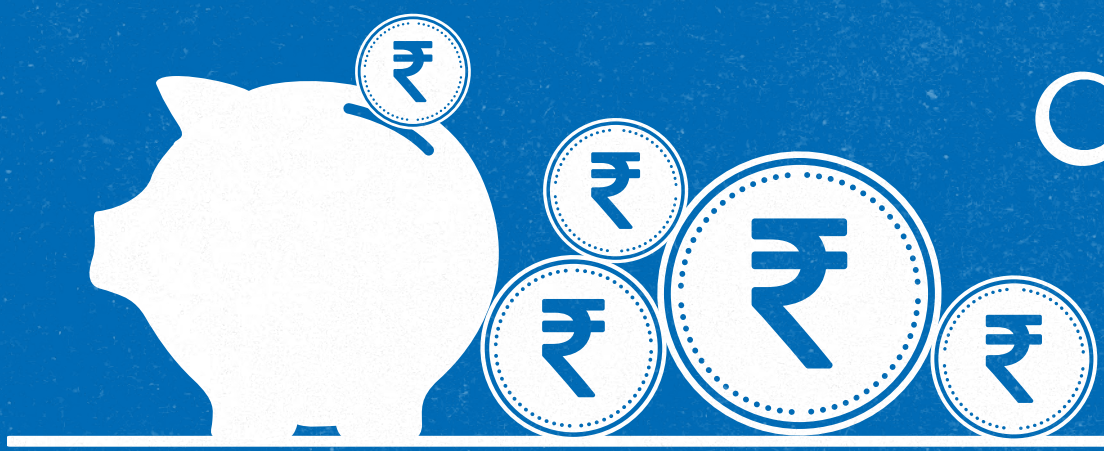
Banking on universal access for overall prosperity

Financial inclusion acts as a catalyst in shared prosperity and sustainable social and economic development. History is replete with evidence of the significant role played by financial and banking institutions in the lives of the citizens as well as the financial health of the economy.

As defined by the Reserve Bank of India, financial inclusion is a process of ensuring access to financial services, timely and adequate credit where needed, by vulnerable groups such as weaker sections and low income groups at an affordable cost. It refers to universal access to a wide range of financial services at a reasonable cost. Increased usage of formal financial services such as savings, pension, payment accounts, wealth creation, etc. by the society and especially low income groups in a country is considered a positive indicator for economic development.

Various initiatives have been taken up by the Government of India (GoI) and the Reserve Bank of India (RBI) to ensure increased financial inclusion. These include opening of bank branches, ATMs, encouraging the proliferation of no-frill accounts, direct benefit transfer (DBT), use of ICT/ mobile technology, Kisan credit cards, Aadhaar scheme, and fair price shops among others.

Apart from the government, various private sector players have taken initiatives for economic and inclusive development through projects like e-Choupal, Project Shakti and Haryali Kisan Bazaar by ITC, HUL and DCM respectively.



SNAPSHOT

During FY 2006-17, bank deposits grew at a CAGR of 12.03% and reached **Rs 1.54 trillion** by FY17

With a bank (as of November 2015) account penetration of around **53%** the country is on a growth trajectory to increase this figure significantly by 2020

Pradhan Mantri Jan-Dhan Yojana (PMJDY), a Government of India stewardship programme to provide bank accounts to poor people in the country, added over

260 million

unbanked individuals into the banking sector during the period 2014-16

Under PMJDY,

Rs 647.77 billion

of deposits have been made, providing access to banking services for more than 291.8 million Indians as of July 19, 2017

India is the second largest smartphone market with over

290 million users

in 2016. The rapidly growing penetration of smartphone devices and internet has led to increased penetration of cashless banking systems in India

According to RBI, the number of mobile banking transactions has increased from 171.9 million in FY 2014-15 to

389.9 million

FY 2015-16

India has a total of

420 million

mobile internet users (as of June 2017, out of which 250 million are in urban areas and 170 million in rural areas)

With the growing number of smartphone users in the country, the smartphone market in India is expected to grow at a CAGR of

55%

during the period of 2015-19

Over the last two years, the Government of India has undertaken various flagship social security initiatives with the objective of increasing financial inclusion in the country. These include:

- **Pradhan Mantri Jan Dhan Yojana (PMJDY):** The Government of India's policies like Pradhan Mantri Jan Dhan Yojana (PMJDY - which is the world's biggest financial inclusion drive) has ensured access to financial services to a large mass of India's rural population.
  - As of July 19, 2017, 291.8 million bank accounts have been opened under this scheme.
- **Pradhan Mantri Suraksha Bima Yojana (PMSBY):** The cheapest accidental death cum disability insurance plan with an annual premium of Rs 12 and an insurance cover of Rs 0.2 million for accidental death and Rs 0.1 million for partial disability.
  - As on July 10, 2017, 108.5 million people were enrolled under this scheme.
- **ATAL Pension Yojana (APY):** Pension for workers from unorganised sector.
  - As on November 28, 2016, total number of subscribers registered under this scheme had crossed 3.73 million.
- **Pradhan Mantri Jeevan Jyoti Bima Yojana (PMJJBY):** The cheapest life insurance policy with an annual premium of Rs 330.
  - As on July 2017, total subscriptions under PMJJBY scheme were 34.4 million.

Along with the above listed initiatives, the Government of India has taken various other initiatives for financial inclusion which include:

- Accident insurance cover of Rs 1 lakh
- Unique identification for each Indian in the form of Aadhaar card
- Increased access to bank account with an overdraft facility
- Rupay-enabled ATM debit card

Impact of financial inclusion

Economic growth:- Supported by decreasing population growth rates, there shall be increase in per capita income and overall GDP growth rates.

Financial deepening:- Financial development would spur growth and generate demand for financial products

Financial deepening: Private insurance players too have witnessed a growth in their general insurance business. For example, Bajaj Allianz General Insurance has seen a growth of over 150% in its personal accident portfolio during FY 2014-15. Bajaj Allianz General Insurance Company has witnessed a growth of 13.7% in the premium earned from personal accident insurance segment during 2015-16 as compared to 11.7% during 2014-15.

Direct benefit transfer (JAM): The Government of India has come up with another key initiative of direct benefit transfer. The prime objective of this scheme is to directly transfer subsidies to the intended beneficiaries and eliminate intermediaries and leakages. This scheme links PMJDY with Aadhaar number along with mobile numbers. This has further propelled customers to open savings accounts. The primary objective of the programme is to replace the existing subsidy distribution system with direct cash transfers to curb leakage. The scheme will enable deeper penetration of financial services and help in achieving financial inclusion goals.

- By the end of 2016, 84 schemes were brought under the ambit of Direct Benefit Transfer and led to savings of around Rs 36,000 crore over a period of two years (2014-16).

As of October 2017, 1.18 billion individuals in India had Aadhaar Cards which covers more than 90% of the population of India

Relaxation of branch licensing policy- The Reserve Bank of India (RBI) has relaxed its branch licensing policy, thereby allowing banks (which meet certain financial parameters) to set-up new branches in tier-2 to tier-6 centres without prior approval from RBI.

- The Reserve Bank of India has issued 10 small banking licenses including eight for micro finance institutions aimed at spreading financial inclusion.
- In June 2016, India Post was allowed to act like a bank. The India Post Payments Bank (IPPB) has been recently incorporated as a Public Limited Company under the Department of Posts with 100% GOI equity.
- India Post Payments Bank (IPPB) will offer demand deposits such as savings and current accounts up to a balance of Rs 1 lakh, digitally enabled payments and remittance services of all kinds between entities and individuals and also provide access to third party financial services such as insurance, mutual funds, pension, credit products, forex, and more, in partnership with insurance companies, mutual fund houses, pension providers, banks, international money transfer organisations, etc. IPPB will reach the unbanked and under-banked sections of the society across geographies.

Other fintech areas supporting financial inclusion:

E-wallets	e-KYC
Biometric	Aadhaar linkage to account for credit information
Funding for MSMEs	

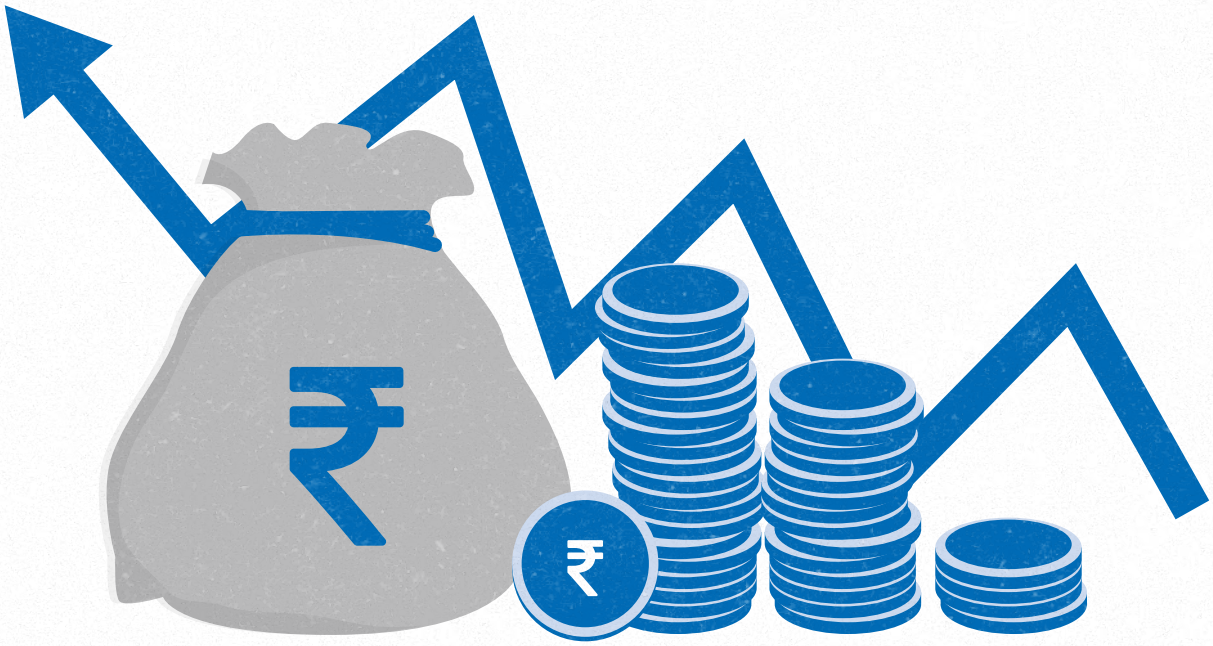
In another attempt for cashless economy and financial inclusion, the Government of India came up with a demonetisation drive which rendered high denomination notes of Rs 500 and Rs 1,000 invalid. As a consequence, citizens have begun to look at other alternatives like online transactions, e-Wallets and debit/credit cards, thereby increasing transparency and boosting the cashless economy. Digital payments have seen a growth rate of 40-70% post-demonetisation, as opposed to 20-50% earlier, according to data from the Payments Council of India.

The story of financial inclusion in India

Banking sector - Backbone of financial inclusion initiatives in India

Financial inclusion is aimed to achieve sustainable development of the country through easy access to formal financial services/systems and their usage by all stakeholders of the economy. The concept first featured in 2005, when it was introduced as a pilot project in the Union Territory of Puducherry. Mangalam village became the first village of the country to have all the households covered with banking facilities. It is important to note that financial institutions play a vital role in promoting financial inclusion in a developing country like India. The efforts towards financial inclusion by the government and private sector can be further enhanced by the pro-activeness of the capital market players and financial institutions including the banking sector.

Considering having a bank account is the first step towards financial inclusion, the banking sector plays a very crucial and wider role in fostering financial inclusion drive in India. The Indian banking industry has come a long way and has developed through several transformations and significant milestones in history. Preliminary banking dealt mainly with basic financial trade activities. The pre-independence banking regime was dominated by Presidency Banks, which later graduated to the Imperial Bank of India and finally into the State Bank of India. The sector went through a major metamorphosis from the erstwhile private ownership, characterised by unstable work ethos to public ownership and nationalisation with greater accountability in 1969 and 1980. In recent times the sector realised the necessity of private and international players in wake of a globally interlinked and competitive scenario and has moved towards greater liberalisation.



Other fintech areas supporting financial inclusion:

Evolutionary Phase (prior to 1950)

- Enactment of the RBI Act, 1935 which gave birth to scheduled banks in India.
- A total of five banks were in existence in the 19th century.
- During the period 1901-1914, twelve more banks were established, prominent among which were the Bank of Baroda (1906), the Canara Bank (1906), the Indian Bank (1907), the Bank of India (1908) and the Central Bank of India (1911).

Foundation phase (1950-1968)

- Enactment of the Banking Companies Act, 1949.
- 14 banks were nationalised with a view to extending credit to all segments of the economy.
- Transformation of Imperial Bank of India into State Bank of India.
- During this period the number of commercial banks declined remarkably. There were 566 banks as of December, 1951; of this, number of scheduled banks was 92 and the remaining 474 were non-scheduled banks. This number went down considerably to the level of 281 at the close of the year 1968.

Expansion phase (1968-1984)

- Nationalization of 6 more commercial banks on April 15, 1980.
- This period saw the birth and growth of what is now termed as 'directed lending' by banks.
- This period also witnessed the birth of Regional Rural Banks (RRBs in 1975) and NABARD (in 1982).

Consolidation and reformatory phase (1984-2000)

- A series of policy initiatives were undertaken with the objective of consolidating the gains of branch expansion by banks.
- Serious attention was paid to improving housekeeping, customer services, credit management, staff productivity and profitability of the banks.
- Entry of private sector players in the banking system of India which included players like ICICI and HDFC.
- Technological upgradation of public sector banks.
- First (1991) and second (1998) phase of banking sector reforms introduced

Measures based on first phase of reforms (1991)

- Lowering Statutory Liquidity Ratio (SLR) and (Cash Reserve Ratio) CRR-SLR from 38.5% to 25% and CRR from 15% to 4.1%
- Introduction of prudential norms that include disclosure of income, classification of assets and provision for bad debts so as to ensure that the books of commercial banks reflect the accurate and correct picture of financial position
- Fixing of Capital Adequacy Norms (CAN) at 8%
- Deregulation of interest rates
- The new private sector banks were allowed to raise capital contribution from foreign institutional investors up to 20% and from NRIs up to 40% leading to increased competition
- Phasing out of directed credit
- The Banking Companies (Acquisition and Transfer of Undertakings) Act was amended to enable the banks to raise capital through public issues
- Setting up of local area banks (LABs) – RBI issued guidelines for setting up 7 LABs

Measures based on second phase of reforms (1998)

- Opening up of new areas of bank financing - insurance, credit cards, asset management, leasing, gold banking, investment banking etc.
- For private banks, the limit of FDI was increased from 49% to 74%
- Increase in the flow of credit to priority sector through focus on micro credit and self-help groups
- Payment and settlement system technology infrastructure was strengthened with electronic funds transfer, centralized fund management system, etc.
- For greater flexibility and better risk management new instruments were introduced - interest rate swaps, cross currency forward contracts, forward rate agreements, liquidity adjustment facility for meeting day-to-day liquidity mismatch
- Banks introduced online banking, e-banking, internet banking, telephone banking etc facilities.

Current phase (Since 2000)

- In 2003, the system of Benchmark Prime Lending Rate (BPLR) was introduced to serve as a benchmark rate for banks pricing of their loan products. RBI introduced the system of Base Rate since July, 2010 (the base rate is the minimum rate for all loans).
- In May 2005, RBI issued guidelines for merger and amalgamation of private sector banks.
- In August 2014, Pradhan Mantri Jan Dhan Yojana (PMJDY) was launched – the biggest financial inclusion initiative in the world. The scheme started with a target to provide "universal access to banking facilities" and "basic bank accounts". As on July 19, 2017, under PMJDY 29.2 crore bank accounts were opened with a total balance in accounts to the tune of Rs 64,776.62 crore.
- In May 2016, RBI allowed foreign banks to invest in local private lenders and supranational institutions like LIC up to a limit of 10%.
- Various new technologies have been introduced in the banking system like – electronic fund transfer, credit cards, debit cards, phone banking, telebanking, internet banking, mobile banking, point of sale (POS) machine, incremental growth of ATMs, electronic clearing services (ECS), etc. More recently, payment banks have been launched to further boost the conventional banking system in the country.

The current phase of banking sector is a very dynamic one. Banks are rapidly revolutionising their services by incorporating latest technologies like mobile and internet devices, thereby, making it easier for their customers to perform various banking transactions. Major banking players are incorporating technological innovations to provide greater ease of doing business with state of the art mobile and internet banking platforms. Banks are focusing on enhancing their digital infrastructure to provide distinctive services in order to attract a greater client base and outshine their competitors. Anytime, anywhere banking, using differentiated channels and technology, is likely to enable a multi-fold increase of reach within rural and remote areas. Some of the factors that have transformed the banking sector are:-

Internet banking - The younger generation has developed a liking to online or hi-tech methods of fund transfer, rather than filling up reams of paper. As a result there has been a shift from the traditional banking to internet banking in the country. India had a total of 420 million mobile internet users as on July 2017, out of which 250 million are in urban areas and 170 million in rural areas. India's internet penetration is projected to reach 59% by 2021 with a total base of 829 million users.

Mobile banking - The volume and value of transactions that are being concluded over smartphones have surged significantly over the last few years. According to RBI, number of mobile banking transactions have increased from 171.9 million in FY 2014-15 to 389.9 million in FY 2015-16. Prime reason for this change is the increase of smartphone usage in the country. The smartphone market in India is expected to grow at a CAGR of 55% during the period of FY 2015-19. As a result of this, smartphone penetration in the country is expected to be around 39% in FY 2019 from 21% in FY 2015. The total number of NEFT transactions reached 152.34 million, with total amount reaching Rs 12,694.20 billion as of June 2017.

Emergence of payment banks - In order to promote payment mechanism in the country, RBI in FY 2015 has granted payment bank licenses to 11 entities. Payment banks will support the conventional banking system in the country. Payment banks can accept deposits and can also offer current and saving account deposits. They can also issue debit cards and offer internet banking services.

Payment banks

Who can promote

- Prepaid card issuers
- Telecom companies
- NBFCs
- Business correspondents
- Supermarket chains
- Corporates
- Realty sector co-ops
- PSUs

What they can do

- Internet banking
- Sell mutual funds, insurance, pensions
- Offer bill payment services for customers
- Have ATMs and business correspondents
- Can function as a business correspondent of another bank

What they cannot do

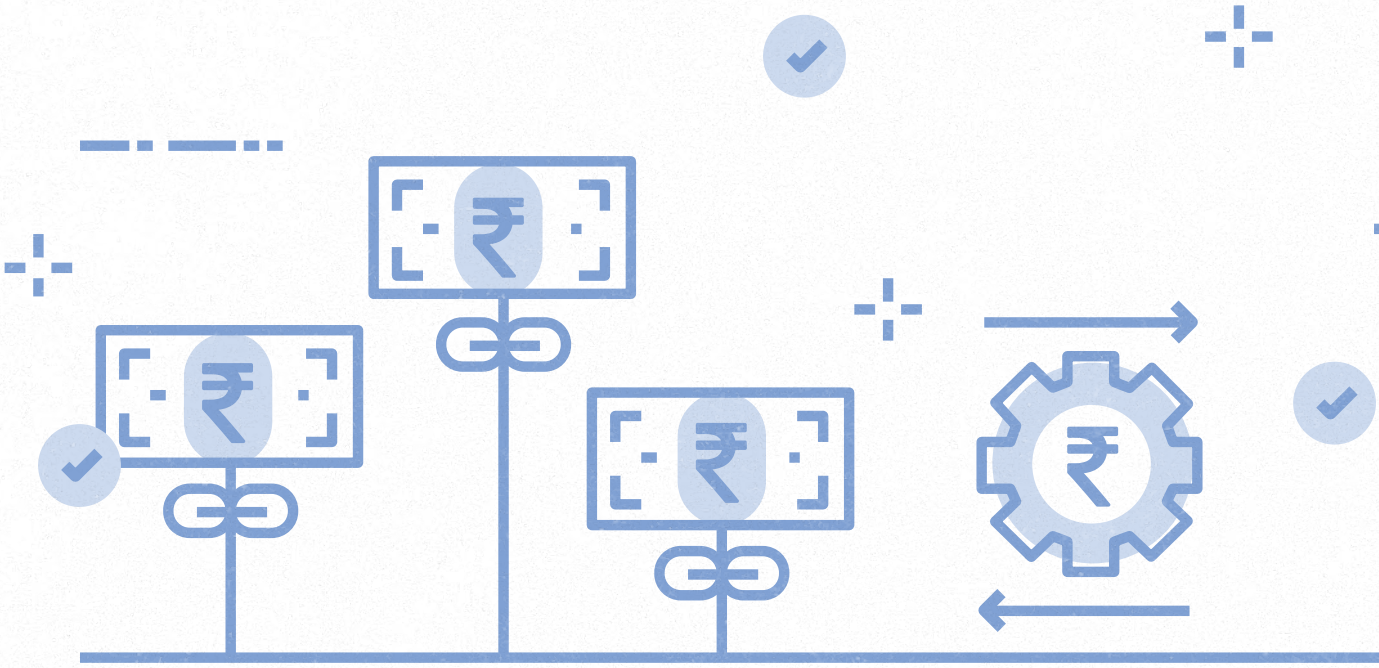
- Offer credit cards
- Extend loans
- Handle cross-border remittances
- Accept NRI deposits

Key requirements

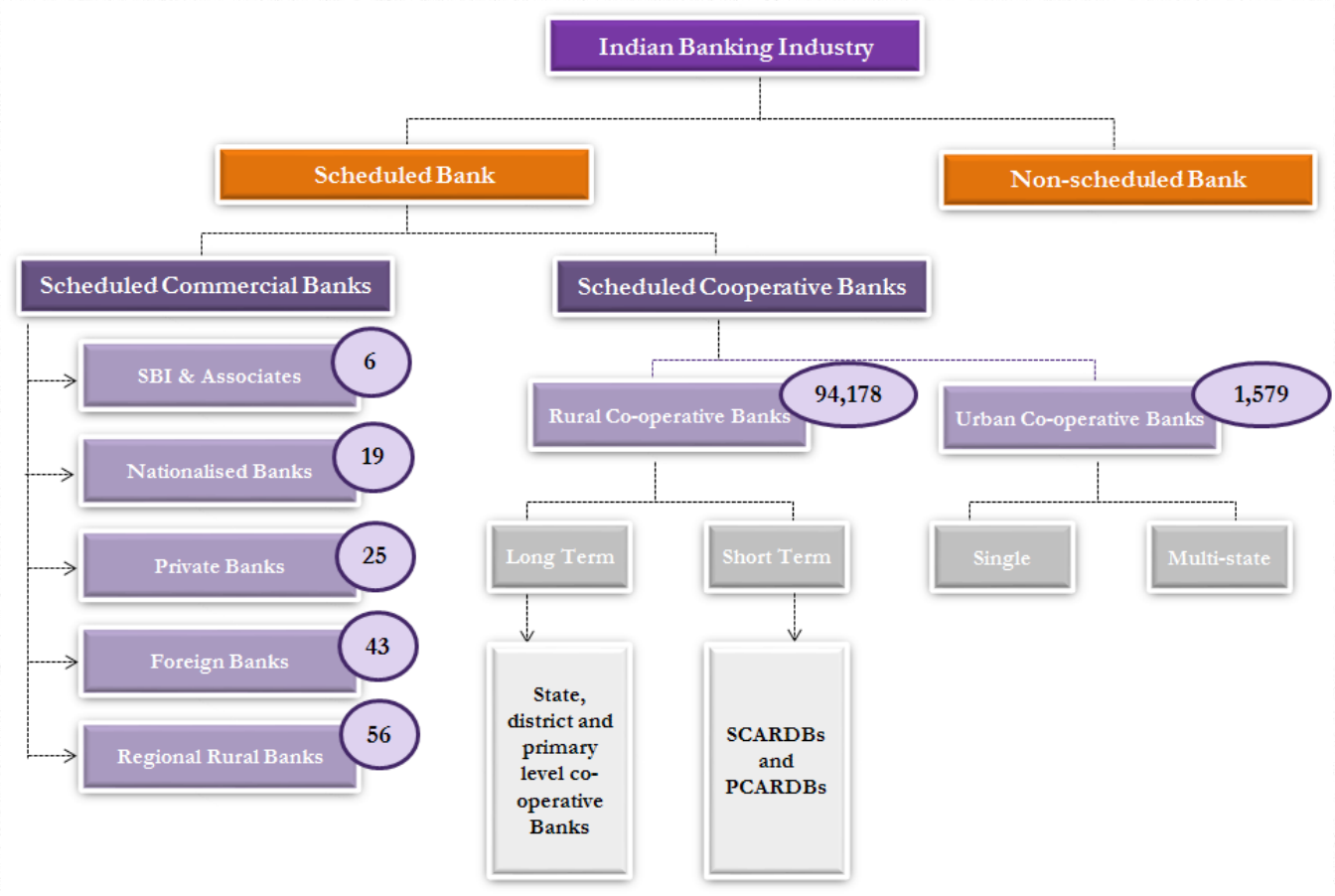
- Have a minimum capital of Rs 100 crore
- Maintain 75% deposits in government bonds
- Maintain 25% deposits in other banks
- Have at least 26% investment by Indians
- Get listed if net worth crosses Rs 500 crore
- Have 25% branches in unbanked areas
- Be fully networked and technology driven
- Have Rs 1 lakh cap for deposits in one account

11 entities given payment bank rights (as of 2015) are as below:

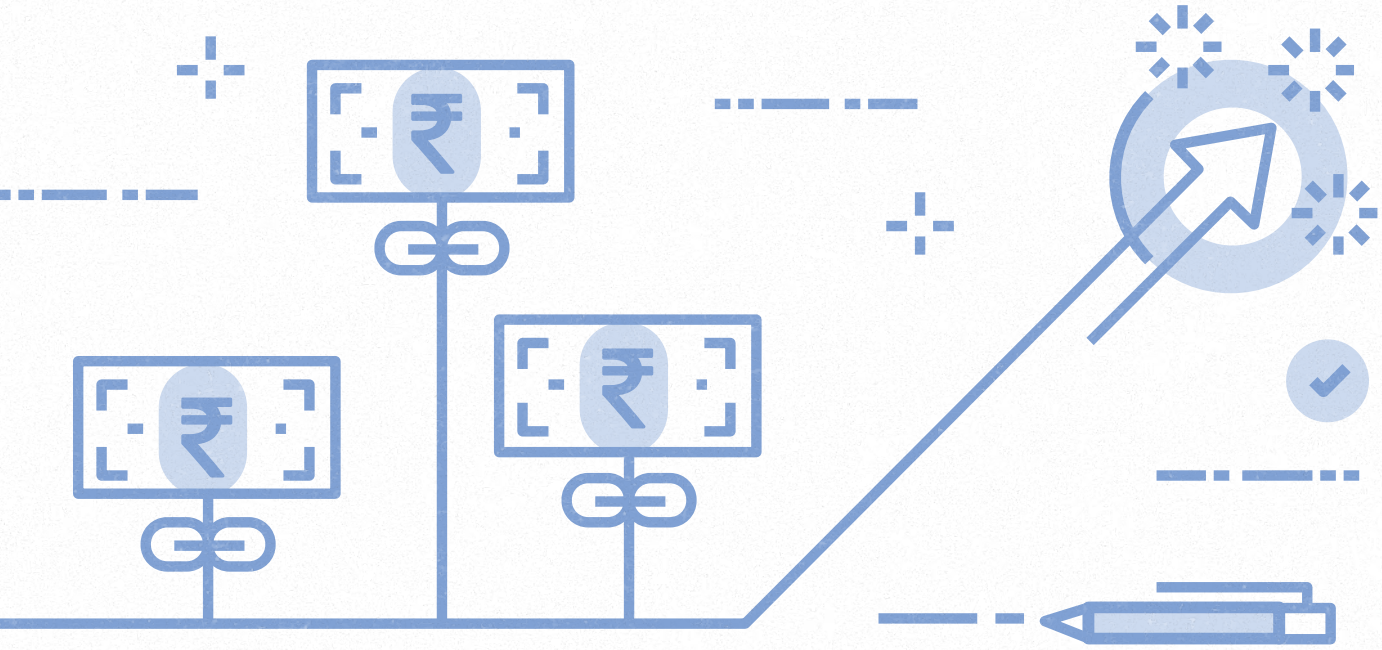
Reliance Industries	Aditya Birla Nuvo	Vodafone	Airtel
Department of Posts	Cholamandalam Distribution Services	Tech Mahindra	National Securities Depository Limited (NSDL)
FINO PayTech	Sun Pharma	Paytm	



The overall structure of banking in India as on 2016



Note: Data for regional rural banks is for 2014



Key players and growth of the sector

Since inception, number of banking companies have come up in India due to huge market potential. Along with government, private sector banks play a pivotal role in the country's economic development as well as financial inclusion drive. Due to the cut-throat competition with various players in the banking sector, the banks are compelled to come up with various new services ensuring quality and efficiency. Hence, they depend heavily on technology and service provision. With combined efforts of public and private sector banks, during the period of FY 2006-16, deposits grew at a CAGR of 11.47% and reached 1.46 trillion in FY16. Also during the same period, total money supply in the country increased at a CAGR of 11%, reaching to US$ 1.8 trillion by the end of June 2016. Highest average growth in time deposits was also witnessed during the same period at a rate of 12.41%, with the value of time deposits reaching to US$ 1.38 trillion in June 2016. It is estimated that the credit growth in India's banking sector would improve to 11-13% in FY17 from a rate of less than 10% in the FY14.

The driving factors of the above growth is largely depended on the key players in the banking sector. Major players include:

Private sector:

S. no.	Name of private bank	Market cap. (in Rs. crore as on 05/01/2017)	% share by market cap.
1	HDFC Bank	302,415.75	34%
2	ICICI Bank	149,677.72	17%
3	Kotak Mahindra	128,501.28	15%
4	Axis Bank	109,501.47	12%
5	IndusInd Bank	67,356.55	8%
6	Others	125,341.13	14%
	Total (25 in number)	**882,793.90**	**100%**

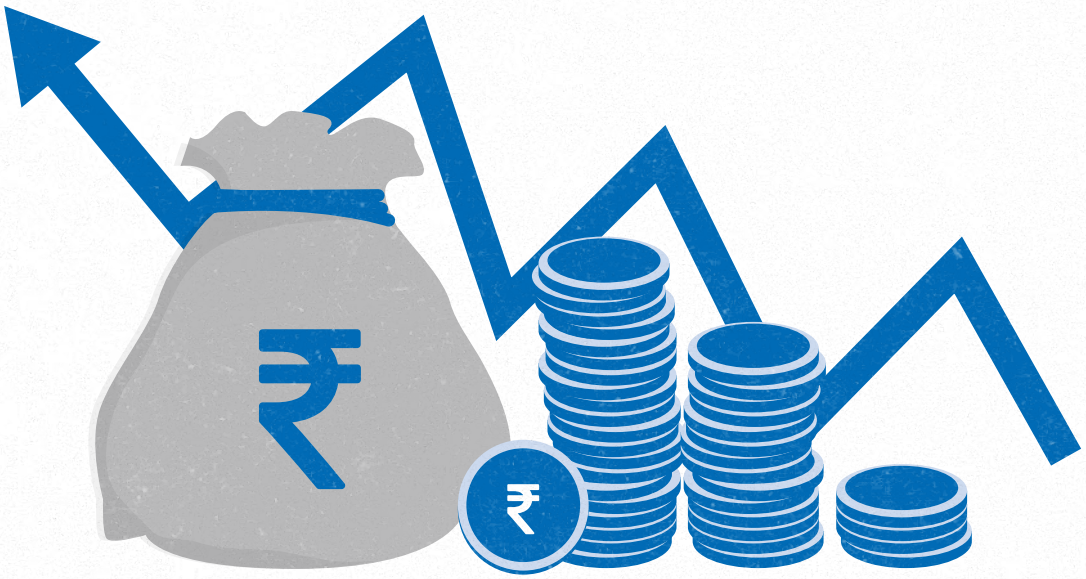
Source: Secondary sources

Public sector:

S. no.	Name of public bank	Market cap. (in Rs. crore as on 31/12/2016)	% share by market cap.
1	State Bank of India	15,856.22	16.7%
2	Canara Bank	10,776.85	11.3%
3	Indian Bank	9,485.02	10.0%
4	Union Bank of India	6,218.00	6.5%
5	Bank of India	5,629.88	5.9%
	Others	47,099.18	49.5%
	Total (26 in number)	**95,065.15**	**100.0%**

Source: Secondary sources

In FY16, the value of public sector bank assets stood at US$ 1.4 trillion. A quick look at the bank deposits and advances reveal that though nationalised banks lead the way with regards to deposits and advances, the growth rate of private sector banks is more promising.



Bank deposits and advances (amount in Rs crore)						
Bank Category	**2010-11**	**2011-12**	**2012-13**	**2013-14**	**2014-15**	**CAGR**
SBI and Associates						
Deposits	11,540,207	13,198,690	15,245,803	17,116,908	19,552,169	14.1%
Advances	8,922,606	10,465,884	12,481,120	13,905,695	14,808,717	13.5%
Nationalised banks						
Deposits	28,649,240	32,081,999	36,885,735	41,685,282	45,473,836	12.2%
Advances	21,598,026	25,151,710	28,229,887	32,075,065	34,474,392	12.4%
Private banks						
Deposits	9,721,514	10,978,490	13,134,929	14,967,939	17,573,147	16.0%
Advances	7,259,112	8,865,434	10,539,682	12,213,341	14,334,223	18.5%
Foreign banks						
Deposits	2,347,605	2,707,653	2,806,173	3,454,359	3,944,052	13.8%
Advances	1,995,536	2,385,736	2,645,858	3,037,902	3,355,086	13.9%
Regional rural banks						
Deposits	1,636,945	1,815,599	2,053,561	2,332,723	2,678,906	13.1%
Advances	981,187	1,163,903	1,358,621	1,588,818	1,812,305	16.6%
Scheduled commercial						
Deposits	53,895,513	60,782,433	70,126,203	62,820,824	89,221,112	13.4%
Advances	40,756,470	48,032,669	55,253,170	79,557,212	68,784,725	14.0%

Source: RBI, Secondary sources

Gross advances (Amount in Rs million)	2011-12	2012-13	2013-14	2014-15	2015-16	CAGR
SBI and Associates	10,470,151	14,188,827	16,087,376	17,191,685	19,071,728	16.2%
Nationalised banks	25,033,741	31,412,859	36,071,821	38,975,490	39,111,756	11.8%
Private banks	8,716,413	11,512,463	13,602,528	16,073,394	19,726,588	22.7%
Foreign banks	2,267,773	2,604,049	2,995,755	3,366,090	3,763,373	13.5%
All scheduled commercial banks	46,488,078	59,718,199	68,757,479	75,606,658	81,673,445	15.1%

Source: RBI, Secondary sources

Also, the public sector banks do play an important role in the banking system of India, however, private sector banks brought in healthy competition in aspects of product innovation, quality service and efficiency.

Private players revolutionised the banking sector while bringing in healthy competition and introduction of computerised operation, credit card business, ATM services, anywhere banking, tele-banking, internet banking, web-banking, e-banking, email/mobile messaging for transactions, BANKNET, SWIFT, etc.

All the above are facilitating and contributing towards cashless economy and financial inclusion objectives.

Upcoming players and recent reforms that shall drive the banking sector and financial inclusion

With the backdrop of growing population and ensuring that our unbanked population gains access and reliance to formal sources of finance, the Reserve Bank of India has taken various steps that include allowing new players in the banking sector etc. The main thrust of reforms in the financial sector was on the creation of efficient and stable financial institutions and markets. In April 2014, the RBI granted banking licences to 23 new players. Two were given universal banking licences (April 2, 2014), 11 were issued payments banks licences (August 19, 2015) and 10 were given licences for small finance banks (September 16, 2015). The niche banks (small finance and payment banks) have been set up from the objective of further deepening the efforts of financial inclusion in the country.

Universal banks	Small finance banks		
• IDFC • Bandhan	• Au Financiers • Suryoday Micro Finance • Capital Local Area Bank • Disha Microfin	• Equitas Holdings • ESAF Microfinance and Investments • Ujjivan Financial Services	• Janalakshmi Financial Services • Utkarsh Micro Finance • RGVN (North East) Microfinance

As of March 2017, eight entities had commenced operations as small finance banks. Furthermore, as of May 2017, three payment banks - Airtel, Paytm and India Post had launched their operations.

The RBI is also considering options of new categories of differentiated banks. This could include banks such as custodian and wholesale financing banks (information as on December 29, 2016 - Reserve Bank of India's latest Report on Trend and Progress of Banking in India). With the backdrop of 'Payment and Settlement Systems in India – Vision 2018', RBI aims to address the five C's to ensure financial inclusion and banking sector reforms that include coverage, convenience, confidence, convergence and cost.

Along with the above initiatives, RBI has also set up various committees with the objective to further strengthen the sector through reforms. The recent committees and their suggestions have been listed below:

Urjit Patel Committee

- The committee was set up by the RBI in September 2013, with an objective to revise and strengthen the Monetary Policy Framework.
- The main recommendation of the committee was that RBI shall target inflation only, rather than concentrating on so many other factors as well like increasing employment, increasing growth, stabilising the exchange rate etc. If inflation is controlled then other indicators of the economy would automatically be corrected, like growth, employment, etc.
- The report recommended that RBI achieves the target of 4% inflation with +/- 2% band by January 2016. To elaborate, RBI should reduce CPI to 8% within 1 year, i.e. January 2015. RBI should reduce CPI to 6% within 2 years, i.e. January 2016. Thereafter, RBI should try to maintain inflation within the 2-6% range. (i.e. 4% with +/-2% band). Thus, minimum inflation should be 2% and maximum 6%.

P.J. Nayak Committee

- The committee was set up by the RBI under the chairmanship of P. J. Nayak with an objective to review the working of banks, especially the public sector banks.
- The committee recommended reduction of the government's shareholding in public sector banks (PSBs).
- Furthermore, the committee recommended that the government repeal some of the following laws, like Bank Nationalization Act (1970, 1980), SBI Act, SBI Subsidiaries Act etc.
- The committee also recommended that, once those acts are repealed, the government should setup a Bank Investment Company (BIC) under Companies Act, 2013, as a "Core investment company".
- These recommendations are expected to increase competitiveness of the PSBs, thereby improving the efficiency and the quality of services provided by the PSBs.

Nachiket Mor Committee

- The committee was set up by the RBI in September 2013, with an objective to propose measures for achieving financial inclusion and increase access to financial services.
- The committee recommended to have a universal bank account number.
- The committee also proposed setting up of Payments Banks whose primary purpose will be to provide payments services and deposit products to small businesses and low income households.
- Another recommendation proposed was to set up a State Finance Regulatory Commission into which all state level financial regulators shall be merged.
- It recommended the removal of the cap on interest rate on loans at the base rate plus 8% per annum. It also recommended that the PSL target be revised from 40% to 50% of credit provided.
- The committee also recommended gradual removal of Statutory Liquidity Ratio (SLR) requirement.

Some of the recommendations of the above committees have already been taken up, for example setting up of payments banks while the others are under consideration. The Government of India and the RBI are focused towards ensuring that the banking system of India is strong enough to support and become the backbone of the financial inclusion drive and initiatives in the country.

Parameters defining financial inclusion in India

With the strong backbone provided by the banking sector, India is fast moving towards more inclusive growth and it is quite visible in the parameters of financial inclusion for the country which can broadly be divided into three categories.

- Penetration of banking system: Bank account penetration in India increased from 35% in FY 2011 to 53% in FY 2015. With initiatives like Jan Dhan Yojana the number of unbanked population in India has come down to around 233 million by the end of FY 2015. By July 19, 2017, the total bank accounts opened through PMJDY reached 291.8 million. There has been a drop of 58% in the unbanked population over the last four years. India has a total of 1,440 million deposit bank accounts and 1,170 million saving bank accounts in FY 2015. The country also has around 144 million of borrower accounts. The number of ATMs in the country has increased drastically in the last few years. The country had 161,750 ATMs in FY 2013-14, which increased to 189,279 in FY 2014-15, which further grew to a level of 199,099 in FY 2015-16, and as at August 2016, the number stood at 202,801.
- Credit penetration: Inclusix , the index that measure the progress of financial inclusion in the country across all districts stood at 50.1 score at the end of fiscal year 2013. There has been a marked improvement from the year 2009, when the score stood at 35.4.

  The index uses parameters that focus on the 'number of people' whose lives have been touched by various financial services.

  Access to financial services also implies that not only the bank account but also affordable credit facilities are available for the citizens of the country to conduct business as well as secure their families. This is also reflected in the credit and debit card usage. Changes have been seen in the credit cards segment where the reach has increased from 19 million in FY 2013-14 to 25 million in FY 2015-16. Similarly, the number of debit cards has increased from 394 million in FY 2013-14 to 662 million in FY 2015-16. Credit card penetration has increased at a CAGR of 14% and debit card penetration has increased at a CAGR of 30% over the last three years (2013-16).

	August 2015	August 2016	August 2017
Credit cards (million)	22.25	26.4	32.64
Debit cards (million)	598.51	712.5	810.87

Source: RBI

Deposit penetration: There has been a significant increase in the number of banking outlets in rural areas in the last 5 years. The progress can be seen with the figures mentioned in the table below:

Particulars	Year ended March 2010	Year ended March 2017
Banking outlets in villages - total	67,694	598,093
Banking outlets in villages - branches	33,378	50,860
Banking outlets in villages - business correspondents	34,174	543,472
Basic savings bank deposit accounts total (number in million)	73	533
Basic savings bank deposit accounts total (amount in Rs billion)	55	977

Source: Reserve Bank of India

The importance and progress of financial inclusion in India can be examined by the current situation of the banking system in India. The country has a total of 26 public sector banks, 25 private sector banks, 43 foreign banks, 56 regional rural banks, 1,579 urban co-operative banks and 94,178 rural co-operative banks (in FY 2015-16).

For the past four years, India has recorded an average growth rate of 8% per annum. Even when markets all over the world crashed, in 2009 the Indian economy posted a stable growth rate of 6.7%. The rising population and per capita index gives the BFSI sector a chance to bolster itself by providing new products, developing and implementing innovative strategies and leveraging technology to maximise its outreach. This in turn helps achieve financial inclusion in the country.

Changes that accelerated the growth of financial inclusion in India

To give a boost to financial inclusion levels in the country, Government of India, Reserve Bank of India and National Bank for Agriculture and Rural Development (NABARD) have taken various initiatives which include the following:

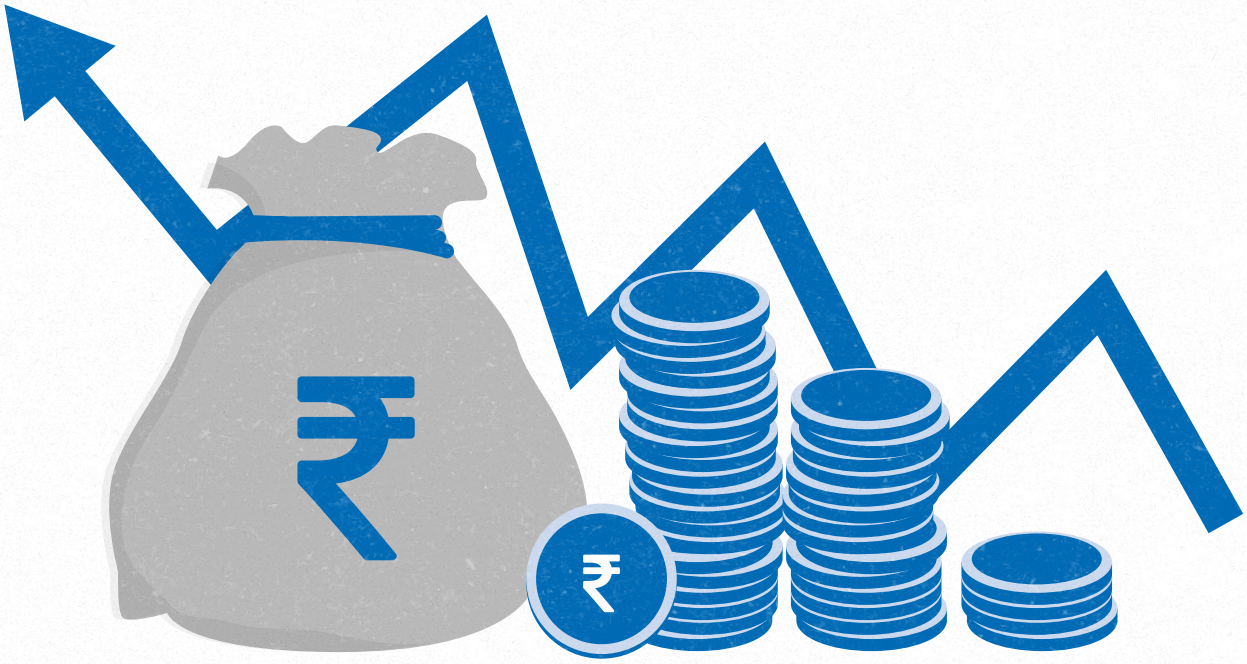
- **Pradhan Mantri Jan Dhan Yojana -** Pradhan Mantri Jan Dhan Yojana (PMJDY) which is the world's biggest financial inclusion drive has ensured access to financial services to a large mass of India's rural population.
  - On the day of inauguration, a total of 150 million bank accounts were opened across the country. The Guinness World Records recognises the achievement made under this scheme.
  - As a result of this, rural and semi-urban centres registered higher growth in deposits in FY 2015 at 16.3% and 15.4%, respectively compared with urban and metropolitan centres at 14.6% and 9.5%, respectively.
  - Under this scheme, 288.1 million accounts have been opened by end of June 2017 with a total balance of Rs 700.7 billion (during the same period), providing access to banking services to more than 15% of the unbanked population.

To encourage the rural people to open accounts under this scheme, the government has provided additional incentives such as:-

  - One of the key benefits under this scheme is that the account holders will be provided a zero balance bank account with RuPay debit card. As of December 2016, 24.6% of the total accounts opened under the scheme were zero balance accounts and 209.3 million RuPay cards were issued to the account holders (December 2016).
  - This scheme also covers accidental insurance of Rs 1 lakh
  - Another notable highlight of these accounts is that after keeping the account operative for over six months, the account holder will be allowed an overdraft of Rs 5,000. As of October 2016, 23.76 lakh account holders had availed this facility amounting to Rs 315.8 crore.

- **Establishment of regional rural banks (RRBs) –** In 1975, regional rural banks were established with a focus to develop rural economy and to create supplementary channels to build a cooperative credit structure in the country, thereby increasing the scope of institutional credit for rural and agriculture sector. The loans and advances of RRBs recorded a growth of 11.7% during FY 2014-15 as against 15.2% in the previous year. As on March 31, 2017, there were around 56 RRBs functioning in the country.
- **Relaxing and simplifying KYC norms –** In July 2015, the RBI relaxed norms for considering Aadhaar as a proof of identity and address to facilitate opening of bank accounts (primarily for small accounts with balance not exceeding Rs 50,000 and aggregate credits not exceeding Rs 100,000 a year).
- **Compulsory requirement of opening branches in unbanked villages –** As per the directives issued by the Government of India, 25% of the total number of branches to be opened by a bank in a year will be in unbanked rural areas.
- **Kisan credit cards (KCCs) –** This scheme was introduced in 1998 as an innovative credit delivery mechanism to meet the credit requirements of farmers. The number of KCCs has increased from 33.8 million in FY13 to 43.2 in FY16.
- **Increase in agriculture advances –** Deployment of gross bank credit to agricultural and allied activities has increased at a yoy growth rate of 13%. The cumulative advance till October 2015 was Rs 8,232 billion which increased to Rs 9,302 billion in October 2016.
- **Other supports -** Credit counselling centres, E-grama project, SHG-Post office linkage, support to cooperative banks and RRBs for setting up of financial literacy centres, electronic benefit transfer, micro pension model, bank credits to MSMEs, insurance penetration, among others. Budget FY 2016 announced setting up of Public Debt Management Agency (PDMA) which would bring both India's external borrowing and domestic debt under one roof. The agency is expected to be operational by the end of 2018.

- **Increase in the number of banking outlets in rural India-** There has been a strong focus from the Government of India to make banking more accessible in rural India. As a result of this, constant efforts have been made to open more banking outlets in the villages. There were around 383,304 banking outlets for 650,244 villages in FY13-14. However, with constant efforts to reach the rural segment, this number has increased to 589,849 in September 2016.
- **Strengthening of banks-** The Department of Industrial Policy and Promotion (DIPP) has allowed 100% foreign direct investment (FDI) in asset reconstruction companies (ARC) under automatic route, which will help to tackle the issue of declining asset quality of banks.
- In order to boost the credit growth in the country, the Government of India in its Union Budget of FY 2016-17 budgeted to infuse Rs 70,000 crore in public sector banks over a period of four years. As per the budget Rs 25,000 crore each was planned for infusion in FY16 and FY17 each and Rs 10,000 crore each in FY18 and FY19.
- **Relaxation of branch licensing policy-** The Reserve Bank of India (RBI) has relaxed its branch licensing policy, thereby allowing banks (which meet certain financial parameters) to set-up new branches in tier-2 to tier-6 centres, without prior approval from the RBI. It has emphasised the need to focus on spreading the reach of banking services to the unbanked population of India.
- **Direct benefit transfer-** Direct transfers to bank accounts coupled with the range of services, envisioned in the government's Digital India programme, will drive customer adoption and promote a savings culture. Given instances of fake claims in pension, gas subsidy, scholarship and other such schemes, by linking it to Jan Dhan Yojana and Aadhaar, it will weed out ghost beneficiaries and is expected to save the exchequer Rs 1 lakh crore annually.
- **FDI-** The Government of India has relaxed FDI policy in 15 sectors which includes raising the foreign investment limit for some sectors, easing the conditions for others and putting many on the automatic route for approval. Banking is one of the sectors which is expected to be benefitted from this relaxation.
- To strengthen the banking system, FDI in private banking has been raised from 49% to 74%. However the FDI limit in public sector banks is still capped at 20%.
- The government has allowed FDI for non-banking financial companies (NBFCs) via automatic route in "other financial services", regulated by any of the financial sector regulators such as RBI, SEBI.
- Also in insurance, FDI limit has been increased from 26% to 49% that has led to a flow of Rs 16,000 crores to Rs 17,000 crores (during the period FY15-16).



Conclusion

With the execution of various policy initiatives, the Indian economy is expected to undergo a structural transformation in the coming years. Public spending on infrastructure and timely completion of the schemes coupled with policy reforms would prove to have a multiplier effect on economic growth. The market is expected to respond with greater faith from business players as well as consumers. The country's banking sector would in turn experience vigorous growth as the businesses would require monetary stimulus to sustain their augmented capacities.

As a result of all the above factors, the Indian banking industry has the potential to become the 5th largest globally by the end of FY 2020 and 3rd largest by the end of FY 2025. The expansion of financial services to all segments of the society in order to achieve financial inclusion will provide a huge stimulus to the Indian economy in the coming years. Financial inclusion has various benefits which include:

- Faster growth in economy
- Expected and likely increase in income
- Reduction in income inequalities
- Higher productivity
- Increased employment opportunities
- Direct benefit transfer for beneficiaries
- Rationalisation of savings
- Reduction in cash economy

Financial inclusion is a necessary building block for sustainable growth in India ensuring access and equity. Easy payments and cash out are likely to make formal savings more attractive and strengthen the network of banking especially through the Aadhaar enabled payment system which is likely to go a long way in taking financial services to the last mile. This will be supported by the cash-in and cash-out points through the upcoming postal payment bank and telecom affiliated payment banks making transfers from bank account to bank account easier via mobile through Unified Payment Interface. Considering the estimated number of 1,034.25 million telephone (wireless) subscribers in India with around 444.84 million from rural areas, the penetration of mobile and internet would ease the operations in banking systems as well as money transfer systems. With an expected increase in rural internet users to around 50% of the total internet users in India by 2020, the cause of financial inclusion will certainly get a major shot in the arm.

India is focusing on three broad elements of financial inclusion to make it a success -

1. Broadening of financial services to those who do not have access to financial services which can be visualised with schemes like PMJDY (288.1 million bank accounts opened by mid-June, 2017)
2. Deepening of financial services
3. Greater financial literacy and consumer protection.

This is supported by the private sector bringing in efficiency and quality of services along with technological advancement.

Expert perspective

Mr. Amitabh Kant,
CEO, Niti Aayog

"The infrastructure sector is the backbone of the Indian economy. Maintaining world-class roads, railways, ports, power, housing, etc. is an imperative for us if we want to leapfrog into double-digit growth agenda.

The government has focused on infrastructure growth as a key priority. Public investment in infrastructure has grown at 20% in the last two years. Roads, railways and power saw 40% rise in the public investment complemented by reforms to expedite stalled projects and remove inefficiencies. Focus shifted to de-bottlenecking key projects. In this regard, outcome-based reviews of major projects are conducted by NITI on a regular basis and presented to the PM and key officials. All of this has also resulted in key reforms: UDAY scheme for financial reforms for state discoms in power, hybrid annuity model to fast-track road projects and increase private investments, massive increase in rail capex, Sagarmala project for port-led development, etc.

I am highly optimistic about the prospects of infrastructure in India. With thrust from the government in award and monitoring of projects and greater private sector participation in the sector, India can reach global benchmarks for infrastructure on all key parameters."

Next big leap for transport infrastructure

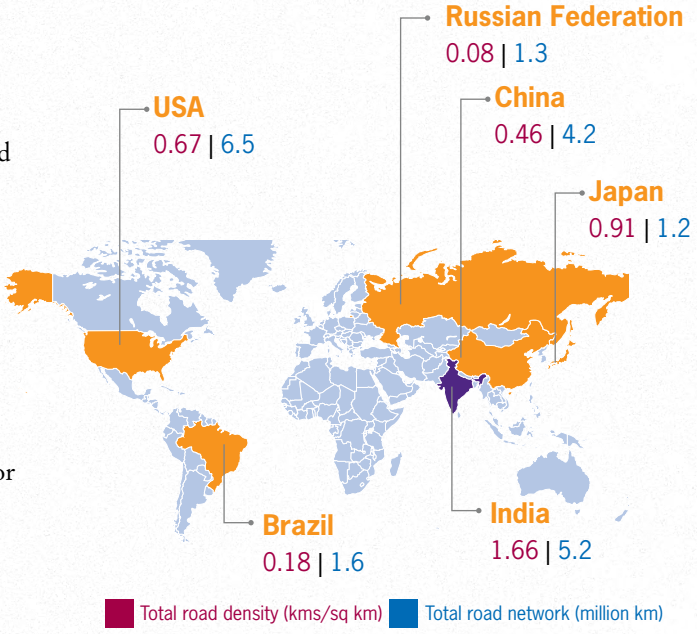
India is one of the fastest emerging nations in the world. Understandably so, the country's transport infrastructure sector (including roads, railways, ports and airports etc.) is one of the most important drivers contributing to its economic growth. This sector acts as a critical backbone for the growth of other sectors by offering a transit platform for goods and services. With the growing economy, the country's demand for transport infrastructure is increasing. Thereby, the government as well as the private sector are working towards providing quantity and quality infrastructure. As India is moving up the ladder in terms of competitiveness and witnessing greater economic prosperity, the role of transport infrastructure sector is getting increasingly important and becoming a game changer in boosting the country's overall growth and development.

Overall

- Transport infrastructure is one of the key sectors that is getting a lot of focus from the Indian government. The growth of other sectors is dependent on the development of the transport infrastructure sector primarily roads, railways, ports and airports as they provide a transit platform for goods and services.
- The Government of India is focusing on creating an investment friendly environment by taking numerous measures including opening up of various sectors by allowing upto 100% FDI, offering various tax incentives, providing easy entry and exit options. The government has set an infrastructure investment target of close to 10.7% of GDP in 2017 from 8.4% of GDP in 2012, with a total planned investment of Rs 41 trillion during 2012-17.

Roads

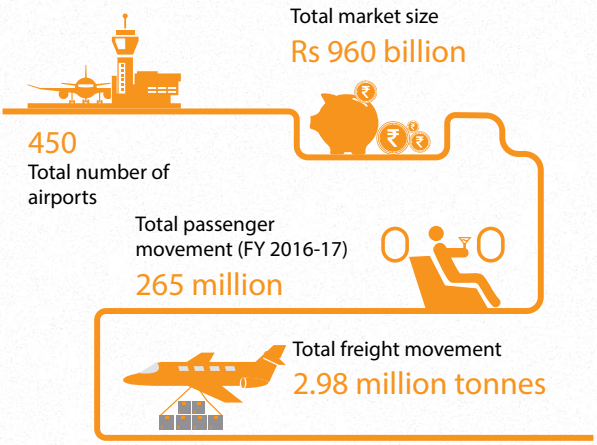
- The total road length has increased at a compound annual growth rate (CAGR) of 4.2% (upto 2015 from 1951).
- As on March 31, 2015, India's road density was at 1.66 km/sq km of area which was higher than that of Japan (0.91 km/ sq km), USA (0.67 km/ sq km), China (0.46 km/ sq. km), Brazil (0.18 km/sq km) and Russian Federation (0.08 km/ sq km).
- The Ministry of Road Transport and Highway (MoRTH) has a target to achieve highway construction of 41 km per day in 2017-18. Along with this, during the period of FY 15 to FY 19, investments in the road sector through PPP route are expected to be around US$ 31 billion for national highways and approximately US$ 10 billion for state highways.
- NHAI plans to add close to 50,000 km of road network by the end of the year 2022.
- The Indian government has launched an online platform for procurement and tendering to improve transparency and accountability for all types of projects.
- To achieve functional efficiency, India is moving towards an electronic toll collection system i.e. FASTag (a device that employs Radio Frequency Identification (RFID) technology for making toll payments directly from the prepaid account linked to it). As of May 2017, FASTag was operational in 346 toll plazas (out of 394) across national highways in the country.
- In order to develop 35,000 km of roads across the country, the Government of India plans to invest Rs. 3 trillion (US$ 44.75 billion). Out of this 21,000 km will be economic corridors and 14,000 km shall be feeder routes. This development is expected to improve movement of freight, inter-city connectivity and ease out traffic bottlenecks. Under the Bharatmala project, MoRTH and NHAI plans to take up 82 highway development projects. This is expected to improve connectivity to major and minor ports of the country.



Increased infrastructure development will have a positive impact on corporate profitability. According to the World Bank, 20% to 30% decline in the transportation costs could boost profit in key manufacturing sectors by 2% to 3%.

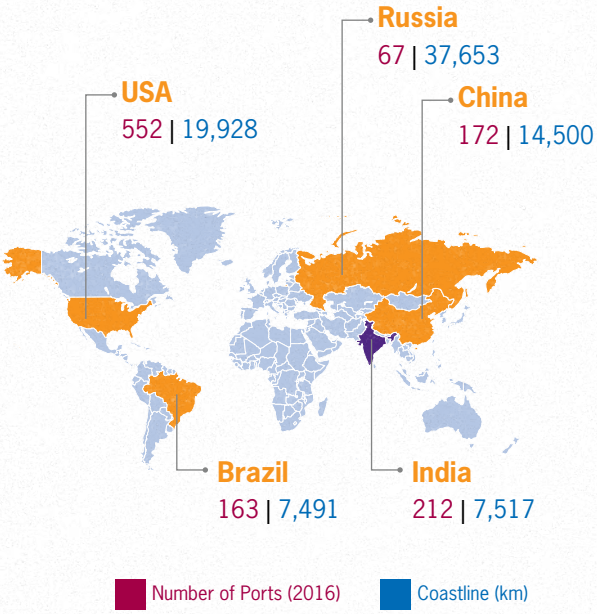
Airports

- The government plans to upgrade and develop India's airports infrastructure both in metro and non-metro cities to cater to the growing passenger and freight traffic volume. To achieve its broader target, it is planning to invest close to Rs 7.2 trillion (US$ 120 billion) for the development & maintenance of airport infrastructure and services over the next decade (FY 2016-2026).
- India has invested Rs 400 billion in building green-field airports in Bengaluru and Hyderabad and has undertaken various projects to build and strengthen airport infrastructure capacity.
- The Government of India plans to invest Rs 80 billion during 2013-17 for up-gradation and modernisation of non-metro airports and also aims to construct 60 no-frills airports to have better connectivity in the unserved areas. Airports Authority of India (AAI) has already taken up work for upgradation of 35 non-metro airports. This shall facilitate the handling of increased air traffic at these airports.
- AAI plans to have 250 operational metro airports across the country by 2020. For this AAI has already developed and upgraded 23 metro airports during FY 2010-15.



Ports

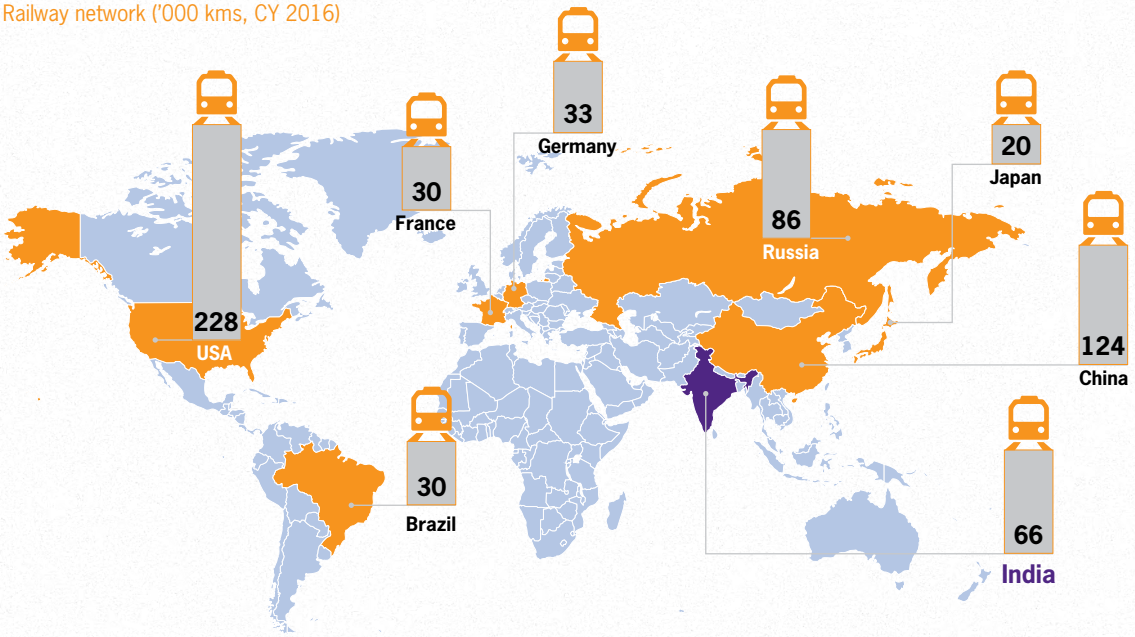
- The government plans to increase the country's port transportation share in the overall GDP and the vision is to increase port capacity (per annum) from 1,400 million tonnes in 2016 to 3,000 million tonnes by 2025.
- Sagarmala project was announced in April 2016 with a total outlay of Rs 4.5 billion. It is a port-led development programme of the Ministry of Shipping. The project focuses on port modernisation and setting up of new ports, efficient evacuation to and from the hinterland and setting up of logistics hubs to increase the ports utilisation through the use of world class technology and infrastructure.
- As per a study conducted under the Sagarmala programme, the project could lead to an annual saving of Rs 40,000 crore by optimising logistics and bring down India's logistics cost from 18% to 10%.
- A total of 173 projects have been identified under four broad heads of Sagarmala – Port modernisation – 53, Port connectivity – 83, Port-led industrialisation – 29, Coastal community development – 8.
- In Union Budget 2016, the Government of India also announced setting up of new greenfield ports and inland waterways. The planned outlay for these is Rs 31.84 billion under the Ministry of Shipping (MoS), which includes Gross Budgetary Support (GBS) of Rs. 1,000 crore for development of Indian shipping, ports, inland waterways and ship building sector.



Railways

- The Indian Railways has a target to increase the per day construction of railways lines to 9.5 km for FY 2017-18 and 15 km by FY 2019 from the 2016-17 target of 7-8 km per day. It also has a target to increase the average speed of trains (i.e. freight and passenger trains) by 5 km per hour every year for the next five years, starting from 2016.
- The Indian Railways has entered into a new age of transformation by venturing into high-speed trains that can run at upto 500 km per hour speed to improve its travel efficiency by reducing travel time.
  - By 2023, the first bullet train is expected to cover 508 km between Mumbai and Ahmedabad in about two hours, running at a maximum speed of 350 kmph and operating speed of 320 kmph.
  - Gatimaan Express, India's first high speed train, runs between Delhi and Agra at a speed of 160 km/hr, reducing the travel time to 105 minutes.
  - Talgo train trial runs between Delhi-Mumbai have been completed on September 11, 2016, reducing the travel time from 16 hrs to 12 hrs and running at a maximum speed of 150 km/hr. Talgo trains are expected to commence operations by mid-2018.
- In August 2016, nine projects were approved by the Cabinet Committee on Economic Affairs to expand Indian Railways network by 1,937.38 km with a total estimated cost of Rs. 240 billion:
  - Construction of second railway line of 176 km length between New Bongaigaon and Kamakhya
  - 132 km long third line between Kharagpur (West Bengal) and Adityapur (Jharkhand)
  - 228.3 km long third line between Rajnandgaon and Nagpur in Chhattisgarh and Maharashtra.
- The overall vision of the Indian Railways is to create a total capacity to handle 1.5 billion tonne of goods by 2020 from around 1.1 billion tonnes in 2016.

Railway network ('000 kms, CY 2016)



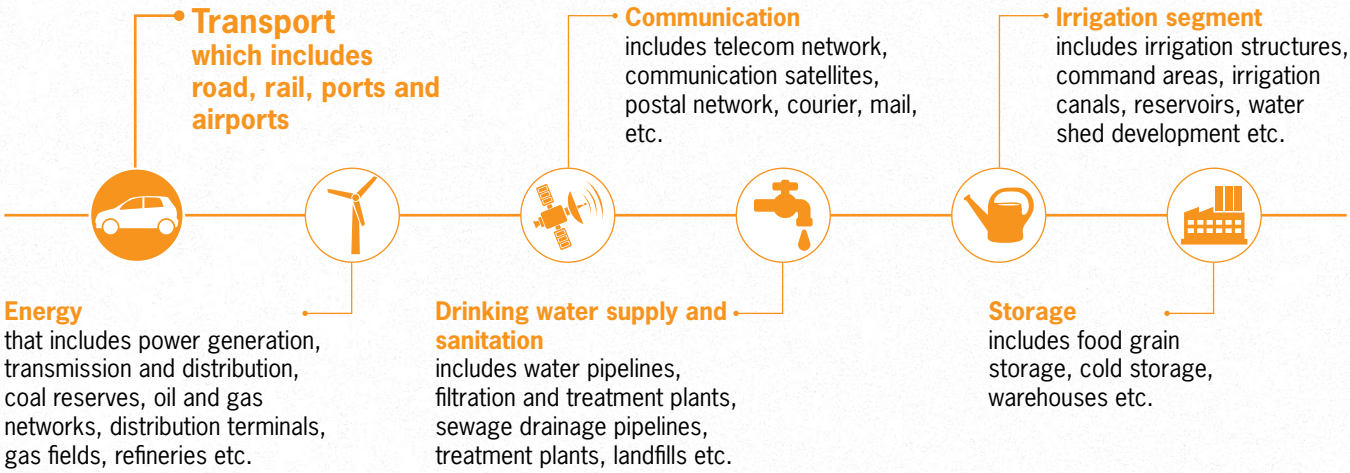
Source: Euromonitor. Ministry of Railways, Morgan Stanley Research

Note: China and India represents 2016 data and the remaining for 2014

The story of transport infrastructure in India

Composition of Infrastructure

The infrastructure sector constitutes six broad sub-sectors:



Transport infrastructure forms the key component of the overall infrastructure sector. For the purpose of this study, transport infrastructure has been detailed in the following sections.

India's transport infrastructure includes close to 5 million km of road network, 66,000 km of rail network, more than 200 ports and more than 450 airports. The overall transport sector contributes close to 6.7% in the country's GDP, out of which road transport contributes the highest share, followed by the railways.

GDP contribution - Transportation	2008-09 (%)	2009-10 (%)	2010-11 (%)	2011-12 (%)	2012-13 (%)	2013-14 (%)
Railways	1.0%	1.0%	1.0%	1.0%	0.9%	1.2%
Road transport	4.7%	4.7%	4.6%	4.8%	4.9%	4.7%
Water transport	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
Air transport	0.2%	0.2%	0.3%	0.3%	0.3%	0.2%
Others	0.4%	0.4%	0.4%	0.4%	0.4%	0.3%
Overall transport share in GDP	**6.6%**	**6.6%**	**6.5%**	**6.6%**	**6.7%**	**6.6%**

Source: Research paper on Indian Railways, Ministry of Railways, Secondary sources

Ministry of Road Transport and Highways is responsible for roads and highways development, Ministry of Railways is responsible for railways infrastructure, Ministry of Shipping takes care of the shipping and port sector in the country and Ministry of Civil Aviation is responsible for the aviation sector.

Key stakeholders and their responsibilities

Both the central and the state governments are responsible for the development and maintenance of infrastructure. From the standpoint of the central authority, India has different Ministries for each of the infrastructure sub-sectors which are responsible for formulation and administration of policies, regulations and laws relating to sub-sectors. For example, Ministry of Road Transport and Highways is responsible for roads and highways development, Ministry of Railways is responsible for the railways infrastructure, Ministry of Shipping takes care of the shipping and port sector in the country and Ministry of Civil Aviation is responsible for the aviation sector. Similar to this, there are state development and transport authorities that design and implement state specific rules and regulations pertaining to specific sub sectors. In addition, there are various autonomous bodies that work under the specific sub-sector Ministry and are responsible for developing, upgrading, maintaining and managing infrastructure in the country.

India is working towards building world class infrastructure to achieve its target of becoming one of the developed nations. As mentioned above, central and state governments are primarily responsible for the development and maintenance of the infrastructure, the private sector is generally involved in the design, construction and operation phase. The government invites private players to participate in the development through PPP route, where both the government and private sector come together for the building of infrastructure. The government leverages private sector finances to meet infrastructure needs in an efficient way.

Funding and implementation of projects

Infrastructure projects require huge amount of investments and could be government funded, donor funded or come under various forms of PPP such as Concession, DBFOT (Design – Build – Finance – Operate- Transfer), BOT (Build-Operate-Transfer), joint ventures etc. The government has been the major source of infrastructure investment until now. During 2007-12, (the Eleventh Five Year Plan), the government had invested double the amount of investment made during 2002-07 (the tenth five year plan). During the Eleventh Five Year Plan, the government spent Rs 20.5 trillion compared to Rs 9.2 trillion during the tenth five year plan. Roads, railways, ports and airports witnessed the highest growth of investment between the two five year plans. Refer to the below mentioned table for the same.

Actual investment (Rs crore)	Tenth Five Year Plan (A)	Eleventh Five Year Plan (B)	% Growth (B/A)
Roads & bridges	127,107	278,658	119.2%
Railways (incl. Mass Rapid Transit System)	102,091	200,802	96.7%
Ports (incl. inland waterways)	22,997	40,647	76.7%
Airports	6,893	36,138	424.3%
Other sub-sectors	660,138	1,497,959	126.9%
Total	**9,19,226**	**2,054,204**	**123.47%**

Source: NITI Aayog

During 2012-17 (the 12th Five-Year Plan), the government had a target to invest close to 10% of GDP with a total planned investment of Rs 41 trillion compared to Rs 20.5 trillion in the Eleventh Five-Year Plan. For 2017-18, the Government of India has targeted investment of Rs 3.96 trillion for creating and upgrading infrastructure. In the below mentioned table, we can see that the government has doubled the target infrastructure investment:

Government projection (Twelfth Five Year Plan)	FY12	FY13	FY14	FY15	FY16	FY17	Total (FY12-17)
Infrastructure investment (as % of GDP)	8.4%	9.0%	9.5%	9.9%	10.3%	10.7%	9.9%
Infrastructure investment (Rs trillion at constant prices)	5.3	6.2	7.1	8.1	9.2	10.4	41.0
Y-o-Y growth (Infrastructure investment)	-	17.2%	15.1%	13.6%	13.2%	18.9%	-

Source: Mid-Term Appraisal Eleventh Five Year Plan, Planning Commission

With the above investments, the focus on transport infrastructure from the government is evident. In addition, the overall private sector participation in the infrastructure sector has been growing from the last ten years. During 2004-05, the private sector share in the gross fixed capital investment in the infrastructure sector stood at 13.2% and it grew to 22.8% in the year 2011-12. The government has a target to further increase the current contribution of the private players in the development and maintenance of this crucial sector. India requires an estimated investment of around US$ 1.5 trillion in the infrastructure sector in the next 10 years (as of 2016).

The total value of infrastructure projects awarded in FY'16 has increased by 28.3% on y-o-y basis to Rs 3.5 trillion, which is the highest in the past five years. In order to further understand the role being played by the infrastructure's sub-sectors and their evolution in India, we look at the standalone sub-sectors such as roads, railways, ports and airports.

Roads

India is ranked as the second largest nation in terms of its total road network which is around 5.2 million km (including running projects) after the United States with a total of over 6.5 million km, followed by China at 4.2 million km. In terms of the density of highway network, India's has 0.66 km of highways per square kilometre of land, which is almost equal to that of the United States with 0.65 km but higher than Brazil and China at 0.20 km and 0.16 km respectively. The Indian roads and highway sector is regulated and administered by the Ministry of Road Transport & Highways at the central level and there are other state and local level authorities for the development and maintenance of the roads and highways sector in the country:

Roads Sector	Authority responsible
National Highways	Ministry of Road Transport & Highways (Central Level)
State Highways	State governments (state's public works department)
Major and other district roads	Local governments, panchayats and municipalities
Rural roads	Local governments, panchayats and municipalities

Total road network has been growing at a CAGR of over 3.5%, 4.5% and more than 5.5% in the last ten, seven and five years respectively (2006-2016).

India's road network is categorised into the primary system which include national highways and the secondary system which includes state highways and other major district roads. The overall segmentation of the Indian road network is as follows:

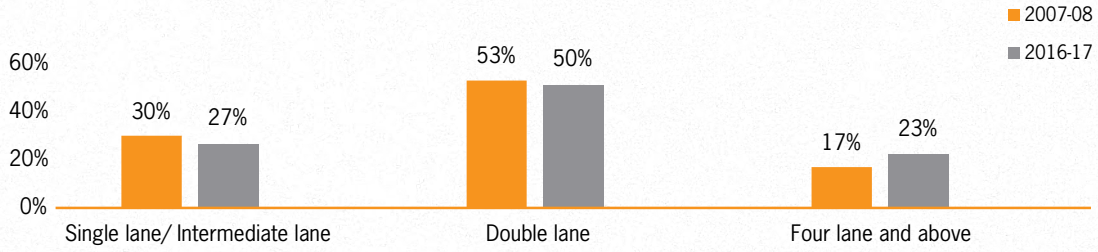
India road sector segmentation	2015-16 (km)	% share	2011-12 (km)	% share	CAGR
National highways/expressways	100,475	1.9%	71,772	1.7%	7.0%
State highways	148,256	2.8%	154,522	3.8%	(0.8%)
Other major district and rural roads	4,983,579	95.2%	3,883,298	94.8%	5.1%
Total length (km)	**5,232,310**		**4,109,592**		**4.9%**

Source: Ministry of Road Transport & Highways, Government of India, Niti Aayog

India's roads handle ~80% passenger traffic and 65% of total freight traffic. This has led to a higher dependency on road infrastructure network in the country. The national and state highways facilitate medium to long distance traffic movement across the country and carry 40% of total road traffic. Major district and other roads provide access to villages and nearby markets.

The growth of the Indian road sector is directly correlated to the country's industrial and economic growth. Total road network has been growing at a CAGR of over 3.5%, 4.5% and more than 5.5% in the last ten, seven and five years respectively. Growing trade and commerce linkages between cities, towns and villages, growing urbanisation and increasing number of vehicles on the road are the main driving factors of the road infrastructure. As a result, the growth of the road sector in the last three to five years is higher than the growth over the last decade. The government has been focused on increasing the broadness and improving the quality of the roads and highways. Indian road's broadness has also improved during the last ten years. During 2007-08, more than 30% of the total national highways were single lane, 53% were double lane, and the remaining 17% were four-lane and above.

National highways density



Source: Ministry of Road Transport & Highways

During 2013-14, the percentage share of single lane highways declined to 24% from the earlier level of 30%, whereas within the same period the share of national highways with four lanes and above increased to 24% from the previous level of 17%. This indicates the shifted focus of the government towards growing connectivity with states, cities and villages. Better road quality and connectivity within states generates higher income and employment opportunities besides promoting access to economic and social services. There were a number of projects undertaken to improve quality of road infrastructure. A lot of projects for widening highways lanes, strengthening roads and improvement of riding quality were initiated and completed during 2001-11. During 2012-17, another 32,750 km length is being upgraded to improve the overall riding quality of roads and highways. The government has been the primary source for investment in the road and transport sectors. Policy makers have taken a number of

Under the Twelfth Five Year Plan (under non-NHDP segment), it is proposed that 19,200 km of roads will be taken up for conservation (two lane roads). In addition to the NHDP programme, 1,000 km of expressways are also planned.

Physical target for national highways development - 12th Five-Year Plan

Projects	Target (km)
Widening to 2-lane (km)	14,800
Widening to 4-lane (km)	9,826
Widening to 6-lane (km)	5,590
Strengthening/improvement of riding quality programme (km)	8,500
Construction of bridges (in numbers)	50
Construction of bypasses (in numbers)	5

Source: Niti Aayog

initiatives to encourage domestic private and/or international investors' participation in the sector and remove the current and future roadblocks in the development of roads and highways. The government has taken initiatives to improve their operational and functional efficiency and promote private investments.

a. Reforms/changes made to accelerate growth

SPV entity: The Ministry of Road Transport and Highways (MoRTH) decided to introduce a dedicated entity to increase the development speed of roads and highway construction and help them in achieving their overall construction target of 20 km of highways per day. In 2014, the Government of India created the National Highways & Infrastructure Development Corporation Ltd to exclusively carry out and manage construction, up-grading and widening of national highways. As a result, a total of 6,029 km of highways were built during 2015-16 which was an all time highest pace of construction. During 2016-17, 8,200 km of roads were built at 22 km per day, again an all time high.

FDI norms: The policy makers have made a number of changes to the FDI norms and other foreign investment regulations to drive private sector participation in the road construction sector. In October 2014, the government allowed 100% FDI in the construction and maintenance of roads including highways and mass rapid transport systems. According to Department of Industrial Policy and Promotion, the total FDI inflows in India increased by 8% and reached to US$ 60 billion during 2016-17, as compared the year 2015-16. In addition, the cabinet also relaxed norms related to minimum amount of capital required and other types of conditions for international investors.

Other incentives: The government also announced other incentives including offering capital contribution of up to 40% of project cost, 100% tax exemption for five years, 30% relief for the next five years, easy environment clearance, duty free import of high capacity and modern road construction equipment, easier commercial borrowing norms and participation in toll collection.

Simplification of procedures: The government has adopted a new simplified process of awarding a road project on build-operate-transfer (BOT) basis, including collection of toll. In September 2013, Indian stock market regulator, SEBI, had simplified foreign investors' access to the local debt market by eliminating disclosure clauses allowing foreign transport companies to easily access the Indian market.

Funding and allocation: The NHAI has adopted an annuity mode of capital support where partial payment of up to 40% of the total project cost is to be provided to the concessionaire during the construction period that helps in easing the capital burden on the concessionaire. The government has implemented an e-payment system or online direct payment process for the payment to third parties such as developers and other stakeholders etc.

Dedicated freight corridors: To improve the connectivity and trade linkage between states, the government has decided to have dedicated freight corridors. The World Bank has provided a loan of US$ 975 million for developing the first phase of the US$ 17.21 billion dedicated freight corridor project in India. In addition, the Dedicated Freight Corridor Corporation Of India Ltd. has partnered with the Japanese Bank of Industrial Cooperation for funding support of US$ 14.56 billion.

b. Use of technology

E-procurement, e-tendering and e-allocation: In 2011, the government had launched an online platform for order procurement and tendering to improve transparency and accountability for all types of projects. They have also introduced online platforms for allotment of construction contracts to developers, monitoring of roads construction status, online approval and clearances to third parties.

E-governance: In order to improve the overall effectiveness and efficiency of various department and divisions, the government has shifted towards the e-governance model. Now compilation of all type of information on accounts and expenditure is computerised with the help of various softwares such as COMPACT, CONTACT, E-Lekha etc.

Radio Frequency Identification (RFID) technology: India has started using radio frequency identification technology to ensure smooth movement of traffic and collection of tolls. In 2010, the MoRTH adopted electronic toll collection technology to achieve functional efficiency. The technology enables individual users to pay tolls electronically without the need of stopping at the toll plazas. In 2012, the country got its first RFID led toll plaza at National Highway 5 that passes through Punjab, Haryana and Himachal Pradesh. The government has rolled this out as a national programme for all of its national highways and they are partnering with various banks such as ICICI Bank and AXIS Bank for the collection of the tolls. By April 2016, the NHAI had launched its e-tolling service at over 300 toll plazas across the country.

Automatic traffic counter and classifier (ATCC): To accelerate the growth of the overall road network and improve the traffic situation, the government is in the process of utilising ATCC systems for better traffic surveys on national highways for effective highways planning. They have identified 1,610 locations all over India for installing ATCC systems.

Use of social media/mobile apps: With the growing number of internet users, the Ministry of Road Transport and Highway has launched an online public grievance redressal system for the general public through the use of social media such as Facebook and other types of sites. The government has recently launched a mobile application "Meri Sadak" that enables people to register and share their feedback on the roads under Prime Minister Gram Sadak Yojana. They have introduced other mobile apps that provide information on roads safety and live traffic information.

c. Skill enhancement

Training and development programme: The MoRTH had created a separate entity named Indian Academy of Highway Engineers (IAHE) that provides a number of technical and non-technical training programmes to engineers. The institute provided 68 training programs to 1,231 engineers in 2015, and 24 trainings for 581 engineers in 2014. In 2016-17, IAHE targets to conduct 42 training programs.

d. Government thrust with various schemes

The Prime Minister Gram Sadak Yojana (PMGSY): The government had introduced PMGSY scheme in December 2000 with a vision to provide connectivity to unconnected habitations by constructing rural roads in India. As of January 8, 2017, the government has completed the construction of 489,905 km of roads since the inception of the programme. Length of national highways in India increased from 97,135 kilometres in FY15 to 100,475 km in FY16. As a part of infrastructure reforms, the government plans to double the length of national highways to 2,00,000 km.

Setu Bharatam: In March 2016, the Indian government launched 'Setu Bharatam' programme to make all national highways free from railway level crossings by 2019. The objective of the project is to ensure road safety and covers 208 rail over bridges and rail under bridges. A separate entity named as India Bridge Management System is set up to carry out surveys of all the bridges with the help of mobile inspection units.

Bharatmala: This is a road and highways development programme which includes construction of a total of 25,000 km of roads along the country's borders, coastal areas, ports etc. The project will begin from Gujarat and Rajasthan, then move to Punjab, Himalayan states and other states etc. The project is expected to be completed by 2022 with an estimated cost of Rs. 802.5 billion.

e. Recent interest from foreign investors

- A financial assistance of US$ 631 million was given by the Asian Development Bank to develop the first coastal corridor i.e. Vishakhapatnam-Chennai industrial corridor. The project is expected to bring manufacturing and exports related industries to the east coast.
- The Government of India allocated US$ 7.34 billion to build 100 smart cities and already released its list of 98 cities in August 2015.
- PTC India Financial Services (PFS) partnered with India Infrastructure Finance Company Limited to jointly provide funding for infrastructure projects in India, particularly in the energy sector.
- Indian Institute of Technology, Kharagpur and National Highways Authority of India have decided to jointly develop technology to construct maintenance free highways in India.

According to the NHAI, traffic on roads in India has been growing at a rate of up to 10% every year. Also, the country is witnessing growth in trade and commerce including the rural and urban areas. The total value of the Indian roads and highways infrastructure is expected to increase at a CAGR of 17.4% during 2012-17. It is estimated that the sector is expected to reach Rs 1.2 trillion (US$ 19.2 billion) by 2017. The Government of India is working on coming up with innovative business and financial models to further increase private interest in road projects. As of 15th May, 2017, there were 1,582 PPP projects in India, of which 783 were related to roads & bridges accounting for a value of US$ 74.63 billion. During 2015-22, investment through PPP is expected to be US$ 31 billion.

Airports

India's aviation sector is one of the largest aviation sectors in the world with a current estimated market size of Rs 960 billion (US$ 16 billion, as of 2016). The aviation sector plays an important role in growth, beyond being a mere mode of transportation. It also acts as a catalyst for trade and commerce within the nation and with neighboring countries. Therefore, the aviation sector is crucial for the sustainable development of trade and tourism in India. The country's civil aviation sector is regulated and administered by the Ministry of Civil Aviation at the central level. The Airports Authority of India (AAI) is responsible for creating, upgrading and managing aviation infrastructure in the country.

Currently, India has close to 450 airports (including operational/non-operational/abandoned airports). Most cities in the country have one operational airport that provides scheduled commercial and leisure air travel services. The AAI manages and operates 125 airports, out of which 69 airports are operational and offer regular commercial flight support.

General aviation accounts for 13.8% share in the total aircraft movement. In terms of aircraft movement, more than 20% of flights travel overseas and 80% travel within India. In terms of passenger movement, more than 24% are international passengers and 76% are domestic travelers. According to AAI, India's airports catered to a total of 264.97 million passengers and provide support to 2.98 million tonnes of freight coming to and going out from the country in 2016-17. As per AAI, 60% of total airport traffic is handled under the PPP model, and the remaining 40% is being managed by the AAI.

Traffic data at AAI airports

Category	APRIL-MARCH 2016-17	APRIL-MARCH 2015-16	Change (%)
Aircraft Movements (in '000)			
International	400.42	375	6.8
Domestic	1,648.67	1,420.46	16.1
TOTAL	**2,049.09**	**1,795.46**	**14.1**
General Aviation	301.63	286.74	5.2
Passengers (In million)			
International	59.29	54.66	8.5
Domestic	205.68	169.3	21.5
TOTAL	**264.97**	**223.96**	**18.3**
Freight (in '000 tonnes)			
International	1,855.06	1,657.7	11.9
Domestic	1,123.18	1,046.88	7.3
Total	**2,978.24**	**2,704.58**	**10.1**

Source: Airports Authority of India

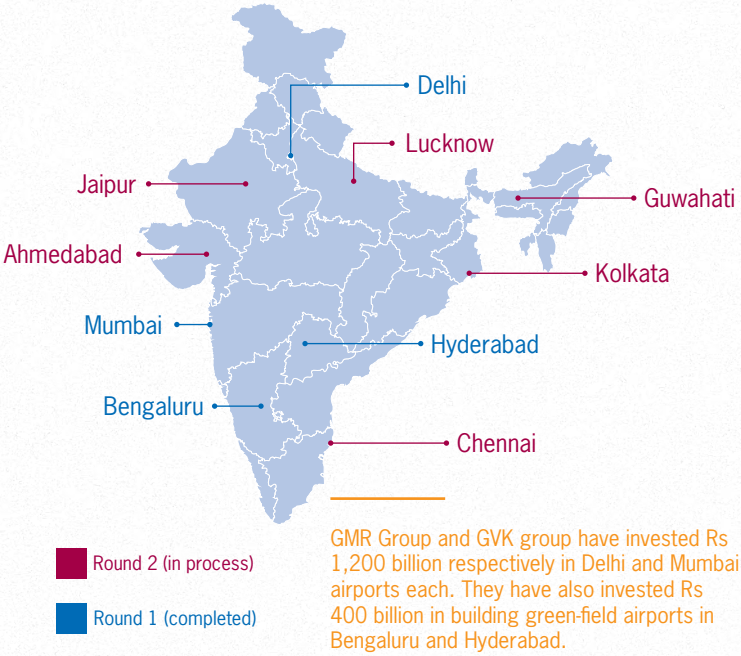
The country's aviation sector is experiencing a transformation primarily driven by factors such as emergence of low cost carriers, construction of modern airports, growing interest from foreign investors, acceptance of advanced technologies and growing focus on regional connectivity.

During 2008-2016, the total aircraft movement at Indian airports has witnessed a growth of 6.6% and 5.2% in the last three and five years in CAGR terms. International and domestic flight movements have recorded a CAGR of 6.1% and 6.8% respectively, in the last three years. Total passenger traffic has witnessed a CAGR of 12% and 9.3% respectively, in the last three and five years. International and domestic passenger traffic have recorded a CAGR of 8.3% and 13.2% respectively in the last three years. Freight traffic has shown a CAGR of 7.3% and 2.9% in the last three and five years. International and domestic freight traffic have shown CAGR of 5.6% and 10.1% respectively in the last three & five years.

Initially, airports in the country had been built and managed by the government and later the government decided to privatise airports to increase their operational and functional efficiency. Another important factor behind the adoption of the privatisation path is to boost infrastructure development.

Status of privatisation of airports (as of November 2015)*

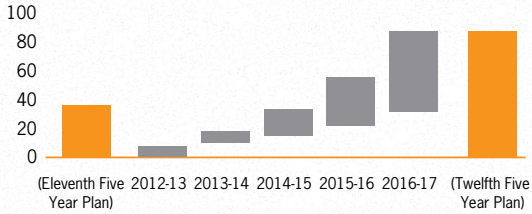
As of March 2017, 11 private players, including four global operators, showed interest in operations and maintenance of Ahmedabad airport. Also, seven private companies, with two global players, registered to bid for Jaipur airport. Furthermore, as of May 2017, Kolkata and Chennai airports, which were removed from the list of privatisation in FY 2016, are expected to be brought back for the privatisation of operations and maintenance.



GMR Group and GVK group have invested Rs 1,200 billion respectively in Delhi and Mumbai airports each. They have also invested Rs 400 billion in building green-field airports in Bengaluru and Hyderabad.

The government initially privatised its largest airports at Delhi, Mumbai, Hyderabad and Bengaluru in its first round. For e.g. GMR Group and GVK group have invested Rs 1,200 billion each in Delhi and Mumbai airports. They have also invested Rs 400 billion in building green-field airports at Bengaluru and Hyderabad. The privatised airports have grown in terms of revenue generation, level of modernisation and the overall efficiency of service quality. For the second round of privatization, the government is in the process of privatising six more airports including Chennai, Kolkata, Ahmedabad, Jaipur, Lucknow and Guwahati to increase the speed of capital investment and infrastructure development.

Projected government investment in airport infrastructure (INR thousand crores)



Source: Niti Aayog

The AAI has undertaken various projects to build and strengthen the airport infrastructure capacity. During 2013-14, the AAI completed a number of projects related to extension, strengthening of existing runways, adding new terminal buildings and various other projects. Projects on strengthening the airport's parking capacity, its unloading and loading, capacity to refuel etc. were completed by expanding the apron (the area of the airport where the aircraft is parked) at airports such as Goa, Calicut, Dehradun, Kandla, Bikaner, Chandigarh, Jammu and Tirupati airports etc. The Authority has also undertaken projects for re-carpeting or maintenance of the runways in many cities. There are a few airports such as New Delhi and Chennai airports that are now well connected with the metro stations. The Indian Railways is currently assessing to build an underground rail link to Hyderabad airport. The AAI has planned to spend Rs 80 billion (US$ 1.3 billion) during 2013-17 on up-gradation and modernisation of non-metro airports.

The government is focused on encouraging public and private participation in airport infrastructure and making policies that promote the growth of the aviation sector in the country. In the recent past, the government has allowed 100% FDI in green field airports, helicopter services and seaplanes, maintenance and repair organisations and flying training institutes. The intent of the government is to bring more foreign capital to India's airport infrastructure. They have allowed up to 100% tax exemption for airport project for 10 years and relaxed custom and countervailing duties for the maintenance, repair and overhaul services.

The Government of India is planning to invest more than Rs 7.2 trillion (US$ 120 billion) for the development & maintenance of airport infrastructure and services over the next decade i.e. over 2016-2026.

The money will be spent on building airport infrastructure to increase penetration of the aviation sector to smaller cities and further increase connectivity to the north eastern part of India. The government is also aiming to construct 60 no-frills airports to have better connectivity in the un-served areas. The government is also looking at options to utilise the private sector's experience in building 25 regional airports in the 2016-17.

Furthermore, government is planning to revive those airports that are in low demand or non-operational. The Civil Aviation Ministry has developed guidelines for the future development of the country's aviation sector. The objectives of the policy are mentioned below:

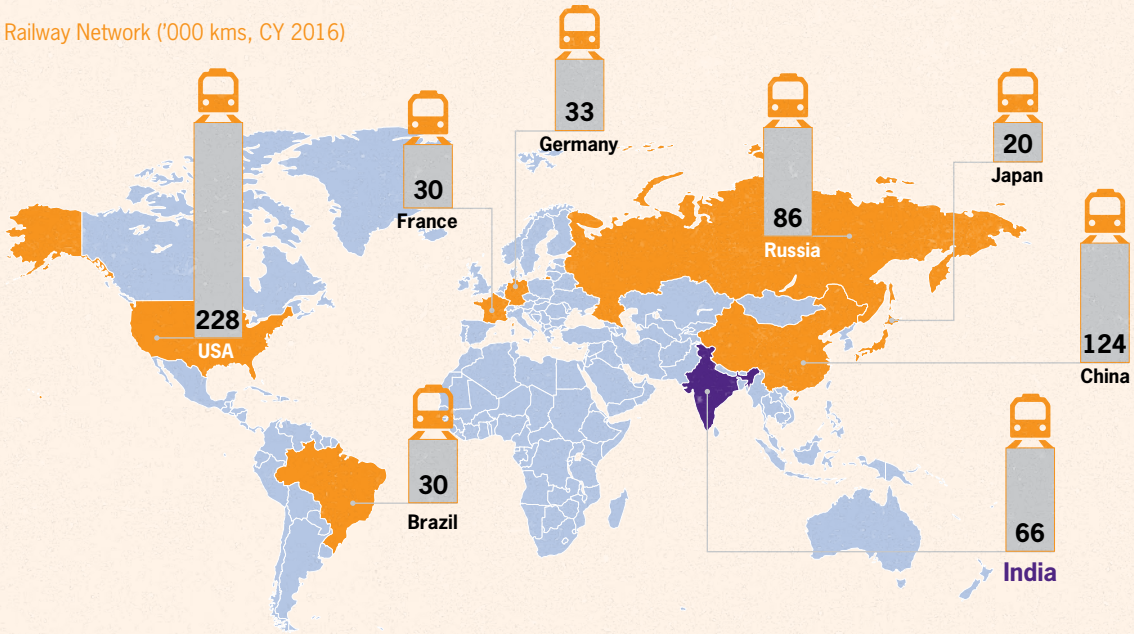
- Building a safe, secure and sustainable aviation sector through the adoption of technology and effective monitoring system.
- Increase regional connectivity through fiscal support and infrastructure development.
- Policy changes to improve the business environment, simplified procedures and e-governance.
- Overall support to the aviation value chain including cargo, MRO, general aviation, aerospace manufacturing and skill development.

The growth in the aviation sector is a result of increasing economic activity, growing middle class population, growing disposable incomes and the growing penetration of low cost carriers (LCC). Emergence of the low cost carriers is an important factor driving the Indian aviation sector. As more and more flights are offering domestic travel at cheaper or competitive prices, this will have a direct impact on the volume of passenger air travel. The LCC phenomena came to India in 2003 with the launch of Air Deccan. Inbound tourism is an important factor behind the growth of the aviation sector. The number of foreign passengers is growing at a CAGR of 7.6% in the last five years (2011-2016) and it is expected to continue its strong growth trajectory in the coming years. Airbus also expects India's aviation industry to grow at over 10 per cent annually in the next decade (2017-2027), almost double the average growth rate of the global aviation industry. India is expected to become the third largest aviation market by 2020. India's airport traffic is expected to exceed 900 million and is expected to be the largest market by 2030.

Railways

After its introduction in early 1853, Indian Railways (IR) has grown as the world's fourth largest after the railways networks of the US, China and Russia. It is the second largest rail network in Asia after China. The Indian Railways is a state-owned public entity of the Indian government managed under the Ministry of Railways. India's rail network has expanded and has become an important mode of transport in the country over the years.

Railway Network ('000 kms, CY 2016)



Source: Euromonitor. Ministry of Railways, Morgan Stanley Research
Note: China and India represents 2016 data and the remaining for 2014

The IR is divided into 17 zones and further divided into 68 smaller operating units called Divisions. Every day, close to 11,000 trains run, out of which 7,000 are passenger trains. The IR network is distributed over 66,000 km and covers more than 7,000 stations. More than 8,000 million passengers travel for more than 1,000,000 passenger million km every year. Both passenger and freight traffic volumes have increased steadily in the past five years. Passenger volume witnessed a CAGR of 7.1% during 2007-2016 whereas freight traffic registered a CAGR of 8.6% during the same period.

Current summary of IR:

Statistics - Indian Railways	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
Total number of trains	8,592	8,889	9,213	9,549	9,956	10,499	10,773	NA
Total running track (in km)	86,937	87,087	87,114	89,801	89,236	89,919	90,803	NA
Number of stations	7,030	7,083	7,133	7,146	7,172	7,112	7,137	NA
No of passengers (in million)	6,920	7,246	7,651	8,224	8,421	8,397	8,224	8,152
Freight traffic (million tonnes)	833	888	922	969	1,008	1,052	1,095	1,107

Source: Ministry of Railways, Statistical Summary: Indian Railways

The country has been experiencing a CAGR of 3.4% in terms of the number of passengers traveling by Indian railways in the last seven years. The total number of people traveling by rail has crossed 8,200 million and the freight transportation volume has recorded a CAGR growth of 5.0% in the last seven years and reached to 1,095 million tonnes. The IR is taking regular initiatives to cater to the growing volumes of passengers and freight traffic. They have introduced 238 new trains, extended runs of 65 trains and increased frequency of existing 22 trains during 2014-15 to cater to the growing rail transport demand. The number of trains has increased at a CAGR of 4.0% in the last five years with a total of 10,733 trains (March 31, 2015)

The Indian Railways added close to 4,000 km of running track during 2010-2015 with the total running track reaching 90,800 km as on March 31, 2015.

Statistics - Indian Railways	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
Steam	43	42	43	43	43	43	43
Diesel	4,963	5,022	5,137	5,197	5,345	5,633	5,714
Electric	3,586	3,825	4,033	4,309	4,568	4,823	5,016
Total number of trains	**8,592**	**8,889**	**9,213**	**9,549**	**9,956**	**10,499**	**10,773**

Source: Ministry of Railways, Statistical Summary: Indian Railways

In 2005-06, the IR had close to 8,000 trains and out of which 60% trains were using diesel. The remaining 40% of the total trains used electricity. With the increase in electricity supply in the country, the number of trains running on electricity has also grown at a steady pace. As of March 2016, 52% trains in India were running on diesel engines.

Electrification of rail tracks	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
Railways track electrified (km)	797	1,117	975	1,165	1,317	1,350	1,375	1,600

Source: Rajya Sabha, Lok Sabha, Railways Performance Report Card, Explanatory Memorandum on Railway Budget for 2015

Over the last decade, the Ministry of Railways has been taking various initiatives in terms of quality of infrastructure, technology, ticketing channel and online governance to improve the customer service experience:

Electrification of railways: The IR has been working to substitute diesel engines trains with the fast-moving electricity running trains. In line with its strategy, the government has started substituting such trains on short routes with electric hauled Main Electric Multiple Unit (MEMU) trains. The IR is completing the electrification of an average of 1,200 km rail tracks every year. After the government completes electrification of the entire rail network, the manufacturing of diesel running railways may be stopped. The IR has also planned to complete the electrification of 35,000 km of rail tracks in three years.

Bio-toilets: The IR has been working towards replacing the current traditional toilets with bio-toilets that treat human waste. They are working on the target of zero discharge from the train's coaches and aiming to fit 140,000 new bio-toilets by 2019. Such bio-toilets were first installed in the year 2009 and according to IR data, close to 35,000 bio-toilets have been installed in coaches as on March 31, 2016. This shall also contribute to the vision and objectives of Swachh Bharat Mission

High speed trains: The IR has entered into a new age of transformation by venturing into high-speed railways. India is looking at possibilities to have high speed trains that can run at about 500 km per hour speed to improve its travel efficiency by reducing travel time. A special purpose entity "High Speed Rail Corporation of India Limited (HSRC)" was formed in 2012 for the development and implementation of high speed rail projects. The government has proposed an investment plan for the period 2015-19 and allocated Rs 650 billion for High Speed Rail & Elevated Corridor between Mumbai - Ahmedabad.

- The Ministry of Railways has also announced a mission called "Mission Raftaar " in its 2016 rail budget with the aim of increasing the current average speed of trains by up to 25 kmph and reducing the air pollution by reducing the use of diesel within the next five years.
- In August 2016, the IR has also partnered with Japanese railway experts to mentor Indian manpower to drive high speed trains.

Dedicated Freight Corridors: In 2006, the Ministry had created a dedicated entity "Dedicated Freight Corridor Corporation of India" for implementing dedicated freight corridor projects that can improve the safety and efficiency of freight transportation. The entity is working on building the eastern (connecting Punjab and West Bengal) and western corridors (connecting Haryana and Maharashtra) with a total length of 2,800 km and the project is expected to be completed by 2017. The body is also working on the planning phase of construction of four additional corridors -North-South (Delhi-Tamil Nadu), East-West (West Bengal-Maharashtra), East-South (West Bengal-Andhra Pradesh) and South-South (Tamil Nadu-Goa).

Private Freight Terminal (PFT): The government is open to welcoming more private sector investors into the sector. The IR launched a major PPP initiative in 2010 for setting up of private freight terminals. The benefit of construction of PFT for the private investors is that 50% of terminal freight charges are shared with the investors. As on January 2016, there are 27 PFTs in India. The IR is planning to build 500 new private freight terminals under the PPP model during 2016-18.

Tourism: The IR has taken a number of initiatives to promote rail tourism in the country. It has started dedicated operations of tourist trains and coach services on popular routes in various regions. This includes tour packages that offer local transportation, accommodation, on-board catering and off-board services such as conducted tours etc. It has introduced luxury tourist trains that comprise facilities such as saloons, multi-cuisine restaurants, lounge, bar/mini bar, gym, spa, conference room, TV, wifi internet, telephone, piped music, CCTV etc. For e.g. there are various trains dedicated to promote tourism in the country such as Buddhist Special Train, Bharat Darshan Trains, Pilgrim Special Trains, Steam Train etc.

Smart ticketing: The Ministry of Railways has been working to increase the efficiency of railways and is coming up with innovative solutions. A pilot project for issuing monthly and quarterly season tickets through automated teller machines (ATMs) has been launched in Mumbai in FY2016 and it is found to be very successful. Another pilot project for purchasing tickets including monthly and quarterly season tickets through smart cards has also been launched in the country.

Wi-Fi infrastructure: The government decided to provide free wi-fi services to rail passengers. In September 2015, the IR appointed Google to build the required infrastructure to provide wi-fi services on 400 railway stations across the country. The Mumbai central station was the first station in India to have free wi-fi facility in January 2016 and as on April 10, 2016, the service has been extended to more than 10 stations. According to Google, close to 2 million people are taking benefit of free wi-fi every month.

National Rail Vikas Yojana: The government has a massive investment plan for the rail sector such as building strategic rail communications links to ports to eliminate capacity bottlenecks, developing mega bridges for improving communication to the hinterland with developing multi-modal transport corridors.

National Rail Vikas Yojana comprises the following investment planning components:

1. Strengthening of Golden Quadrilateral and Diagonals connecting the 4 metro cities i.e. Delhi, Mumbai, Chennai and Kolkata.

2. Providing Rail based port-connectivity and development of corridors to hinterland including multi-modal corridors for movement of containers.

3. Construction of 4 mega bridges at Patna and Munger on river Ganga, at Bogibeel on river Brahmaputra and at Nirmali on river Kosi.

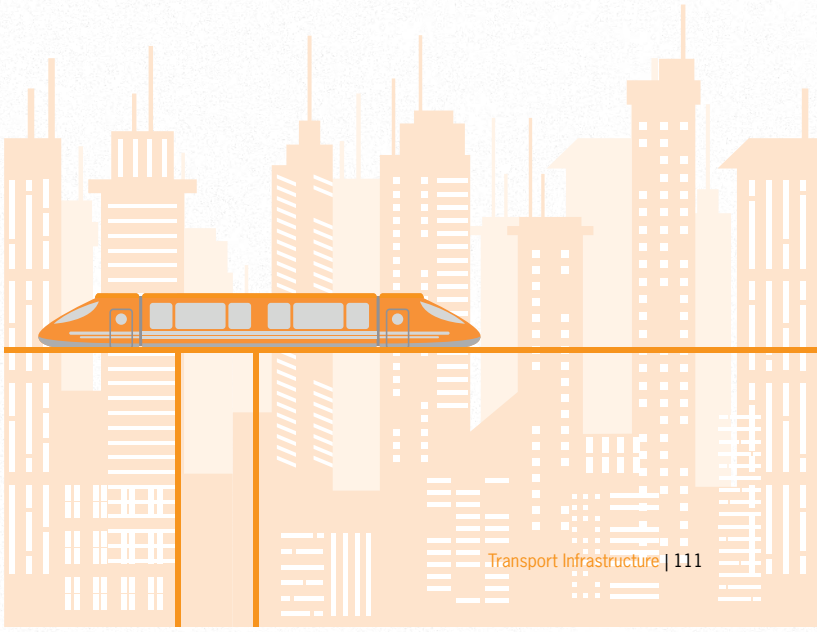
FDI: India welcomes foreign investment for the development and transformation (upgrading and modernisation) of railways infrastructure. According to industry sources, the country requires investments of close to US$ 120 billion in the process of upgradation and expansion of Indian Railways. The government has opened up its railways sector for foreign investors by allowing 100% FDI limit in the development of railway stations and manufacturing of coaches.

Railways specific projects:

- Japan has agreed to modernise 400 railway stations. The project is expected to be completed by 2020-21. This will contribute to the government's vision of providing quality railway infrastructure to its citizens.
- Improvement of last-mile connectivity to boost business activities around ports and mines through the formation of special purpose vehicle companies under the PPP model.
- PPP investments in provision of foot-over bridges, escalators and lifts at all major stations are aimed to boost passenger amenities.
- Three rail connectivity projects namely Gevra Road-Pendra Road new line, Raigarh-Bhupdeopur new line and Jaigarh Port connectivity projects are being implemented through the joint venture route.
- Mass Rapid Transit Systems (MRTS) projects are being planned in Ahmedabad, Bengaluru, Hyderabad, Chandigarh, Chennai, Delhi, Jaipur, Kochi, Kolkata, Mumbai, Patna, Pune, Lucknow and Surat through the PPP model.
- To improve safety and prevent head-on collisions of trains, the IR is working to install the European Train Control System.
- IR has been working on creating applications that can help a passenger in tracking the train information system, making warning systems for road users and geospatial technology for mapping assets of railways.

Trains will remain the preferred mode of transport for long-distance travel. The passenger traffic using IR is expected to grow from close to 8.2 billion in FY16 to 15.2 billion by FY20, at a CAGR of 16.8% during the same period. The IR is working on to increase the cargo handling capacity to 1.5 billion tonne of goods by 2020 from 1 billion tonnes as on April 2015.

The Ministry of Railways has committed to invest over US$ 132 billion in strengthening its railways system over 2015-20 i.e. 285% higher than investment of US$34bn spent during 2009-14. The Ministry, under its vision 2020, aims at significantly increasing the IR contribution to the national goal of achieving double-digit GDP growth rate on a sustainable basis.



Ports

India has close to 14,500 km of navigable waterways that include rivers, canals, creeks and backwaters. The country has a coastline of around 7,517 km, interspersed with over 212 ports. There are 12 major ports (administered by the Union Government) and 200 non-major ports (administered by the state government) in India. These ports manage 95% of the country's overall international trade by volume and 70% by value through maritime transport. India handled a total cargo traffic of 1,052 million metric tonnes (MMT) in 2015, and the number is expected to reach 1,758 MMT by 2017. Most cargo ships sailing between East Asia, America, Europe and Africa pass through Indian territorial waters. The Ministry of Shipping regulates and administers the major ports in the country. The minor and intermediate ports are developed and managed by the relevant state level relevant departments in the nine coastal states - Andhra Pradesh, Odisha, West Bengal, Tamil Nadu, Kerala, Karnataka, Goa, Maharashtra and Gujarat.

Traffic handled (million tonnes)	2004-05	2009-10	2016-17	CAGR 2010-17
Major ports	384	561	647	2.1%
Non-major ports	138	289	485	7.7%
Total traffic handled	**522**	**850**	**1,132**	**4.2%**

Source: Indian Ports Association, CARE Ratings

During 2010-16, the traffic volume handled by Indian ports has increased at a CAGR of 5.5%, out of which a CAGR of 8.3% was recorded by non-major ports in terms of traffic volume during the same period. During April-July, 2017, traffic handled at all Indian ports reached 221,955 thousand tonnes, a growth of 4.13% yoy. According to industry reports, all major ports and non-major ports are expected to manage traffic volume of 1.7 billion tonnes by 2021 as a result of increase in international and domestic trade and passenger volumes. The government has taken initiatives to facilitate the growth in the trade volume. They have identified more than over 150 projects on building ports infrastructure and strengthening the cargo handling capacity through a range of green-field and brown-field projects. In addition, the government is also working on improving the overall efficiency of ports through mechanisation and modernisation.

Most of India's major ports have good connectivity with other modes of transport such as roads and rails. However, the government is working to improve the existing connectivity to facilitate the smooth flow of trade and commerce. The government has been taking various initiatives to build and upgrade the ports infrastructure in the country. The target is to achieve an overall cargo handling capacity by all ports of around 3.2 billion by 2020 from the current level of around 1.2 billion at the end of 2015. The government has also taken initiatives to promote private sector participation in India's shipping and marine sector.

Increased private sector participation: To create a favourable investment climate, the government has announced FDI allowance of up-to 100% under the automatic route for projects related to the construction and maintenance of ports and harbours. In addition, they have also introduced a 10-year tax waiver for enterprises developing, maintaining and operating ports. Further, non-major ports are allowed to determine their own tariffs in consultation with State Maritime Boards; however, tariffs at major ports are regulated by the Tariff Authority for Major Ports (TAMP).

Following is a brief overview of the progress in terms of private sector participation across ports projects in India:

- As of June 2017, 39 Public Private Partnerships (PPP) projects are operational at a cost of around US$ 2,219.4 million and capacity of 240.72 million tonnes per annum (MTPA).
- Between December 20, 2005 and May 17, 2017, 36 PPP projects worth Rs 486.78 billion had been approved for the ports sector by the Public Private Partnership Appraisal Committee (PPPAC).
- 10 PPP projects with an estimated investment of US$ 1.5 billion and capacity of 95 MTPA were awarded in FY15.

Sagarmala Yojana: The government has launched an initiative named as "Sagarmala Yojana" in June 2015 that focuses on port modernisation and setting up of new ports, efficient evacuation to and from the hinterland and setting up of logistics hubs to increase the ports utilisation by leveraging world-class technology and infrastructure. The government is expected to invest close to Rs 1 trillion (US$ 15 billion) for the completion of this yojana. According to industry experts, this project is expected to create 10 million jobs, will boost merchandise exports by US$ 110 billion and increase coastal shipping volumes by close to five times. Under this scheme:

- 5 to 6 new ports are proposed to be built and capacity of more than 40 ports will be increased.
- More than 80 projects are planned to improve the existing port connectivity and to enable efficient movement of containers on key routes.

Project Green Ports: The government is working on a programme named "Project Green Ports" that aims at making India's major ports cleaner and greener. Under this programme, the government is acquiring equipment that can help in monitoring environmental pollution, reducing oil spill events and prohibiting disposal of garbage in the sea.

Ports upgradation: The government has been working on upgrading the quality of the Indian ports sector and has undertaken several projects in recent years. For e.g., the government completed upgradation of a number of projects including the mega container transshipment terminal at Vallarpadam (Kochi) and bulk terminals at Dahej, Mundra and Hazira in Gujarat in 2010. Another project at Dhamra (Odisha), a greenfield port, was completed in May 2011. As of March 2017, 415 projects at an estimated investment of around Rs 8 lakh crore had been identified under Sagarmala programme for phase wise implementation during 2015 to 2035.

Financial support: The government has planned an investment of close to Rs 1.9 trillion in the Twelfth Five Year Plan (2012-2017). The investment to be made in the port sector includes construction of new terminals, inland water systems, upgradation of existing berths and modernisation of operations. The commencement of these projects will in turn contribute towards employment generation, estimated at over 4 crore, thus contributing significantly towards economic growth.

Setting up of port-based SEZs: SEZs have been developed in close proximity to several ports that present a strategic advantage for various industries within these zones, and thus acts as an economic growth driver. Plants being set up at Mundra, Krishnapatnam, Rewas and few others are underway:

- Coal-based power plants to take advantage of imported coal
- Steel plants and edible oil refineries

Smart port cities: The government is planning to build smart industrial port cities that will have broader roads, advanced townships, special economic zones, greenery, etc. According to experts, these smart port cities will focus and utilise green energy that will be generated at the ports.

New water ports: The government is working on building inland waterways infrastructure as a result of growing imports and exports. Goods transportation through waterways would reduce the overall cost of goods. Therefore, the government is planning to set up 30 water ports on the Ganga. They also plan to set up satellite and dry ports to facilitate traffic movement through trains for states with no waterways facilities.

Conclusion

The government has been focusing on increasing the speed of transport infrastructure development both in the urban and rural areas.

In 2016, Raghav Chandra, Chairman at NHAI, announced that they will build road infrastructure of over 50,000 km over the next five to six years. The Ministry for Road Transport and Highways and Shipping is also planning to integrate smart technologies such as OVSM (On Vehicle Smart Module) for revamping the transport sector. While around 3,133 FASTags were sold in May, 2016, the number went upto 178,266 by December 22, 2016. Fees collected from FASTags increased to Rs 47.02 crore by December 22, 2016 from Rs 0.71 crore in May 2016.

The total passengers catered by the Indian airports are likely to reach 421 million by 2020. Hence, the government is planning to invest more than Rs 7.2 trillion (US$ 120 billion) for the development & maintenance of airport infrastructure and services over the next decade. Similar to roads and airports, the Railway Minister also announced a 285% increase in railroad spending over 2014-2019 to spur change and accelerate the growth of the country's manufacturing and other sectors. The government plans to increase its port transportation share in the overall GDP and envisions to increase port capacity from 1,400 million tonnes in 2016 to 3,000 million tonnes by 2025.

The primary objectives behind this huge amount of investment in transport infrastructure are:

- **To improve inter-city connectivity:** The government is working to increase the pace of rural road construction to 133 km per day in 2017, from the current pace of 100 km per day during 2014-16. In addition, the MoRTH has set a target of building over 40 km of national highways every day in 2017-18 that is more than double the road construction average of 17 km per day in 2016-17. It is also working towards achieving an ambitious target of 100 km a day in future.
- **Ease out movement of passengers & cargo transportation:** The country's primary objective behind improving connectivity is to ease out movement of both passengers & cargo within and outside the nation. Therefore, the country is witnessing huge amount of investments in transportation sector including road, rail, airports and ports.
- **Reduce overall logistics cost:** India's logistics cost is around 18%, which is higher than China at around 8-12% and Europe at 12%. The government is working on reducing logistics costs with the help of better transport infrastructure.
- **Increase corporate profitability:** Increased infrastructure development would have a positive impact on corporate profitability. According to the World Bank, 20-30% decline in the transportation costs could boost profit in key manufacturing sectors by 2-3%.
- **Increase inter-regional trade:** The government is coming up with multiple dedicated freight corridors to improve connectivity and trade linkages between states. The World Bank has provided a loan of US$ 975 million for the first phase of the US$ 17.21 billion dedicated freight corridor project. The Dedicated Freight Corridor Corporation of India Ltd. has partnered with Japanese Bank of Industrial Cooperation (JBIC) to provide support of US$ 14.56 billion.
- **Increase the current level of GDP:** Good physical connectivity will have its positive impact on the country's competitiveness and its GDP. According to industry experts, the adoption of IT in the transportation network would help India achieve higher GDP growth of 8-9% over the next few decades.
- A report by BMI Research projects accelerated growth in transport infrastructure in the next five years in India due to increased investment in road and rail projects, policies to encourage private sector participation and key reforms. For instance, the National Highway Authority has announced plans to build 50,000 km of roads valued at Rs 1.7 trillion by 2022 with the goal of doubling the length of the national highway network to 200,000 km. The Indian Railways on the other hand has plans to commission 3,500 km of new lines and renovate 500 stations in 2018, and has formulated a US$ 65 billion plan for modernizing the railway network.

Expert perspective

Mr. Anil Khanna,
Managing Director, Blue Dart

"India's logistics sector is at an inflexion point guided by a promising economic environment under the leadership of our Honourable Prime Minister Mr Narendra Modi. There has been a significant ramp up in airport, sea ports, roads, highway and transport infrastructure and other initiatives like 'Make in India', launch of the Civil Aviation policy and the advent of Goods and Services Tax (GST) etc.

The sector is evolving rapidly and it is this interplay of infrastructure, technology and service providers that will define the industry, enabling its customers to reduce their logistics costs and provide effective services. Logistics is the backbone of the Indian economy, providing efficient, cost effective flow of goods on which other sectors depend."

Mr. Rajkiran Kanagala,
VP, Transport Corporation of India Limited

"The transportation sector is evolving with multi-modal transportation solutions being set up and the development of inter-modal transportation infrastructure facilities. Dedicated freight corridors by the railways and improvements in coastal shipping facilities along with the construction of massive state-of-the-art logistics parks at key distribution hubs are helping to meet the specialized warehousing needs of industries. The non-major ports are driving traffic growth with the traffic at these ports growing at a very healthy rate. This strong growth is expected to continue, with the share of the non-major ports increasing further.

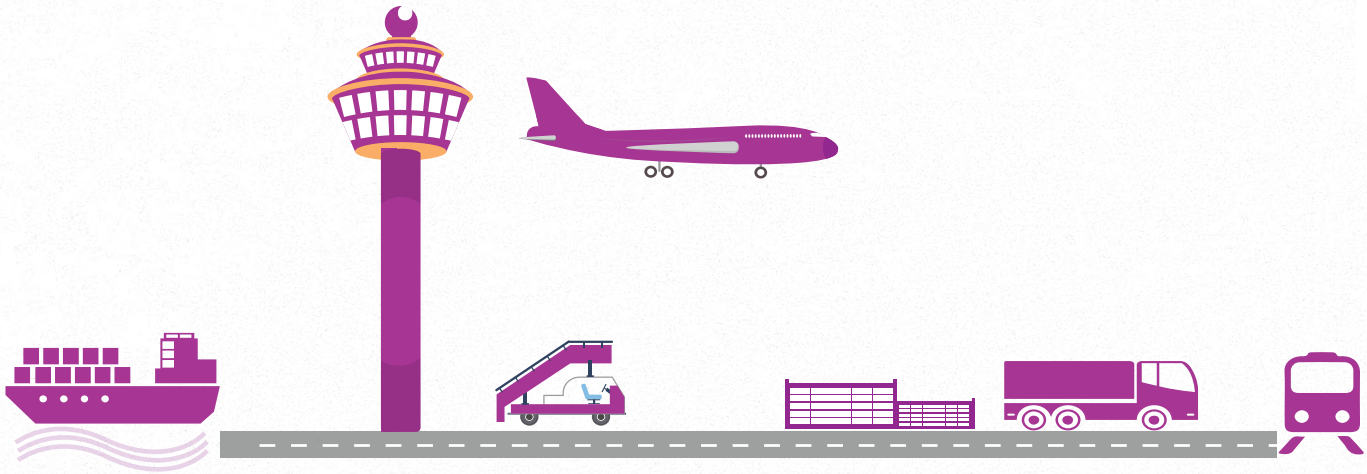
The rise in the growth of online retail transactions via marketplaces is due to the underlying mobile technology and the ready availability of online access. As a result, the profile of the Indian consumer is changing. According to a research report, mobile platforms have emerged as a major gateway for customer purchases as smartphones are increasingly replacing PCs for online shopping. Competition is heating up among online retailers.

Historically, companies have tended to measure their performance in an ad-hoc manner. But as technology becomes simpler, more affordable and more accessible, associations are realizing the vital role technology plays in lowering operating costs, increasing revenue and improving operational efficiency. IT has a big role to play in improving the efficiency of the supply chain and also meeting the ever-rising expectations of the user community. Though the penetration of IT in the Indian transportation and logistics sector has been quite low, there are huge opportunities to leverage it for the benefit of not only the logistics companies but also the consumer. In an increasingly technology-driven environment, transportation and logistics companies need to adopt technology solutions that not only align themselves to the organization's business needs but also help them achieve growth and efficiencies.

Implementation of GST (Goods & Services Tax) will have significant impact on Logistics & Supply Chain Industry. GST's implementation in the logistics industry will diminish logistics costs up to 10-15% over a period of 3-4 years. The industry will see a major change; sourcing, distribution and warehousing decisions which are currently planned based on state level tax avoidance mechanisms instead of operational efficiencies will be reorganized to leverage efficiencies of scale, location and other factors relevant to the business."

Smart logistics for greater competitiveness

The Indian logistics sector has gained immense importance over the years and is a major contributor to the GDP. The demand for logistics services in the country has been largely fueled by the consistent growth of Indian economy. India is ahead of other developed countries in terms of logistics spending. As of 2016, the logistics spending in India is high (14% of GDP) as compared to developed countries (8-9% of GDP). According to industry estimates, Indian logistics industry is expected to witness robust growth of 10-12% per annum and reach US$ 310 billion by 2020 from US$ 203 billion in 2016. India's growing trade with Asia, Europe and North America is likely to drive the freight forwarding and transportation business. In addition, a huge thrust by the government towards promoting the manufacturing sector and exports is likely to increase the demand for logistics functions during 2015-2020. The Government of India's Foreign Trade Policy (2015-2020) aims to increase the value of trade to US$ 900 billion by 2020, by aligning its flagship missions such as Make in India, Digital India, and Skills India to promote exports growth.



Snapshot: Transport and Logistics

Rs 2.4 trillion allocated for the development of transport sector (Budget 2017)

100% FDI in warehousing and food storage facilities

Demand for warehousing space is **621 million** sq. ft. (2016)

6,300 cold storage facilities and installed capacity of **30.11 million** MT (2016)

Fleet size of **2.2 million** heavy duty trucks and **0.6 million** light duty trucks (as of September 2016)

India has an inland waterways network of **14,500 km**

247 Listed container terminals across the nation

The government has planned the construction of **4,800 acres** of logistics parks.

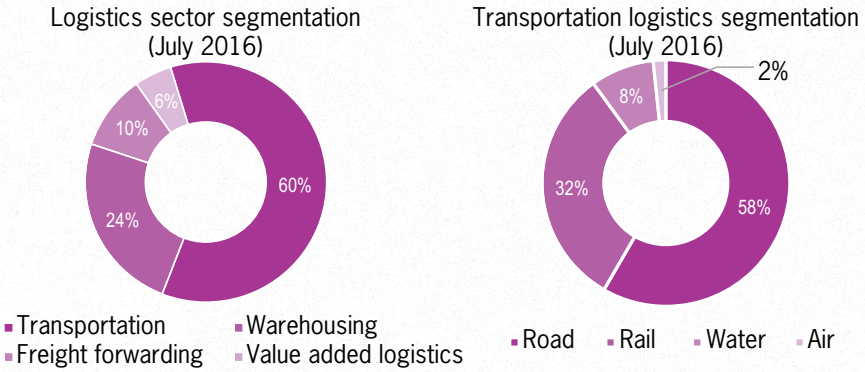
The government has shortlisted **15 locations** with the highest freight movement for the development of multimodal logistics parks

E-commerce market exposure in the logistics sector is projected to reach **US$ 2.2 billion** (2020)

GST will lead to development of new or expanded logistics hubs in different regions.

Segmentation of Indian logistics sector:

India's logistics market was valued at US$ 203.7 billion in 2016. The logistics sector in India is primarily categorised into four segments i.e. i) Transportation, ii) Warehousing, iii) Freight forwarding and iv) Value added logistics. The transportation segment accounts for the largest share at 60% in the Indian logistics sector. The remaining share of 40% is contributed by warehousing, freight forwarding and value added logistics:

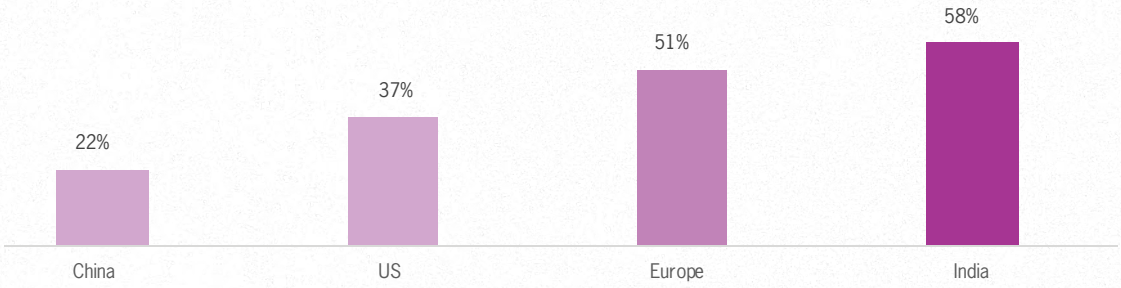


Source: CII, CARE Ratings

Transportation segment: This segment comprises of transportation of goods and services through rail, road, air, waterways. Road transportation accounts for the largest share, that is, 58% of the overall transportation share, followed by rail (32%), water (8%) and air transportation (2%).

- **Road:** India is ranked as the second largest nation in terms of its total road network which is around 5.2 million km (including running projects). India is ahead of other large developed nations such as the US, Europe in terms of transportation of goods through road network. For e.g. nearly 60% of the total transportation in India happens through road, compared to 51% in Europe, 37% in the US and 22% in China. Road transportation is the preferred mode due to its last mile connectivity.

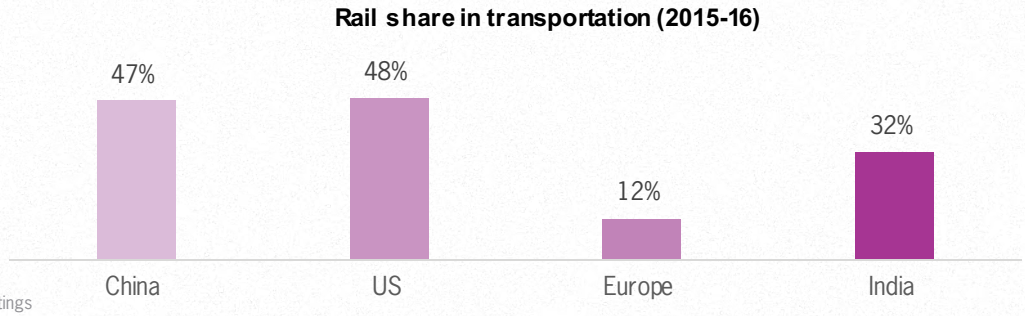
Road share in transportation (2015-16)



Source: CII, CARE Ratings

Logistics solutions using road network are provided to metro, urban and rural areas across India. The goods are transported through national highways, expressways, state highways, dedicated freight corridors etc. India's road network comprises of 100,475 km of national highways/expressways, 148,256 km of state highways and 4,983,579 km of other major district and rural roads. As of June 2016, road freight constitutes nearly 58% of the total freight movement in India, consisting of 2.2 million heavy duty trucks and 0.6 million light duty trucks. In 2016, the overall fleet covered over 1,800,000 kms of road length and carried over 3,000 MMT (million metric tonnes) of load. According to industry experts, the road freight movement in India is expected to increase at a CAGR of 15% during 2015-2020. The growth in road freight movement will be primarily driven by the growth of FMCG, retail and pharmaceutical sectors. In the road transportation sector, more than 70% of the total operators are of small size.

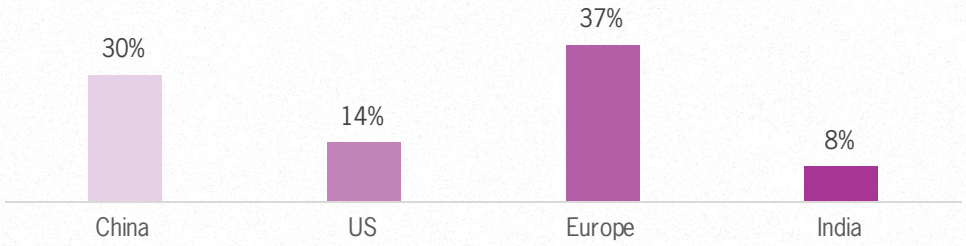
- **Rail:** The Indian rail network comprises of 11,000 trains which run over 66,000 km of track length. As of 2016, the rail network carried more than 1,400 MMT of load.



Source: CII, CARE Ratings

Given the emerging growth in the manufacturing sector and with the proposed *Make in India* mission, it is expected that the freight movement of core commodities such as iron ore, steel, coal, petroleum etc. is expected to increase at a fast pace. Indian rail freight market is expected to grow at a 10% CAGR over the next 5 years (2015-2020) and reach US$ 56 billion from US$ 35 billion in 2015. The Indian Railways has been working to complete two corridors i.e. Western dedicated freight corridor (Uttar Pradesh to Mumbai) and Eastern dedicated freight corridor (West Bengal to Punjab) by the end of 2019. This will further improve the rail freight market in India.

- **Port:** India has a coastline of 7,516 km with 12 major ports and 200 minor ports.



Source: CII, CARE Ratings

Ports on the west coast account for a larger share in terms of cargo traffic compared to east coast due to a geographical advantage. The west coast is closer to India's major consumption centers and the industrial belt of Northwest India. Container market growth in India is primarily driven by west coast with over 70% share in the overall Indian container market. Key ports in India include:

- Kandla port, located in Gujarat, is one of the major ports on the west coast. It is one of the largest ports in terms of the volume of cargo handled. In the first half of FY17, Kandla port handled a total cargo of over 53.9 million tonnes.
- Jawaharlal Nehru Port, also known as Nhava Sheva, is one of the largest container ports in India and is situated in Mumbai, Maharashtra. It accounts for nearly half of total container volumes handled at India's 12 public ports and nearly 40% of the nation's overall containerised trade through waterways. During April -September of 2016 (first half of FY17), JNPT handled a total cargo of 30.8 million tonnes.
- Mumbai port, earlier known as Bombay port, is situated in Mumbai, Maharashtra. This port is used for bulk cargo. In first half of FY17, Mumbai port handled a total cargo of over 30.8 million tonnes.
- Chennai port is amongst the largest and oldest ports in India. It is considered as a large hub for cargo traffic, cars, large containers at the east coast of India. It is also known for its coastal breakwater, artificial, large seaport type of harbour. In the first half of FY'17, Kandla port handled a total cargo of over 25.8 million tonnes.

Key product categories

- **Highest export volume**: Cereals (12.9 MT), iron and steel products (11.6 MT), textiles & garments (6.6 MT), sugars and sugar confectionery (3.6 MT) and plastic products (2.9 MT).
- **Highest import volume**: Iron and steel products (21.2 MT), animal & vegetable fats & oils (15.1 MT), plastic products (6.7 MT), edible vegetables, roots & tubers (5.5 MT) and pulp of wood/other fibrous material (4.4 MT).

The port logistics sector is primarily dependent on the container volume handled at the Indian ports. According to industry experts, Indian ports have witnessed a modest CAGR of 4% in terms of container movement during 2011-2016 on account of a slower global economic growth.

- **Airport:** Air freight logistics accounts for around 1% share in the total logistics segment in India and nearly 4 MMT of freight tonnage is transported per annum through air. In 2016, the air freight traffic witnessed a CAGR growth of 7.3% and 2.9% over a period of three (2013-16) and five years (2011-16) respectively. According to the industry estimates, the Indian air freight market is expected to grow at a CAGR of around 12.5% and reach US$ 3.4 billion in 2020 from US$ 2 billion in 2016. The growth is expected to come from the growing number of private airlines entering into the logistics space coupled with the lower turnaround time needed for delivery.
- **Express logistics:** Express delivery is a premium segment of the logistics industry in India which provides logistics services for movement of time perceptive shipments. Under this, multi-modal logistics services are provided, creating an integrated logistics platform including both air and surface. The express industry fine-tunes the logistics process for time-bound deliveries of shipments across domestic and international regions. According to industry experts, India's express segment has witnessed a CAGR growth of 15-20% during 2010-15 and reached US$ 3 billion (Rs 20,346 crore) in 2015. Surface express (land transportation) has been and is expected to have the largest share in the express logistics market with Delhi, Maharashtra and Bengaluru taking large market share in India. Express logistics industry is fragmented with a large number of small and medium-sized players operating with local and regional networks. Document shipments constitute the largest share (69%) by volume whereas, non-document shipments (64%) share is higher in terms of value. The domestic market contributes to a larger share of the industry as compared to the international market. Key players offering express logistics services are Gati, Safexpress, Blue Dart, TCI XPS and SpotOn.
- **Inland Waterways:** India has an extensive network of inland waterways which comprise of rivers, canals, backwaters and creeks. The total navigable length of inland waterways is 14,500 km, out of which rivers comprise of 5,200 km and 4,000 km of canals. Inland water transport costs around Rs. 0.6 a kilometre compared to transportation by rail which is around Rs. 1 per kilometre and road at around Rs. 1.50. Despite the cost effectiveness, as of 2016, freight transportation by waterways is under-utilised in India compared to other large countries such as the United States, China and the European Union. In 2015-2016, the total cargo moved by the inland waterways in India was just 0.1% of the total inland traffic in India, compared to the 21% for US.

Warehousing: The warehousing services include container freight stations, inland container depots, cold storage etc. According to industry experts, India's demand for warehousing space is expected to grow to 839 million sq. ft. by 2020 from 621 million sq. ft. in 2016. Hence, there is an additional annual demand for warehousing space of 54 million sq. ft. over the next four years (2017-20). The manufacturing sector requires an additional 42 million sq. ft. of space every year, followed by brick and mortar retail stores (8 million sq. ft. space). The National Capital Region, Mumbai and Hyderabad are amongst the top locations with a demand for warehousing space.

The inland container depots (ICDs) and container freight stations (CFSs) provide both exporters and importers with storage and warehousing facilities during the movement of containerised goods from and to the ports. The container market in India witnessed over 5% of y-o-y growth in FY16 with combined traffic handled to the tune of 12.53 million twenty foot equivalent unit (TEU) compared to 11.9 million TEUs in FY'15.

- **Container freight stations (CFS):** Container freight station is a facility for consolidation of cargo for containerised goods under custom supervision with warehousing and specialised storage. Jawaharlal Nehru Port Trust (JNPT) is India's first container port with various options for Container Freight Stations. As of FY'16, JNPT had over 30 CFS facilities and Chennai port has around 32 registered CFSs in its vicinity.
- **Inland container depot (ICDs):** Inland container depots are dry ports capable of handling and temporary storage of containerised cargo. An ICD in India is generally situated in the hinterland, unlike a CFS which is in proximity to the port (an off-dock facility). Inland depots have been gaining popularity as many shippers/importers are dependent on direct movement of cargo to the ports where the cargo would be loaded/unloaded before moving to/from the final destination.

  As of May 2015, there were 221 operational CFS/ICDs in India with an additional 39 CFS/ICDs under implementation, out of which most are CFSs located closer to the ports. Between FY16 and FY17, CFS volume has increased from 274,000 to 282,000 TEU, representing a CFS utilisation increase from 57% to 58%. Of the total operational/under construction terminals, around 49 are in Maharashtra alone and 43 of these are located in the vicinity of Jawaharlal Nehru Port Trust (JNPT) port. The CFS/ICD infrastructure in India is clustered in western, southern and northern regions with Tamil Nadu, Maharashtra and Gujarat contributing to over 24%, 19% and 13% respectively.

Container Corporation of India is the largest player which operates through a network of 66 ICDs/CFSs in India. The company operates its largest Inland Container Depot at Dadri which is spread over 110 hectares as compared to ICD Tughlakabad' with 42 hectares. Gateway Distriparks Limited is amongst the largest players offering CFS services in the country.

- **Cold chain:** Cold chain includes the transportation of perishables such as dairy products, fruits, vegetable, meat and other products through thermal and refrigerated packaging methods. The cold chain sector in India is a combination of surface storage and refrigerated transport. Logistics providers in India transport cold chain products through refrigerated trucks and railcars, refrigerated cargo ships and air cargo. As of FY 2015-16, over 100 million metric tons of perishable products were transported between various cities of India. Out of this, nearly 95% of perishable products were transported through non–reefer trucks and less than 5% through reefer vans. More than two-third of the reefer vehicles are used for milk and milk products transportation. Also the refrigerated storage (reefer trucks) market in India is expected to grow at a CAGR of 15% in the next 5 years (2016-2021) in terms of number of trucks. As of 2016, meat and fish cold storage had the largest revenue share in the entire cold storage market in India followed by the dairy cold storage and pharma cold storage segments.

  As of 2016, the cold chain market is largely unorganised, with nearly 8-10% of the cold chain industry revenue generated from organised players. There are over 3,500 players offering cold chain-related services in the unorganised sector and nearly 30 players are a part of the organised sector. As of 2016, there were 6,300 cold storage facilities unevenly spread across India, with an estimated installed capacity of 30.11 million MT. Majority of these are used for storing potatoes. Over 95% of the total cold storage capacity is being owned and managed by the private players. Uttar Pradesh and West Bengal are top states in terms of number of storage facilities. Over 60% of the cold storage facilities are located in Uttar Pradesh and West Bengal. The cold chain market has grown at a CAGR of 20% in 2014, 2015, 2016 and is estimated to reach US$ 13 billion by 2017.

- **Agri-warehousing:** The term agri-warehousing pertains to an organised setup and is run by government organisations like Food Corporation of India, Central Warehousing Corporation (CWC) etc. According to industry estimates, agri-warehousing accounts for nearly 15% of the warehousing market in India (108 million MT in FY'15). Agri-warehousing capacity in India has been growing at a CAGR of 8–10% over 2010-15 and was estimated at 130 million MT in FY'16. Agri-product exports from India have been growing at an annual rate of around 20% (fruit and vegetables being the key categories) propelling growth in demand for high-quality warehousing. In addition, the Government of India has decided to improve agri-warehousing infrastructure to reduce agricultural wastage. It announced ~35 million MT additional capacity under the Twelfth Five-Year Plan (2012-17).

Freight forwarding: India is expected to witness a considerable growth in freight forwarding businesses considering growing economic activities and increased international trade. It is expected that the freight forwarding market in India will grow at a CAGR of 12% and reach US$ 31.5 billion by 2020 from the estimated level of US$ 20 billion in 2016. The pharmaceuticals industry will be one of the main drivers of demand for freight forwarding services. Indian freight forwarding companies have been diversifying into the fast-growing logistics business from their traditional activities.

Value added services: There are a number of value added logistics services such as customised packaging, kitting, labelling, temperature controlled logistics, cash management services and other time definite deliveries etc. that are offered in India. These value-added services complement and enhance warehousing, transportation, and logistics offerings.

Private participation in Indian logistics and transportation sector

Indian logistics sector offers significant investment opportunities across segments and a number of leading international logistic players including FedEx, UPS supply chain, DHL, Kintetsu World Express etc. have established their presence in the Indian market through green field projects, JVs and acquisitions. The logistics sector in India witnessed an unprecedented interest among global and domestic investors in the last few years. With government policy initiatives such as allowing 100% FDI in warehousing and food storage facilities under automatic routes (where manufacturers can sell their products online directly) and approval of some zones to be tax-free (i.e. free trade warehousing zones) have increased the attractiveness of the sector for foreign investors. As a result, segments such as agriculture logistics, cold chain logistics and warehousing are the key categories that have received higher attention from a wide range of investors including private equity.

Some major private equity investments (FY'15 and FY'16) in the logistics sector

Private Equity	Target	Segments	Deal value (Rs. crore)
Warburg Pincus	Ecom Express	Logistics solution provider	850
Warburg Pincus	Embassy group	Warehouse	650
Tiger Global Management	Delhivery	Logistics solution provider	542
Asia Climate Partners	Cold Ex	Cold chain logistics	250
Mandela Capital	GATI	Cold chain logistics	120
Creation Investment & Everstone Capital	Agri-logistics firm	Warehouse management	100

Source: Industry report

Outsourcing in the logistics sector

With the changing market dynamics, a large number of businesses are looking at outsourced solutions related to their warehousing and transportation requirement with the use of 3PL method (third party logistics providers). External parties provide specialisation in logistics and transportation and help with better cost and time efficiencies. As of 2016, businesses in India outsourced an estimated 52% of their logistical requirements. 3PLs constitutes around 1% of the total logistics cost. As of now, 3PL activity is limited to a few industries such as retail, FMCG, pharma, automotive, telecom and infrastructure equipment etc. Organised players offering outsourcing logistic services account for nearly 10% of the total outsourced logistics industry. In the outsourced warehousing segment, 92% of players are from the unorganised sector. The 3PL market in India is at a nascent stage, however, it is expected that the market will reach US$ 7.5 billion by 2019, registering a CAGR of 25% during 2015-19.

The critical reasons for preference towards outsourced logistics include:

- Better focus on core competencies and cost savings from better management of supply chain
- Wider and better geographical coverage by access to specialist capabilities
- Improved re-engineering benefits and lesser internal resources

The 3PL companies have been focusing on technological upgradation to engage with the clients and making a pathway for fourth-party logistics (4PL), which is emerging in India. In the 4PL model, a company outsources its supply chain management operations to two or more firms and appoints another specialist firm (the fourth party) to coordinate the activities of the third parties. Key players offering 3PL services are Allcargo Logistics, Gati Ltd, DTDC Ltd and Gateway Distriparks Ltd etc. Key players offering 4PL services are DHL, UPS, FedEx, TCI Supply Chain etc.

Key infrastructure projects

As of June 2016, India's logistics cost was around 18%, which is higher than China at around 8-12% and Europe at 12%. The government is working on reducing logistics costs with the help of better transport infrastructure. Select projects to achieve the same include:

- **Dedicated freight corridors (DFCs):** To improve the connectivity and trade linkages between states, the government decided to have dedicated freight corridors. DFCs are being implemented in the Eastern and Western corridor, and will see a major boost for cargo movement in India. The Eastern DFC has a combined route length of 1,856 km and consists of two distinct segments i.e. an electrified double-track segment of 1,409 km between Dankuni in West Bengal & Khurja in Uttar Pradesh and an electrified single-track segment of 447 km between Ludhiana (Dhandarikalan) - Khurja - Dadri in the state of Punjab, Haryana and Uttar Pradesh. The Western DFC covers a distance of 1,504 km of double line electric track. The Western Corridor passes through 5 states such as: Haryana, Rajasthan, Gujarat, Maharashtra and Uttar Pradesh. As of January 2017, The Dedicated Freight Corridor Corporation of India Limited has already awarded 83% and 100% of the Eastern DFC and Western DFC civil contracts respectively. Also, 37% of the total development of both DFCs has been achieved in terms of physical progress.
- **Dedicated cargo airport:** With the growing demand for quick logistics services in India, the Government of India is planning to consider a proposal to set up dedicated cargo airports in the country starting with Telangana and UP, Telangana aims to have a dedicated cargo airport to be built in northern Hyderabad whereas Uttar Pradesh is looking at government approval to construct a cargo airport in the western part of the state.
- **Port modernisation and upgradation:** The government has been working towards modernisation and upgradation of the existing Indian ports. The scheme aims to boost the country's GDP by 2%. For this project, the Sagarmala project, following mega ports are planned:

  a) West Bengal - Sagar Island

  b) Gujarat - Wadhwan

  c) Tamil Nadu - Colachel

  d) Andhra Pradesh - Machilipatnam

  e) Karnataka - Tadadi.

  As of February 2017, a total of 199 projects with an outlay of over Rs. 3 lakh crore have been identified for implementation in the next three years (2017-2020) under the Sagarmala programme. Of these, projects worth more than Rs 1 lakh crore are already under implementation. According to industry estimates, the project will boost merchandise exports to about US$ 110 billion by 2025.
- **Logistics parks:** Logistics parks facilitate domestic and foreign trade by providing services including warehousing, cold storage, multi-modal transport facilities and ICD/CFS. Key factors that differentiate a logistics park from a typical ICD/CFS/warehouse are value added services such as cross-docking, customisation, stacking and labelling. The government announced a project Logistics Efficiency Enhancement Programme (LEEP) in 2016 with an objective to improve overall transport and logistics efficiency and reduce cost as much as 10% through IT intervention. The total project will involve construction of a total of 4,800 acre of logistic parks across India in the first phase. The government has shortlisted 15 locations with the highest freight movement for the development of multi-modal logistics parks. The shortlisted locations are Maharashtra, Punjab, Gujarat, Rajasthan, Tamil Nadu, Karnataka and Telangana.

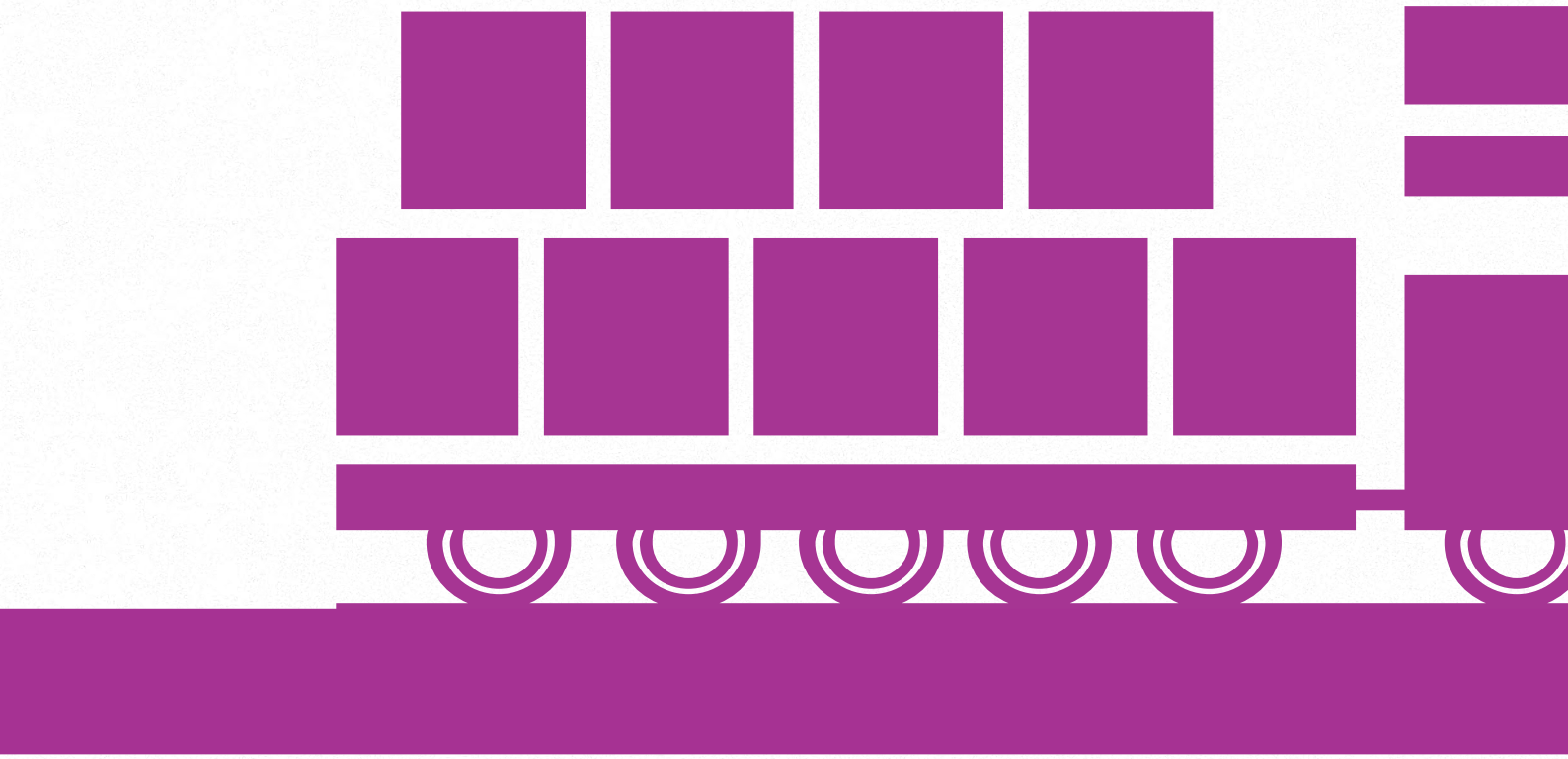
As of March 2017, the Indian government is working on formulating an integrated, multi-modal logistics and transport policy which will further reduce the logistics costs by nearly half, making Indian products more competitive. The integrated policy would include construction of 50 economic corridors, 35 multi-modal logistics parks to improve freight aggregation and distribution, multi-modal transportation, storage and warehousing and value added services. In the 2015 budget, the National Waterways Bill 2015 was approved which aimed at developing 101 inland waterways in the country to ease the burden of roads and railways and reduce the overall logistics cost of transportation.

Growth drivers

Economic growth: The growth prospects of the logistics sector are directly dependent on Indian economic growth and its foreign trade. India has witnessed robust GDP growth in recent years, having grown at a CAGR of 7.6% during 2011-2016. The logistics sector has witnessed an average growth of 1.2 to 1.5 times of India's GDP growth during the same period. The growing emphasis on infrastructure development, increasing public investments across sectors and growing economic activities are key drivers and provide impetus to Indian logistics sector.

Investment in logistics infrastructure: Of late, the government has been focusing on building transport infrastructure which will drive the growth of the Indian logistics sector. The government has significantly increased the investment allocated for the development of logistics infrastructure. In the 2017 Union Budget, the Government of India has allocated Rs 2.4 trillion for the development and maintenance of the transport sector as a whole, including railways, road and shipping. The government has undertaken various infrastructure projects such as development of highways, railways, rural roads, revival of unused airstrips and airports, port modernisation and port automation, development of multi-modal logistics parks and dedicated freight corridors.

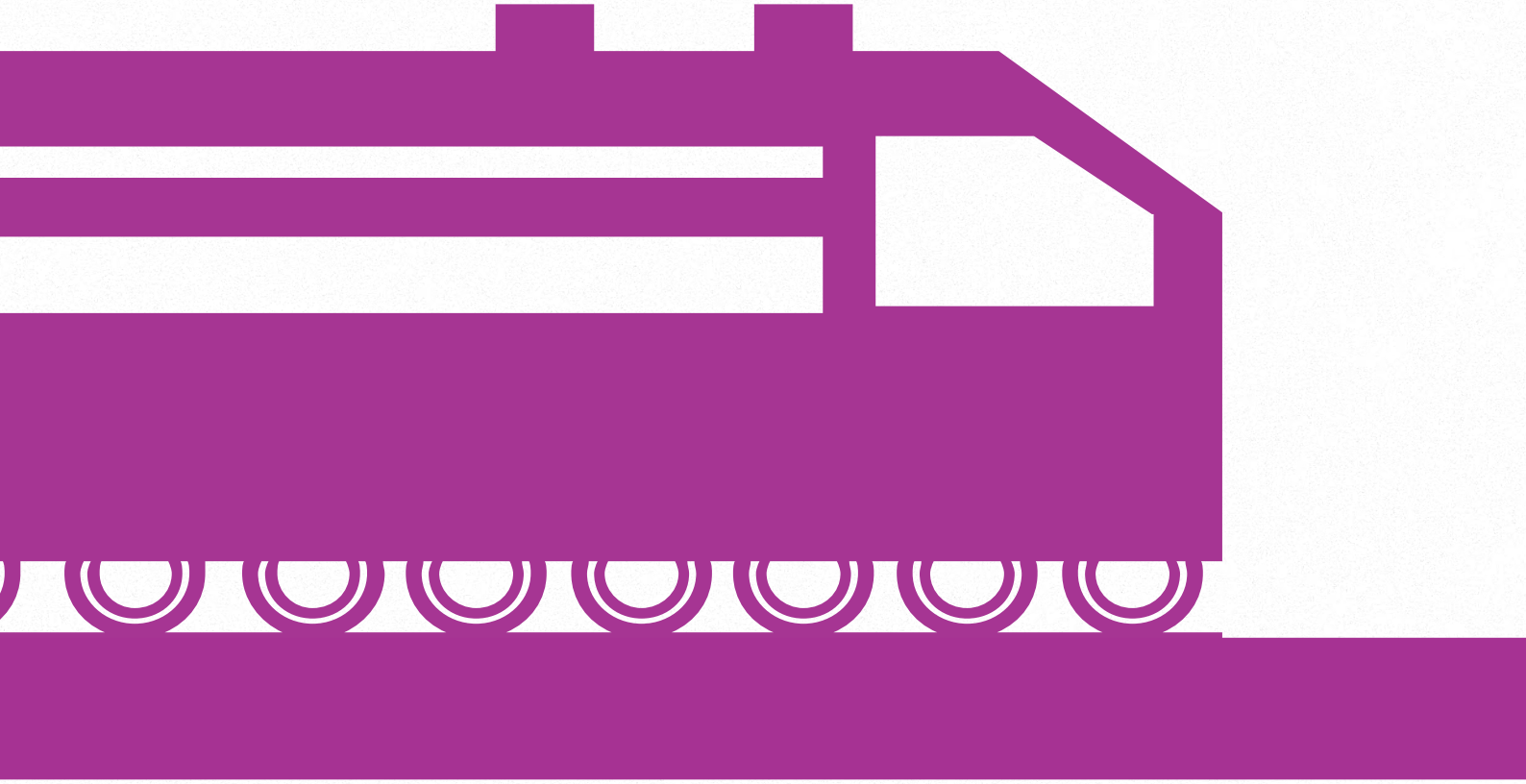
Private sector participation: The government has taken several measures to encourage private sector participation in the logistics industry across all modes. These measures include tax exemptions and duty free imports etc. The Government of India has also allowed private investments and public-private partnership (PPP) in container rail segment and transport infrastructure which has promoted the interests of various international players to make investments in the Indian logistics sector.



Export-import growth: The logistics sector plays an important role in export and import of goods and services. India's exports as a percentage of GDP stood at around 19.2% and imports as a percentage of GDP were at 20.6% in 2016. The growing foreign trade of India with other Asian countries, Europe, and North America remains a key driver for freight forwarding and transportation companies.

Technological implementation: Introduction of IT and ICT in logistics has changed logistics and transportation processes and has improved supply chain efficiencies. The use of transportation management systems, unmanned aerial vehicles and robotics etc, are changing the logistics landscape in the country. There are growing numbers of logistics providers focusing on RFID (Radio-frequency identification) and Automatic Identification and Data Capture (AIDC) based technologies for improving the order fulfilment process. AIDC is being used to provide real-time insight into a shipment location, estimated time of delivery, explanation of delayed delivery etc. Bluetooth technology enables logistics providers to enhance logistics tracking and processing. These technologies are helping logistics industry in delivering quality services to their customer.

Growth of e-commerce: Logistics is a key enabler for growth of the e-commerce businesses and is increasingly emerging as a differentiator in terms of customer service and satisfaction. Major e-commerce companies including Flipkart, Amazon etc. have invested in building their logistics networks and capability, and are driving the growth of logistics sector in the country. India's e-commerce market is expected to grow at a CAGR of 44% and reach US$ 75 billion by 2020, from US$ 30 billion in 2016. The growth of e-commerce businesses will drive the demand for logistics services. According to industry experts, the logistics sector's exposure to e-commerce businesses in India is estimated at US$ 0.5 billion in 2016 and is projected to witness a CAGR of 48% and reach US$ 2.2 billion by 2020.



Conclusion

The long-term outlook of the Indian logistics industry is favourable on implementation of the GST, successful commissioning of infrastructure projects under road, railways and ports, increase in private sector participation and adoption to global standards of tracking and tracing mechanisms. International trade with Asia, Europe, and North America is likely to remain a major driver for freight forwarding and transportation companies in the region. The Government of India's initiatives to promote the manufacturing sector and exports are likely to increase the demand for logistics services in the country. In the 2017 Union Budget, the government allocated Rs 2.4 trillion for the development and maintenance of transport sector as a whole. The investments made by public and private sectors in infrastructure, technology upgrades and expansion of sea and airport facilities, and dedicated logistics corridors are expected to strengthen the Indian logistics infrastructure.

The growing e-commerce market in India is offering new opportunities to third party logistics. The demand for logistics services will increase further on account of increase in domestic and international trade. Other factors that will contribute to the growth of the logistics sector are growing penetration of e-commerce players into hyper-local delivery formats and increasing demand for express logistics services in the country. Goods and Services Tax (GST) is likely to completely change the distribution structure of majority of industries. GST, with its standard tax structure allows corporations to avoid building a warehouse in different states to adhere to each state's tax code. A company can have a large mother warehouse at critical points and appoint logistics companies to manage distribution and supply chains. It is expected that this will lead to development of new or expanded logistics hubs in different regions. The new tax regime will result in greater adoption of a hub-and-spoke model in multiple sub segments including warehousing, cold chain, container freight stations etc. It is further expected that there will be an improvement in the logistics operational efficiency through quicker and increased number of deliveries. According to World Bank, corporates can save up to 30-40% of logistic costs incurred due to enhancement in operational efficiency through fast and increased deliveries of goods. Overall, GST is a win-win situation for every entity involved in the supply chain in the country. GST will make domestic products more competitive at global level and will provide impetus to various flagship campaigns such as "Make in India" and "Digital India." According to industry experts, the GST is expected to boost the country's GDP by 1.5-2% and growth of exports by 10-14% by 2019-20. On the whole, GST promises to provide sustainable competitive advantage to India and help achieve higher growth.

Expert perspective

Mr. Sushil Sethi Jain,
MD, SPML Infra

"India is undergoing a major transition towards urbanisation and in the next two decades almost 50% of India's population will be living in cities. Developing smart and intelligent infrastructure will be the key challenge of urbanisation as billions of dollars will be required to build smart cities which will have facilities for clean drinking water, integrated sewerage and waste management network, uninterrupted power supply, efficient transportation system, affordable housing, better health and education facilities, sustainable urban environment, high speed internet and advanced communication technologies. These cities will attract investments and become the growth engines of the Indian economy to contribute 75% of India's GDP by 2030, setting in motion a virtuous cycle of economic growth and development. The Government of India has initiated the development of 100 smart cities to develop and upgrade the infrastructure and facilities with a dedicated fund allocation of Rs 48,000 crore. The AMRUT scheme for 500 towns and cities to develop infrastructure for drinking water, sanitation, and transport is another ambitious plan. The sanitation sector also received attention and the much acclaimed Swachh Bharat Mission (SBM) is being implemented with a dedicated budget. These schemes together with other development programs will boost the economic growth of the country.

The focus of the last decade was to build physical infrastructure such as roads, rail and telephones, whereas the new cities are being defined by integrated information and communication technologies. In the last decade, 31% of India's population were living in urban areas and contributing about 63% in India's GDP, whereas it is estimated that by 2030, almost 41% of India's population would be living in urban areas contributing 75% towards GDP. There is an imperative need to rejuvenate and revitalise India's existing towns and cities and create new smart cities to sustain the demand of urbanisation. The internet and communication platforms will become the foundation for developing future cities. All vital public services such as utilities, transportation, security, education, communication and healthcare would leverage on the network platform for service delivery. In future, all services, things and entities will be connected, be more intelligent, and green for greater collaboration, productivity, and economic growth.

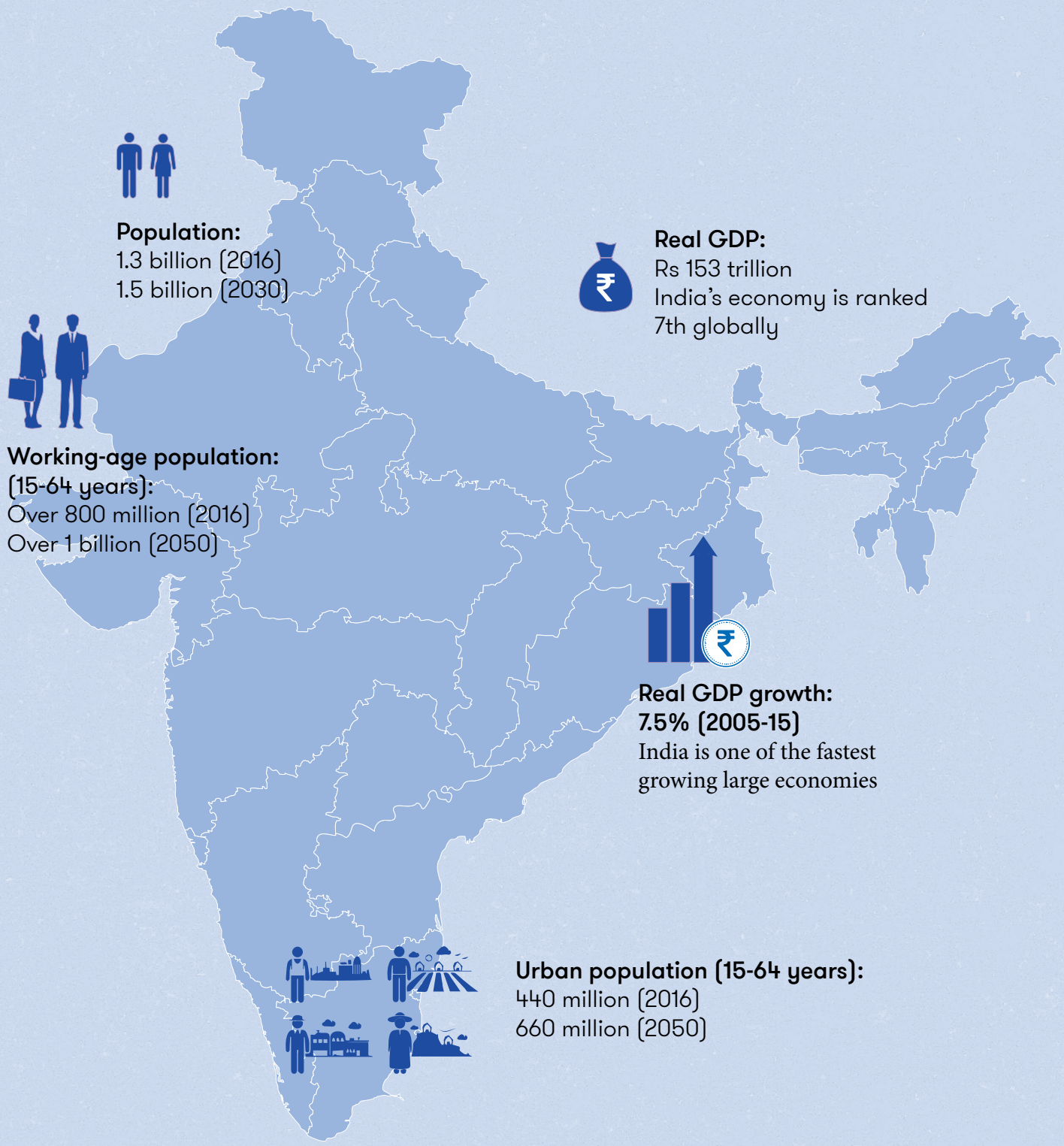
While India is a late starter in urbanisation process, it has significant advantages of being able to use technology to leapfrog stages of development and learn from good practices adopted by other countries. The renewed optimism about urban infrastructure development is clearly visible with the government looking serious about it and the conducive environment being created with a number of reforms. The growing emphasis on infrastructure development is in line with the growth plans that the government has fixed. Easing of the investment mechanism and availability of funds and other resources for ensuring efficient project management in time are in focus now. Application of smart IT solutions will enable cities to use technology, information and data to improve infrastructure and services.

We expect that the sector will gain momentum this year and coming years when new policies of land acquisition and environment clearances will become faster and smoother than before and funds will be available for large infrastructure development projects. The government has initiated specific reforms to encourage private sector partnership in urban development programs that will accelerate growth. The demonetization scheme has helped banks to accumulate large amount of surplus cash that will be used for financing of infrastructure projects.

The best part is that the government has stepped in with clear mandates and proposed investment over the next five years in several new schemes that will see the healthy growth of urban infrastructure. Innovation is being planned, implemented, deployed and leveraged in different sectors including water management, power distribution, sophisticated systems for traffic management, tracking movement of garbage disposal trucks, smart and reliable communication infrastructure among others. Going ahead, the sector is poised to rebound with new opportunities."

Preparing for an increasingly urban future

Urban areas are the anchor development centres and activity hubs for transportation, employment, housing, economic growth as well as industrial development, among others. Every nation comprises of urban and rural areas, however, their relative share would differ. The urbanisation rate for a nation depends on its level of economic development. India had an urbanisation rate of over 33% in 2016 and the urban areas contributed approximately 63% to the country's economic output. The country has been opening its doors to private and international investors to generate employment opportunities. As a result, growing numbers from the rural population are looking at urban areas for better employment opportunities and life style options. Therefore, it is expected that the urban population in India shall cross 40% and its contribution to the overall GDP would be around 75% by 2030. To cater to the growing urban population, the Government of India has been working towards building its infrastructure and focusing on ways to provide adequate resources such as water, electricity, waste management, transportation, social institutions such as schools, hospitals, banks etc in a more broad-based manner. The ongoing broad demographic transformation and India's young population shall drive the way forward for urbanisation in the country. On the other hand, urban centres are likely to play a pivotal role towards economic and sustainable growth.


Population:
1.3 billion (2016)
1.5 billion (2030)
Real GDP:
Rs 153 trillion
India's economy is ranked
7th globally
Working-age population:
(15-64 years):
Over 800 million (2016)
Over 1 billion (2050)
Real GDP growth:
7.5% (2005-15)
India is one of the fastest
growing large economies
Urban population (15-64 years):
440 million (2016)
660 million (2050)

Future vision – Smart cities

India's population is expected to increase to 1.5 billion by 2030 from the current 1.3 billion. The rural-urban migration in India is on the rise due to better job opportunities and lifestyle and urban population is projected to increase to 600 million in 2050 from the current 440 million. The growing urban population, rural-urban migration and enhanced pressure on the existing cities/infrastructure to accommodate the growing population (with the limited resource availability) globally requires new paradigms to be developed to make these cities sustainable and livable. Thus, the concept of smart city was coined.

There is no universally accepted definition of a smart city. The concept of a smart city depends on the level of development, willingness to change and reform, resources and aspirations of the city residents. Urban planners are looking at developing the entire urban ecosystem i.e. the comprehensive development of institutional, physical, social and economic infrastructure. The objective of the 'smart city' in concept is to promote cities that provide core infrastructure and give a decent quality of life to their citizens, a clean and sustainable environment and application of 'Smart' Solutions.

Various components of smart urbanisation

Energy Management
- Smart Meters & Management
- Renewable Source of Energy
- Energy Efficient & Green Buildings

Urban Mobility
- Smart Parking
- Intelligent Traffic Management
- Integrated Multi-Modal Transport

E-governance and citizen services
- Public Information & Grievance Redressal
- Electronic Service Delivery
- Citizen Engagement
- Citizens – City's Eyes and Ears
- Video Crime Monitoring

Waste Management
- Waste to Energy & Fuel
- Waste to Compost
- Waste Water to be Treated
- Recycling and Reduction of C&D Waste

Water Management
- Smart Meters & Management
- Leakage Identification, Preventive Maintenance
- Water Quality Monitoring

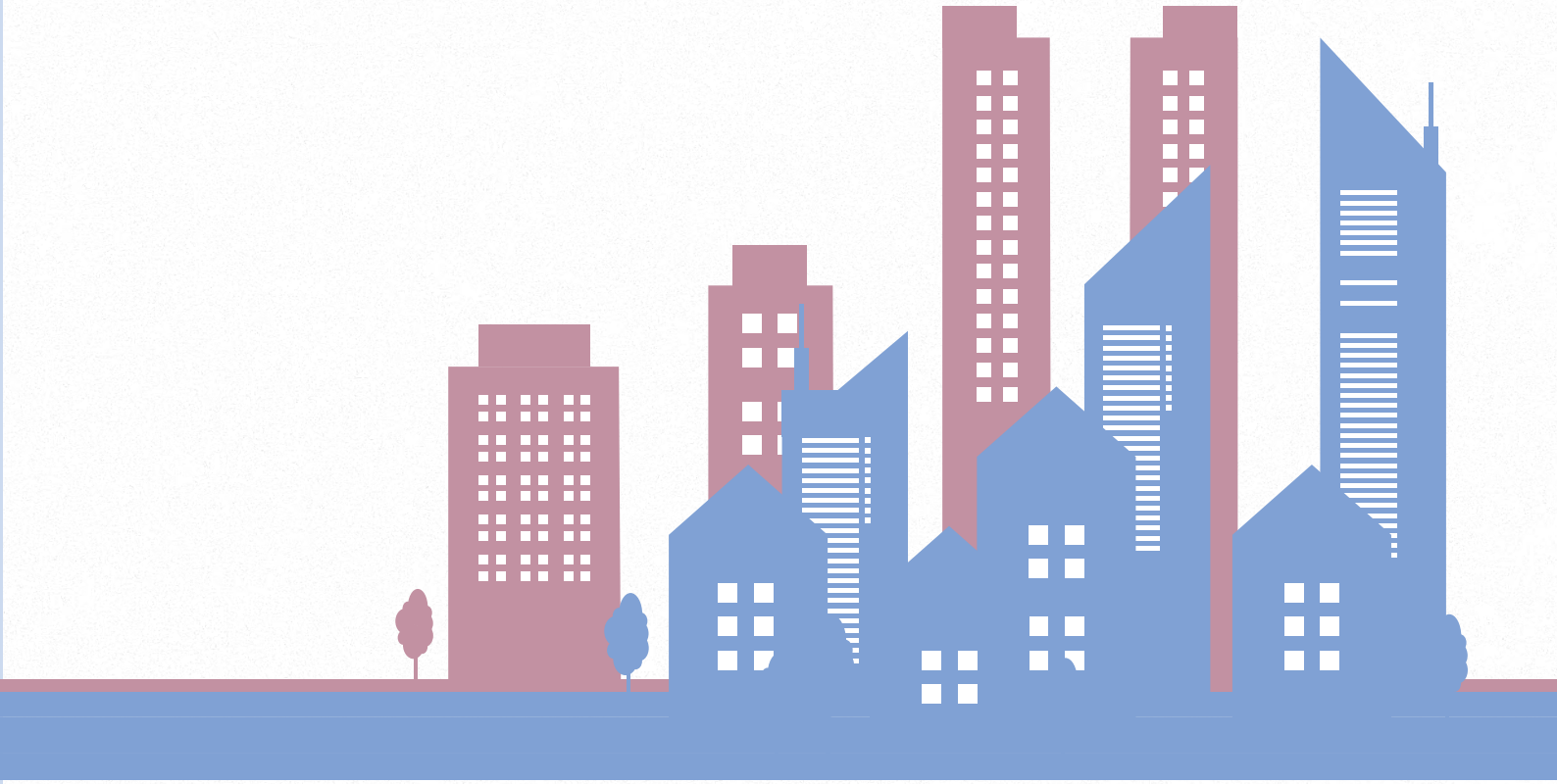
Current key trends in India

Smart Cities - The Smart Cities Mission, launched in June 2015, includes creation of 100 smart cities within an overall duration of five years i.e. FY 2015-16 to FY 2019-20. Smart city focuses on the opportunity to improve citizen's lives through the adoption of different approaches e.g. the use of information technology, importance of urban planning and construction through public-private partnership, etc. As of December 2016, the government had shortlisted a list of 60 cities to be included in the first and second phase of the Smart Cities Mission. The total proposed investment for these 60 shortlisted cities would be around US$ 22 billion.

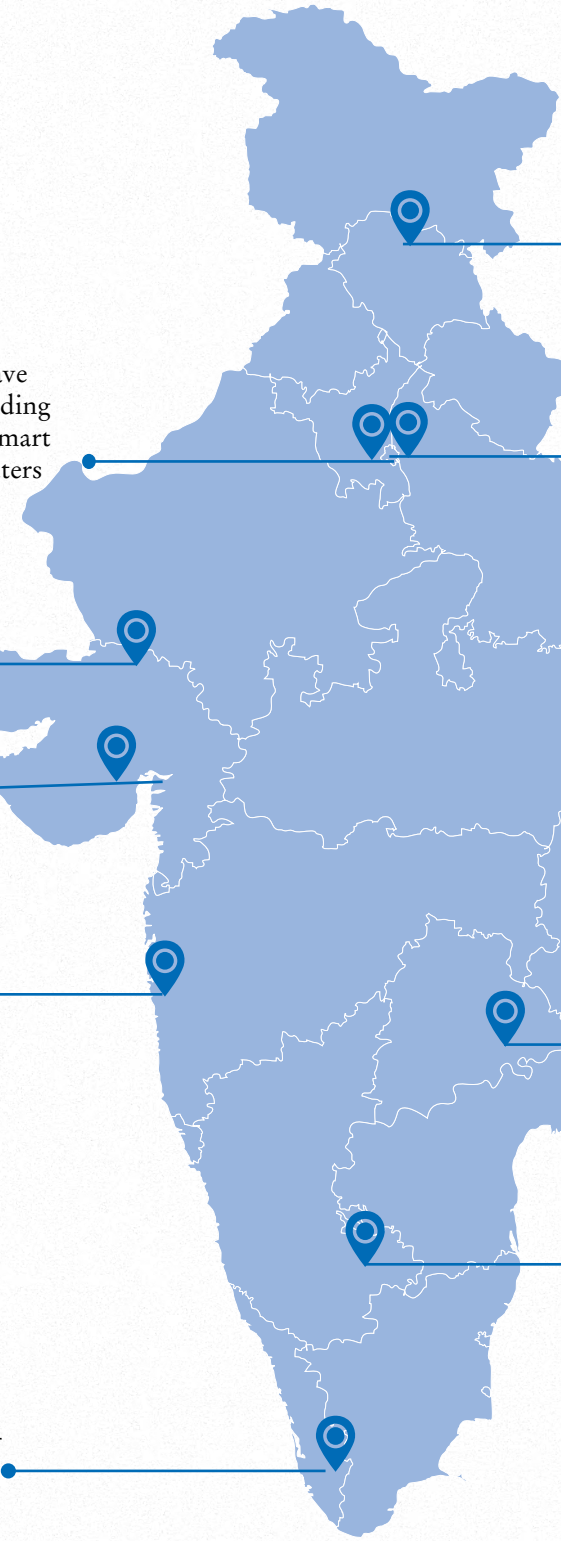
The implementation will be done by a special purpose vehicle (SPV) created for the purpose. The SPV will plan, appraise, approve, release funds, implement, manage, operate, monitor and evaluate the development. Each smart city will have a SPV which will be headed by a full time CEO and have nominees of the central government, state government and Urban Local Bodies on its Board. The states/ULBs will ensure that:

(a) A dedicated and substantial revenue stream is made available to the SPV so as to make it self-sustainable and evolve its own credit worthiness for raising additional resources from the market

(b) The government's contribution for smart cities is used only to create infrastructure with public benefit outcomes.



Some smart city projects in progress/on the anvil



Greater Noida city, a part of NCR region, has been looking at ways to have smart street lighting solutions by setting up smart poles in the city. According to a senior official at Greater Noida Industrial Development Authority, smart poles would be mounted with LED lights, CCTV cameras and Wi-Fi routers etc.

Sewage Treatment Plant (STP) in Ahmedabad uses Supervisory Control & Data Acquisition (SCADA) system. It is India's first STP with PLC (Programmable Logic Controller) Supervisory Control and Data Acquisition (SCADA) system with auto operation. The STP is capable of generating about 1.2. MW electricity by providing additional biogas engine system, which is self-sufficient to make the STP "energy-free".

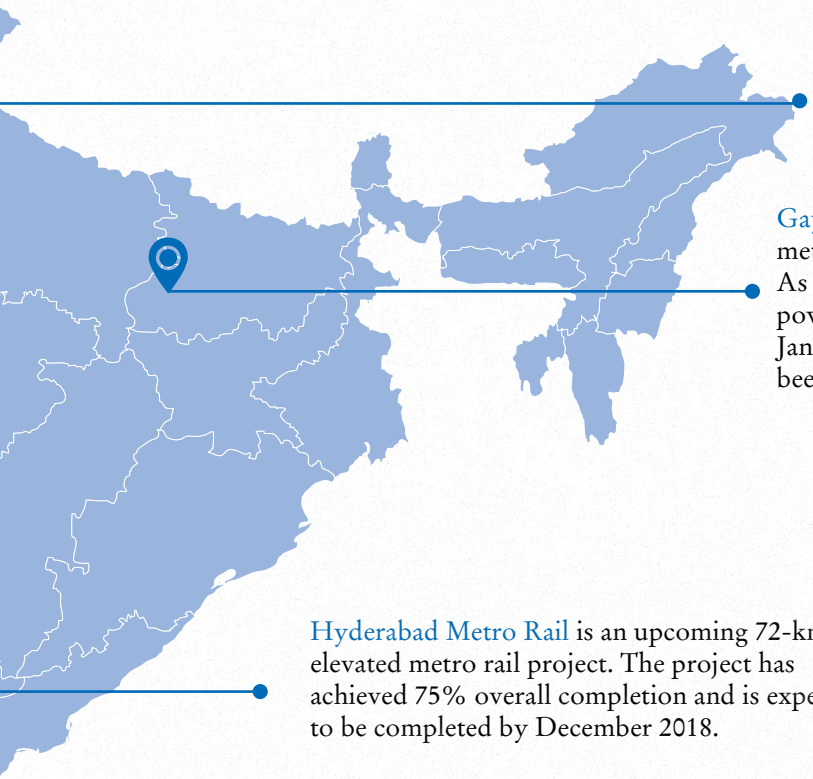
The Government of Gujarat has decided to develop a Mass Rapid Transit System network from Ahmedabad to Dholera. The project will provide connectivity to DSIR (Dholera Special Investment Region) from the greenfield international airport at Dholera

As of November 2016, Delhi Mumbai Industrial Corridor Development Corporation has planned a number of Mass Rapid Transit System (MRTS) projects across the DMIC (Delhi Mumbai Industrial Corridor). These projects will connect existing and/or proposed airports and will provide faster regional connectivity.

Smart City Kochi is an upcoming knowledge-based business township which is spread across a **network of 246 acres.** The project is expected to be completed by 2020 and the estimated cost of construction is close to **Rs. 20.7 billion.**

Dharamshala is the first planned smart city of the state of Himachal Pradesh, which would have a 12-km passenger unibus skyway system covering "Dharamshala and McLeodganj".

Tata Power Delhi is installing smart meters for all residential consumers in the city. In addition, BSES, a power distributor in Delhi, is also planning to move to smart meters for over 3.5 million customers.



Gaya, in Bihar, has started installing smart electric meters in residential premises
As of August 2016, there were nearly one lakh power consumers in Gaya town, and by early January 2017, the first set of 100 smart meters had been installed.

Hyderabad Metro Rail is an upcoming 72-km elevated metro rail project. The project has achieved 75% overall completion and is expected to be completed by December 2018.

In December 2014, the Government of Karnataka launched a multi mode mobile governance platform called MobileOne. It caters to various types of services including G2C, B2C and G2B. It is a one-stop shop for all state government services related to utility, banking, healthcare, transport, telecom, municipal, travel, taxation, agriculture (free SMS alerts on prices of commodities in different markets, ICT solutions across the entire agri-value chain, access to knowledge about which fertilizers and pesticides to use), and other services. As of February 2016, total hits on MobileOne (all channels) were 2.1 crore, while there have been 60 lakh calls on the IVRs.

Atal Mission for Rejuvenation and Urban Transformation Mission (AMRUT)

In June 2015, the Government of India launched another city development programme called "AMRUT" mission with the objective of providing basic services such as water supply, sewerage, urban transport to urban households which will improve the quality of life for all. The mission covers 500 cities across states in India. Some examples of projects as below:

- In November 2016, the Ministry of Urban Development planned to invest Rs 58.2 billion in the states of Gujarat, Rajasthan, Punjab, Bihar and Tripura for the period of 2017-2020. The committee has started giving its go ahead to projects across water supply, sewerage networks etc for the next three financial years.
- In November 2016, the government has approved projects to increase the current drinking water supply in Nagpur, Chandrapur, Amravati and Akola with a total estimated cost of Rs 6.8 billion.
- AMRUT will be operated as a centrally sponsored scheme with the total investment planned for the mission being Rs 500 billion for five years from FY 2015-16 to FY 2019-20. The below mentioned table indicates the amount of funds approved by the Central Government to state governments.

Allocation - 2016-17	Rs. billion
Uttar Pradesh	18.8
Tamil Nadu	18.0
Maharashtra	14.4
Madhya Pradesh	10.6
Karnataka	9.5
Gujarat	9.1
Rajasthan	5.6
Bihar	4.5
Chhattisgarh	4.2
Andhra Pradesh	4.0

Source: Secondary sources

Allocation - 2016-17	Rs. billion
Odisha	3.0
Jharkhand	2.6
Uttarakhand	2.2
Jammu & Kashmir	2.0
Himachal Pradesh	1.0
Mizoram	0.5
Goa	0.4
Chandigarh	0.2
Total allocation	110.7

Source: Secondary sources

Affordable Housing in Partnership

In September 2015, the Government of India gave the go ahead to a scheme called "Affordable Housing in Partnership" with the objective of increasing stock of affordable housing in the country. Under this scheme, a total of 21 projects have been sanctioned for development of 24,141 housing units in three states, namely Karnataka, Gujarat and Rajasthan through the public-private partnership route. Gujarat has got 10 of these approved projects.

Progress report AHP scheme as on July 10, 2017

States	Project cost (Rs. million)	Houses (Sanctioned)	Houses (Completed)	Houses (In-Progress)	Houses (Not started)
Gujarat	11,670.8	17,373	14,895	1,707	771.0
Rajasthan	1,752.5	5,776	5,776	-	
Karnataka	560.7	992	704	288	
Total	13,984.0	24,141.0	21,375.0	1,995.0	771.0

Source: Secondary sources

Housing for ALL by 2022

In 2015, the Government of India launched its mission called "Housing for All by 2022" with an overall objective of providing a) housing for slum dwellers with participation of private developers using land as a resource, b) promoting affordable housing for weaker sections through credit-linked subsidy, c) focusing on partnership with public & private sector for affordable housing and d) providing subsidy for house construction or enhancement. Some developments in this regard are as follows:

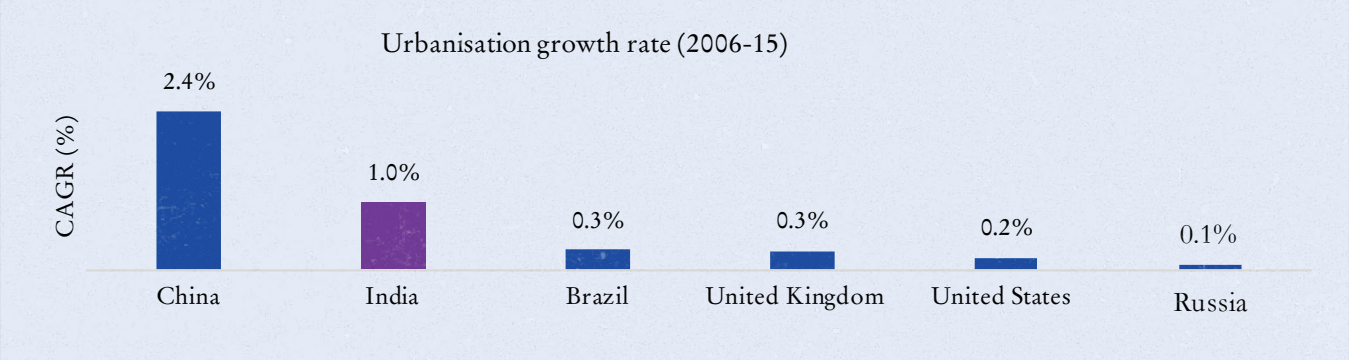
- In April 2016, the government gave its go ahead to construct 10 million houses during the period of 2016-19 under the scheme of 'Housing for All by 2022.
- In November 2016, Government of Maharashtra and Government of Canada entered into an agreement wherein Canadian Pension Funds would invest US$ 2 billion in affordable housing projects in Mumbai. The Government of Maharashtra has a target to provide 11 lakh affordable housing in the next five years (2017-21).
- In April 2016, the Ministry of Housing & Urban Poverty Alleviation approved an investment of Rs 90 billion for the construction of 73,205 houses for the economically weaker sections in urban areas of Maharashtra, Punjab and Jammu & Kashmir. The construction is expected to be completed by the end of 2022.
- In August 2016, the government also approved 37,013 houses for the urban poor in the states of Karnataka and Haryana with an investment of Rs 15 billion. The construction is expected to be completed by the end of 2022.

Other key developments

- The Government of India together with the Government of UK will be working towards strengthening the clean energy, climate change and smart city initiatives. The Government of UK will help India in conducting joint research (£ 10 million investment), development and deployment of clean technology, renewables and nuclear initiatives. In addition, the UK will provide its expertise in developing India's smart cities infrastructure.
- In November 2016, Cisco Systems Inc. has committed to work with various state governments to transform 14 cities and plans to further connect 100 cities. Cisco has been working closely with its Indian partners to make this happen. In addition, the company also announced the availability of its new advanced security software suites: Threat Defense for Data Centre, Threat Defense for WAN and Edge and Policy and Threat Defense for Access for India.
- In May 2015, IBM India decided to help three cities i.e. Surat, Allahabad and Visakhapatnam with waste management, disaster management and citizen services. IBM will help these cities in transforming into smart cities. IBM shortlisted Allahabad and Visakhapatnam to provide smart solutions, and later added Surat to the list.
- In February 2017, Pune Smart City Development Corporation shortlisted Google, IBM, Larsen & Toubro (L&T) and RailTel for the development of citywide wi-fi network. Google will deploy its Google station platform which has wi-fi network management capabilities. L&T will act as the system integrator of the project and RailTel will provide last mile fiber connectivity to enable wi-fi hotspots across the city.

Urbanisation in India

Urban agglomerations have been the main drivers and contributors towards economic development of a nation. Increased number of people are moving towards urban areas in search of better job opportunities, increased income levels and better lifestyle, etc. Therefore, the concept of urbanisation brings higher productivity and innovation for any nation. Urbanisation is considered as a driver of economic growth. For e.g. in 1950-51, the urban area contribution to India's GDP was ~29% that increased to 47% in 1980-81 and further to over 63% in 2016. Amongst the BRICS nations, in the last decade (2006-15), India has witnessed the second highest growth rate of urbanisation. According to the World Bank, the urbanisation rate in India has grown at a CAGR of 1% during 2006-15, followed by 0.3% in Brazil and 0.1% in Russia. China has seen the highest growth rate of 2.4% CAGR in terms of urbanisation. India had an urbanisation rate of over 33% in 2016 and the urban areas contribute approximately 63% to the country's economic output.



Source: World Bank

According to the World Bank, more than 80% of the global economic output is generated from urban areas. Therefore, the role of the urban population in the country's economic growth becomes vital. According to the World Urbanisation Prospects report, close to 66% of the world's total population will be living in the cities by 2050. As a result, more than 2.5 billion people globally are expected to move to urban areas by 2050. The urban population in India is expected to cross the 40% mark and its contribution to the overall GDP would be over 75% by 2030. There will be a growing need to house more and more people who are shifting to urban areas in the country, which would create huge demand for physical, social, institutional and economic infrastructure. With the increasing population in urban areas, it is important to focus on ways of improving and providing adequate infrastructure resources such as the following:

Water supply

Electricity

Waste management

Transportation

Social institutions such as schools, hospitals, banks etc.

Constituents of urban infrastructure and its current status

Housing: As per an estimate by Arthveda Fund Management (2017), India is required to develop 19 million urban houses in the low and mid-income category by 2022 to support the growing urban population in the country.

Urban transport: There are a number of cities with smart transportation options such as Bus Rapid Transit System (BRTS), Metro Rails and Mono rail etc.

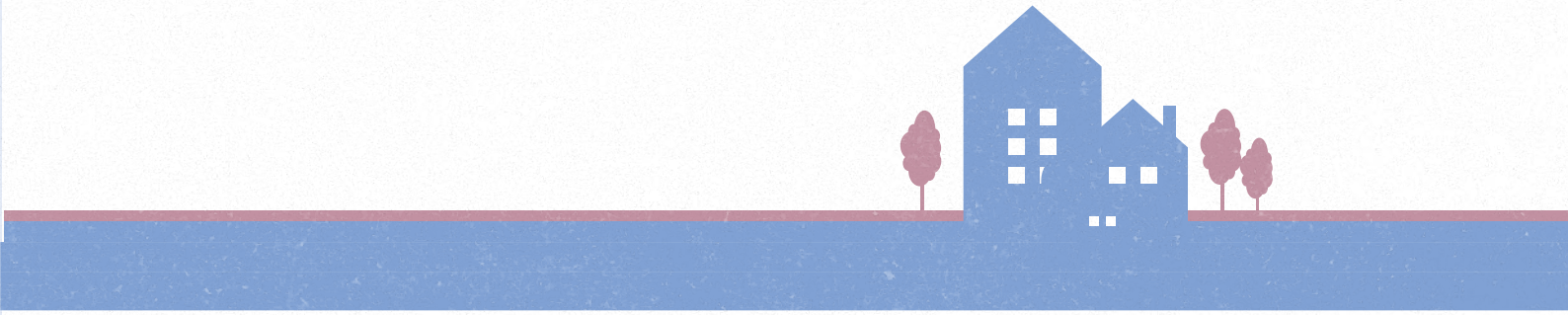
- As of February 2017, the country has metro rail/rapid transit facilities across key cities such as Delhi Metro (213 km) in Delhi & NCR, Kolkata Metro (27.2 km) in Kolkata, Namma Metro (43.2 km) in Bengaluru, Rapid Metro Rail (5.1 km) in Gurugram, Mumbai Metro (11.4 km) in the city of Mumbai, Jaipur Metro (9.63 km) in the city of Jaipur, Chennai Metro Rail corridors between Chennai Central to St. Thomas Mount (22 km) and between Washermanpet to Airport in Chennai (23.1 km) etc.
- The country has operational BRTS networks in Ahmedabad (nearly 89 km), Jaipur (8.5 km), Indore (11.7 km), Pune-Pimpri Chinchwad (22.5 km), Rajkot (10.5 km), Surat (60 km), Bhopal (24 km) and Visakhapatnam (40 km).
- The Indian Railways is looking at possibilities for high speed trains that can run at about 500 km per hour speed to improve its travel efficiency by reducing travel time. A special purpose entity "High Speed Rail Corporation of India Limited (HSRC)" was formed in 2012 for the development and implementation of high speed rail projects. In the Union Railway Budget of 2015-16, the government proposed an investment plan for the period 2015-19 and allocated Rs 650 billion for High Speed Rail & Elevated corridor to be constructed between Mumbai-Ahmedabad.

Water supply: Majority of the urban households have access to water supply, out of which close to 70% have their principal source of water within their premises and the remaining outside their premises.

Electricity: The country draws its power from a number of sources and a number of players are supplying power to Indian households. India witnessed a decline in its energy deficit to 0.7% (6.638 million units) in FY 2016-17 compared to 8.5% in FY 11. As of March 2016, India's per capita power sector consumption was nearly 940 kilo watt-hours. According to the Twelfth Five Year Plan, India is targeting to have an additional power generation capacity of 88.5 GW by the end of 2017. The total existing installed electricity capacity was about 329.23 GW by August 2017.

Sewage management: Majority of the urban areas are well connected in terms of sewerage connection. To further accommodate the growing urban population, the government is working towards effective sewage management. As of March 2016, according to the Central Pollution Control Board, India has an installed capacity to treat 30% of the excreta it generates. Two cities - Delhi and Mumbai - generate nearly 17% of the country's sewage and have 40% of the country's installed capacity.

Solid waste: Around 62 million tons of waste is generated annually in the country. Out of this 43 million tons per annum (TPA) is collected, of which 11.9 million TPA is treated and 31 million TPA is dumped in landfill sites. To use the existing waste for conversion to energy, the country has around 553 compost and vermi-compost plants, 56 bio-methanation plants, 22 Refuse Derived Fuels (RDF) plants and 13 waste-to-energy plants. However, it is important to note that the untapped waste has a potential of generating 439 MW of power from 32,890 tons per day (TPD) of combustible wastes including refuse derived Fuel (RDF), 1.3 million cubic metres of biogas per day, or 72 MW of electricity from biogas and 5.4 million metric tons of compost annually to support agriculture.



Key stakeholders and their roles & responsibilities

According to the Indian constitutional structure, the overall planning and decisions related to urban development have been assigned to the state governments. The Constitution's 73rd and 74th Amendment Acts have further delegated a number of these functions to the urban local bodies who are responsible for the urban infrastructure development in the country. There are various other government departments that are responsible for subject-specific development such as water, electricity etc.

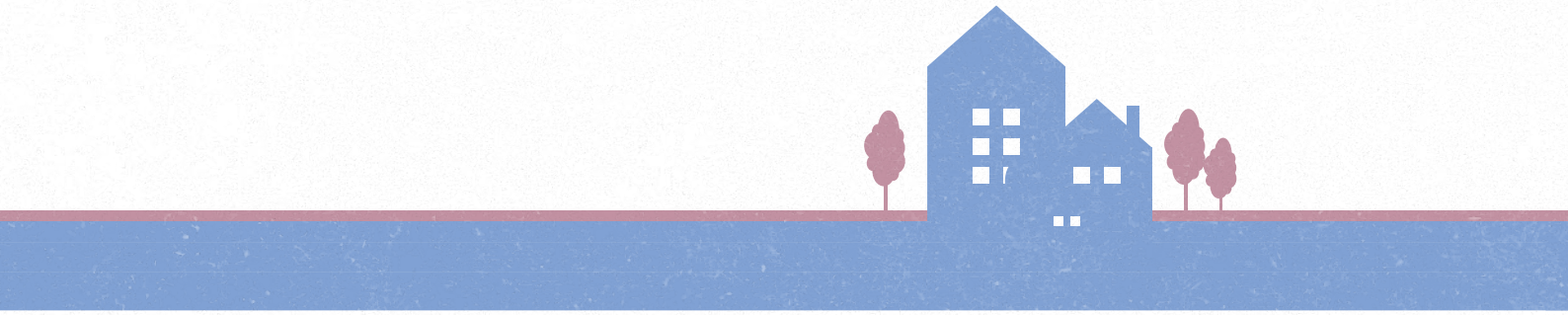
The Ministry of Urban Development is the apex body at the national level that is responsible for the formulation of policies, sponsoring and supporting various programmes, coordinating with various central ministries, state governments and other nodal authorities. In addition, the Ministry of Urban Development is also responsible for the overall monitoring of various projects concerning all the issues of urban development in the country.

Funding of urban infrastructure in India

Indian urban infrastructure including water supply, sewerage and transport requires huge amount of investment because of the size of the country and population. These projects are usually financed through budgetary provisions and borrowings from domestic and international funding agencies. Out of these agencies, HUDCO has been a major provider of long-term finance for housing and urban infrastructure. Over the last few years, the role of the private sector has been growing for a few urban infrastructure projects such as Tirupur water supply, and urban infrastructure projects in Nagpur, Hubli, Dharwad, Alandur and Gorai etc. The various key modes of funding available for urban development include:

- Central and State Finance Commission fund
- Pool finance development find
- State level infrastructure fund
- Bank and institutional fund
- Municipal bonds
- Public private partnership

According to the Ministry of Urban Development, an estimated investment of over Rs. 9.97 trillion (US$ 150 billion) is required for the development of all 100 smart cities. The government has allocated close to Rs 90 billion for the two schemes i.e. Smart Cities and AMRUT in the 2017-18 Budget estimates. As of May 2016, the total investment approved under Pradhan Mantri Awas Yojana (PMAY) program has reached to Rs 439.22 billion for the construction of 683,724 houses for the urban poor with total central assistance commitment of Rs 100.5 billion. According to the Government of India's High Powered Expert Committee (HPEC), nearly Rs. 42.6 trillion (US$ 640.2 billion) is required to be invested in urban infrastructure and services by 2031.



Smart urbanisation and its need

India's population is expected to increase to 1.5 billion by 2030 from 1.3 billion in 2016. The rural-urban migration in the country is on the rise due to better job opportunities and lifestyle; the urban population is projected to increase to 600 million in 2050 from the current 440 million. Indian urban areas which accommodated nearly 34% of its population in 2016, are expected to house over 40% of India's population by 2030.

The explosive population growth and dynamic shift in urban sprawl, coupled with the economic growth of mega cities in the emerging economies, will pose a variety of opportunities for companies operating in different sectors. This will also lead to the evolution of smart cities with eight smart features, including Smart Economy, Smart Buildings, Smart Mobility, Smart Energy, Smart Information Communication and Technology, Smart Planning, Smart Citizen and Smart Governance.

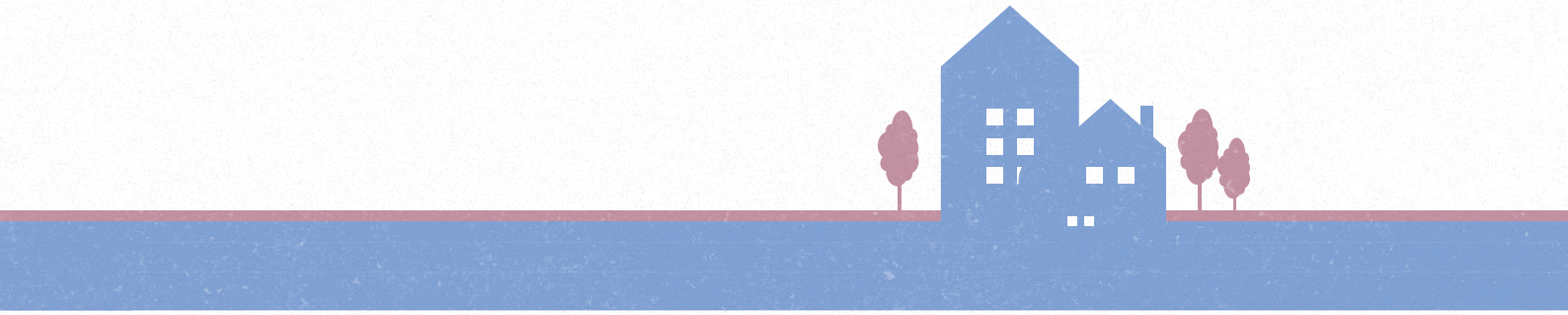
Given the current rate of growth of urban infrastructure and urbanisation in India, it is imperative to look into various options for service delivery. Smart urbanisation is the answer. The Smarter Planet concept (as coined by IBM) talks about innovative solutions for society such as intelligent transport systems, customer focused power and smart systems for managing water, healthcare, public safety and food. IBM introduced solutions such as smart grids, water management systems, traffic congestion solutions, greener buildings and many others. Later this concept gained global attention and many developed countries adopted smart solutions. A few of initiatives taken by some developed nations are mentioned below:

- **Norway:** The City of Oslo has installed a network of smart street lighting systems which helps in reducing energy consumption.
- **Singapore:** The country installed a number of cameras and sensors across the island to track everything from cleanliness to traffic under "Singapore's Smart Nation program" in 2014.
- **Spain:** The City of Barcelona has installed smart parking technology and smart streetlights & sensors to monitor air quality and noise
- **United Kingdom:** The City of London has taken smart parking initiatives in the Westminster neighborhood to address traffic situation.
- **United States:** The city of San Francisco had launched the SF Park initiative in 2011 and installed sensors and cameras that help someone to assess the level of occupancy for parking

> "Smart urbanisation includes the use of smart computing technology in building and managing essential infrastructure components and services such as administration, education, healthcare, real estate, transportation, utilities and safety."

The basic objective of smart urbanisation is to accommodate the growing population migrating to urban areas and provide them effective and efficient infrastructure solutions.

A number of initiatives have been taken in the past few years by the Government of India, which have led to development of better urban infrastructure. The government has realised that the change in urbanisation rate and urban infrastructure management will have to be addressed through change in the framework for governance and financing. In this direction, a number of initiatives have been taken by the Government of India during 2005-16, which include the following:



Jawaharlal Nehru National Urban Renewal Mission

A programme called "The Jawaharlal Nehru National Urban Renewal Mission " was launched by the Indian Government in December 2005 with the objective to encourage reforms and bring efficiency in urban infrastructure/services delivery mechanism, community participation and accountability of urban local bodies (ULBs)/Parastatal towards citizens. The objectives of the programme are mentioned below:

- Improvement in urban amenities including water supply, sanitation, storm drainage etc.
- Improvement of urban transport
- Improvement of city governance structure
- Addressing urban poverty
- Slum rehabilitation
- Encouragement PPP to attract private investment in urban sector
- Sustainability of cities

The Mission involved a total investment of Rs 1,000 billion in the Mission Cities, across a period of 7 years (2005-12), and aimed to leverage a similar amount from the states and cities. The focus of the programme was to develop state level infrastructure. The Government of India provided its support in developing 66 chosen urban areas. Under the programme, each city was supposed to submit a city development plan and a detailed project report for the proposed projects and GOI provided funds after evaluation.

The mission completed its normal tenure on March 31, 2012. Later the government extended the mission for a period of two years i.e. up to March 31, 2014 for completion of ongoing projects. The government sanctioned 539 UIG and 806 UIDSSMT projects in phase 1 (March 2005-March 2012), out of which 217 UIG and 413 UIDSSMT projects were completed at the end of November 2013. The remaining 322 UIG projects and 393 projects were in various stages of their development with Rs. 560 billion worth of physical works. Some examples of projects under JNNURM are as below:

- BRTS – Ahmedabad
- E-Governance initiatives in Kalyan Dombivli Municipal Corporation
- SCADA system in Pimpri Chinchwad Municipal Corporation (PCMC) for water supply
- Delhi - Disposal and treatment of municipal solid waste

Rajiv Awas Yojana (RAY) - 2011:

Another scheme named as "Rajiv Awas Yojana (RAY)" was launched by the Government of India in June 2011 in two phases (phase I - 2011-13, phase II – 2013-22) with an overall objective to make a "Slum Free India". In 2015, the government approved construction of 6.8 lakh affordable houses for the urban poor in 18 states with a total estimated investment of Rs 350 billion. The Government of India has already provided an assistance of Rs 36.3 billion for construction of houses under the three below mentioned segments of the mission:

1. Affordable Housing In Partnership – Construction of 124,642 houses
2. Beneficiary Led construction – Construction of 115,989 units
3. In-Situ Slum Redevelopment - 3,636 houses

Note - JNNURM was a reform driven, fast track programme to ensure planned development of identified cities with focus on efficiency in urban infrastructure/ service delivery mechanisms, and through community participation and enhanced accountability of ULBs/parastatal agencies towards citizens. JNNURM had two sub-missions - Sub-Mission on Urban Infrastructure and Governance (UIG), Sub-Mission on Basic Services for the Urban Poor (BSUP) and two sub schemes - Urban Infrastructure Development Scheme for Small and Medium Towns (UIDSSMT), Integrated Housing and Slum Development Programme (IHSDP). The Ministry of Urban Development (MoUD) was the nodal Ministry for the UIG Sub-Mission and UIDSSMT, while the Ministry of Housing and Urban Poverty Alleviation (MoHUPA) was the nodal Ministry for the BSUP Sub-Mission and IHSDP.

Recent key initiatives

A number of programmes such as "Smart Cities Mission", "Atal Mission for Rejuvenation and Urban Transformation (AMRUT)" and "Housing for All Mission" were launched by the Government of India with an overall agenda of proving physical, social, economic infrastructure to its urban population. The broader targets of the schemes are:

- **Smart Cities Mission:** Construction of 100 smart cities over the next five years (2015-2020)
- **AMRUT:** Development of 500 cities by 2020
- **Housing for All:** Construction of 20 million houses in urban areas by the end of 2022.

The Government of India will be investing Rs. 32 billion for the development of 100 smart cities across the country by 2020 and close to Rs 50 billion for AMRUT mission. According to an estimate, the construction of 100 smart cities would require a total investment of nearly Rs. 9,989 billion (US$ 150 billion). The remaining investment is expected to come from the private sector and fund raising from various sources (municipal bond issuance, borrowings from bilaterals and multilaterals, national investment and infrastructure fund etc.)

8.1. Smart Cities Mission

This is a flagship mission launched by the Indian Government in June 2015 to drive the country's overall economic growth and improve the quality of life of people through the integration of technology and infrastructure. Smart city focuses on the opportunities to improve citizens' lives through the adoption of different approaches such as the use of information technology, visionary urban planning and construction through public-private partnership. A smart city is poised to provide smart solutions that are efficient, affordable and self-sustainable to people at large. The core infrastructure elements of a smart city would include:

- Adequate water supply
- Assured electricity supply
- Sanitation, including solid waste management
- Efficient urban mobility and public transport
- Affordable housing, especially for the poor
- Robust connectivity and digitalization
- Good governance, especially e-governance and citizen participation
- Sustainable environment
- Safety and security of citizens, particularly women, children and the elderly
- Health and education

India already has a few smart cities under various phases of development. The list includes Kochi Smart City, Gujarat International Finance Tec-City (GIFT) in Ahmedabad, Naya Raipur in Chhattisgarh, Lavasa in Maharashtra and Wave Infratech's smart city near New Delhi. Recognising the high pace of urbanisation and movement of its citizens from smaller towns and villages to cities, India will be required to have more than 500 new smart cities to accommodate the influx in its urban areas. This thrust for smart cities will have a multi-layered impact on the growth of other sectors. According to industry estimates, smart city projects are expected to create 10-15% growth in employment. Smart cities will enable the following benefits to India:

- Enhancement of GDP
- Generation of employment opportunities
- Improved quality of life in urban areas
- Reduction in the migration rate
- Increased foreign direct investment (FDI)

Below mentioned are four models of area-based smart city development:

- Retrofitting: Under this, an area of over 500 acres will be identified by the city in consultation with citizens. Depending on the existing level of infrastructure services in the identified area and the vision of the residents, the cities will prepare their strategies to become smart.
- Redevelopment: This envisages an area of over 50 acres, identified by ULBs in consultation with citizens. A new layout plan of the identified area will be prepared with mixed land-use, higher FSI and high ground coverage.
- Greenfield: This includes development of smart solutions in a vacant area (over 250 acres) using innovative planning, plan financing and plan implementation tools (e.g. land pooling/land reconstitution). This type of development is required around cities to address the needs of the increasing population.
- Pan-city development: It includes application of smart solutions (using technology, information and data) to the existing city-wide infrastructure. For example, intelligent traffic management system, waste water recycling and smart metering etc.

The Smart Cities Mission covers 100 cities and the expected duration of completion is five years (2016-2020). The government has shortlisted a list of 60 cities to be included in the first and second phase of the Smart Cities Mission. The total proposed investment for these 60 shortlisted cities would be around US$ 22 billion.

In the first phase of development, the government has decided to have 33 smart cities. In September 2016, the government approved a list of another 27 new cities which will be included in the second phase of the Smart Cities Mission. An investment of around US$ 10 billion has been planned for 27 new cities.

8.1.1. Components of smart cities

Smart transportation

The smart city concept encompasses a variety of components which could include buildings, environment, security, transportation, etc. We discuss the developments in two such components in detail below:

- The Government of Karnataka came up with its Traffic Transit Management Centre (TTMC) constructed in Hassan city. Later such TTMCs were constructed across various cities of the state. These centres serve as platforms for buses commuting to various places within 40 km radius of the city. The centre consists of various facilities such as a parking lot for vehicles (two-wheelers and four-wheelers), office blocks, waiting areas, restrooms, cloakrooms, first-aid facilities, shops and kiosks.
- Ahmedabad BRTS, operated by Ahmedabad Janmarg, is a bus rapid transit operating in the city of Ahmedabad, Gujarat. The service was launched in October 2009 under the JNNURM project. The total network was expanded to 89 km with 157 bus stations and 250 buses with daily ridership of nearly 140,000 passengers.
- Mumbai Monorail was built as part of an expansion of public transport in the city and it was launched for the public in February 2014. As of April 2016, the monorail service was making over 130 trips every day, carrying more than 16,000 people daily. Another phase of Mumbai Monorail (phase-II) is expected to be completed in 2017 and will add another 10.3 km of length to its current 8.9 km network.
- The Delhi Metro Rail Corporation operates as a world-class Mass Rapid Transport System in the city. The Delhi Metro network consists of about 213 km with 160 stations along with six more stations of the Airport Express Link. The network is now beyond the boundaries of Delhi reaching to Noida and Ghaziabad in Uttar Pradesh and Gurugram and Faridabad in Haryana. As of December 2016, the DMRC had 216 trains with a combination of four, six and eight coaches.
- New Delhi got its first multi-level automated car parking in 2011. The automatic system saves customers' time spent in searching for empty parking slots and searching for their own parked cars. New Delhi got its second multi-level automated car parking in 2012.
- The city is planning to have smart parking lots where the customer will be able to pay fare using their mobile phones and get the availability of parking space displayed on their mobile phones.
- As of October 2015, the Bilaspur Municipal Corporation announced plans to introduce a smart parking system through issuance of smart cards. The city of Lucknow is also planning to add smart parking solutions including digital display of the number of vacant parking slots and fares at parking entrance. In July 2017, it was decided to convert all LMC and LDA parking lots to smart parking in Kaiserbagh, which has been selected for development under the Smart City project.
- In February 2016, Chennai-based startup Ather Energy launched the first made in India smart electric scooter. The vehicle is powered by a lithium-ion battery pack and charges up to 80% in less than an hour. There are other players such as Ampere Vehicles Pvt Ltd, Hero Ultra, Yo Bikes, ACE Motors and Eko Vehicles who are also selling electric scooter or electric bikes in the country.
- The Government of India launched 'FAME India (Faster Adoption and Manufacturing of Hybrid) and Electric Vehicles in India' in 2015 as part of the National Electric Mobility Mission Plan (NEMMP). The NEMMP and FAME aim to have 6-7 million electric vehicles on the Indian roads by 2020. The government is aiming to make the country, a 100% electric vehicle nation by 2030.

Smart Energy

India has been working towards building a smart nation consisting of cities offering smart and innovative solutions at affordable prices. The overall objective is to ensure efficient distribution of electricity and other utilities for citizens and industries. The government has decided to provide all time power support to its citizens by FY 2020. The larger share of the power generated will comprise of renewable energy. India is moving towards the adoption of smart grid technology in order to bring efficient utilisation of the generation, transmission and distribution resources of the country. The government launched National Smart Grid Mission (NSGM) in May 2015. This is an institutional mechanism for planning, monitoring and implementation of policies and programmes related to Smart Grid activities in the country.

- The government has decided to invest a total of Rs 980 crore for the NSGM activities under the 12th Five Year Plan. More than 90% of the investment is planned for the development of smart grids in smart cities under the Smart Grid Mission.
- In August 2016, the National Smart Grid Mission launched its first programme to train utility personnel in smart grid components and applications. The United States Agency for International Development Agency will conduct a series of training programmes aimed at building the capacity and skills of utility personnel to develop India's Smart Grid infrastructure. The government is targeting to train 10% of its utility personnel from 14 Indian state utilities in smart grid functions.
- According to an industry study report, India is expected to invest a total of US$ 44.9 billion in large scale smart grid infrastructure projects over the period of 2017-2027.

India is considered as one of the largest emerging nations in terms of type of innovation. A number of states have already started generating energy from combustible, organic or biodegradable waste. Rapid urbanisation and increased industrial activities have resulted into huge amount of waste in the country. As a result, India generates close to 1.5 lakh tons of municipal solid waste per day from the urban areas. A number of states are generating energy through waste-to-energy (WTE) plants. As of January 2016, nearly 23% of municipal waste i.e. residential and commercial waste produced in a day is processed for electricity generation. For instance:

- Delhi has an operational WTE plant in Okhla which uses the method of direct combustion of MSW (municipal solid waste) and produces 16 MW/day of power with an input of 1,350 TDP of waste. The plant works on the model of public-private partnership and is operated by Jindal Urban Infrastructure Limited.
- Another plant in Ghazipur, Delhi has started operations in December 2016. The plant is set up by IL&FS Environment on a public-private partnership mode. The plant has been operational on a trial basis. The plant can produce 12MW/day power with the input volume of 1,300 TPD of waste. The plant has a capacity of taking up to 2,000 TPD.
- A WTE plant at Narela-Bawana is under construction and is expected to produce 12MW/day power with 600 TPD waste. The North Delhi Municipal Corporation (NDMC) has collaborated with private partner Ramky Solid Waste Management Solutions for this project.
- In May 2016, Essel Infra announced the successful commissioning of WTE plant in Jabalpur. The plant generates 11.5 MW energy by recycling 600 tons of municipal solid waste per day and is expected to reduce over 37,000 tons of carbon emission for Jabalpur annually.

As of November 2016, there were total of 53 waste-to-energy projects at different stages of construction/tendering with a proposed capacity of 405.3 MW of energy. Five projects with 66.5 MW capacity were operational/under trial run, taking the aggregate capacity to 471.8 MW. In addition, the government is planning to make it mandatory for power distribution companies to buy 100% of electricity generated from municipal solid waste. The government has already promised to offer 20% grant for solid waste management projects under the Swachh Bharat Mission.

The country is moving towards the adoption of communication-enabled smart meters. The smart meter consumers are not required to register complaints as these smart meters automatically send signals to the main server. The government has centrally procured smart meters at a unit cost of Rs 3,223 to go for only such meters in the future. As of March 2016, India had 200 million legacy meters and the government plans to install up to 130 million smart meters by 2021. Some of the initiatives are as follows:

8.1.2. Foreign partnerships

The Indian government has been welcoming foreign investors and developers for the development of its 100 smart cities. It has signed a few deals with international players to build these smart cities. A few of the select partnerships have been listed below:

France: The Government of France is helping India in the development of three smart city projects with special focus on Chandigarh, Nagpur and Puducherry. They have committed to invest a total of over € 2 billion for the development.

Germany: The German government has partnered with India in the development of three smart cities - Kochi, Bhubaneswar and Coimbatore. In 2015, Germany had assured for a total investment of over € 1.5 billion in the development of smart solutions across sustainable urban mobility, water and waste-water management, renewable energies and energy efficiency etc.

Internet of Things (IoT) would be playing a key role in development of smart solutions as it connects communication devices with non-living things such as vehicles, buildings and other items through software, sensors, actuators and network connectivity. IoT brings together smart solutions in the field of sanitation, transportation, healthcare and energy etc. It is expected that IoT will be able to connect more than 2.7 billion devices by 2020 and the industry in India shall reach US$ 15 billion by 2020. Private IT companies such as Sterlite Technologies and Aeris India are investing in resources towards building network infrastructure with the aim of linking intelligence and information with devices.

- Sterlite is currently working for building internet network capacities and systems in two smart cities - Jaipur and Gandhinagar.
- Aeris Communications India currently is working on smart city projects for network infrastructure building by leveraging IoT technology.

United Kingdom: The UK Government plans to provide financial assistance of £ 4.5 million over a period of four years (2016-2020). The UK government would also assist the Indian government in the development of three smart cities - Pune, Indore and Amravati - through technical assistance and skill sharing with various business partnerships.

United States: The US government has signed a partnership agreement for the development of three smart cities - Ajmer, Allahabad and Visakhapatnam. It would provide financial assistance for the feasibility studies and pilots, study tours, workshops/trainings and other types of project support.

According to the Ministry of Urban Development, an estimated investment of over US$ 150 billion is required for the development of all 100 smart cities. The government has taken a number of initiatives to promote inflow of private and international capital. It has allowed 100% foreign direct investment to operate and manage projects like townships, malls, shopping complexes and business centres under the automatic rule. In addition, the government has also allowed transfer of ownership and/or control of the investee company from the residents to the non-residents. However, there would be a lock-in-period of three years, calculated with the reference of each tranche of FDI, and transfer of immovable property or part thereof is not permitted during this period. According to the DIPP, construction development, including townships, housing and built-up infrastructure has received a total equity inflow of Rs 7.0 billion in 2015-16 and Rs 46.5 billion in 2014-15. This amount is expected to rise significantly.

8.1.3. Technology infrastructure

Given that smart cities are required to utilise the internet and digital technology including WiFi-internet infrastructure, various service providers and over-the-top content providers are planning to invest heavily in city-wide WiFi networks which will be the backbone for smart city services. For example,

- In 2016, Reliance Jio has decided to make investments to roll out WiFi services across over 50 cities
- In November 2017, Tata Communications announced plans to invest US$ 100 million in the IoT space. It also plans to expand its Tata Communications will also expand its low-power wide-area network (LPWAN), which is used to map smart city applications and urban planning at a low bit rate.
- Bharat Sanchar Nigam Ltd (BSNL) plans to set up 1 lakh WiFi hotspots by 2019, out of which 25,000 will be in rural areas.
- Facebook launched its Express WiFi services in May 2017 after beta testing for 18 months across 700 hotspots in Gujarat, Uttarakhand, Rajasthan and Meghalaya.
- In September 2016, Google announced a new project called "Google Station" which aims to bring high-speed internet to WiFi hotspots in the country. The company has been working on free public WiFi at Indian railway stations in partnership with RailTel. As of December 2016, internet WiFi services were active at 100 stations, providing internet services to 10 million people traveling through these stations every day.

8.2. Atal Mission for Rejuvenation and Urban Transformation mission (AMRUT)

In June 2015, another city development programme called "AMRUT" mission was launched by the Government of India with an objective of providing basic services such as water supply, sewerage, urban transport to urban households which will improve the quality of life for all. The mission covers 500 cities across India. The objectives of AMRUT mission are as follows:

- Provide access to every household of efficient water supply and a sewerage connection.
- Development of greenery and well maintained open spaces e.g. parks, gardens etc.
- Reduction in city level pollution by switching to public transport and non-motorised transport e.g. walking and cycling.

In November 2016, the Ministry of Urban Development decided to invest Rs 58.2 billion in the states of Gujarat, Rajasthan, Punjab, Bihar and Tripura during 2017-2020. The Ministry of Urban Development has started giving its go ahead to projects across water supply, sewerage networks etc. The government has also approved projects to increase the current drinking water supply in Nagpur, Chandrapur, Amravati and Akola with a total estimated cost of Rs 6.8 billion. In August 2016, the Government of Karnataka got an approval for 487 non-AC low-floor buses that are equipped with security network systems and ramps for people with disabilities. These buses will operate in 13 towns and cities.

AMRUT budget by state/UT (2017-20)

State	No. of Municipalities	Amount approved (Rs. crore)
Madhya Pradesh	34	7,201
Gujarat	31	4,884
West Bengal	60	4,035
Rajasthan	29	3,223
Andhra Pradesh	33	2,890
Punjab	16	2,767
Bihar	27	2,469
Odisha	9	1,599
Jammu & Kashmir	5	593
Goa	1	80
Tripura	1	64
Mizoram	1	140
Chandigarh	1	85

Source: Times of India, Ministry of Urban Development

8.3. Pradhan Mantri Awas Yojana (Urban) - Housing for ALL by 2022

In 2015, the Indian Government launched a mission called "Housing for All by 2022" with an overall objective of providing a) housing for slum residents with participation of private developers using land as a resource, b) promoting affordable housing for weaker section through credit linked subsidy, c) focusing on partnership with public & private sectors for affordable housing and d) providing subsidy for house construction or enhancement.

The PMAY (Urban) scheme also provides various credit linked and interest subsidy benefits to the economically weaker sections:

- Under its slum rehabilitation programme, the government will offer a central grant of an average of Rs 1 lakh per house.
- Economically weaker category will be receiving a central assistance of Rs 1.5 lakh per house under the affordable housing in partnership, beneficiary led house construction or enhancement.
- Economically weaker sections/lower income groups will be given interest subsidy of 6.5% on housing loans taken for up-to a tenure of 15 years.

The program has a technology sub-mission under which it emphasises on the adoption of modern, innovative and green technologies and building material for faster and quality construction of houses. This sub mission will coordinate with a number of regulatory and administrative bodies for streamlining and up scaling deployment of modern construction technologies and material. As of May 2016, the total investment approved under PMAY programme had reached to Rs 439.22 billion for construction of 683,724 houses for urban poor with total central assistance commitment of Rs 100.50 billion. The program has a technology sub-mission under which it emphasises on the adoption of modern, innovative and green technologies and building material for faster and quality construction of houses. This sub mission will coordinate with a number of regulatory and administrative bodies for streamlining and up scaling deployment of modern construction technologies and material. As of May 2016, the total investment approved under PMAY programme had reached to Rs 439.22 billion for construction of 683,724 houses for urban poor with total central assistance commitment of Rs 100.50 billion.

8.4. Affordable Housing in Partnership:

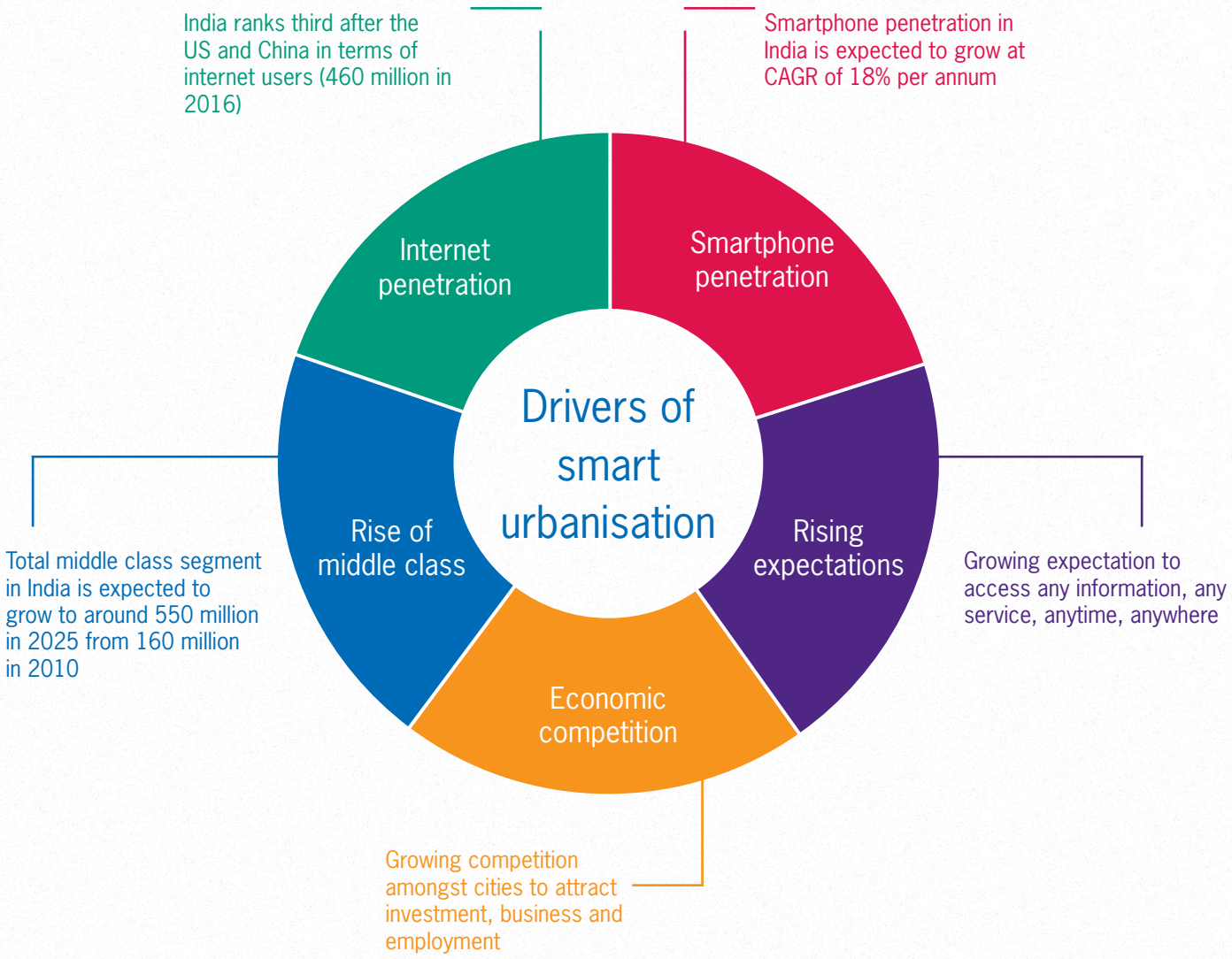
In September 2015, the Indian Government gave its go ahead to a scheme called "Affordable Housing in Partnership" as part of RAY program. The objective of the scheme is to increase stock of affordable housing. Under Affordable Housing in Partnership scheme, a total of 21 projects have been sanctioned for development of 24,141 housing units in three states - Karnataka, Gujarat and Rajasthan through the public-private partnership route. Gujarat has got 10 of these approved projects.

In 2015, the government had approved construction of 6.8 lakh affordable housing for the urban poor in 18 states with a total estimated investment of Rs 350 billion. In 2016, the Indian government has approved the construction of over 2.4 lakh houses for the urban poor under its Pradhan Mantri Awas Yojana (Urban) with a total estimated cost of Rs 166 billion. The central government has already provided an assistance of Rs 36.3 billion for construction of houses under the three below mentioned segments of Urban Housing Mission (approval given in July 2016):

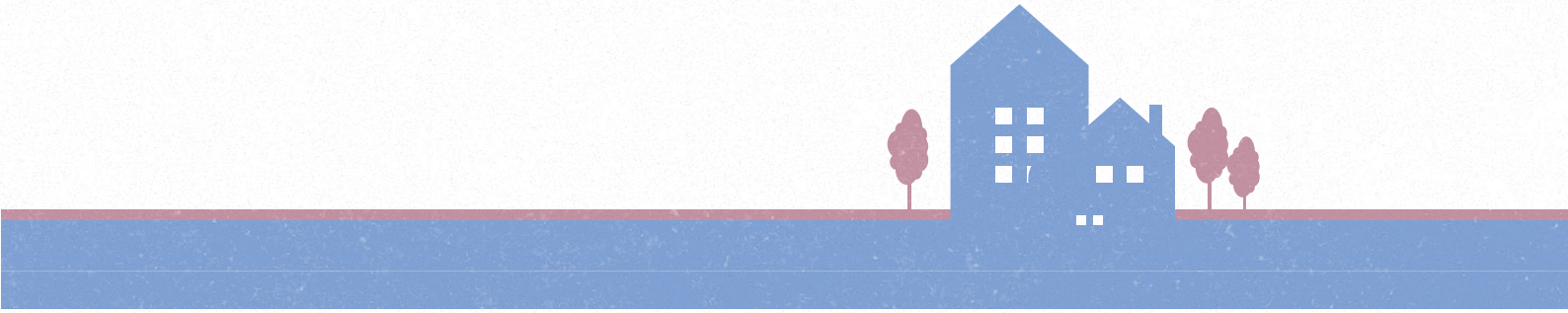
1. Affordable Housing In Partnership – Construction of 1,24,642 houses
2. Beneficiary Led Construction – Construction of 1,15,989 units
3. In-Situ Slum Redevelopment - 3,636 houses

State wise, the government has approved over 1 lakh affordable houses for Maharashtra, 42,896 houses for Tripura, and 23,843 houses for Odisha. In addition, the Ministry has given approval for 21,474 houses for Bihar and 17,838 houses for Gujarat during 2016. As of July 2016, a total investment of more than Rs. 515 billion has been approved under the PMAY (Urban) for the construction of 1 million houses for the economically weaker sections in 20 states. The private sector has also played an important role in the development of affordable housing for people in the urban areas. The government is clear on its intent to undertake infrastructure and city development projects under the Smart Cities Mission and AMRUT through public-private partnership (PPP) route and other innovative ways of financing.

9. Drivers of smart urbanization



*Definition of middle-class according to National Council for Applied Economic Research: "Households with an annual income above Rs. 88,800 annually"



Conclusion

India is on its path to become an urbanised emerging country by 2030. The Government of India has been taking up numerous flagship programmes such as Make in India, Startup India, and Digital India among others that shall promote entrepreneurship and employment opportunities across the nation. It is expected that the growing population from the rural areas shall look at urban regions for better employment opportunities and life style options. Hence, it is expected that the urban population in India shall cross the 40% mark by 2030 from the current estimated level of 33% (as of 2016, it is expected that an additional 215 million people will move to urban areas in India by 2030). To address the growing needs for accommodation and infrastructure, the government has already launched large-scale missions that include "Smart Cities Mission", "Housing for All 2022", and "AMRUT". Accordingly, the urban centres in India are likely to play a pivotal role towards economic and sustainable growth. This surging growth, employment opportunities and infrastructure development in the cities will make them a powerful magnet. This can be seen from the fact that the overall per capita income is likely to cross the Rs. 100 K mark by FY 2017-18 from Rs. 87K in 2014. With cities and towns becoming key to sustaining livelihoods, India is expected to have 68 cities with over one million people and six megacities with over 10 million people by 2030. Other parameters that shall drive the growth of urban centres in India are network platforms and use of smart solutions leveraging ICT (information and communications technology). All key public services such as transportation, utilities, security, entertainment, education, and healthcare are key contenders that could leverage the network platform for service delivery. In future cities, the use of network platform/smart solutions/ ICT infrastructure will help to plan, build, and manage day-to-day operations with efficiency in every aspect of community administration and public service delivery. The need of the hour is to capitalise on the immense opportunities presented and sustainably plan and develop India's cities.

Expert perspective

Mr. Om P Manchanda,
CEO, Dr. Lal PathLabs

"The healthcare diagnostics industry in India is a rapidly growing one clocking an estimated growth rate of ~15-17% per annum. This is being driven mainly by increasing reliance on evidence based treatment by doctors, growing urban population, increasing access to healthcare, improvement in income and affordability.

On one end, there is increasing awareness about preventive health which is driving industry growth (this segment is expected to be growing upwards of 25%) and on the other hand epidemiological factors such as rising population, increasing life expectancy and prevalence of disease will also add to need for diagnostics. There has been an increase in incidence as well as diagnosis of various non-communicable diseases such as cancer, diabetes, cardiovascular disease, hypertension to name a few, which alone will contribute anywhere between 2-3% growth to diagnostics.

Beyond routine testing, in India we are also abreast with the latest advances in diagnostic science such as in the field of genomics. Genomics led diagnostic techniques today can help a doctor diagnose & predict who may be at risk early & even help in which genetic mutations may respond best to which drug therapy for those undergoing treatment.

This industry which is highly fragmented is also starting to see entry of more organized competition with a growing number of local players expanding beyond their immediate city to neighbouring cities and states. National players too continue to invest in significant expansion in facilities in various regions of the country. This has led to increasing access for patients and thus to further growth with increasing adoption of diagnostics by healthcare providers.

We are also seeing the impact of technology with the increasing adoption of digital and mobile-led healthcare apps, real time health monitoring, as well as tele-pathology and tele-radiology with technology playing an enabler in driving access to better healthcare."

Dr. GSK Velu
Founder Chairman, Trivitron Healthcare & Medfort Hospitals

"Healthcare is one of the fastest growing business opportunities in India with a focus to improve access and affordability for the entire population of the country. Private equity funds and foreign institutional investors have shown enormous interest in the segment due to the robust nature of the industry.

Unlike pharmaceuticals and health services which have seen substantial investments and growth over the past 10 years, medical devices segment is still largely import dependent with lower access and relative unaffordability. Hence, investments in the medical devices sector will see a huge growth in the years to come with the impetus given by the government through 'Make in India' and preferential sourcing policies for government procurement. Medical devices will become one of the most sought-after investment areas over the next 2 to 3 years in India."

Mr. R. C. Juneja, Chairman
Mankind Pharma Ltd.

"Innovation and technology are the key growth drivers for the Indian pharmaceutical sector. With the immense opportunities in clinical trials, high-end drugs, bioactive therapeutic proteins, etc., the sector is likely to witness double-digit growth in the next five years. As a result, the nation is likely to be among the top three pharmaceutical markets by 2020."

Nerve centre for healthcare innovation

India is the second largest country in Asia, seventh largest in terms of area and the second most populated country in the world. It has a population of around 1.3 billion and GDP of around US$ 2 trillion as of 2016. Nearly 5% of the total population comprises senior citizens (above 65 years old) with life expectancy of around 66 years. The healthcare sector has grown at a tremendous rate of 15% (CAGR) during 2010-15 owing to strengthening services, coverage and increasing investments. India spends nearly 4-4.5% of its GDP on healthcare, out of which the government spends nearly 1-1.5% of the country's GDP on healthcare sector. With a rise in aging population and growing disease burden, the demand for healthcare services and healthcare infrastructure is expected to increase manifold, thereby leading to rapid increase in corresponding business interest and investments across the country.

Snapshot: Healthcare

India added **11** years to the average life expectancy (1990 - 2015)

Average life expectancy
55 years - 1990
66 years - 2015

US$ 104 billion - Indian healthcare market (2015)

Hospital ownership (2015)
74% by private sector
26% by the public sector

Doctor-to-patient ratio for India stands at **1:1,674** (2015)

30 hospitals have adopted robotics technology

200 surgeons performing robotics surgeries (June 2016)

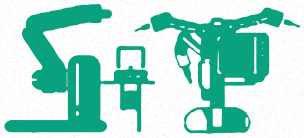
460 Medical colleges (2016)

770 District hospitals (2016)

25 Regional Cancer centres (2016)

7 All India Institute of Medical Sciences (AIIMS, 2017)

Robotic surgeries in India projected to cross **25,000** by 2020



India has one hospital bed for every **1,050** patients

7.4 million - Projected human resource requirement by 2022 in healthcare (NSDC)

Healthcare India

Healthy people are more productive, enabling them to earn and save more, therefore contributing to the nation's prosperity. India's healthcare sector has made significant improvement in this direction in the last few years. The country has added 11 years to the average life expectancy, raising it from nearly 55 years in 1990 to 66 years by 2015. The major contributing factors are improved nutrition, robust investment by private players in building the healthcare infrastructure and innovations in medical technologies, etc. In addition, key health metrics i.e. infant mortality rate (IMR) and maternal mortality ratio (MMR) have also improved substantially.

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Evolution of healthcare sector

Before 1990s, government funding and long-term debt were used as the primary sources of funding healthcare infrastructure development and providing support to hospitals in India. The economic reforms (1990s) have helped the country to attract a lot of interest and investment from international investors such as private equity, venture capital, external commercial borrowings, etc. These have brought in new funding options for the development of healthcare infrastructure in India.

In May 2013, the government also launched the National Urban Health Mission (NUHM), as a sub-mission of the National Health Mission. The objective of the mission was to meet health care needs of urban poor by providing them access to essential primary health care services. The government focused on strengthening the existing urban health care service delivery system, targeting people living in slums and converging with other schemes relating to other health related determinants such as drinking water, sanitation, school education, etc. The Ministries of Urban Development, Housing & Urban Poverty Alleviation, Human Resource Development and Women & Child Development have been helping the government in the NUHM mission.

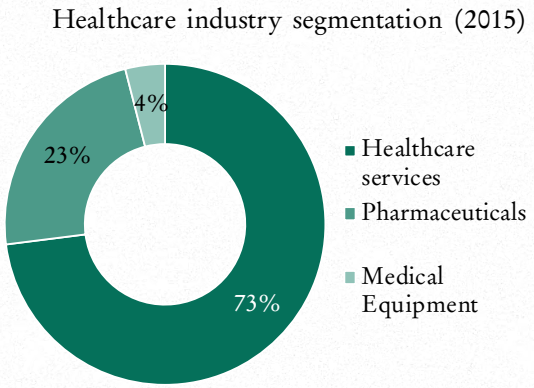
Key Stakeholders

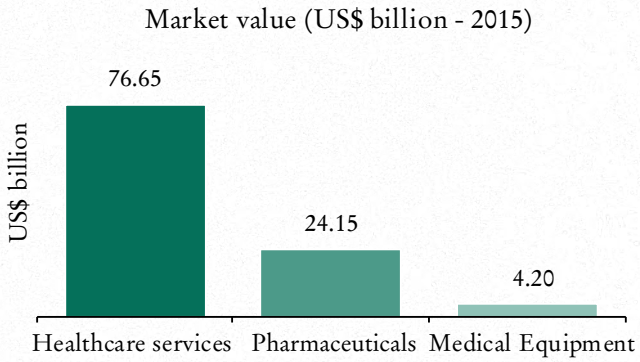
The healthcare sector in India is governed by the Ministry of Health and Family Welfare. Initially four departments i.e. Department of Health & Family Welfare, Department of AYUSH, Department of Health Research and Department of AIDS Control were headed by the Ministry of Health and Family Welfare. Later on August 7, 2014, Department of AIDS Control was merged with Department of Health & Family Welfare and is now known as National AIDS Control Organization (NACO). On December 8, 2014, Department of AYUSH became Ministry of Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homeopathy (AYUSH) with focused attention on development of education and research in Ayurveda, Yoga & Naturopathy Unani, Siddha and Homeopathy systems. Now the Ministry of Health and Family Welfare comprises the following two departments i.e. Department of Health & Family Welfare and Department of Health Research.

Composition of healthcare industry

Indian healthcare market is projected to touch US$ 160 billion by 2017, around 4.2% of GDP. It is segmented into healthcare services, pharmaceutical and medical equipment market. The healthcare services segment is the largest segment in the Indian healthcare market followed by pharmaceuticals and medical equipment.

Hospital industry segmentation (2015)





Source: WHO, IMS Health, Medtech, Secondary sources

Healthcare services: This is the largest segment with over 73% share in Indian healthcare market. The segment comprises of many sub-sectors such as hospitals, outpatient care centres, diagnostic laboratories, dental clinics, nursing care facilities, ambulatory healthcare services, veterinary services etc. These healthcare services are largely delivered by practitioners in medicine, chiropractic, dentistry, nursing, pharmacy, allied health, and other care providers. Healthcare services segment has witnessed a CAGR at 11.0% in the last five years (during 2011-15). According to industry experts, the healthcare segment is expected to grow at a CAGR of 20% during 2015-20 owing to increasing government expenditure on healthcare services, rising disposable income, growing healthcare spending on advanced healthcare services, increasing awareness on healthcare issues and growth in preventive testing.

Pharmaceuticals: The pharmaceutical sector is another key segment which accounts for over 23% share in the overall healthcare market in the country. It comprises of public and private players engaging into discovery, development, manufacturing and sales of medicines for human and animal health. Every drug is subject to various laws and regulations related to patenting, testing and ensuring safety and efficacy and marketing of drugs. The pharmaceutical sector is largely driven by discovery and development of novel drugs. Generic drugs account for 70% share in the pharmaceutical sector in India, followed by OTC (over-the counter) medicines (21%) and patented drugs (9%). The pharmaceutical segment has witnessed the second highest CAGR at 9.0% during 2011-15 and is expected to grow at a CAGR of 13.0% during 2015-20. Indian pharma sector accounts for 2.4% of the global pharma sector share by value and 10% by volume in 2016. India is expected to become the third largest pharma market by 2020. The pharma sector has attracted a cumulative FDI inflow of US$ 14.70 billion between April 2000 and March 2017. India is expected to become the third largest pharma market by 2020 in terms of incremental growth.

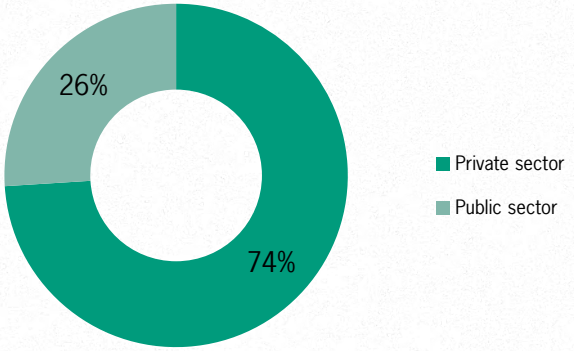
Medical equipment: Medical devices segment offers a range of equipment, hospital supplies, and invitro diagnostic devices and substances. This industry primarily aims for developing novel technologies which helps in early diagnosis and treatment of diseases. Electro-medical equipment, irradiation apparatuses, surgical instruments and supplies, dental equipment are some of key sub-segments in the industry. The medical equipment segment recorded a CAGR growth of 7% during 2011-15 and is expected to grow at a CAGR of 8% during 2015-20.

Healthcare infrastructure

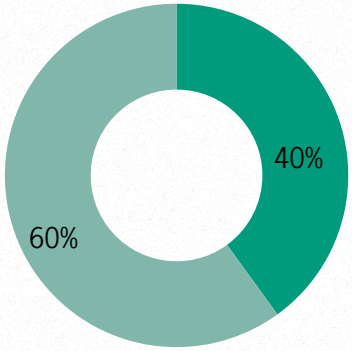
Similar to other countries, India comprises of public and private healthcare infrastructure. There are a total of 196,312 hospitals (2015) operational in the country. These hospitals together have a total bed capacity of 2,293,355. Nearly 74% of the hospitals in the country are owned and run by the private sector, and the remaining 26% by the central and state governments. In terms of total bed facilities, the public sector holds nearly 60% share, followed by 40% from the private sector.

The healthcare sector was ranked as the fifth largest sector (2015) in terms of overall employment in India. The sector employs nearly 5 million people across various categories such as doctors, dental surgeons, nurses, pharmacists etc. With the rising demand for healthcare services, it is expected that an additional 4.3 million of employment opportunities would be generated in the next five years (2022) by the healthcare sector in the country.

Hospital segmentation (2015)



Segmentation of hospital beds (2015)



Source: Secondary sources, RNCOS, GT analysis

Public healthcare infrastructure components

The country's public healthcare system comprises of centre and state-owned healthcare facilities which are owned and controlled by the Government of India. The urban public healthcare infrastructure in India comprises of super specialty referral hospitals, special disease hospitals, government medical colleges, district hospitals and taluk hospitals.

Urban public health care system - India

Source: Industry reports, Secondary sources

Super Specialty Hospitals: These are a chain of referral hospitals which are controlled and owned by the central government. All India Institutes of Medical Sciences (AIIMS) spread across the nation belong to this category. As of January 2017, there were a total of 7 AIIMS serving the urban population. The Government of India is in the process of setting up another 11 new AIIMS.

Special Disease Hospitals: These hospitals are controlled and owned jointly by state and central governments. Regional cancer centres are an instance of hospitals that fall under this category. Research institutes (for e.g. National Institute of Medical Statistics) are also included under this category. As of January 2017, more than 25 regional cancer centres were in operation.

Government Medical Colleges: Government medical colleges are also controlled and owned by the respective state governments. These medical colleges possess medical facilities for patient care on outpatient (OPD) and inpatient (IPD) basis. For example, the Government Medical College and hospital in Aurangabad is one of the biggest medical hospitals in Maharashtra with over 1,177 beds available. As of January 2017, there were a total of 460 medical colleges in India with the sole objective of providing quality medical care to the patients. Of these 250 are private medical colleges and 210 are government medical colleges.

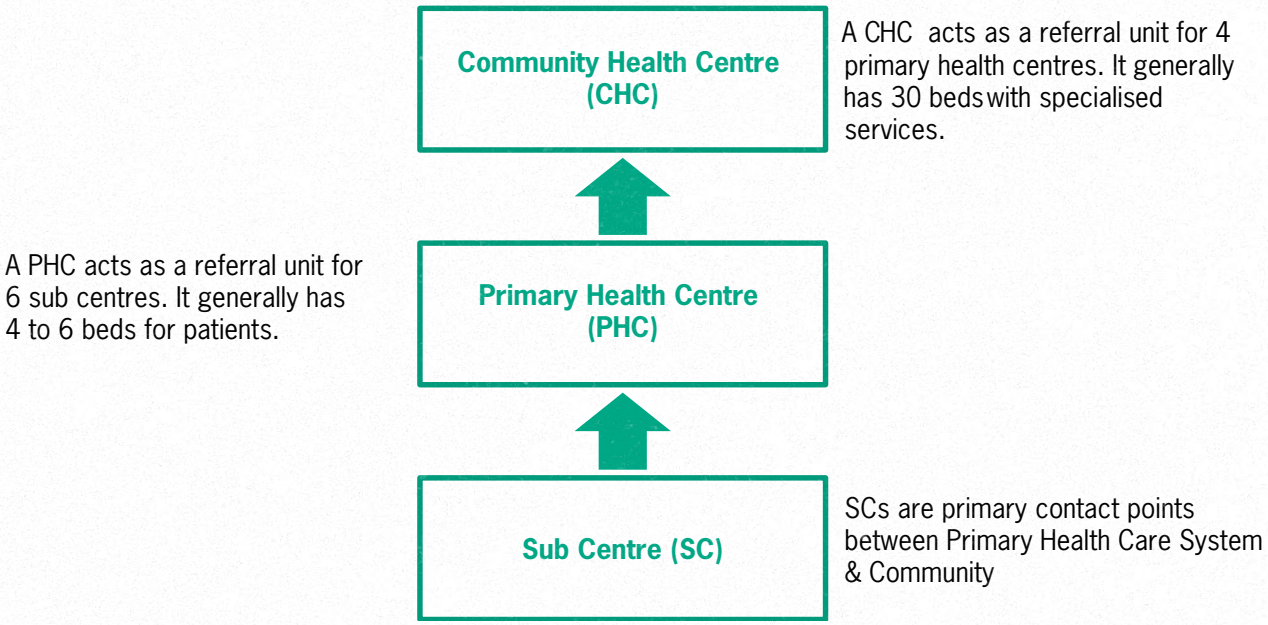
- Karnataka has the highest number of MBBS seats in the country while Maharashtra and Tamil Nadu occupy 2nd and 3rd place respectively. As of 2016, Karnataka had 18 government colleges with a total of 2,400.

District Hospitals: As the name suggests, these hospitals are particularly for serving a particular district and are controlled by respective state governments. In April 2017, the Telangana government has started an initiative to strengthen the district hospitals by hiring specialist doctors and lab technicians for these hospitals. As of FY'16, there are more than 770 district hospitals across the country to provide secondary healthcare facilities to the people.

Taluk Hospitals: Taluk hospitals serve the administrative divisions which are smaller than the districts and bigger than a block, called taluks. These are basically controlled and maintained by the respective state governments.

The public healthcare infrastructure in rural parts of India is segregated into a three tier system i.e. sub-centres, primary health centres and community health centres.

Rural healthcare system in India



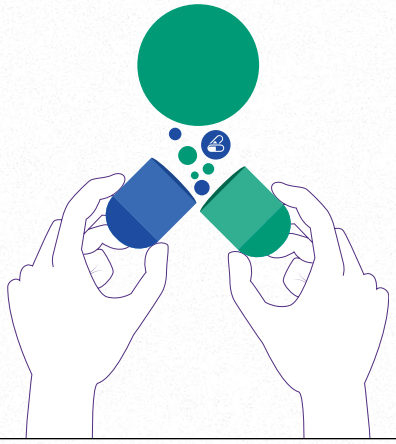
Source: Industry reports, Secondary sources

Sub-centres (SCs): A sub-centre is the first contact point between the primary health care system and the community. These sub-centres are responsible for internal communication and provide various services such as child health, family welfare, nutrition, immunisation, diarrohea control and control of communicable disease programme. One sub-centre caters to a population of 5,000 in general and 3,000 people in hilly, tribal and backward areas. The Department of Family Welfare provides funding assistance to all the sub-centres in the country. According to the Rural Health Statistics 2016, there are a total of 155,069 sub-centres in India. The government is planning to convert 1.5 lakh sub-centres into health and wellness centres by 2020.

Primary health centres (PHCs): Primary health centres, also known as public health centres, are rural healthcare facilities owned by the state government. The PHCs are responsible for meeting the healthcare needs of citizens living in rural areas. These PHCs take care of general medical treatment, infant immunisation treatment, birth control and related care treatment and other emergency care programmes. One primary health centre generally covers rural population of 30,000 and population of 20,000 in difficult/tribal and hilly areas. According to the Rural Health Statistics 2016, there are a total of 25,354 primary health centres in India.

Community health centres (CHCs): A community health centre is a network of medical clinics consisting of general practitioners, nurses and other officers providing healthcare services to rural citizens. The overall objective of a CHC is to provide expert care to the community, to maintain an acceptable standard of quality of care and to ensure that services at CHC are matching with global best practices. One community health centre caters to 120,000 population in general areas and 80,000 population in difficult/tribal and hilly areas. According to the Rural Health Statistics 2016, there are a total of 5,510 community health centres in India.

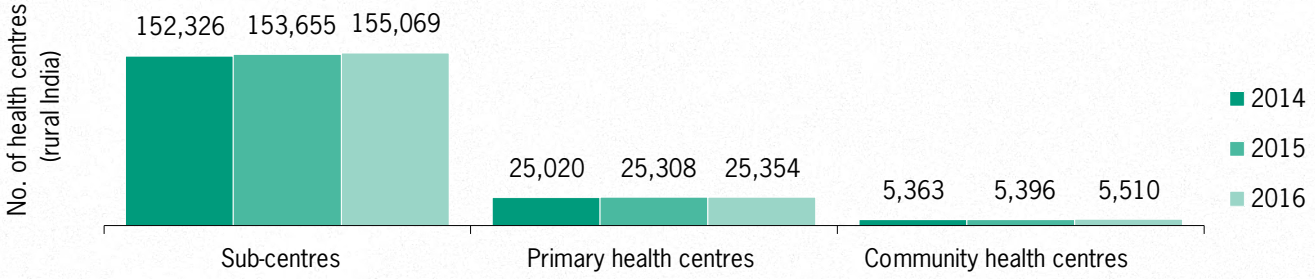
Uttar Pradesh, Rajasthan, Tamil Nadu, Kerala, Odisha and Maharashtra are key states in terms of number of sub-centres, primary health and community health centers (as of March 2016).



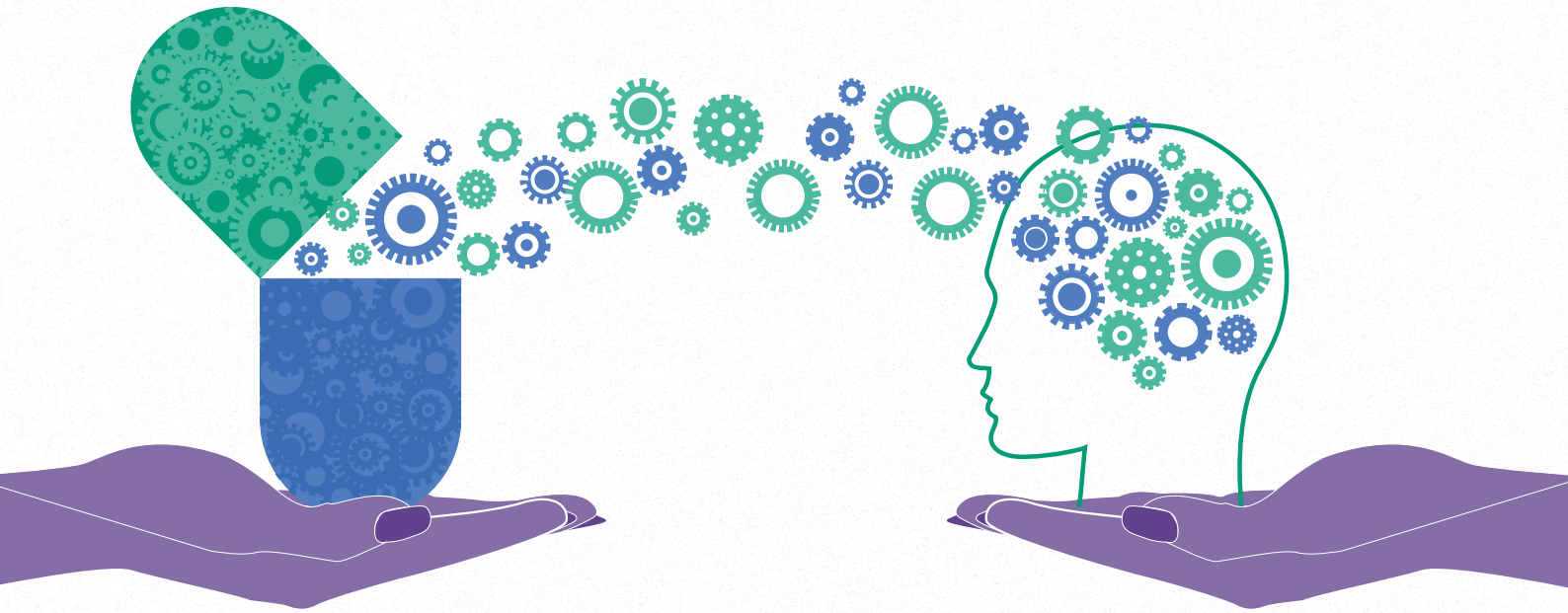
AYUSH Hospitals: AYUSH consists of different medical disciplines i.e. Ayurveda, Yoga, Unani, Siddha and Homeopathy. These are based on specific medical philosophies and showcase a way of healthy living with their own concepts on prevention of diseases and promotion of health and holistic care in the country. In November 2014, the Ministry of AYUSH was formed to ensure the optimal development and propagation of AYUSH systems of health care. There are around 3,600 AYUSH hospitals and 25,723 dispensaries offering AYUSH medical services in the country (FY'16).

- Out of total AYUSH hospitals, 2,820 hospitals are of Ayurveda, 257 of Unani, 274 of Siddha, 7 of Yoga, 35 of Naturopathy and 207 of homeopathy.
- Out of total AYUSH dispensaries, 15,291 are of Ayurveda, 1,461 of Unani, 803 of Siddha, 185 of Yoga, 94 of Naturopathy, 7,856 of Homeopathy and 33 of Sowa-Rigpa.

No. of health centres (rural India)



Source: National Rural Health Mission



Biotechnology

India is one of the fastest emerging nations with a vibrant biotechnology industry. The nation accounts for 2% share in the global biotechnology market and ranks among the top 12 biotech destinations in the world. The biotechnology sector comprises of five sub-sectors i.e. bio-pharma, bio-services, bio-agriculture, bio-industrial and bio-informatics. Bio-pharma product are therapeutic or preventative medicines that are derived from materials naturally present in living organisms. Bio-services primarily includes clinical research, contract research organisation (CRO) and custom manufacturing. Bio-agriculture products are segmented into hybrid seeds, transgenic crops, bio-pesticides and bio-fertilizers. Bio-industrial comprises of enzyme manufacturing and marketing companies. Bio-informatics includes development and maintenance of electronic databases on a range of biological systems, sectors, etc. The government is also focusing on developing biotech startups by building bio-incubation centers and university innovation clusters to foster the growth of this sunrise sector. The bio-pharmaceutical segment accounts for the largest share of 64% in the total biotech sector in the country during FY'16. Serum Institute is the largest player and accounts for close to 22% share in the total bio-pharma market. The bio-services and bio-agri segments together account for one third of the total biotech sector in the country. The Indian bio-technology market has grown at 57% on y-o-y basis and reached US$ 11 billion in FY2016 compared to US$ 7 billion in FY2015. The biotech sector is expected to grow at a CAGR of 30% and reach to US$ 100 billion by 2025.

The biotech sector too has attracted significant amount of attention from global companies that have partnered with Indian companies to explore new areas in biotech.

Few major FDI equity investments in the Indian biotech sector during April 2014-March 2016

Foreign Collaborator	Country	Indian company	FDI (in US$ million)
Glaxo SmithKline PTE Ltd	Singapore	Glaxo SmithKline Pharmaceuticals Ltd	228.39
Sanofi Pasteur Merieux SAS	France	Shantha Biotechnic Limited	109.41
Helix investment Holdings Pte Ltd.	Singapore	Concord Biotech Ltd	12.00
Tano India Pvt.	Mauritius	Windlas Biotech Ltd.	7.46

Sources: DIPP, 2016

Key government schemes - Healthcare sector

The Indian government has been working towards making healthcare services more accessible and affordable for its citizens. National Health Policy (NHP): The government approved the National Health Policy 2017 in March 2017, which provides a framework for achieving the target of universal health coverage and delivering quality health care services at an affordable cost. The policy aims to achieve the following targets:

Increase life expectancy at birth from 67.5 in 2017 to 70 by 2025 and reduce infant mortality rate to 28 by 2019.

Reduce under five (children under five years of age) mortality* to 23 by the year 2025.

Achieve the global 2020 HIV target (i.e. 90% of people with HIV know their HIV status, 90% of people diagnosed with HIV receive sustained antiretroviral therapy and 90% of people receiving antiretroviral therapy will have viral suppression).

The following are the proposals under the National Health Policy 2017 to increase public health expenditure to 2.5% of the GDP from the current share of nearly 1.5% of GDP in 2016.

The policy plans to allocate a large share of resources to primary care to ensure availability of two beds per 1,000 population.

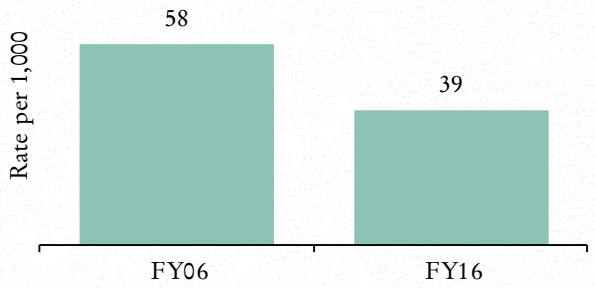
The policy is focusing on introducing yoga at school and work places to promote good health.

The policy is also focusing on providing free drugs, free diagnostics and free emergency and essential health care services across public hospitals.

*Defined as number of deaths per 1,000 live births of children under the age of 5 years.

National Rural Health Mission (NRHM): The National Rural Health Mission was launched by Government of India on April 12, 2005 with the objective of providing quality and affordable health care to the rural section of the India's population. The central government is making significant investments to improve the infrastructure and delivery mechanism jointly with the state governments through National Rural Health Mission. It focuses on Maternal, Newborn, Child Health and Adolescent services. One of the main targets of this mission was to lower the Infant Mortality rate and Maternal Mortality rate which is evident from the fact that IMR was 58 (per 1,000) in FY'06 and 39 (per 1,000) in FY'16 and MMR reduced from 254 (per 100,000 live births) in FY'06 to 174 (per 100,000 live births) in FY'15. The NRHM has allocated US$ 10 billion for the development of healthcare facilities in the rural areas.

Infant mortality rate (per 1,000 births)



Source: UNICEF, WHO, World Bank

Maternal mortality rate (per 100,000 births)

Source: UNICEF, WHO, World Bank

Other goals include child health, sanitation and hygiene; prevention and control of communicable and non-communicable diseases. Local communities are being made aware about the importance of local health traditions. The central government provides financial support to states to strengthen the health care system by employing nurses, doctors and specialists on contractual basis as per requirement.

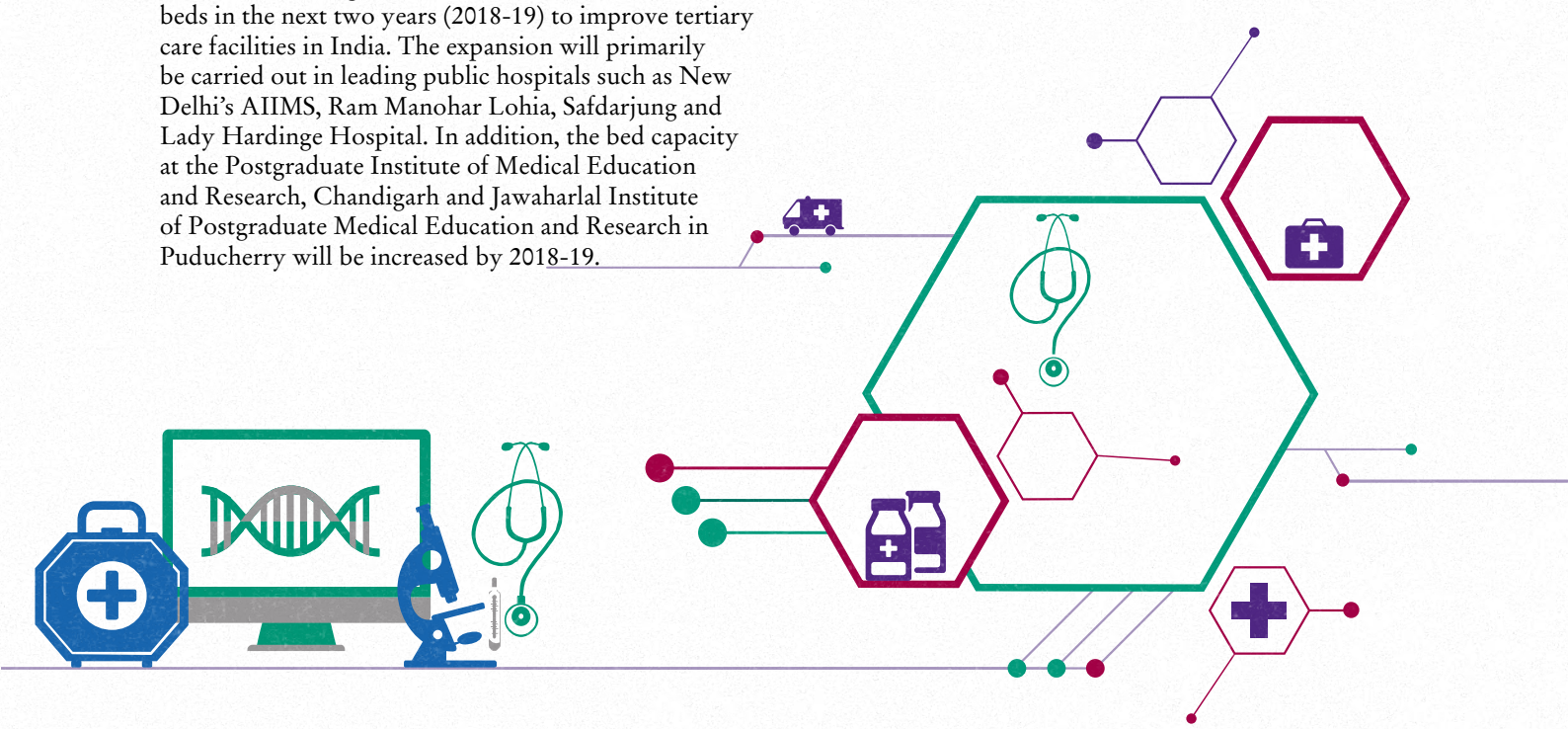
- Mobile Medical Units: Under the NRHM programme, the government introduced mobile medical units with an overall aim to provide preventive, promotive and curative health care in inaccessible areas and underserved or unserved areas. There are nearly 1,500 mobile medical units functioning across India. Tamil Nadu accounted for 26.41% of total mobile medical units.
- Patient Transport Service: The government introduced the concept of patient transport ambulances service operating under dial number 108/102. As of January 2017, 31 states and union territories have patient transport ambulances facility for their people. Over 7,550 and 8,200 ambulances are being employed to provide transportation services through 108 and 102 emergency transport numbers respectively. More than 6,600 empaneled vehicles are deployed in some states to provide transportation services to pregnant women and children For e.g. Janani express in Madhya Pradesh, Mamta Vahan in Jharkhand, Nishchay Yan Prakalpa in West Bengal etc.

National Urban Health Mission (NUHM): The National Urban Health Mission was launched by the government in May 2013, as a sub-mission under an overarching National Health Mission, with the sole objective of improving the health of the urban population by making quality healthcare services available to them. NUHM aims to cover all state capitals, districts and cities with a population of 50,000 and above. NUHM involves partnering with local communities for efficient implementation and monitoring of health services. The primary focus under this mission are the slum dwellers and other vulnerable groups like rickshaw pullers, street vendors or their equivalent. Accessibility of primary and quality health services is being facilitated through a modified public health care system and involvement of communities and urban local bodies. Existing urban family welfare centers and urban health posts have been strengthened and upgraded to primary health centres under this mission. A number of Asha centres have been opened in a ratio of 1 per 1,000-2,500 population that serves as an efficient medium for the transfer of the medical facilities to the slum population.

- In FY'16 and FY'17, the government allocated Rs 950 crore and Rs 752 crore respectively for the development of healthcare infrastructure in urban areas under the National Urban Health Mission.
- In Budget 2017-18, the government announced to set up two new AIIMS i.e. one each in Gujarat and Jharkhand. The Central Government has requested states to identify three or four suitable locations for the establishment of new AIIMS.
- Upgradation of government medical colleges: The government decided to upgrade 71 existing government medical colleges institutes (GMCIs) under the Scheme at various phases i.e. Phase-1 (June 2006): up-gradation of 13 existing GMCIs, Phase-II (February 2009): up-gradation of 6 existing GMCIs, Phase-III (November 2013): up-gradation of 39 existing GMCIs & Phase IV (August 2016): up-gradation of 13 existing GMCIs. Until August 3, 2016, 58 Government Medical Colleges have been approved for upgradation under the Pradhan Mantri Swasthya Suraksha Yojana. Out of this, work is completed in 16 colleges while it is in progress at other places. On August 3, 2016, the Cabinet Committee on Economic Affairs approved upgradation of another 13 existing GMCIs (Bihar, Chhattisgarh, Delhi, Gujarat, Madhya Pradesh, Odisha, Rajasthan, Uttar Pradesh) at an estimated cost of Rs. 200 crore for each GMCI. It is expected that the work shall be completed in a time period of 36 months i.e. by the year 2019.
- In June 2016, the government decided to add over 6,000 beds in the next two years (2018-19) to improve tertiary care facilities in India. The expansion will primarily be carried out in leading public hospitals such as New Delhi's AIIMS, Ram Manohar Lohia, Safdarjung and Lady Hardinge Hospital. In addition, the bed capacity at the Postgraduate Institute of Medical Education and Research, Chandigarh and Jawaharlal Institute of Postgraduate Medical Education and Research in Puducherry will be increased by 2018-19.

Rashtriya Swasthya Bima Yojana (RSBY)/National Health Protection Scheme: The National Health Protection Scheme was approved by the government in 2016. The scheme aims to provide financial assistance in the form of insurance to citizens below poverty line for their health purposes. The insurance coverage is provided to five members per household. The beneficiaries need to pay Rs. 30/- as registration fee while the central and state government pays the premium to the insurer. The government allocated Rs.24,000 crore for a five-year period (2016-2021). The scheme is expected to benefit more than 10 crore families in India by providing a health cover of Rs. 1 lakh per family. In FY'16, the scope of RSBY was enhanced to include rickshaw pullers, taxi drivers, sanitation workers, rag pickers and mine workers.

Transformative healthcare initiatives: In Union Budget 2018, the Hon'ble Finance Minister announced two landmark initiatives under the "Ayushman Bharat Programme". The first was the commitment of Rs 1,200 crore towards the development of health & wellness centres as envisioned by the National Health Policy, 2017. The second was the launch of a flagship National Health Protection Scheme providing cover of up to Rs 5 lakh for the benefit of 100 million poor and vulnerable families. The cover is expected to benefit around 500 million individuals and will increase health cover by up to 17 times that of the existing Rashtriya Swasthya Bima Yojana (RSBY, upper limit of Rs 30,000 per year).



Other measures to boost healthcare sector:

- In FY'16, the government planned to open 3,000 Jan Aushadhi stores offering affordable generic medicines. As of FY'16, India has a total of 137 Jan Aushadhi stores across 19 states.
- In FY'16, the government allocated US$ 875.4 million for improving medical education, training and research institutes in the country.
- As of December 2016, 100% FDI is allowed in the pharma sector under the automatic route for greenfield pharma projects. Also, for brownfield projects, 100% FDI has been allowed under the government route and up to 74% FDI is allowed under the automatic route.
- The government plans to scale-up the number of biotech start-ups to 2,000 over the next three years (2017-2020) from 500 in 2016. The Department of Biotechnology has decided to push start-ups by promoting over 300 new businesses each year to reach the target.
- In October 2015, the Department of Pharmaceuticals (DOP) set up an inter-ministerial co-ordination committee to periodically review, coordinate and resolve issues faced by the Indian pharmaceutical companies.
- In April 2016, the Regional Centre for Biotechnology Bill, 2016 was approved in Lok Sabha, which aims to provide the status of national importance to the Regional Centre for Biotechnology, for facilitating transfer of technology and knowledge and making it a hub for biotechnology expertise in the Asian region.
- In August 2016, the Government of India relaxed norms for import and export of human biological samples, doing away with import licenses or export permits, in an effort to improve the ease of doing business in the sector.
- In June 2016, the government approved its plan to set up a Venture Capital Fund of Rs. 1,000 crore to support start-ups in research and development in the pharmaceutical and biotech sectors.
- The Indian government has also provided various grants and aid to biotechnology sector for the development of biotechnology parks in the country.

Details of key biotechnology parks in India

Parks	City	Area (in acres)
Shapoorji Pallonji Biotech Park	Hyderabad	300
ICICI Knowledge Park	Hyderabad	200
International Biotech Park	Pune	103
Lucknow Biotech Park	Lucknow	20
Golden Jubilee Biotech Park	Chennai	8
Ticel Bio Park	Chennai	5

Source: Secondary sources, Industry reports

Emerging trends in healthcare in India

Robotic surgery: Robotic surgery is a surgery carried out using small surgical instruments attached to a robotic arm. The inherent advantages of robotic surgery over laparoscopic surgery include enhanced magnification, 3D-vision, motion scaling, precision and control of operating instruments. From the patients' perspective this means smaller incisions, decreased blood loss, less pain, and quicker healing and consequent reduction in hospital stay. Robotic surgery started off in India with a surgical procedure aided by 'da Vinci Surgical Robot' in 2002.

- As of March 2016, the technology has been adopted by nearly 30 hospitals with more than 200 surgeons performing robotic surgeries.
- It is expected that the number of hospitals offering robotics surgery will reach 100 hospitals with 500 such surgeons in the country by 2020.

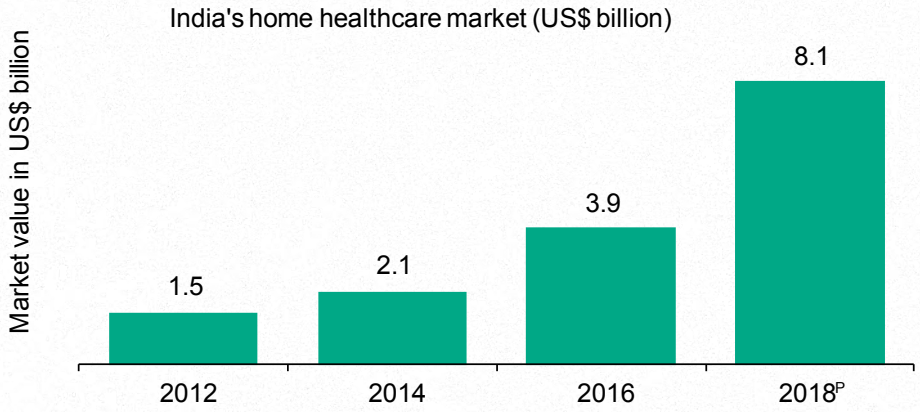
Tele-medicine: The concept of tele-medicine involves offering clinical health care services from a distance using telecommunication technology. There is a growing number of service providers offering healthcare facilities through tele-medicine methods such as monitoring and treatment of patients via video conference to other healthcare providers, doctors on phone call, etc. Though the Indian tele-medicine market is in its nascent stage, it has witnessed a remarkable growth of 35% CAGR from US$ 100 million in 2011 to nearly US$ 450 million by 2016. The growth has largely come from its potential to provide increased access, lower costs, better patient outcomes, greater patient engagement and improved safety. Going forward, the tele-medicine market is expected to play a key role in the convergence story. Tele-medicine technology is likely to help in upgrading skills via tele-education, tele-training, tele-monitoring and tele-support. Major hospitals including Apollo, AIIMS, Narayana Hrudayalaya have adopted tele-medicine services and entered into a number of PPPs in India.

Electronic health records: There are a large number of hospitals maintaining a database of patient's information related to including their medical history, diagnoses, medications, treatment plans, immunisation dates, allergies, radiology images, laboratory and test results in digital format. Thus, it enables physicians to provide evidence based healthcare solutions to any patient. This data is extremely useful for health policy makers, insurance providers, researchers, drug- development, etc. Microsoft Dynamics is one such CRM software extensively used in healthcare industry. It helps in healthcare, financial and human resource management and leads to increase in patient satisfaction. With an ever increasing population, these records will grow exponentially, in that case the emergence of Big Data and Analytics tools will surely have an impact on healthcare sector. In January 2017, the Ministry of Health issued standards and guidelines for the implementation of EHR across the nation. These standards include uniform norms related to compilation, storage, retrieval, exchange, and analytics of healthcare information including guidelines for keeping privacy and confidentiality.

Health insurance: Increasing healthcare cost and burden of new diseases have been raising demand for health insurance coverage. Number of people covered under health insurance in FY'16 is 36 crore (approximately 30% of the total population) as opposed to 28 crore in FY'15. The total spending through health insurance has reached 8.4% of total health spending in FY'15, from 6.4% in FY'10. With growing demand for affordable and quality healthcare services, the penetration of health insurance in India is expected to grow exponentially in the coming years. The health insurance market has been growing at a rate of 20% and is expected to increase multifold times in the next few years.

Medical tourism: Medical tourism refers to people going to another country to receive medical aid. India is witnessing a growing number of international medical tourists. Medical tourist inflow into India crossed 320 million in 2016 compared to 85 million in 2012. According to industry experts, the number of people arriving in India for medical treatment is set to double by FY 2018-19. This will further drive the demand for healthcare services and infrastructure in the country. The Indian medical tourism market is projected to grow to US$ 7-8 billion by 2020 as opposed to US$ 3 billion in 2015. Around 34% of the patients come from Bangladesh and Afghanistan. Chennai is one of the top destinations for medical tourism. A study shows that a patient from the US can save up-to 90% of the cost if he opts for a medical procedure in India as compared to a saving of 65% in the case of Mexico.

Home healthcare: Home healthcare means providing healthcare related services such as nursing, diagnosis and doctor visits at home. The Indian home healthcare sector is still in its nascent stage, valued at US$ 1.5 billion in 2012. The sector is projected to grow at a rate of 40% during 2016-2018, to reach US$ 8.1 billion. The Indian home healthcare market is dominated by a few players including Portea Medical, India Home Health Care (IHHC), Healthcare at Home, and Homital. Ahmedabad, Bangalore,



Source: GT analysis

Chennai, Delhi-NCR, Hyderabad, and Pune are the key cities in India for home healthcare, having presence of multiple players.

Healthcare Aggregators: Healthcare aggregators provide a platform of integrated services, comparison between the services and a customised interface as per customer preferences. For example, Practo and Credihealth Private Limited are healthcare aggregators which provide information on clinics and doctors across India. They partner with healthcare providers such as doctors, clinics, diagnostic centres and hospitals. The platforms provide information related to doctors along with their appointment schedule and electronic medical records. The global mobile medical apps market designed for healthcare professionals is expected to reach US$ 14 billion by 2020. Of this, Asia Pacific is the top growth market with a CAGR of 70.8% during 2015-2020.

Biotech startups: The Indian biotech sector is the 3rd largest in the Asia-Pacific region. DST (Department of Science & Technology) and DBT (Department of Biotechnology) provide support to establish biotech-based startups. BIRAC (Biotechnology Industry Research Assistance Council) has been set up under Department of Biotechnology to "strengthen and empower emerging Biotech enterprise to undertake strategic research and innovation, addressing nationally relevant product development needs." As a result, the sector is expected to reach the US$ 100 billion mark by FY 2025 from US$ 11 billion in FY 2016. A number of biotechnology-based startups have started their research and development operations in different parts of India.

Corporate healthcare- This is a unique concept where the healthcare service providers target organisations rather than individuals. The popularity of this concept has been increasing as the corporates compete to offer best possible healthcare benefits. Corporates also combine services with in house health checkup/programmes like yoga and meditation, discounted health-checkup, hospitalisation and pharmacy, etc. Corporate healthcare is expected to have a growth rate of 15% for 2016 – 2018.

Private participation in healthcare infrastructure

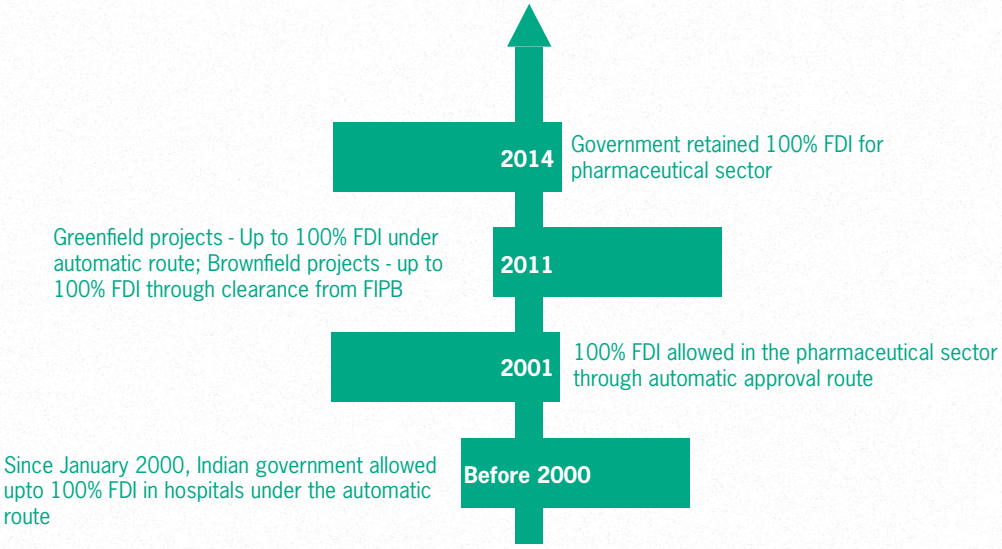
The private sector has played a key role in the development of the healthcare infrastructure in India, with active participation from the private equity investors and increase in FDI. Private equity players are increasingly looking at healthcare investments in India. For e.g. the value of private equity transactions in the healthcare sector has increased from US$ 94 million in 2011 to US$ 1,275 million in 2016, registered an increase by 13.5 times.

Key private equity deals in healthcare (value > US$ 50 million)

Target	US$ million	Investors	Date
Vijaya Diagnostic Centre	63.5	Kedaara Capital	December 2016
Apollo Health & Lifestyle	68	IFC	May 2016
Care Hospitals	221	Abraaj Group	January 2016
Cloud Nine	60.5	India Value Fund	December 2015
Metropolis Healthcare	127.5	Carlyle	September 2015
Metropolis Healthcare	90	KKR	April 2015
Sutures India	60	TPG Growth	February 2015
Manipal Health Enterprises	150	TPG Capital	January 2015
Medanta Medicity	113.5	Temasek	January 2015
Aster DM Healthcare	60	India Value Fund, Olympus Capital	May 2014

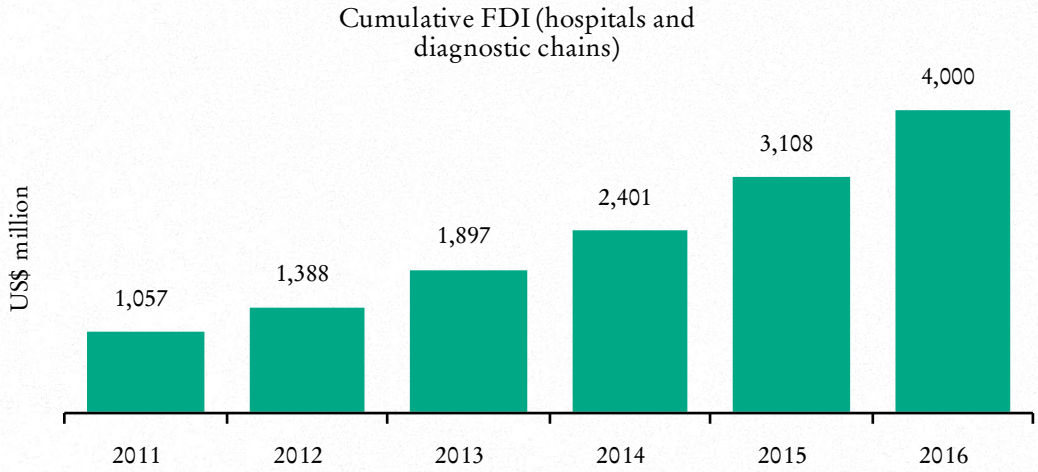
Source: Secondary sources, Industry reports

The growing interest from private investors is driven by the introduction of new emerging models such as single specialty clinics, day care centres, primary health centres and diagnostic chains. In addition, the overall healthcare delivery segment is largely dominated by the private sector which caters to a majority of the total healthcare delivery market in India. In the last 20 years, there has been an increase in hospitalisation in private facilities both in the rural and urban areas. According to the National Sample Survey Office 2015, nearly 72% of the rural and 79% of the urban population depended on private hospitals for treatment.



The healthcare sector in India has evolved due to its strong focus on the use of innovative technology, enhanced delivery models and new applications. In addition, the government has taken a number of measures to promote private and foreign players' participation in the healthcare sector in the country. It is also focusing on ways to bring innovative modes of funding for the development of healthcare infrastructure.

- 100% FDI is allowed under the automatic route for greenfield projects and for brownfield project investments. Furthermore, up to 100% FDI is permitted under the government route.

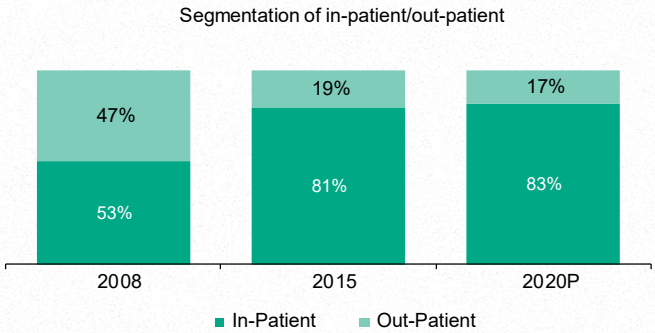


Source: DIPP

According to DIPP, hospitals and diagnostic centres attracted a total foreign direct investment (FDI) of over US$ 4.3 billion between April 2000 and March 2017. With the easing of FDI norms, the share of healthcare FDI has grown by nearly 4 times since 2011, highlighting the growing interest of foreign players in the healthcare infrastructure sector in India. This has consequently encouraged the inflow of foreign exchange, helping strengthen its position in the international market. In addition, several global companies have invested in the country due to the country's strong generic biotech and pharma potential. Many large companies such as Procter & Gamble (USA), Pfizer (USA), Glaxo Smith Kline (UK), Johnson & Johnson (USA) etc. have already invested in India. The pharma sector has attracted a cumulative FDI inflow of US$ 14.70 billion between April 2000 and March 2017.

Demand drivers of healthcare infrastructure

- Elderly population: With a rise in aging population in India and growing disease burden, the demand for healthcare services is expected to increase manifold. According to industry experts, elderly people (over 60 years) will account for an estimated share of 12.5% in the country's population by 2022. It is expected that India will face an additional demand of 7 to 8 lakh beds over the next five to six years by 2022.
- Per capita healthcare expenditure: India's per capita healthcare consumption has grown from US$ 55 in 2011 to US$ 76 in 2015, growing at a CAGR of 8.6%. The growth has largely come from rising income levels, growth in preventive testing and increasing government expenditure on healthcare infrastructure. According to industry experts, the per capita healthcare expenditure is expected to grow to US$ 168 in 2019 from US$ 76 in 2015, registering a CAGR of 21.9% during 2015-19.
- Changing lifestyle: The changing lifestyle has led to a transition in the disease profile in the country. The share of lifestyle diseases has grown to nearly 60% of total mortality in 2015 from 40% in 2013. In India, communicable diseases account for more than 35% of all deaths in India. Transition in disease profile is expected to be a major factor in driving health care expenditure in India.
- Growth of in-patient/out-patient base: It is expected that the in-patient market is expected to grow at a CAGR of 13% during 2015-2020. Also, the out-patient market is expected to grow at CAGR of 10% during the same period.



Source: Apollo Investor Presentation, Fortis Investor Presentation

Conclusion

With a rise in aging population in India and growing disease burden, the demand for healthcare services is expected to increase manifold. The elderly people (over 60 years) will account for an estimated share of 12.5% in the country's population in 2025. According to industry experts, India is expected to witness demand for an additional capacity of over 100,000 beds per year for the next 5-6 years (2022) to address the growing demand for healthcare facilities.

Global analytical company CRISIL predicts that Indian hospital sector revenues are expected to grow at 15% annually during FY 2018-2020. Rapid expansion in coverage of health insurance through government-sponsored schemes is the main reason behind the predicted surge. According to CRISIL, health insurance coverage in India has nearly doubled to 42 crore in the past three fiscal years—a trend that is expected to continue. It also points out, via a study of 144 hospital firms, that significant bed additions are being undertaken by hospitals to capitalise on demand prospects. This is projected to increase capacity of large hospital chains (revenue > Rs 400 crore) by 25% during FY'18 and FY'19. This is also expected to lead to a similar trend among small and medium hospital chains.

According to the Ministry of Health, India plans to increase its public healthcare spending to 2.5% of GDP by 2025 from 1.5% of GDP in 2016.

With the advent of new and innovative healthcare models such as wellness centres for diabetes, depression & obesity, diagnostic centres etc, the sector is expected to create many more employment opportunities, enhance productivity and increase export potential of healthcare services. According to industry experts, there will be additional employment opportunities generated for over 4.3 million people in the next five years (by 2021-2022). The launch of Ayushman Bharat Scheme in Budget 2018 will give a strong boost to healthcare infrastructure and employment, along with vastly improved healthcare outcomes for the population. The growth in healthcare employment will further improve the doctor-patient ratio to 1:1,250 people by 2020 and 1:1,075 people by 2022 compared to 1:1,674 in 2014.

With the growing penetration of information technology into the healthcare industry, physicians and patients are experiencing the advantages of on-demand access to medical information. Going forward, the Indian tele-medicine market provides immense opportunities in supplying healthcare services and attracting medical tourists from other regions such as African nations, SAARC and CIS countries. In addition, many developed countries including the US have been in shortage of trained radiologists which provides an opportunity for India to deliver low-cost tele-radiology services to such countries. Given the rising number of innovations happening in developing countries, India is increasingly emerging as a favourable nation to provide an effective ecosystem for frugal innovation in the healthcare sector.

Expert perspective

Mr. Santosh Vaidya, Senior Adviser, World Bank and Former Joint Secretary, Ministry of New and Renewable Energy

"Power sector in India is experiencing a momentous transformation. The role of new and renewable energy has been assuming increasing significance in recent times with the growing concern for the country's energy security. The Ministry of New and Renewable Energy (MNRE) has been facilitating the implementation of broad spectrum programs including harnessing renewable power, renewable energy to rural areas for lighting, cooking and motive power, use of renewable energy in urban, industrial and commercial applications and development of alternate fuels and applications.

There has been a visible impact of renewable energy in the Indian energy scenario during the last five years. Renewable energy sector landscape in India has, during the last few years, witnessed tremendous changes in the policy framework with accelerated and ambitious plans to increase the contribution of solar energy. Renewable energy will now play a significant role, as also, there is a confidence in the technologies and capacity to do so.

Renewable energy has a great potential to usher in universal energy access. In a decentralized or standalone mode, renewable energy is an appropriate, scalable and viable solution for providing power to un-electrified or power deficient villages and hamlets. Around 1.1 million households are using solar energy to meet their lighting energy needs and almost similar numbers of the households meet their cooking energy needs from biogas plants."

Mr. Anil Sardana, MD & CEO, Tata Power

"Indian power sector forms the backbone of the economy. Access to electricity is directly linked to human development index (HDI) and improving electricity access will be instrumental in providing better schooling, health and other facilities. The country needs to balance between its development needs and climate change commitments. A combination of focus on energy efficiency, improved technology and clean energy options forms the focus of the sector at present. The government has demonstrated increased focus on rural infrastructure development by fast-tracking rural electrification. In addition, several initiatives like incentives, capital and interest subsidies, viability gap funding, concessional finance, fiscal incentives, etc have been offered to promote adoption of renewable energy. The government has created a road map for the next two financial years, 2017-18 and 2018-19 with the objective of adding 42.6 GW - almost equivalent to its cumulative renewables capacity to date."

Mr. Praveer Sinha
CEO & Managing Director
Tata Power Delhi Distribution Limited (TPDDL).

"Power sector plays a pivotal role in fueling the overall growth of a developing country like India. All sectors and all areas, be it big or small, urban or rural, require a reliable and quality supply of power for the functioning and development of an economy. Short-term changes in electricity use are often positively correlated with changes in economic output and a growing economy leads to greater energy and electricity use. Changes to the economic activity in manufacturing, industrial and agricultural sectors are big contributors to overall growth of an economy. Thus we can say that energy contributes significantly towards the growth of any economy, which is why it is one of the key parameters in the World Bank 'Doing Business' Report.

Over the past 10 years, the Indian power sector has observed commendable improvements across the entire value chain, be it the addition of power generation capacity or increase in transmission lines and fuel supply. The Government of India has initiated many significant reforms through its policies as India has declared that it will become power surplus, for the first time in the history. The total capacity of India stands at 329,205 MW in March 2017 while it is also pushing to amplify green energy by aiming to add 175,000 MW of renewable energy by 2022.

Over the last few years, lot of focus has been given to the distribution sector too which is the most critical link to the entire value chain and substantial reforms have been initiated on this front. The GoI schemes like Ujwal DISCOM Assurance Yojana (UDAY), IPDS and DDUGVNL provide an enabling environment and assure the rise of vibrant and efficient state discoms through a permanent resolution of past as well as potential future issues of the sector. All these initiatives and programs empower discoms with the opportunity to supply reliable power to these consumers and become break even in the next few years. And a critical element of the scheme is that the states will take over the existing financial losses of discoms in a graded manner.

Through the National Smart Grid Mission (NSGM), the Ministry of Power leads the Smart Grid Program. Government of India (GoI) has committed budgetary support for taking up smart grid and smart metering projects in various cities and towns. For the development of smart grids in the smart cities, the Ministry of Power has allotted more than 90% of its outlay.

Looking at the huge potential of demand side management, GoI is recognizing its importance to attain energy sustainability and carbon emission reduction. Great amount of efforts and initiatives are being taken in this regard such as subsidy on energy efficient appliances, building thermal storage capacity, replacement of existing agriculture pump sets with energy efficient pumps, energy efficient street lights, LED replacement program etc.

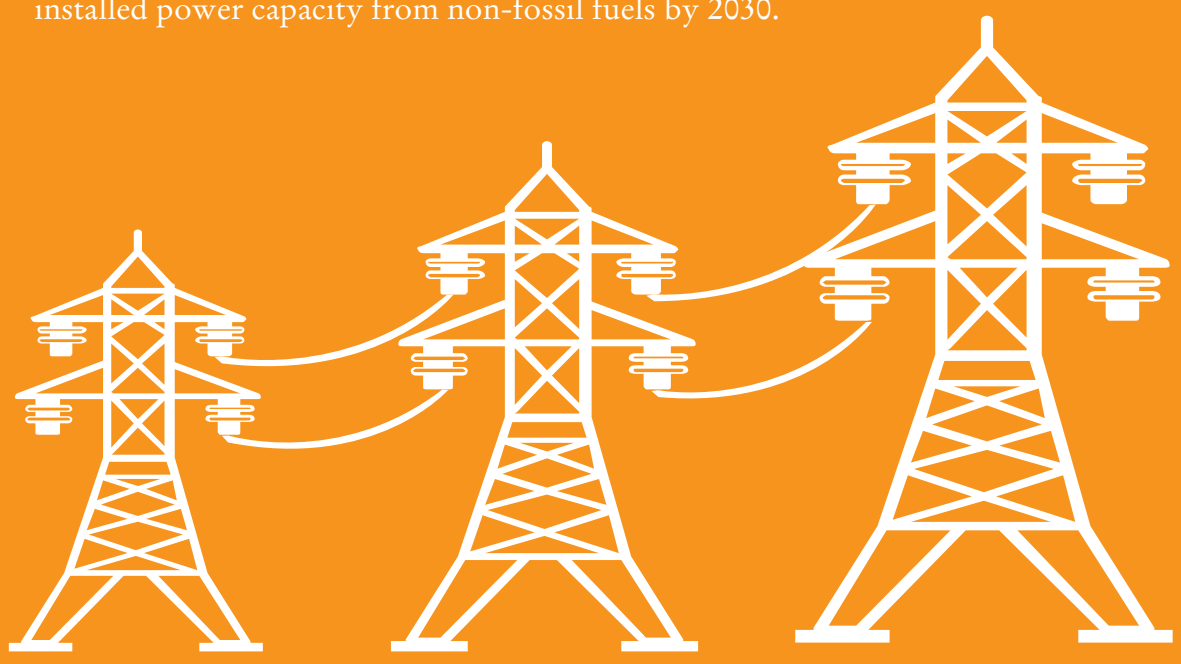
It is definitely a growth story and India is going to achieve even more in the coming years. The national capital's power distribution scenario post-privatisation has experienced a massive revamping in the power supply. The average availability of power supply has improved from 70% to more than 99.6%. One of the major achievements in Delhi has been an expeditious reduction of AT&C loss levels from around 55-60% in 2002 to nearly 8.59% as on March 2017. This radical improvement in operational performance and service levels has been possible through augmentation of network (HVDS, LTABC, DT level metering), introduction of state-of-art technologies (SCADA, DMS, Integrated GIS, OMS, AMI, AMR), operational initiatives and social interventions such as aggressive enforcement and community development among others."

Tipping the scales on energy

The power sector is one of the key pillars of India's infrastructure sector. The country ranks fifth in terms of power generation capacity and third in terms of electricity production in the world. As of May 31, 2017, India had a total installed power capacity of about 330.26 GW. India generates power from thermal, nuclear, hydro and renewable sources. According to the Energy Information Administration (EIA) report titled "International Energy Outlook 2016", the net electricity generation in India is expected to increase from 1,052 billion kWh in 2012 to 2,769 billion kWh in 2040, growing at a CAGR of 3.5% The Government of India has introduced several new initiatives such as the Integrated Power Development Scheme (IPDS), Deendayal Upadhyaya Gram Jyoti Yojana (DDUGJY) and financial restructuring of power distribution companies (DISCOMS) to reduce aggregate technical and commercial (AT&C) losses along with providing a definitive regulatory framework.

Investment opportunities:

- According to an estimate, the Indian power sector has Rs 15 trillion of investment potential during 2015-2020.
- The government plans to invest Rs 3.3 lakh crore in the power transmission sector in the five-year period between 2015 to 2020.
- As of February 2015, 293 global and domestic companies have committed to generate 266 GW of solar, wind, mini-hydel and biomass-based power in India between 2020-2025.
- India ratified the Paris Climate Treaty in 2016. As part of initial commitments, India plans to bring down its carbon emission intensity - defined as emission per unit of GDP - by 33-35% from 2005 levels over a period of 15 years. Furthermore, India is aiming to produce 40% of its installed power capacity from non-fossil fuels by 2030.



Snapshot: Indian Power Sector

India - 5th in terms of power generation capacity

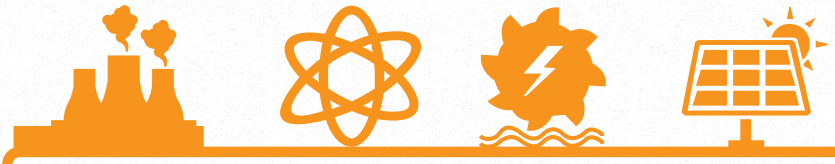
3rd in terms of power production in the world

Total installed power capacity of **330.26 GW (May 31, 2017)**

Installed power generation capacity: **44%** from the private sector and **56%** by the public sector.

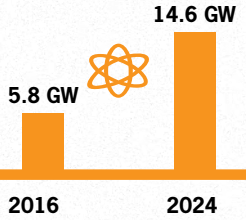
Installed capacity (May 31, 2017)

Thermal	Nuclear	Hydro	Renewable
(67.1%)	**(2.05%)**	**(13.5%)**	**(17.34%)**



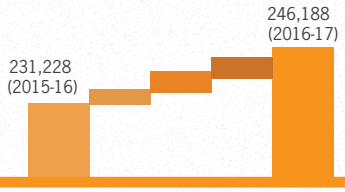
Targets to add around **100 GW** of power generation capacity under 13th Five-Year Plan (2017–22).

Aims to have **14.6 GW** of installed nuclear capacity by 2024 and plans for 40% of installed power capacity from renewable sources over 15 years.



Over 290 global and domestic companies have committed to generate **266 GW** of solar, wind, mini-hydel and biomass-based power in India during 2020-2025

GVA at constant prices for electricity, gas, water supply and other utilities (base year 2011-12, in Rs crore)

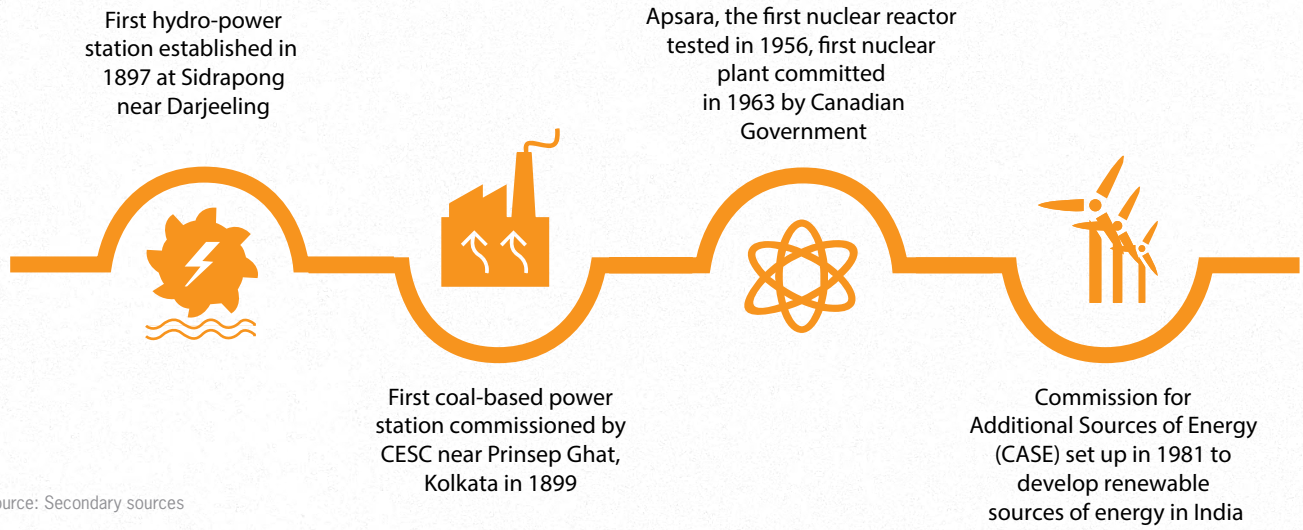


During April 2000-March 2017, Indian power sector received total FDI equity inflows of **US$ 11.59 billion**

Evolution of the Indian power sector

Origins of the Indian power sector date back to 1897, when the first hydro-based power station in the country was commissioned at Sidrapong, near Darjeeling. In 1899, India got its first coal-based thermal power plant at Emambagh Lane near Prinsep Ghat in Kolkata, set up by the Calcutta Electric Supply Corporation Limited (CESC Ltd). India's first nuclear reactor, Apsara, was inaugurated on January 20, 1957. This marked the beginning of the nuclear energy sector in the country. In the renewable sector, a Commission for Additional Sources of Energy (CASE) was set up in 1981 for developing the sector in India. This commission has further evolved into what is known today as the Ministry of New and Renewable Energy (MNRE).

Evolution of power generation segment in India



Source: Secondary sources

Transmission of electricity was defined as a separate activity under the Electricity (Amendment) Act, 1998. This Act led to the creation of the central transmission utility of the country, Power Grid Corporation of India Ltd (PGCIL) and state transmission utilities. Further, the Regulatory Commission Act, 1998 led to the creation of the Central Electricity Regulatory Commission (CERC) and State Electricity Regulatory Commissions (SERCs), which are independent regulatory commissions at the central and state levels respectively.

Previously the government had a monopoly in the generation and distribution of electricity. After the amendment of "The Electricity Act 2003", the private sector has been given the rights for generation and transmission of power. The government gave approval to Tata Power and Power Grid Corporation of India Ltd for constructing a transmission network in joint venture. This was the first public-private partnership-based power transmission project in India. In addition, the Central Electricity Regulatory Commission (CERC) along with State Electricity Regulatory Commissions (SERC) were set up to grant licenses for building, maintaining and operating transmission lines through tariff-based competitive bidding (TBCB) mechanism. Under this bidding system, anyone quoting the best tariff bags the transmission project. CERC and SERCs grant licenses for building, maintaining and operating transmission lines. Both, private players and public utilities (Power Grid Corporation of India Limited and state transmission utilities or STUs) participate in the bidding individually or through joint ventures. Power transmission is largely controlled by the public sector. However, policy reforms and increased confidence of lenders have made the power transmission sector in India an attractive proposition for the private players.

The last link in the entire electricity value chain is power distribution. It is also the most crucial link as the performance of the segment has a direct impact on the sector's commercial viability. As of FY 2016, nearly 4% of India's total power distribution was being handled by private sector players. This indicates that there is a huge scope of privatisation in this space. Historically, the sector has witnessed high aggregate technical and commercial (AT&C) losses due to distribution losses, theft of electricity, low metering levels and poor financial health of utilities with low recovery ratios. This has led to the distribution segment not receiving appropriate attention and funding.

Now, with the restructuring of the state electricity boards (SEBs), the sector has started to receive appropriate attention and investment. The government has introduced several new

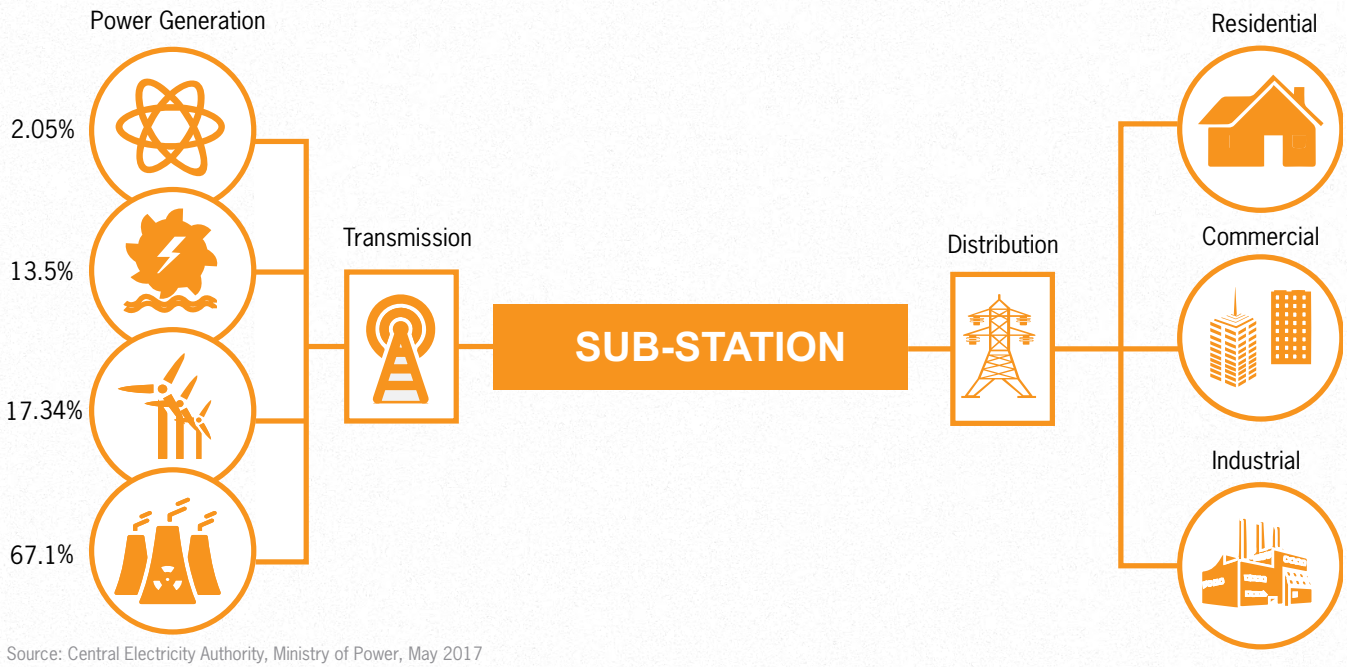
initiatives such as the Integrated Power Development Scheme (IPDS, launched in September 2015), Deendayal Upadhyaya Gram Jyoti Yojana (DDUGJY, launched in July 2015) and financial restructuring of power distribution companies (DISCOMS) to reduce aggregate technical and commercial losses along with providing a definitive regulatory framework.

The electricity sector is a significant contributor to the gross domestic output. Gross value added (GVA) from 'Electricity, gas, water supply and other utility services' sector at basic prices is estimated to have grown by 6.5% yoy at current prices in 2016-17. IIP for electricity grew by 5.8% yoy during 2016-17.

Composition of power sector in India

The power sector broadly consists of three segments – generation, transmission and distribution. Power is generated using thermal, nuclear, hydro and renewable sources of generation. Once generated, the power is transmitted at high voltage using a national transmission grid (which consists of five regional grids, namely North Eastern, Eastern, Western, Northern and Southern grids). These transmission lines feed power into regional substations at high voltages, where the voltage is stepped down and the power is fed into distribution networks. Industrial, commercial and residential consumers then draw power from this distribution network.

Classifying the power sector in India



Source: Central Electricity Authority, Ministry of Power, May 2017

Key Stakeholders

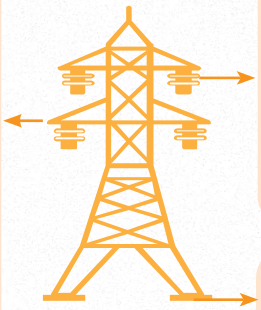
Stakeholders Involved

The stakeholders involved in the power sector can be categorised into three broad categories: key, primary and secondary stakeholders.

1. The key stakeholders are the organizations/people who have significant influence and drive the sector towards a brighter future.
2. The primary stakeholders are the ones who are directly affected, either positively or negatively by the sector.
3. The secondary stakeholders are intermediaries who are indirectly affected by the sector.

Key Stakeholders

- GoI and associated ministries
- Power generation, transmission and distribution companies
- Employees of power companies
- Domestic investors
- Foreign investors
- Coal and other fuel suppliers
- Power equipment manufacturers
- IT companies



Primary Stakeholders:

- Industry/business/corporates including all associated sectors i.e. manufacturing, IT etc.
- Citizens and residents of India
- Government employees
- Indian Railways
- Hospital, medical services etc

Secondary Stakeholders:

- Product distributors and retailers
- Exporters, etc.

The key stakeholders manage and develop the entire power generation scenario in India. They provide funding, technology, infrastructure and the required manpower.

- The Government and its associated Ministries/agencies are the backbone of the Indian power sector. They initiate projects, provide funding and other necessary clearances to power generators, transmission and distribution companies. National Thermal Power Corporation, Power Grid Corporation of India Limited etc. are government owned generation, transmission and distribution companies.
- The role of the private sector (including investors) is increasingly becoming important in the Indian power sector. Power generation, transmission and distribution are open to private sector participation and many eminent private players have invested significant capital to develop the sector. For instance, Tata Power has an estimated investment of Rs 16,000 to 20,000 crore in the Mundra Ultra Mega Power Project (UMPP).
- Information technology (IT) companies are being involved now to digitise the power sector, especially in power distribution. For instance, under the Integrated Power Development Scheme (IPDS), the IT sector is being engaged for establishing IT-enabled energy accounting/auditing systems and improving collection efficiency for billed energy based on metered consumption.

Funding structure in the power sector

The government has allowed up to 100% foreign direct investment (FDI) in the power sector under the automatic route, except for atomic energy. The inflow of foreign capital in the power sector is allowed for undertaking four types of activities:

- Generation and transmission of electrical energy produced through hydroelectric, coal/lignite-based thermal, oil-based thermal and gas-based thermal power plants
- Non-conventional energy generation and distribution
- Distribution of electrical energy to households, industrial, commercial and other users
- Power trading

From April 2000 to March 2017, the Indian power sector had seen a total FDI equity inflow of Rs 60,087 crore (US$ 11.59 billion). This forms approximately 3.5% of the total FDI equity inflows in the country during this period, making power the 9th top sector to attract FDI equity inflows. This trend is expected to continue as many private players are now attracting significant capital through the FDI route. For example Azure Power, a leading solar energy producer in India, entered into tie-ups for approximately US$ 470 million financing for its projects to be commissioned in 2017.

Regulatory scenario

Regulation of the power sector started with the introduction of Electricity Act, 1910 during the British era. The act laid down the introductory framework for power generation and distribution, which was allowed through licensing provided by the state governments. This was followed by the Electricity (Supply) Act, 1948, which documented the creation of the CEA and the SEBs. The SEBs were given powers to generate, transmit and distribute electricity within a state periphery.

Successively, the Electricity Regulatory Commission Act, 1998 was introduced. This led to the creation of the Central Electricity Regulatory Commission (CERC) and State Electricity Regulatory Commissions (SERCs). Rationalisation of electricity tariffs and promotion of energy efficiency and environmental conservation in the energy sector were initiated. All these acts were repealed with the introduction of the Electricity Act, 2003, which laid the foundation for the current power sector in the country. The Electricity Act, 2003 has made provisions for unbundling of the state electricity boards (SEBs), introduction of multiple licenses for distribution,

introduction of trading of electricity as a separate commercial activity, formation of the appellate tribunal of electricity, etc. Also, open access was allowed for bulk producers and consumers.

Generation

India had a total installed power capacity of about 330.26 GW as on May 31, 2017. Power generation infrastructure forms the backbone of the sector in the country. The Government of India has set a target for increasing the installed power generation capacity by increasing private sector participation for electricity generation. This is evident as the installed power generation capacities with private players have gone up by 46% in the 2014-16, compared to 21% with public sector players. Below mentioned are a few major initiatives introduced by the government to rapidly increase installed capacity both in the urban and rural areas:

Key Schemes

- **Ultra Mega Power Projects (UMPP):** The UMPP program was introduced by the Ministry of Power in association with the Central Electricity Authority and the Power Finance Corporation in 2006. The objective of program was to minimise the power deficit by increasing production of power in the nation. The UMPP program includes the installation of a series of power stations. This includes creation of an additional capacity of at least 100,000 MW by 2022. The government had identified 15 UMPPs, each with a capacity of about 4,000 MW across India. As of 2016, four projects were awarded. Three of them - Sasan in Madhya Pradesh, Krishnapatnam in Andhra Pradesh and Tilaiya in Jharkhand were awarded to Reliance Power. The fourth one at Mundra in Gujarat was awarded to Tata Power.

- **Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY):** The RGGVY program was launched by the government in April 2005 for the creation of rural electricity infrastructure. The objective of the program was to increase rural household access to electricity by providing electricity distribution infrastructure in the rural areas. During 2007-12, the government had given free electricity connections to 18.7 million below poverty line (BPL) households living in 65,971 villages under the RGGVY program. In 2009, the Ministry of Power introduced Decentralised Distributed Generation Scheme under RGGVY to electrify un-electrified villages through mini grids. This also included villages which receive less than six hours of electricity per day. The continuation of RGGVY in the Twelfth Five Year Plan was approved by the Cabinet Committee on Economic Affairs (CCEA).

- **Deendayal Upadhyay Gram Jyoti Yojana (DDUGJY):** In July 2015, the government announced Deendayal Upadhyay Gram Jyoti Yojana (DDUGJY) with major modifications in RGGVY. According to Ministry of Power, out of the 18,452 un-electrified census villages in India, 13,469 villages have been electrified as of May 2017. In addition, the Ministry of Power has been able to provide free electricity connections to 25.68 million BPL households (as of April 2017).

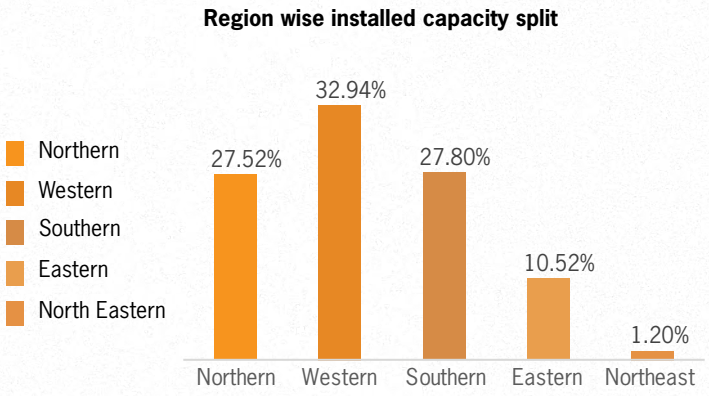
As of June 2017, the installed power generation capacity in the country is mostly thermal. The government is now also promoting alternate sources of power generation such as solar and wind to drive sustainable development of the entire sector.

- Renewable energy: The government has decided to increase renewable power capacity to 175 GW by 2022 from 44.24 GW in 2016. India's existing installed capacity is dominated by coal-based generation. Thus, coal supply shortages and poor financial health of utilities affect the power generation in the country. Further, unlike domestic coal, the price of imported coal is unregulated and can vary substantially on the higher side.
- India needs to supply electricity to nearly 300 million people to achieve 100% coverage. Rampant load-shedding and low-quality electricity supply forces people to resort to private, local and costly solutions such as diesel generators, which pose both health and environmental concerns. Going ahead, India's electricity demand is expected to increase significantly. This demand can be met through renewable energy sources where India has huge potential.
- One of India's major advantages is that its renewable energy potential is vast and largely untapped. Recent estimates (as of 2016) show that India's solar potential is greater than 750 GW and its wind potential is 302 GW (actual could be higher than 1,000 GW).
- The potential of biomass and small hydro is also significant. Thus, renewable energy has the potential to anchor the development of India's electricity sector. In addition, reaching 175 GW of renewable energy by 2022 could dramatically reduce the coal import bill by that year.

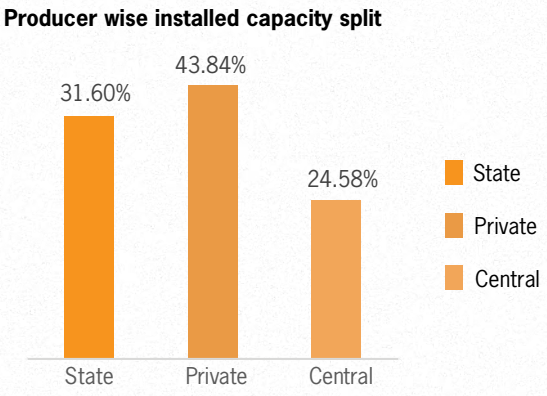
This is in line with the government's mission to provide electricity to every household. According to Niti Aayog, the country is expected to add 100 GW of photovoltaic capacity, 60 GW of wind power, 10 GW of biomass and 5 GW of hydro projects by 2022.

Splitting generation capacity region-wise shows us that the western region enjoys the highest share of installed generation capacity at 35.6% of the country's installed capacity. This is followed by the northern and the southern regions at 26.2% and 25.3% respectively (refer to figure 5 below).

All India installed generation capacity split region wise and producer wise, May 31, 2017.



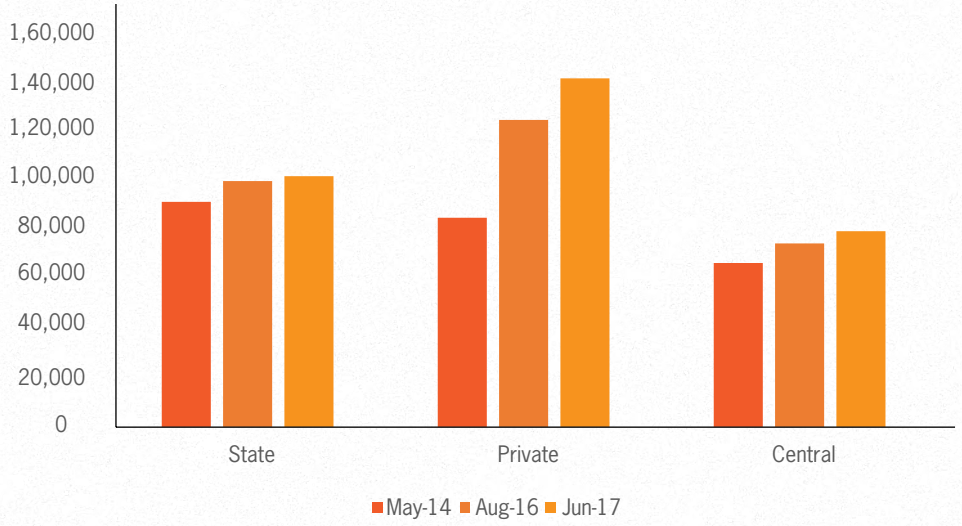
Source: Central Electricity Authority, Ministry of Power



Source: Central Electricity Authority, Ministry of Power

On considering a producer-wise classification, the private producers enjoy the largest share of generation capacity at 43.8%, followed by the state and centre at 12% and 24.6% respectively (as of June 2017). Comparing this with the producer-wise installed capacity mix in May, 2014 we see that the private producers have seen a growth of about 67% during 2014-17 compared to 12% and 19% for the central and state producers respectively.

Producer-wise power production growth witnessed during 2014 -17 (MW)



Source: Central Electricity Authority, Ministry of Power

The table no. 2 below shows the latest available installed capacity distribution across central and state generating stations.

All India installed capacity of power stations as on May 31, 2017 (in MW)

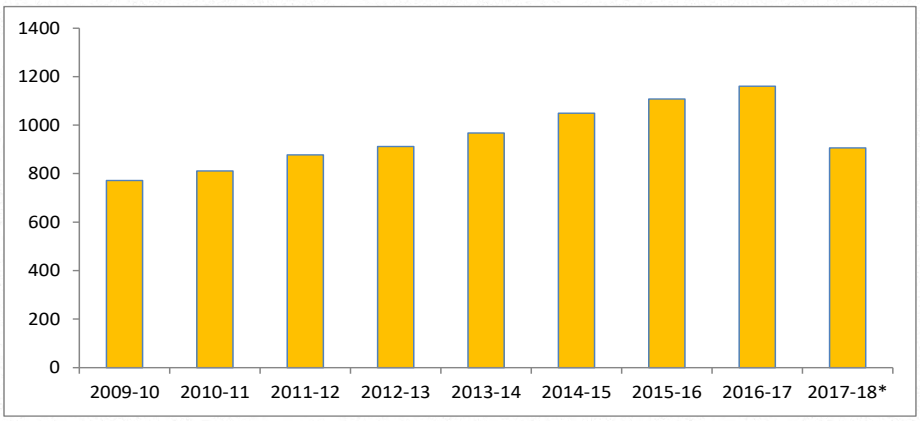
Ownership	Thermal				Nuclear	Hydro	Renewable	Total
	Coal	Gas	Diesel	Total				
State	65,145.5	7,113.95	363.93	72,623.38	0	29,703	1,976.9	104,303.28
Private	75,212.38	10,580.6	473.7	86,266.68	0	3,240	55,283.33	144,790.01
Central	55,245	7,490.83	0	62,735.83	6,780	11,651.42	0	81,167.25
All India	195,602.88	25,185.38	837.63	221,625.88	6,780	44,594.42	57,260.23	330,260.53

Source: Central Electricity Authority (CEA)

Power generation targets

For 2016-17, a power generation target of about 1,178 billion units (BU) had been set. This was a planned increase of 6.3% over actual generation of 1,107.8 BU for the previous year (2015-16). As per data from the Ministry of Power, actual power generation during 2016-17 reached 1,160.14 BU, thereby exceeding the target. Electricity generation target of conventional sources for 2017-18 has been set at 1,229.4 BU, a growth of 5.97% over actual generation in 2016-17.

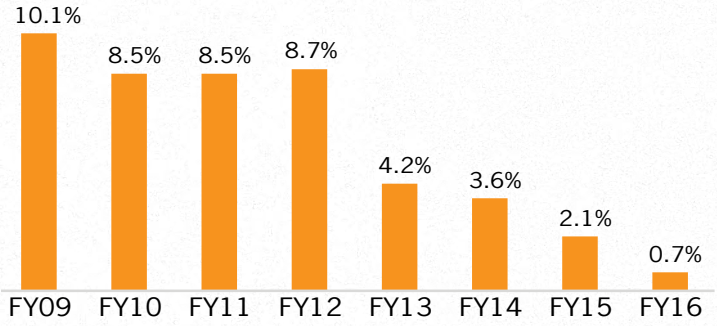
Energy Generation from Conventional Sources (BU)



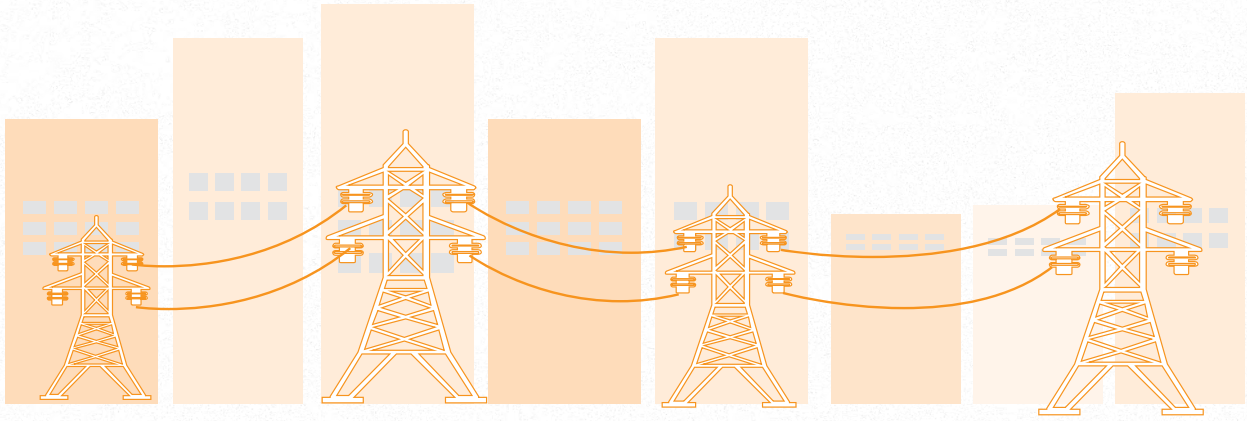
Source: Power Sector at a Glance All India, Ministry of Power, *upto December 2017 (Provisional)

The country has seen significant addition to generation capacity in the last few years. However, the plant load factor (PLF) has remained over the 60% level. PLF is a measure of average capacity utilisation and defined as the output of a power plant to the maximum output it could produce.

Energy Deficit (%) 2009 -2016



Source: Ministry of Power, 2016-17



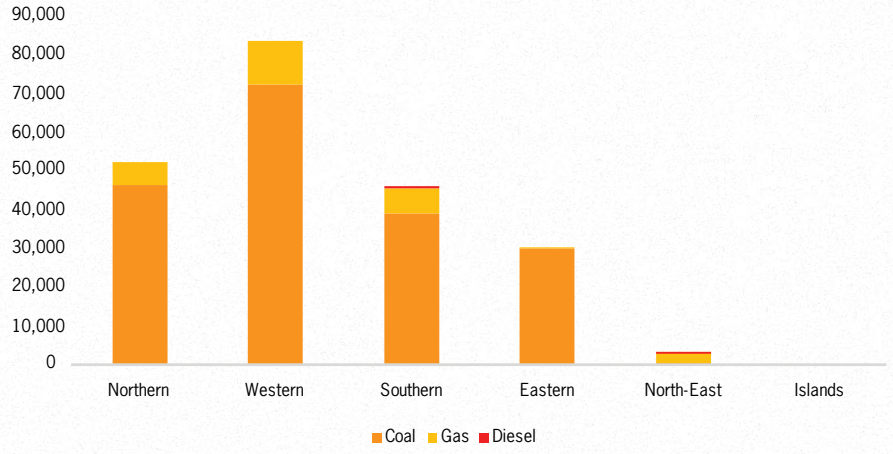
During FY 2009-10 to FY 2016-17, India has improved in terms of its power supply and witnessed a decline in its total annual power deficit data (total requirement/total availability) to 0.6% in FY 2016-17 as compared from 10.1% in FY 2009-10.

Thermal power generation

As of 2017, thermal sources of power generation contribute around 67% to the total power generated in India. Basically three types of fuel are used for the same – coal, gas and diesel. This is attributed to the fact that India has significant reserves ~300 billion tons of coal and 1,488 billion cubic meters of natural gas (as of January 2017). In addition, significant capacity addition for thermal sources of generation has already been taken up. Thus, it is expected to continue as a major source of energy generation for the country in the near future.

The government targeted a capacity addition of ~88.5 GW during 2012-17 and 86.4 GW during 2017-22 in thermal power generation. As of October 2016, 99.4 per cent of the target had been achieved.

Region wise thermal generation installed capacity (May 2017)



Source: Central Electricity Authority (CEA)

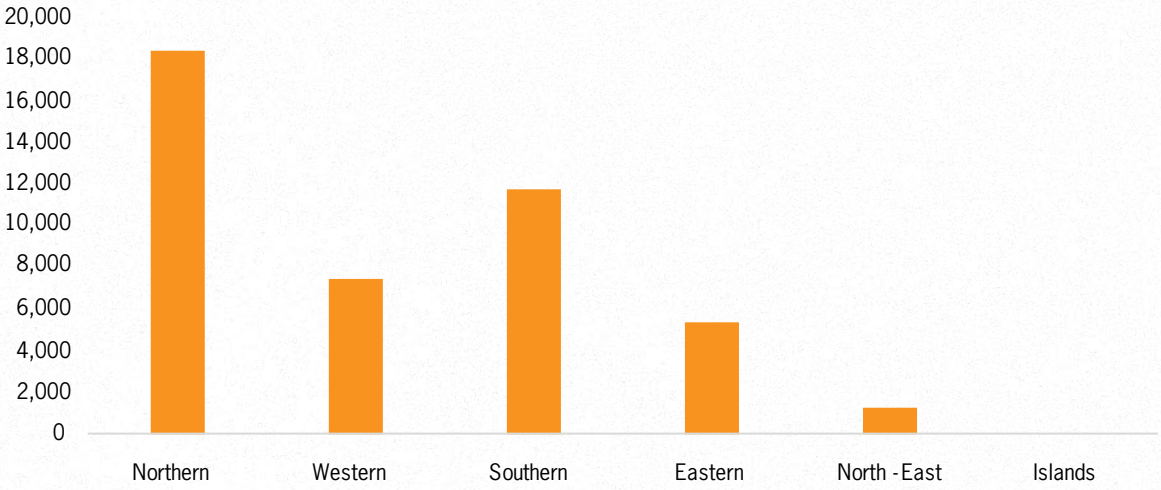
Majority of the installed thermal power generation capacity is in the western part of the country and is dominated by coal-based power generation. This is primarily attributed to the presence of a higher number of larger power plants in the region which is comparatively also richer in coal reserves e.g. the Sasan Ultra Mega Power Project (UMPP) in Madhya Pradesh is a pit-head coal based power project with an installed capacity of 3,960 MW (6X660 MW). In addition, the Mundra UMPP in Gujarat is an imported coal-based 4,000 MW (5X800 MW) power plant.

Hydro-based power generation

Hydropower plants capture the energy of falling water to generate electricity. A turbine converts the kinetic energy of falling water into mechanical energy. Then a generator converts the mechanical energy from the turbine into electrical energy. Hydro-based generation is the third largest installed power generation source in the country contributing around

13.5% of the total installed capacity (as of May 2017). As per the CEA, the country has a hydro-power potential in excess of 84,000 MW at 60% load factor. The government accorded a policy on hydropower development in 1998 with an objective to undertake measures for the exploitation of the vast hydro-electric potential in the country especially in the northern and north eastern.

Region wise hydro power generation installed capacity (May 2017) (MW)



Source: Central Electricity Authority, Ministry of Power

The northern and southern regions together have the highest share in hydropower generation in the country due to availability of higher number of waterfalls and terrain suitable for commissioning of hydropower projects. Together they generate nearly 60% of the total hydropower capacity in the country. In the northern region, nearly 87% of the hydropower is generated from the public sector owned plants, followed by 13% from the private sector. In the southern region, 100% of the hydropower is generated from state-owned power plants. NHPC is the largest hydropower utility player in India, with an installed capacity of around 6.5 GW while SJVN Limited is the second largest hydropower company in India. The government is planning to come up with hydropower purchase obligation (HPO), which will make it mandatory for power distribution utilities to purchase a fixed amount of hydro power to reduce dependence on coal fuelled electricity.

Nuclear-based power generation

The Department of Atomic Energy (DAE) is responsible for the development of the nuclear power sector in the country. It drives the development of nuclear power technology, applications of radiation technologies in the fields of agriculture, medicine, industry and basic research. Under the DAE, Nuclear Power Corporation of India Limited (NPCIL) is responsible for design, construction, commissioning and operation of nuclear power reactors in the country. Nuclear-based power generation is the fourth largest source of power generation in the country and contributes ~ 2% to the total installed power generation capacity of the country.

As of May 2017, 7 atomic power stations were operational in India and had a combined installed capacity of about 6,780 MWe. Further, three more projects are under construction. These projects are managed completely by NPCIL and there is no private or state production in this segment.

Nuclear power generation in India (2012-13 to 2017-18*)

Year	Gross generation (MUs)	Capacity factor (%)	Availability factor (%)
2012-13	32,863	80	90
2013-14	35,333	83	88
2014-15	37,835	82	88
2015-16	37,456	75	77
2016-17	15,908	77	79
2017-18*	6,013	66	69

Source: NPCIL website, *2017-18 data provisional, up to May 2017

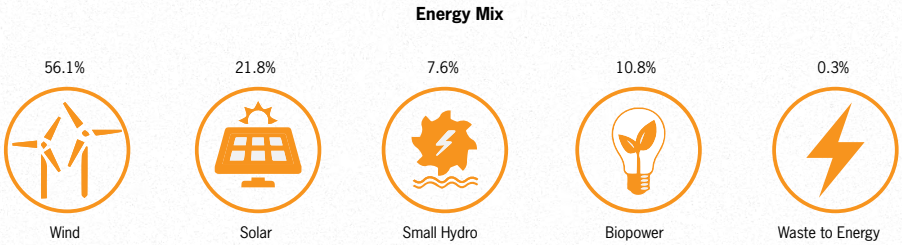
As per the World Nuclear Association, India currently has a significant nuclear power program on the way and expects to have ~14.6 GW of installed nuclear capacity by 2024 and 63 GW by 2032. Further, India is looking forward to supply ~25% of its electricity from nuclear power by 2050. Also, India has recently signed major nuclear development deals. In July 2016, a major nuclear development deal was enacted with the United States, under which the two countries would work jointly on developing six nuclear reactors in India. In November 2016, India signed a bilateral civilian Nuclear Cooperation Agreement with Japan for peaceful uses of nuclear energy and for the development of nuclear power projects in India. The agreement is expected to significantly enhance the collaboration between Indian and Japanese industries in the Civil Nuclear Programme. India also signed another nuclear cooperation agreement with Vietnam in December 2016, asserting that the two countries will conduct research on nuclear reactors as soon as India becomes a member of Nuclear Suppliers Group.

1. Indian nuclear scientists are in the final throes of starting a high-tech giant stove more than 15 years in the making
2. World's only commercially operating fast breeder reactor is situated in the Ural Mountains of Russia
3. India has been running an experimental facility called a Fast-Breeder Test Reactor (FBTR) now for 27 years

Renewable energy generation

Renewable energy forms a major thrust area for the government. It now forms the second largest source of power generation after thermal. The current capacity of power generation through renewable sources stands at 57,260.23 MW as on May 31, 2017. The current mix of renewable energy primarily comes from wind-based generation (56.37% of total renewable energy) as can be seen from the energy mix below.

Energy mix of renewable-based generation as on May 31, 2017



Source: Physical Progress (achievements), Ministry of New and Renewable Energy

Grid-interactive power generation capacity for renewable energy (MW)

Year	Cumulative achievement (as of September 2017)
Wind power	32,700.64
Solar power*	14,771.86
Small hydro power	4,389.55
Bio-power	8,181.7
Waste to power	114.08
Total	60,157.83

Source: Physical Progress (Achievements), Ministry of New and Renewable Energy; *Ground Mounted + Roof Top

Under the current government, there is a huge focus on developing renewable energy, especially solar-based generation. The government plans to increase installed capacity of solar-based generation to 1 lakh MW by 2022.

As of CY 2016, India had a total capacity of 9 GW in solar, including rooftop projects. It is expected that the country would have increased its total capacity in solar to 18 GW by the end of CY 2017. According to industry estimates, India's solar potential is greater than 750 GW and its wind potential is 302 GW. As of February 2015, around 293 global and domestic companies have committed to generate 266 GW of solar, wind, mini-hydel and biomass-based power in India between 2020-2025. In addition, the World Bank has decided to invest US$ 1 billion in solar energy projects in the country.

India has witnessed a decline in the solar power tariff from Rs. 12 a unit in 2010 to around Rs. 3 per unit in 2016. In November 2016, a few projects were awarded to sell solar power at Rs. 3 a unit for 25 years in Uttarakhand, Himachal Pradesh and Puducherry. Solar power tariffs in India have now gone further below Rs 3 per unit. Acme Solar Holdings won a 200 MW solar power project in Rajasthan, for instance, at Rs 2.44 per unit in May 2017.

Indian urban areas generate approximately 53 million tonnes of municipal solid waste and 38 billion litres of sewage every year. In addition, large quantities of solid and liquid wastes are being generated by industries. Rapid urbanisation and industrialisation over the recent decades have resulted in increased waste generation in Indian cities. According to the Central Pollution Control Board, the discharge of 144,165 tonnes per day (TPD) in the country is projected to increase to 265,834 TPD by 2017. The Ministry of New and Renewable Energy is actively promoting the generation of energy from waste, by providing subsidies and incentives for the projects. Indian Renewable Energy Development Agency (IREDA) estimates indicate that the country has realised only about 2% of its waste-to-energy potential. A number of states are now generating energy through waste-to-energy (WTE) plants. As of January 2016, nearly 23% of municipal waste i.e. residential and commercial waste produced in a day in urban India is processed for electricity generation.

As of March 2016, there were a total of 24 waste-to-energy projects at different stages of construction that will produce 233 MW of energy. In addition, five projects with 79 MW aggregate capacity had been tendered, adding up to a total of 312 MW of waste to energy capacity in the country (as of March 2016). After becoming operational, India's WTE capacity will go up 53 MW (as of March 2016) produced to over 312 MW. According to the Ministry of Urban Development, nearly Rs 650 billion of public and private investments will flow into city waste management, cleanliness and waste-to energy projects over a period of three years i.e. by FY 2020. In addition, the government is planning to make it mandatory for power distribution companies to buy 100% of electricity generated from municipal solid waste. The government has already promised to offer 20% grant for solid waste management projects under the Swachh Bharat Mission.

Renewable energy is expected to pick up in the country due to the following reasons:

- India is a large importer of oil, petroleum products and LNG globally. Driving increased use of indigenously produced renewable sources of energy could reduce India's dependence on expensive imported fossil fuels.
- The government is offering various initiatives and incentives, such as generation-based incentives (GBIs), capital and interest subsidies, viability gap funding, concessional finance, fiscal incentives etc. It has also established a dedicated financial institution – the Indian Renewable Energy Development Agency for promotion, development and extension of financial assistance to renewable energy and energy efficiency projects. This has created an environment suited for investment in renewable energy projects.
- The National Solar Mission aims to promote solar energy for power generation and other uses by reducing the cost of solar power generation through long-term policy, large scale deployment and aggressive R&D. In addition, domestic production of critical raw materials, components and products is also being driven through Make in India. The ultimate objective of the mission is to make solar energy compete with fossil-based energy.

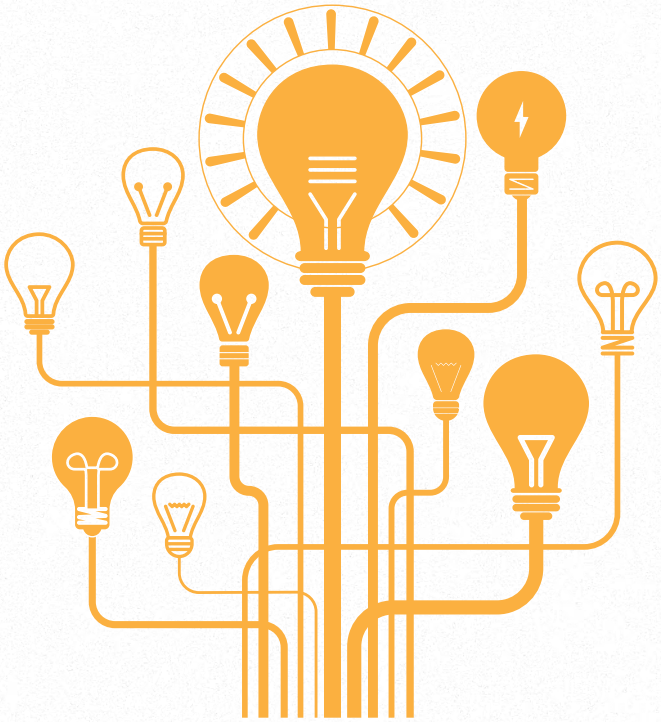
Equipment for renewable energy is becoming more cost-competitive compared to other sources of power generation. Wind energy equipment has become cheaper due to technological innovation, experience curve gains and increased manufacturing scale. Prices for solar modules have fallen by almost 80% since 2008 and wind turbine prices have declined by more than 25% during the same period. Solar power is expected to become cheaper than or equivalent to conventional thermal energy prices. As of April 12, 2017, French company Solairedirect won the rights to put up 250 MW of solar plants and sell power to NTPC Ltd at a record-low tariff of Rs 3.15 kWh.

Transmission of electricity

Transmission of electricity refers to the process of transmitting the electricity generated at a power station to a sub-station at higher voltages.

The Indian electricity transmission grid is a unified grid, which is made up of five regional grids, namely the north eastern, eastern, western, northern and southern grids. These are managed by Power Grid Corporation Of India Limited (PGCIL) which drives a one nation one grid policy. Grid integration in the country started with the integration of north eastern and eastern grids in October 1991. This was followed by integrations of western and ER-NER grid in March 2003. In August 2006, the north and east grids were interconnected, thereby 4 regional grids were synchronously connected forming a central grid. On December 31, 2013, the southern region was connected to central grid thus achieving 'one nation - one grid - one frequency'.

- The central and state governments have been awarding transmission projects under tariff-based competitive bidding (TBCB) route.
- State governments are expected to bid for projects worth ~ Rs 1.5 trillion in the next few years (2017-20), some of which will be in smart cities. With the advent of smart cities, all utilities in the energy value chain are expected to improve operations by supplying reliable and quality power.
- In February 2017, the government decided to double solar park capacity to 40,000 megawatts (MW) in three years (2020) and has opened up business opportunities for power transmission companies in India.
- PGCIL has committed to spend Rs 1 trillion over the period of 2016-2020 to expand its network and connect remote areas . This is in tandem with the government's initiatives on village electrification, uninterrupted power for all and development of the north-east. During April to February 2017, it commissioned projects worth Rs 207 billion and incurred capital expenditure of Rs 179 billion.
- Private sector players have been invited in the transmission sector. Till now, with respect to the size of the sector, presence of private sector is negligible though the private sector participation in power transmission is growing gradually with recent policy reforms.
- To cater to the growing needs of the renewable energy sector, PGCIL has introduced the green corridor project, which was announced in 2013. This is a dedicated transmission network for renewable energy at an estimated cost of close to Rs 55,000 crores for connecting 27 solar parks.
- PGCIL is also endeavouring to increase its revenue by installing telecom towers along its transmission route based on optical fibre technology. It is also planning to expand overseas by bidding for global transmission projects jointly with private players.
- The Asian Development Bank has decided to lend US$ 500 million to India to improve its large-scale power transmission project across the northern and the southern regions. The project, which is expected to be completed by December 2020, will help build over 800 kilovolt (kV) and 320 kV high voltage direct current (HVDC) converter stations and 765 kV power transmission systems in India.



India is moving towards the adoption of smart grid technology in order to bring efficient utilization of the generation, transmission and distribution resources of the country. The government launched National Smart Grid Mission (NSGM) in May 2015. This is an institutional mechanism for planning, monitoring and implementation of policies and programs related to smart grid activities in the country:

- The government has decided to invest a total of Rs. 980 crore for the NSGM activities under the 12th Five Year Plan. More than 90% of the investment is planned for the development of smart grid in smart cities.
- In August 2016, the National Smart Grid Mission launched its first programme to train utility personnel in smart grid components and applications. The United States Agency for International Development Agency will conduct a series of training programs aimed at building the capacity and skills of utility personnel for the development of smart grid infrastructure in the country. The government is targeting to train 10% of its utility personnel from 14 Indian state utilities in smart grid functions.
- According to an industry study report, India is expected to invest a total of US$ 44.9 billion in large-scale smart grid infrastructure projects over the period of 2017-2027.

Distribution of electricity

Distribution forms the final phase of delivery of power to the end consumer where the power is transmitted at a sub-station and brought to a lower voltage suitable to supply it to residential, industrial and commercial consumers. The existing system of power distribution in the country is marred by high aggregate technical and commercial (AT&C) losses. Also, many DISCOMS are in huge debts to multiple generators due to their inefficiency in making appropriate collections from their consumers. Thus, an initiative was needed to find a solution to the challenges that the DISCOMS were facing.

Revival package

The Government of India introduced the UDAY initiative in 2015, which is a financial turnaround and revival package for the DISCOMS in India. The scheme basically consists of four initiatives - improving operational efficiencies of DISCOMS, reduction of cost of power generation, defining roles of states and central utilities and enforcing financial discipline on DISCOMS.

Under the scheme, the states would take over 75% of DISCOM debt as on September 30, 2015 over two years, i.e. 50% of DISCOM debt taken over in 2015-16 and 25% in 2016-17. States would issue non-SLR including SDL bonds in the market or directly to the respective banks/financial institutions (FIs) holding the DISCOM debt to the appropriate extent. Further, 50% of the DISCOM debt as on September 30, 2015, not taken over by the state would be converted by the banks/FIs into loans or bonds with interest rate not more than the bank's base rate plus 0.1%. Alternately, this debt could be fully or partly issued by the DISCOM as state guaranteed DISCOM bonds at the prevailing market rates, which would be equal to or less than bank base rate plus 0.1%. As of May 2017, 27 states and Union Territories, accounting for around 97% of the total discom debt have come on board UDAY.

India's power distribution system has started showing signs of revival and lower operational losses. Out of the states that are part of the UDAY scheme – at least eight have a lower gap between their average cost of electricity supply and average cost of realisation. As of March 2017, the electricity distribution players in Rajasthan, Haryana, Chhattisgarh and Punjab are amongst the major gainers in lowering their interest costs under the UDAY scheme. For e.g the Government of Rajasthan projected a saving of around Rs 47 billion, Dakshin Haryana Bijli Vitran Nigam projected a saving of Rs 7.6 billion and Chhattisgarh projected Rs 5.2 billion savings.

Conclusion

India is one of the world's largest energy consumers and has a target to provide 24/7 electricity to its citizens over the next decade. The country has been investing in building its installed power generation capacity and expanding transmission and distribution infrastructure across different sources of generation. According to International Energy Agency estimates, India would invest about US$ 845 billion in power transmission and distribution networks between 2015 and 2040 to ensure universal access to power for its citizens.

While the past decade has seen India rapidly ramp up on the power generation capacity to meet the demand and bring down the deficit (with the private sector playing a major role post the Electricity Act, 2003), the next decade should see India make rapid strides towards sustainable power generation, largely driven by renewable sources of energy. The government aims to increase India's renewable power capacity from 44.24 GW in 2016 to 175 GW by 2022. In addition, the Ministry of New and Renewable Energy plans to launch an Integrated Bio-energy Mission to push sustainable development of renewable energy in the country. Under this, the focus will be to enhance the use of bio-fuels like ethanol and biogas and reduce consumption of fossil fuels. The government is also strengthening solar and wind energy capacities to reduce dependence on fossil fuels, and strengthen its global position. It is offering incentives, subsidies and easing investment norms to promote both domestic and international private sector participation into the Indian power sector.

Simultaneously, the government is working towards building power capacity across segments, removing transmission bottlenecks, improving financial stability of DISCOMS through debt management, and other ease of doing business initiatives to further accelerate the power sector and improve the power scenario in India. This thrust to power sector in terms of infrastructure development will result in a significant rise in overall employment growth and economic activity in the coming decade.

Expert perspective

Mr. Manish Kumar, MD & CEO, National Skill Development Corporation

"Investment in skill development initiatives in India in the next few years is critical to tap into the enormous human potential of our youth to contribute to the rising economic opportunities for India and transform us into a leader in the global arena. This is a cyclical opportunity that India just cannot afford to miss and opens up opportunity to engage more than 400 million Indians productively for the next 40 years."

Leveraging the demographic dividend

India has a population base of 1.32 billion out of which its youth population (15-34 years) is estimated to be 450 million as of 2016 and is projected to be 464 million by the end of 2021. The working population, people in the age bracket of 15–64 years, is expected to grow to 870 million in 2020-21 from an estimated 800 million in 2016.

This indicates the demographic potential offered by the country. In addition, India offers an advantage of abundance of economical labour force, making it a preferred destination for businesses and it is expected to become the world's most populous nation by 2025. According to the Hays Global Skill Index 2016 report, the skill shortages and skill mismatch are worrying issues for businesses around the globe. Both developed and developing nations have been struggling with shortage of skilled manpower. For example, US employers have been facing a hard time finding skilled talent to fill critical jobs. According to industry experts, the existing skill gap in the US may grow further in the coming years. As per Canadian Chamber of Commerce estimate of 2016, Canada is facing skill shortage of a total of 1.5 million people. In addition, nearly 40% of the European employers face trouble finding people with required skills primarily in manufacturing. Meanwhile, the Government of India has taken several initiatives like Pradhan Mantri Kaushal Vikas Yojana to train Indian youth in various skills. India has the potential to provide a skilled workforce to drive higher GDP growth rates for itself and also fill the expected shortfall in the aging developed world.

Snapshot: Skill Development

India has a population base of **1.3** billion

Working Population (15 to 64 years) of **800** million

Skill India campaign was launched in July 2015. It targets to train over **400 million** people by 2022

People benefited from Skill India
> **10.4** million - 2015-16
> **7.5** million - 2014-15

Skill India

Functioning through **690** projects with over **300** skilling prtners

These projects and training partners span over **330** trades and **82** industry sectors

DDU-GKY
Deen Dayal Upadhyaya Grameen Kaushalya Yojana
Empowering India • Powering the World

In FY 2016-17, 739,245 enrollments took place. The target for FY 2017-18 is **866,062 enrollments**

PMKVY
प्रधानमंत्री कौशल विकास योजना
PRADHAN MANTRI KAUSHAL VIKAS YOJANA

As of May 2017, over **22,230** candidates got trained under the Udaan scheme

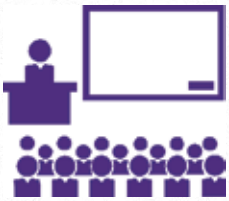
Udaan

Through skill training, the programme aims to enhance the employability of unemployed youth of J&K

The government has a target to provide skill loans to **3.4** million youth by 2020

Target budget allocation of Rs **172.7** billion for employment generation, skill development and livelihood (2017)

Skill Loan Scheme provides loan facilities to citizens going through skill training



Skill Development Infrastructure

National Skill Development Corporation:
4,526 training centres (as of December 2016)

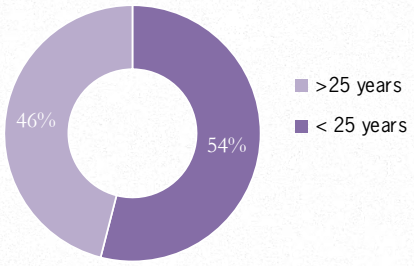
Industrial Training Institutes:
Nearly **18,000** ITI centres (as of September 2016)

Private skill training centres:
8,179 skill training centres (as of May 2016)

Introduction

For every nation, skill has been a key driving force behind the economic growth and social development. India currently is one of the youngest nations in the world with over 54% of the total population below 25 years of age and over 62% of the population in the working age group (15-59 years). In addition, the average age of the population in India will be 29 years by 2020 compared to 40 years in USA, 46 years in Europe and 47 years in Japan. This offers an immense opportunity to India to transform its demographic surplus into a demographic dividend by improving the skill levels of its working age population.

Young population in India (2016)



Source: Secondary sources

Average age of an individual (2020)

Source: Secondary sources

Despite the large young population and work force, India is currently facing a shortage of well-trained, skilled workers. According to industry experts, the skill gap in India is estimated to be around 13 million medium skilled workers by 2020. The Government of India has acknowledged that as the country moves progressively towards becoming a global knowledge economy, it has to meet the rising aspirations of its youth. Hence, it has been focusing on scaling up skill training efforts to meet the aspirations of its youth, demand of employers and to drive economic growth. There are various stakeholders such as multiple government departments (the centre and state levels), private training providers, educational and training institutions, employers, and certification bodies etc. that have been working towards achieving the skill development objective. It is expected that in the next 20 years, the labour force in the industrialised world is expected to decline by 4% while in India, it is expected to witnesses an increase by 32%.

Evolution of skilling in India

Skilling activities in India were largely undertaken by the state government and the central government. The first National Policy on Skill Development was reported in 2009. Later, National Skill Development Corporation (NSDC) was established in 2009 to promote private sector participation via innovative funding models. NSDC supports and incubates sector skills councils (SSCs) which facilitate participation and ownership of industry to ensure needs-based training programmes. In June 2013, National Skills Development Agency (NSDA) was established which has been working with state governments to rejuvenate and synergise skilling efforts in the states.

Skilling has been mainly undertaken through government-run industrial training institutes and industrial training centres (ITIs/ITCs) and apprenticeship trainings (ATs). Skilling services at the private front are rendered through privately run ITIs, ITCs and ATs. With the growing population and labour force to be trained, the Government of India realised the need to collaborate skilling activities of both government and privately run training centres and therefore initiated various projects under the PPP model. Various key initiatives such as Skill India Mission (July 2015), Pradhan Mantri Kaushal Vikas Yojana (March 2015) and Skill Loan Scheme (July 2015) were launched to motivate a large number of youth to take up skill training and become employable and earn their livelihood.

Policy framework and stakeholders

The Ministry of Skill Development and Entrepreneurship is an integral part of the government policy on "Sabka Saath, Sabka Vikaas". It has been working towards the government's common mission of overall skill development. In July 2015, the government launched the National Skill Development Mission to integrate skill development activities across states and sectors. The NSDM provides an overall institutional framework to rapidly implement and scale up skill development initiatives in India. It is consolidating skilling efforts and expediting the decision making process to achieve skilling at a large scale. The Mission has a three-tiered decision making structure i.e. a governing council, a steering committee and an implementation committee.

The government formulated the National Skill Development Policy in 2009 after recognising the imperative need for skill development. The existing policy was reviewed in 2014-15 in terms of its progress in implementation and emerging trends in the national and international environment. The new policy - National Skill Development and Entrepreneurship policy of 2015 supersedes the policy of 2009 and would form the backbone of National Skill Development Mission. The Scheme's objective is to meet the challenge of skilling at scale with speed and standard (quality). It focuses on apprenticeship as a key component for creating skilled manpower in the country. It provides an umbrella framework to all skilling activities being carried out within the country, align them to common standards and link the skilling with demand centres. The policy proposes to work pro-actively with the various industries including MSMEs to facilitate tenfold increase in employment opportunities in India by 2020.

Ministry of Labour and Employment: This is a key Ministry of the Government of India which has been working for the last several decades towards developing skilled manpower for the labour markets in India and abroad. The Ministry of Labour and Employment launched its flagship scheme called "Craftsmen Training Scheme" in 1950 by setting up fifty ITIs for imparting skills in various vocational trades. As of 2015, there are over 12,000 ITIs with a total capacity of about 17 lakh seats.

Ministry of Skill Development and Entrepreneurship (MSDE): Ministry of Skill Development and Entrepreneurship (MSDE) was established in June, 2014 with a purpose to organise the existing skilling ecosystem in the country and to achieve India's goals to skill 500 million individuals by 2022. MSDE is the first ever skill development and entrepreneurship-focused Ministry providing a common direction, coordination, organisation, standardisation, efficiency and effectiveness to the existing skill development Ministries and bodies. MSDE presently unifies operations of 21 Ministries and undertakes functions like content research, motivational programs for entrepreneurs, identifying various job roles and promoting soft skills and computer applications for the youth.

National Skill Development Corporation (NSDC): National Skill Development Corporation (NSDC) (established in 2009) is a unique public-private partnership (P-P-P) in India and a key coordinating body in the skill development sector promoting the participation of the private sector and employers in training and skilling. NSDC was incorporated with an objective to train 500 million people across industries by 2022 under the Ministry of Skill Development & Entrepreneurship. NSDC consists of sector skill councils (SSCs) which standardises skilling activities, facilitates content research and provides training and trainee certification. NSDC achieved the figures (depicted on the right) by the end of December, 2016.

Ministry of Rural Development (MoRD): The objective of Ministry of Rural Development (MoRD) is to educate, skill and employ the youth residing in rural areas of the country. MoRD imparts education to the rural youth who have never received any formal education in the past. Initiatives like 'Aajeevika' (launched in 2011) by MoRD focus on providing education and skills to the rural youth.

Ministry of Human Resource Development (MHRD): The Ministry of Human Resource Development (MHRD) focuses upon different industrial job roles like engineering and technology, biotech, arts, hotel management and culinary courses etc. In 2015-16, the total number of polytechnic institutes under MHRD were 3,867. MHRD also concentrates on providing practical training through apprenticeship programs to polytechnic students, diploma holders and 10+2 students by combining secondary education with vocational training.

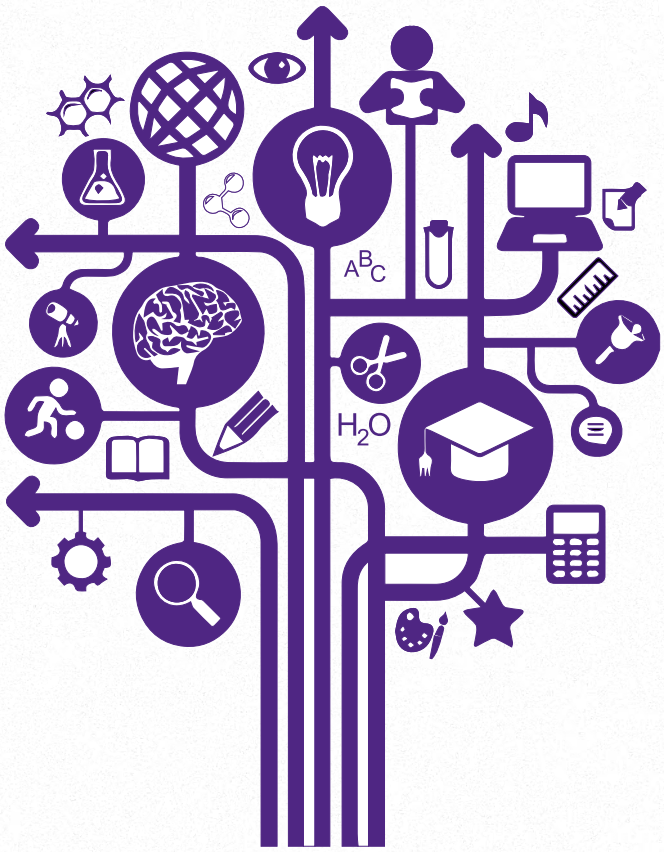
NSDC footprint (2016)

Government thrust to skill development

Nearly 30 lakh students graduate every year and enter into job market but close to 5 lakh are considered employable. The Government of India has recognised the need to bridge the skill and placement gap and has undertaken various initiatives through sponsored programs providing skilling and employment to the Indian labour force. These schemes are implemented by the Ministry of Skill Development and Entrepreneurship through the National Skill Development Corporation:

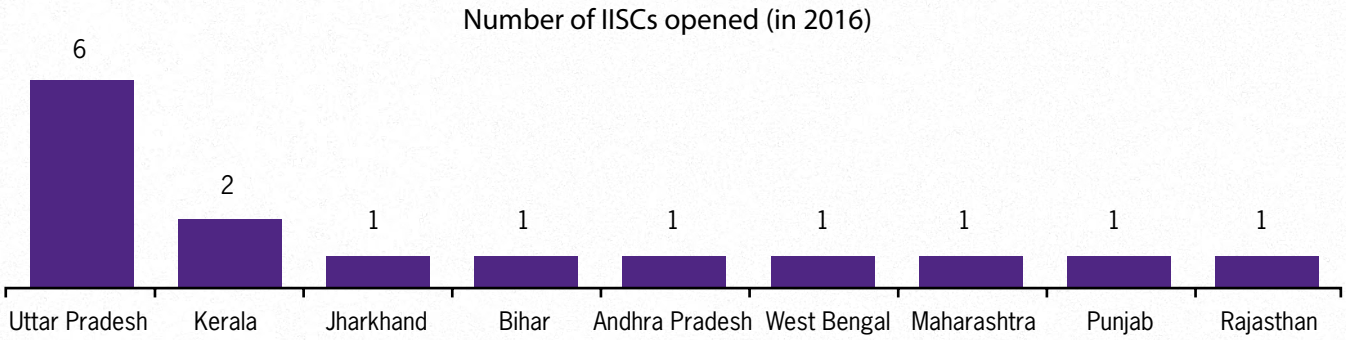
Key Government initiatives:

- **Skill India**: The Ministry of Skill Development and Entrepreneurship, in July 2015 launched a campaign called "Skill India", which was aimed at training the Indian population on different skill sets. A number of other initiatives such as National Skill Development Mission, National Policy for Skill Development & Entrepreneurship 2015, Pradhan Mantri Kaushal Vikas Yojana (PMKVY) scheme and the Skill Loan scheme were launched by the government to achieve its overall skill development target. According to government data, more than 1.04 crore people (36.8% higher than the previous year) have benefitted from the Skill India program in FY'16 compared to 76 lakh in FY'15. The Union Budget of 2017-18 announced that for imparting new skills to people in rural areas, mason training will be provided to 5 lakh persons by 2022, Pradhan Mantri Kaushal Kendras will extended to more than 600 districts across the country, 100 India International Skills Centres will be established across the country, etc.
- **Pradhan Mantri Kaushal Vikas Yojana (PMKVY):** The PMKVY is a flagship scheme of the Government of India launched in March 2015. The scheme focuses on providing skill training including industry-relevant skills, soft skills, personal and behavioural grooming skills to youth that will help them in securing a better livelihood. The mission aims to target the youth in India with a prime focus on the Class X/XII dropouts and lower income groups. PMKVY is implemented by NSDC under the guidance of the Ministry of Skill Development and Entrepreneurship. Under this scheme, training and assessment fees are fully paid by the Government of India. In July 2016, the PMKVY mission got an approval for its 2.0 version with an outlay of Rs 12,000 crore to train one crore youths over the next four years (2016 to 2020). Nearly 18 lakh candidates have been enrolled and 17.93 lakh trained till July 2016 under the scheme. The Ministry of Skill Development and Entrepreneurship targets to skill one crore people in the youth sector. The Union Budget of 2017-18 gave the Skill Development Ministry Rs 2,766.11 crore.
- **Skill Loan scheme**: The Ministry of Skill Development and Entrepreneurship launched a programme called "Skill Loan Scheme" in July 2015 to support the Indian youth going through skill training programmes. This Skill Loan Scheme replaced the previous Indian Banks Association Model Loan scheme for vocational education and training. A citizen who gets an admission in a course run by any school recognised by central or state education boards, training partners affiliated to NSDC sector skill councils, State Skill Corporation etc. can avail a loan between Rs 5,000 to 150,000 based on the course for a period of 3 to 7 years at a rate of interest of 11% and 12% per annum. According to Department of Financial Services, 6,003 skill loan accounts have been opened during July 2015–September 2015 and the total amount sanctioned was Rs 38.663 crores. The government has set a target of providing skill loans to over 34 lakh youth in India for a period of 5 years (2016-2020).



Other initiatives:

- **National Apprenticeship Promotion Scheme**: The National Apprenticeship Promotion Scheme was approved by the government in July 2016. This is the first scheme which offers financial incentives to employers to engage apprentices. The scheme has an outlay of Rs 10,000 crore with a target of 50 lakh apprentices to be trained by 2019-20. Approximately 50% of the total expenditure on providing basic training would be supported by the government. As of December 2016, there were nearly 23,000 private companies providing apprenticeship across the country.
- **Skill Management and Accreditation of Training Centres**: The MSDE and NSDC jointly launched Skill Management and Accreditation of Training Centres (SMART) which aims to synergise the efforts of all the stakeholders in the skilling ecosystem, and streamline skill development initiatives. SMART provides a single window clearance system to the training providers (TP). The main features of the SMART are:
  - Offering a transparent, unified, one-stop solution to training providers, mandating time-bound delivery of accreditation and affiliation of training centres.
  - Enabling training providers to have a single front-end portal interface across multiple sector skill councils and schemes.
  - Providing opportunity to the stakeholders to perform technology-driven continuous monitoring of the training centres, evaluate performance of the skill development programmes in an objective manner, foster excellence in training centres and building effectiveness in delivering competency-based training;
  - Enabling the trainees and other stakeholders to make informed choices with regard to training centres.
- **Pradhan Mantri Kaushal Kendras (PMKK):** The Pradhan Mantri Kaushal Kendra is an initiative of the MSDC which is implemented by the NSDC. The PMKK is a multiple skill development centre with state of the art infrastructure which provides high quality industry relevant courses to citizens. It also focuses on employability, thus creating aspirational value for skill development training. In February 2017, the Finance Minister announced the target to expand the PMKK network to over 600 districts from the current 60 districts.
- **India International Skill Centres:** In July 2016, the government launched 15 India International Skill Centers (IISCs) across the country which will support the youth in getting foreign placements. The IISCs provide training and certification programmes to youth intending to migrate overseas for work. These 15 IISCs were opened across nine states i.e. UP (6), Kerala (2) and one each in Jharkhand, Bihar, Andhra Pradesh/Telangana, West Bengal, Maharashtra, Punjab and Rajasthan.



Source: Secondary sources

In the 2017-18 budget, the government revised its target to increase the total number of IISCs to 100 from the previous number of 50 in a phased manner. These IISCs will be set up through the NSDC and implement the Pradhan Mantri Kaushal Vikas Yojana and Pravasi Kaushal Vikas Yojana.

- **Skill India Online:** In July 2016, the Ministry of Skill Development and Entrepreneurship launched "Skill India Online", an online platform for imparting skills to millions of skill seekers in the country. Skill India Online focuses on providing top quality online courses in India. The courses range from computer education to personality development courses. The courses involve nationally renowned acknowledged professionals, creative leaders and teachers.
- **Corporate Skill Centres:** In January 2016, the Ministry of Skill Development & Entrepreneurship, under the Skill India effort, launched a special industry initiative which combines leading corporates to set up corporate skill excellence centres in PPP mode. These corporate skill excellence centres help to directly involve the industry in establishing high quality centres to substantially increase youth aspirations, and to cater to the captive skilling demands of the industry, enhance productivity of the skilling partners and fulfil the aspirations of youth and women.

- **Skill Acquisition and Knowledge Awareness for Livelihood Promotion (SANKALP):** In the FY'17 budget, the Ministry of Finance announced Skill Acquisition and Knowledge Awareness for Livelihood Promotion (SANKALP) with a budget of Rs 4,000 crore. The project focuses on empowering the country's 3.5 crore youth through education, skills and jobs.
- **Labour Management Information System (LMIS):** The LMIS is a single-window platform launched in July 2016 to estimate supply and demand trends in the Indian skill development space. The LMIS summarises, monitors and evaluates skill development schemes and programs across ministries and agencies in the country. The LMIS also provides data that can be leveraged to undertake future projects and avoid duplication of efforts.

The government is also taking some key initiatives towards international collaboration. Some instances are as follows:

- The Ministry of Skill Development and Entrepreneurship has ensured exchange of best practices and alignment to transnational standards with countries like the US, UK, France, Germany, Australia, Canada, UAE etc.
- The government has four skill academies of excellence in aviation, healthcare, automotive were in conjunction with Canada.
- The government has also rolled out International Trainer and Assessor Course (ITAC) through Australian-registered training.
- UKIERI facilitated a partnership between the NSDC and the Federation of Industry Skills & Standards to support benchmarking of Indian National Occupational Standards against UK National Occupational Standards - 15 Indian SSCs have benchmarked 82 job roles with 11 UK SSCs and prepared transnational standards.

Types of Skill Development Centres

- **Industrial Training Institutes (ITIs):** ITIs play a vital role in economy by providing industrial training to Indian citizen. The major focus is towards imparting training through 70% skills & 30% theory. ITI training is imparted in 126 trades (73 Engineering + 48 Non-Engineering + 5 exclusively for visually impaired) with a duration 1-2 years. As of September 2016, there are a total of 18,000 ITIs centres in all states/UTs. In 2016, AICTE has permitted to run ITI courses in 500 polytechnics across the country: The government is planning to upgrade existing infrastructure and implement the best technology solutions. In FY15, 1,227 ITIs were given interest free loans, Rs. 2.5 crore per ITI for the upgradation of those centres through public private partnership. The Ministry of Skill Development has planned to open more than 5,000 new ITIs by the end of 2018.
    - **Vocational Training Improvement Project (VTIP)**: The VTIP project was implemented with World Bank assistance in December 2014. The scheme envisaged upgradation of 400 government ITIs. Out of those 400 ITIs, 305 ITIs have taken up multi-skilling courses under center of excellence.
- **Apprenticeship Training:** National Apprenticeship Scheme was started in 1959 on voluntary basis and converted into Apprenticeship Act in 1962. The Central Apprenticeship Council is the apex body that advises the government on policies and prescribing norms & standards in respect of apprenticeship training scheme (ATS). Apprenticeship training involves on-the-job and classroom training programs carried out by industry players. In this, trainees and employees work together in teams and receive on-the-job experience. This kind of training in India is governed by the Ministry of Labour & Human Resource Development and the Apprenticeship Act 1961. There are 259 trades in 254 groups of industries are available for apprenticeship training. According to Directorate General of Training, there are 28,500 establishments which provide apprentices (as of July 2016). As of February 2016, 2.12 lakh training seats had been utilised against 3.92 lakh seats identified under the Act and 0.43 lakh training seats for graduate, technician and technician (vocational) apprentices have been utilised against 1.22 lakh seats identified for these categories. The programme provides training to the trainees in the age group of 15-18 years covering manufacturing, non-manufacturing, organised and unorganised sector.

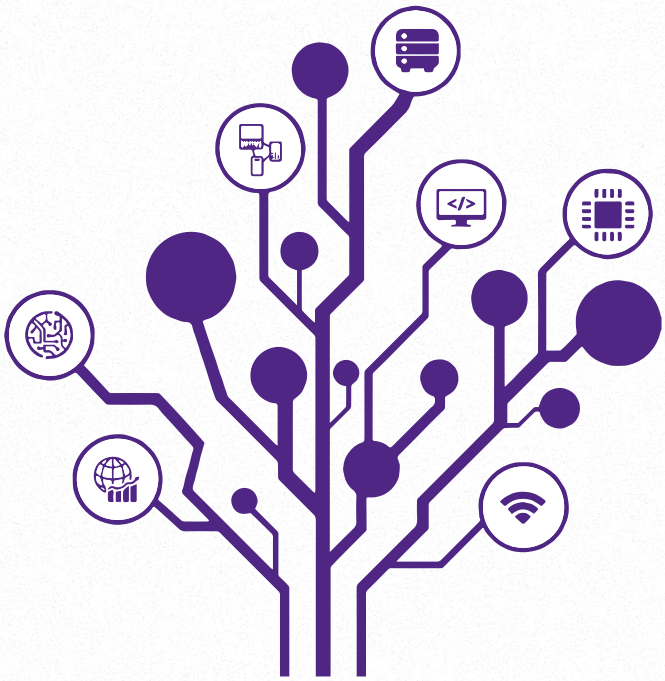
Role of private sector in Skill India Initiative

Skill India initiative was launched to encourage the youth to take up skilling and vocational training to improve their employability and to bridge the large scale skill mismatch that exists in India. While the Government of India has launched multiple initiatives under the Skill India Mission but private sector – being the major job creator in the industry has a huge potential to enhance the scale, quality and sustainability of skill development programs. The private sector has created a positive impact on the skilling ecosystem in India by validation and updation of National Occupational Standards (NOS) and quality packs (QPs) across industries, demand forecasting, engaging pro-actively with training providers, facilitating on the job work experience and co-investing in training infrastructure among others. A number of private companies have also launched initiatives to skill the youth, under their CSR programmes.

Some key initiatives launched by the private sector:

- The Tata STRIVE, an initiative by Tata group (launched in July, 2016) collaborates and combines with all other private companies and government bodies like NSDC and its partners. The project focuses on building internal capabilities by introducing Tata STRIVE training centres and increasing scale of operations by collaborating with government ITIs, NGOs and corporates.
- In February 2017, Microsoft launched Project Sangam with LinkedIn that will help train and generate employment for middle skilled and low-skilled workers in India. The project will also allow people to enrol through Aadhaar cards and later utilise the LinkedIn channel to manage their professional account.
- In 2015, Tata Housing had stated that it would provide vocational skill development training to 100,000 backward youth across India by 2024.
- NIIT has collaborated with the US based TedX to provide skilling and training to over 5 lakh people through online courses by 2019.
- In 2015, Larsen & Toubro (L&T) implemented a programme to help youth pursue careers in construction and allied industries through its Construction Skills Training Institute.
- In February 2017, Samsung signed a memorandum of understanding (MoU) with the Assam Skill Development and Entrepreneurship Department to set up a centre in Guwahati with an aim to impart electronics-related training to youth like repairing mobile phones, televisions and other gadgets.
- In 2015, Bharat Petroleum initiated a skill development programme providing training to the unprivileged sections specifically concentrating on women, unemployed youth and specially challenged.
- Mahindra Pride Schools by Mahindra & Mahindra trains youth belonging to socio-economically disadvantaged communities and has already trained more than 14,000 youth in the cities of Pune, Patna, Chennai, Chandigarh and Srinagar by April, 2016.

There are a number of industry associations such as Federation of Indian Chambers of Commerce and Industry (FICCI), National Association of Software and Services Companies (NASSCOM), Confederation of Indian Industry (CII) etc. who have been providing their support in building skilled manpower in the country. For e.g. FICCI



launched a FICCI Skills Development Forum in 2008 to provide its support in achieving government's ambitious of youth skill development. The forum works around three critical areas i.e. policy advocacy, strengthen industry involvement and international partnerships. FICCI also has skills development division which focuses on skill development, entrepreneurship, counselling, gender development, education and assessments etc. In addition, FICCI established FICCI Ladies Organisation (FLO) to promote entrepreneurship and managerial skills among women in India. In March 2017, the Telangana Minister of IT, Industries and Commerce has given its go ahead to open a FLO in Hyderabad. This FLO will provide training to 1,200 to 14,000 women in various skills required by the industries.

In 2012, the National Association of Software and Services Companies (NASSCOM) together with Nation Skill Development Council (NSDC) formed a council named as "IT-ITeS SSC" for the overall workforce development in the IT and ITeS industry. The overall objective of the IT-ITeS SSC is to create a pool of skilled manpower for the IT and ITeS industry and to enhance employability options for them. The IT-ITeS SSC aims is to cultivate diversity to increase economic activity. In October 2015, NASSCOM Foundation partnered with Atos SE, a European digital services provider, to open skill development training centres. The centres conduct IT related skill development programmes for underprivileged people in the country. These centres target to train over 4,000 people per year across all digital devices, primarily computers and mobile phones

The Confederation of Indian Industry (CII), in collaborating with the state governments and the private sector, has set up a number of skill hubs and skill gurukuls in various districts of India which provide training support in various skills. In May 2012, CII launched its first skills centre in Chhindwara, Madhya Pradesh to provide training support to rural youth and make them employable. The objective of skill centre is to create a talent pool of trained workers for the industry. In addition, CII has also set up a multi skill centre in Bhiwadi, Rajasthan which focuses on offering training in the manufacturing trades. Another multi skill centre was launched in Balasore, Odisha which focuses on building skill development in the service trades.

Skill Development Growth Drivers

Sectoral growth: Increased growth rates across sectors have triggered the need for skilled manpower. The manufacturing and agriculture sectors have the potential to grow at 4% provided that labour extensive activities are adopted. The agriculture sector may also benefit from improved yield and crop portfolio thereby employing 508.9 million by 2020. The Government of India wants to make the manufacturing sector the backbone of the Indian economy along with services sector. According to industry estimates, the manufacturing sector is forecasted to employ 100 million individuals by 2020.

Supply of training centres/institutes: The Government of India in collaboration with private players/corporates has set up a number of new training centres which provide skilling to the trainees and ensure employment through placement. For e.g. the number of industrial training centres has grown to 13,350 in 2016 compared to 8,085 in 2010.

Population demographics: India's population is showing an upward trend with 54% of the population below the age of 25 years. Constitution of women in the country's labour force increased to 27% in 2016 from 24% in 2015. Hence, there is a growing demand for skill development schemes.

Corporate CSR: The government has made it mandatory for large corporates to have a self-regulatory CSR mechanism where they take up initiatives for the upliftment of society and weaker sections. Under the CSR initiatives, corporates have initiated various skilling and training programs where they train their existing employees, provide training to raw human resources and later place them in their own institutions, undertake skill development in weaker sections of the society and promote charity and donations for the same.

Collaboration of schools and vocational institutes: Schools have also realised the need to provide practical training to students through on the job training simulation along with theory-based classrooms sessions. The idea of providing practical training to students has enabled schools to partner with a number of vocational training institutes and centres.

Conclusion

The Indian economy is in the midst of a structural transformation towards becoming a modern skills-based nation. The population of India is expected to reach 1.5 billion by 2030 and nearly 13 million people annually will be entering into the labour market for the first time during 2015-30. According to the current market trend the growth of sectors like manufacturing, services and non-manufacturing activities would result in an increasing demand for skilled, semi-skilled and unskilled labour. The country offers a labour advantage over countries like Japan, US and the European countries. India is seen as one of the largest nations in terms of labour force in the world with nearly 800 million people who are in the working age of 15-64 years which is more than the combined labour force of Japan, the European Union and the United States. In addition, India's working age population is expected to surpass China in the next ten years. According to industry experts, India is expected to have around 28% of the world's workforce with more than a billion of labour force by 2030. Quality education, healthcare, and skill enhancement will remain the key focus areas for the government. The government has launched various education and skill development initiatives to address the existing/upcoming demand for education and skill development. It is planning to achieve the target of skilling 400 million people through the introduction of Ministry of Skill Development and Entrepreneurship which governs other skilling ministries that are aggressively introducing new initiatives and policies to train more and more youth in the emerging sectors. With the introduction of bodies like NSDC, India is looking to equip itself with a trained and skilled labour force which can bridge the gap of quality and quantity and create a sturdy human resource pool by 2020.

Expert perspective

Mr. Dinesh Agarwal,
Founder & CEO, India Mart

"IoT and smart consumerism are changing the way India is doing business. Everything from a mobile phone to a card swiping machine to a cloud computing software, is an example of 'machine talk' and contributes to the gamut of Internet of Things. In the last decade we have witnessed many innovations from budding startups. Moreover, government initiatives like Smart Cities and Digital India will play a pivotal role in rapid growth. I hope that these innovations and government initiatives will together make IoT more accessible and affordable for our micro, small & medium enterprises. This is definitely a growth story for all of us and I expect more startups and innovations in this sector."

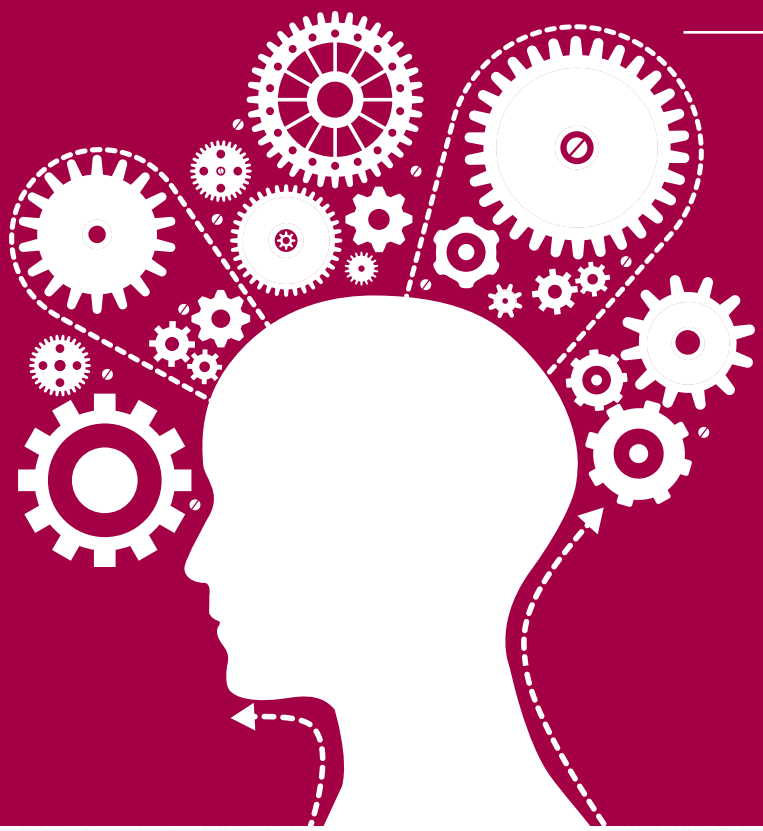
Mr. Yashish Dahiya,
Co-founder & CEO, Policybazaar

"Internet of Things (IoT) is a story that has come of age in the ongoing millennium. With digital influence on the consumers getting bigger and the economies world over recognizing the empowering potential, this story will only grow exponentially going forward. The transformation would also bring with itself a unique set of challenges. There will be a definite need of collaboration to execute this concept effectively. We are entering an era where devices will be the mode of communications and transactions. Advanced security protocols to protect privacy will be needed to bring sustainable change."

Changing customer dynamics in the digital age

Technology has been playing a pivotal role in the surge of the Indian economy. Internet and smartphones are bringing a sea change in consumer behaviour. There are growing numbers of businesses taking advantage of the internet for reaching out to their potential customers. For instance, Indian banks have launched their internet and mobile banking platforms, retailers have come up with online platforms for buying products, travel and tourism companies have brought online channels of sales for consumers, etc. It has changed the way businesses do trades, consumers buy goods/services and the way the government goes about managing the affairs of the nation.

According to industry experts, it is expected that the Indian e-commerce industry will witness more than 300 million new online shoppers between 2015-2030. It is further expected that India will have 10,500-11,000 new technology-based startups emerging by 2020 from 4,750 in 2016. With more and more businesses coming into existence, the contribution of the e-commerce market will reach the US$ 300 billion mark by the end of 2030 from US$ 20 billion in 2015. This changing consumer behaviour along with the supporting business responses like online platforms and startups are set to play a game changing role in the country's future economic outlook. Hence, in light of the above, through this theme there is an attempt to put forward the key changes/evolution that have brought about the change in consumer behaviour leading to smart consumerism.



Snapshot: Next-generation Consumerism

35%
Internet penetration in India

Smartphone penetration
28% (2016)
59% (2021E)

Urban India had **180** million social media users (2016)

Internet contribution to GDP
4.6% (2018, projected)
3.2% (2013)

E-commerce market segments

- **70%** Online Travel
- **17%** E-tailing
- **6%** Financial services
- **4%** Online classifieds
- **5%** Others

India's e-commerce market to grow at a CAGR of **34%** (2016-2020)

Average online consumer spending to grow at a CAGR of **13%** (2016-2020E)

Growing numbers of people are buying products using smart phones as witnessed by the rise of large e-commerce players

Market growth
CAGR (2015-2020E)

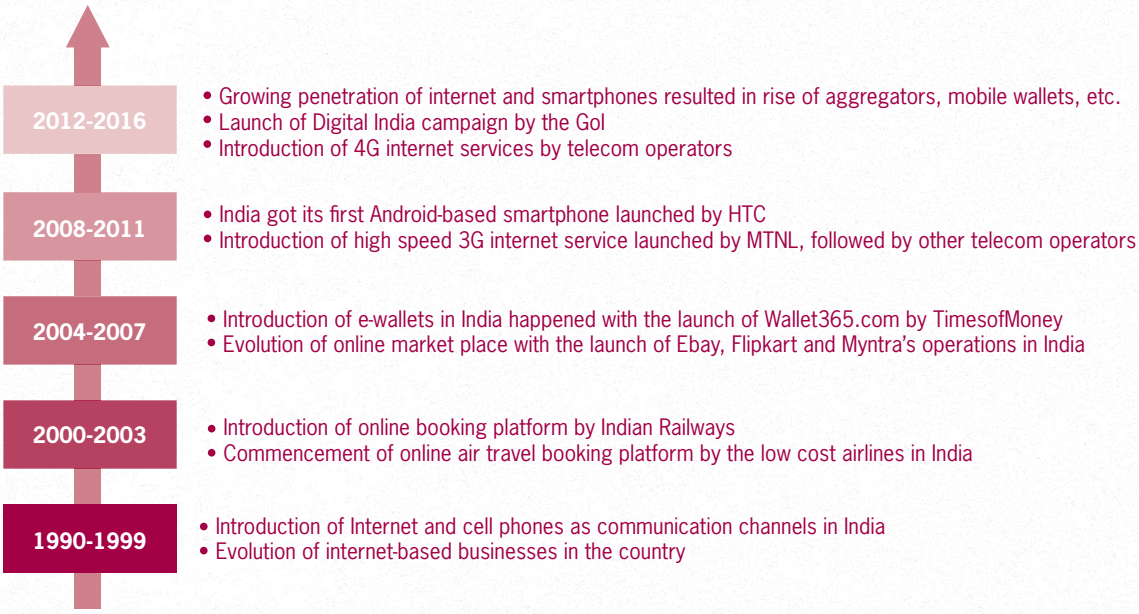
E-tailing **52%**

M-commerce **55%**

6.0 billion
Number of mobile app downloads in 2016

389.9 million
Mobile banking transactions in FY 2016

Evolution of technology

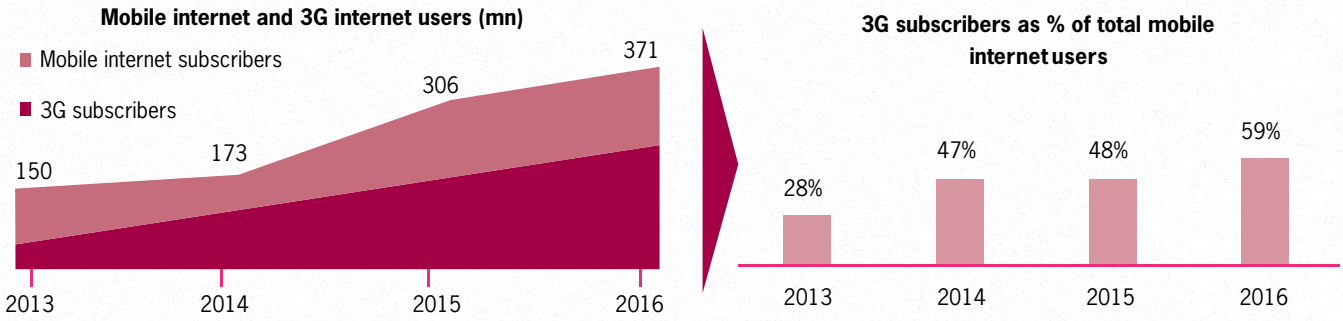


Source: GT analysis, secondary research

The introduction of computers/laptops, internet and cell phones brought a lot of changes in the consumer lifestyle which further resulted in business innovation. The transformation in technology and the integration of various communication tools gave birth to virtual market places and online businesses in India. Now public and private sectors were looking at this space in search of a scalable market opportunity in the country. As a result, Rediff.com launched its online business portal in 1999 in India. Post the entry of Rediff.com, there were a growing number of private players entering the online marketplace. The government passed the Information Technology Act 2000, which focused on building e-commerce and internet related businesses in India. The bill provided internet businesses with a legal and policy framework. The Indian Railways too decided to have a virtual presence through the introduction of its first online platform "IRCTC" for purchase of railway tickets online in 2001-02. The intent behind the launch of IRCTC was to provide comfort while booking train tickets. Consumers were freed from the hassle of standing in long queues for ticket booking. Although consumers were slowly becoming aware about the new market channels including online platforms, the level of awareness was low at that point.

While the trend of booking railway tickets through the online channel was growing, various airlines such as Air Deccan, Indian Airlines, SpiceJet etc. started shifting their focus to internet-based booking to save on commission costs given to agents. As growing number of people were looking at online channels, new companies such as MakeMyTrip and Yatra, offering online flight booking services, launched their operations in the country. This was the phase of aggregators coming to the virtual market place. After their success, they added new services such as hotel booking and holiday packages to their product portfolio.

During the mid-2000s, India was witnessing a growth in per capita income and a growth in discretionary spending. Consumers were now looking at internet-based channels as a cost effective way of buying goods and services. To capitalise on the growth opportunities in the e-commerce space, Flipkart launched its operations in the country in 2007 and started selling products with huge discounts that further gave a boost to online transactions in the country. In 2009, HTC Corporation launched India's first Android phone which further gave a boost to online retail sales. In December 2008, MTNL (Mahanagar Telephone Nigam Ltd) launched the country's first 3G (third-generation) mobile service in Delhi and later it was introduced in Mumbai and Chennai. Thereafter, a lot of private players entered the 3G arena and started offering high speed internet services. This led to faster internet services and in-turn increased online buying in the country. By the end of 2010, India had a total of 10 million subscribers with 3G services. More and more consumers started shifting to 3G from 2G network. Another large e-commerce retailer, Snapdeal, launched its operations in 2010 and started offering a number of consumer products. By then, the e-commerce sector was witnessing double digit growth and to tap this opportunity, foreign players also started focusing on India.



Source: Mobile Internet in India, IAMAI

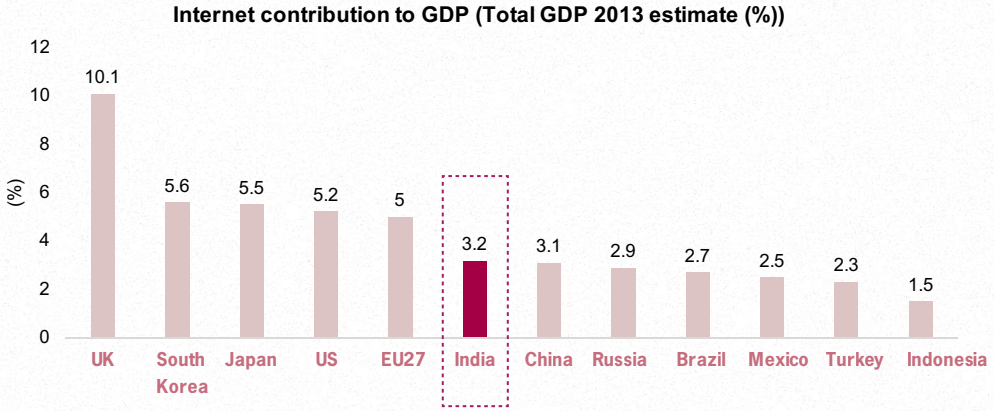
Note: Internet users are calculated at the end of calendar year

A new phase of India's telecom revolution begin with the launch of 4G internet in the country. In 2012, Indian telecom operator Airtel started offering 4G services through the introduction of its cutting edge TD-LTE technology. Post the introduction of 4G, internet consumers were able to enjoy faster speeds and share videos, photos, downloads at just a click. 3G operators are now focusing on expanding their network. The launch of 4th generation network has also led to a decrease in 3G service prices by the telecom operators. During 2013-16, the 3G user base in India had grown to 59% (in 2016 as a % of total mobile internet users) compared to 28% in 2013. As affordability of 3G and 4G internet increases, this will further have an overall impact on the online business in the country. The Government of India is also planning to commercially roll out 5G internet services by the end of CY 2020 and has commissioned a research team to work on 5G technology. As of October 2016, the team had filed over 100 patents, out which nearly 10 had already been granted. As of June 16, 2017, scientists at IIT Hyderabad and Centre of Excellence in Wireless Technology (CEWiT) have tabled the country's first patent before an international body that defines global cellular radio standards for different generations of wireless network.

Consumerisation - Changing consumer behaviour

Internet, smartphones and computers/laptops are becoming an integral part of the consumer's lifestyle. Growing numbers of consumers look at various internet sites for information on products/ services, discounts and offers before buying them online or offline. To capitalize on such growth opportunities, new business concepts such as aggregators, discount-based retailers, sector specific online retailers, mobile-based online players are emerging in the country. Following are key consumer trends that are visible in today's India:

Adoption of internet: Internet is contributing to the growth of a number of sectors including travel, retail, financial services, telecom, etc. Internet contribution to GDP in India is among the highest when compared with other developing countries across the globe.

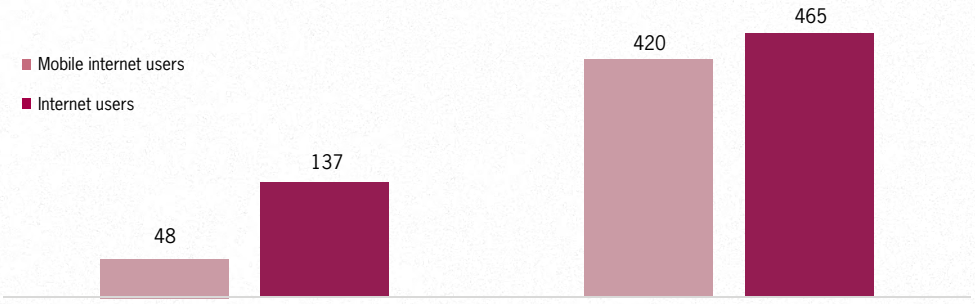


Source: Internet and Mobile Association of India, Industry reports

According to industry experts, internet's (internet-related products and services) contribution to India's GDP shall reach 4.6% in 2018, compared to 3.2% in 2013.

Consumerisation - Changing consumer behavior

Growth of internet users vs mobile internet users (million)



Source: GT analysis, IAMAI June 2017 Estimates, Secondary research

During 2012-17, the number of total internet users has grown at a CAGR of 27.7% and reached 465 million on June 2017 compared to 137 million in June 2012. The number of users accessing the internet from mobile phones has grown at a CAGR of 66% during 2012-16. More than 70% of the total mobile internet users are from the urban parts of the country. The remaining 30% are from the rural areas. The growth of internet in India has given a boost to e-commerce business.

Moving towards online shopping: Overall Indian retail industry is expected to reach US$ 1 trillion by 2020, compared to US$ 600 billion in 2015. A similar trend can be witnessed in e-commerce, which involves selling goods and services through electronic channels. Growing penetration of internet and smartphones, changing online shopping experience, growing focus on online marketing and changing lifestyle have been propelling the growth of the e-commerce market in the country.

Average online annual consumer spending is expected to grow at a CAGR of 13% to reach US$ 445 by 2020 from the US$ 336 in 2016. It is expected that the Indian e-commerce market shall grow at a CAGR of 34% and reach US$ 75 billion by CY 2020 from the estimated market of US$ 23 billion in CY 2016.

The overall e-commerce segment is categorised into five broad sub-segments - online travel, financial services, classifieds, e-tailing (sale of goods only) and others. Close to 70% of the total e-commerce market constitutes online travel services, followed by other segments. E-tailing, which constitutes close to 17% of the total e-commerce revenue has grown in double digits during 2010-15. As of March 2016, one third of the total sales of computer electronics, apparels, accessories etc. in the country were through online channels.

Large online businesses are focusing on technological platforms to make effective the customer shopping experience to capture a larger share. According to industry experts, the Indian e-tailing market is expected to grow at 52% to reach US$ 20.7 billion by 2020 from US$ 2.5 billion in 2015.

The average cost of smartphones has come down to US$ 158 in 2016 compared to US$ 530 in 2011, declining by close to 70%. Declining average costs are driving the demand for smartphones in the country. The consequent rise in smartphone penetration and availability of high speed internet (3G and 4G) are changing consumer shopping behavior.

Rise of aggregators: Aggregator is an online site or application which collects and compiles data about a product and displays it on a separate online platform. Aggregators have revolutionised the marketing and distribution of various products and services across sectors, thus changing overall consumer shopping behavior. In the last few years, a number of web-based aggregators have emerged in India.

- The Indian online travel market was valued at US$ 10.3 billion in 2016. The market is expected to grow by 13% during 2016-2020 and reach US$ 16.5 billion by 2020. Makemytrip, Yatra and Goibibo are among the major players in the online travel market segment of the country.
- Indian taxi aggregator market was valued at US$ 15 billion in 2015. According to industry estimates, the country's radio taxi market is expected to grow at a CAGR of 17% during 2015-2020.
- Indian food-tech market was valued at US$ 18 billion in 2016. The food-tech market i.e. web & mobile app is expected to grow at a CAGR of over 12% during 2015–2020. Zomato, Foodpanda and Swiggy are among the leading players in India's food-tech market.
- The online classified market is expected to grow three times to reach US$ 1.2 billion by 2020. The market will be driven by the rapid growth of e-services, real estate and automobiles etc.
- Indian fintech firms have changed the face of financial

services in the country. According to industry estimates, the transaction value for the Indian fintech sector was approximately US$ 33 billion in 2016 and is expected to reach US$ 73 billion in 2020. Paytm, Freecharge and Mobikwik are among the key players in the segment.

Social commerce: As of March 2017, India had an estimated 196.02 million social media users, out of which, 194.11 million users were active on Facebook, making the country the second largest market for Facebook after the USA. Close to 66% of the total internet users in urban India regularly access social media platforms. This phenomenon is also visible in the rural parts of the country as a result of growing mobile penetration and declining prices of internet data plans. It is an estimate that by 2020, about 315 million Indians from rural areas will be connected to the internet as compared to 120 million as of August 2016.

Social media enables people to share their views or perspectives on various subjects including product specific reviews and any emerging trend in the technology. Thus, the purchasing decisions of various such consumers get influenced by the views of others. The country is witnessing an increase in the number of consumers buying online through social media/online platforms. Social media provides a platform for engagement between a consumer and a seller. There is an increase in the number of retailers and businesses investing in their social media platforms to make it more user friendly and convenient. Through social media, retailers are able to analyse customer purchasing preferences and behaviour, and this enables them to offer appropriate products. Also customers can now stay connected with retailers and stay updated through their posts published on social media sites.

Online research: As information is now readily available with a click of a button, customers prefer to make use of this information before making their decision of buying any product. As per a report published by Retailers Association of India and Hansa Cequity in 2016:

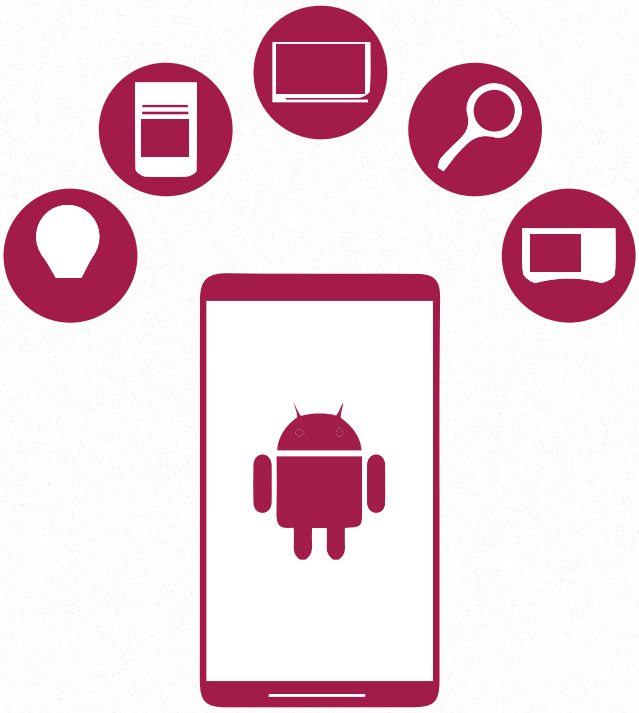
- 74% the survey respondents exhibit omni-channel behaviour (they shopped on local retailer, large department stores and online)
- 96% of shoppers look out for product information before actual purchase
- More than 75% consumers use internet for information before making purchase of any electronic product

In addition, consumers also look for discounts and deals before buying any product. In search of discounts, consumers search and visit a number of online sites such as mysmartprice.com (an average of 12.3 million visits), Junglee.com (an average 10.7 million visits), and Pricedekho.com (an average of 1.2 million visits during the period of July-December, 2016), etc.

Internet & mobile banking: This form of banking is gaining momentum considering the preference towards online methods of fund transfer by the youth of the country. Thus, India has recorded a significant shift from traditional banking to internet-based banking. The volume and value of transactions that are being undertaken through smartphones have surged significantly over the last few years and this is another notable consumer trend. Mobile banking has taken the country by storm:

- Mobile banking has grown by 183% Y-o-Y in value terms and 158% Y-o-Y in volume terms during 2015-2016.
- The mobile banking sector in India is expected to grow 200 times to US$ 3.5 trillion in 2022 from US$ 17.5 billion in 2015.
- According to the RBI, the top five banks hold close to 92% of the entire value of mobile banking transactions in India (March 2016). State Bank of India is the market leader with 36% share, followed by ICICI (21.5%), HDFC (17.8%), Axis (12.8%) and Kotak Bank (4.7%). These banks have managed to remain proactive in the development of mobile apps and mobile banking.

Mobile wallets: Penetration of mobile phones is higher than the penetration of bank accounts in India. Transactions through mobile have become the next big alternative payment method for the consumers. In 2012, companies were allowed to introduce mobile wallet solutions in India. As a result, Vodafone came out with M-Pesa service in April 2013 in West Bengal, Kolkata, Bihar and Jharkhand. Mobile wallet allows you to make transactions by using mobile phones as a prepaid account where money can be stored.



There are three kinds of m-wallets that are available i.e. closed, semi-closed and open wallets:-

- A closed wallet is issued by a company for buying in-house goods and services only. They provide online wallets where a consumer can store money and carry out online transactions. However, there is no advantage of cash withdrawal or redemption e.g. portals like Flipkart, Jabong and MakeMyTrip.
- A semi-closed wallet is issued for buying goods and services, including financial services, at select merchant locations or establishments which have a contract with the issuing company. Semi-closed wallets do not permit cash withdrawal or redemption by the holder e.g Paytm and Mobikwik.
- Open wallets are used for buying goods and services, including financial services such as funds transfer at merchant locations or point of sale terminals that accept cards. It also allows cash withdrawals at ATMs or business correspondents. These wallets can only be issued by banks e.g. M-Pesa by Vodafone in partnership with ICICI Bank.

Currently, the mobile wallet offers services like transfer of money, banking transactions, value-added services such as shopping, ticketing, recharging, bill payments, etc. As of 2016, the highest market share of 38% was captured by the money transfer businesses, followed by recharge/bill payments, and utility areas by 30% and 12%, respectively. The number of transactions through mobile wallets has grown at a CAGR of 164% and the value of transactions has also grown at a CAGR of 174% during 2013-16. This indicates how consumers are accepting technology in their daily life and are moving towards virtual/online transactions. These players have been helping the government in their financial inclusion program by offering mobile-based banking solutions.

- The mobile wallet market in India is expected to reach US$ 12 billion by 2020, growing at a CAGR of 30% from an estimated level of US$ 3 billion in 2015.
- As of December 2016, Paytm recorded over 1 billion transactions.
- As of September 2016, leading companies in terms of the number of registered wallet users were Paytm: 140 million, ITZ cash: 110 million and Mobikwik: 35 million.

Key emerging technologies

Indian retail sector is witnessing changing consumer dynamics as a result of growing smartphone penetration, rising number of internet users, increasing standards of living and deeper penetration of social-media, etc. The current consumption trend will further put emphasis on technological led solutions that are customised and sustainable. Therefore, leveraging technology in businesses will become critical given the growing competition and transparent engagement. The below mentioned are major emerging technological trends being witnessed in the country:

Cognitive computing: Cognitive computing involves simulation of the human thought process into a computerised system. This technology acts like a human brain by collecting and recognizing the past patterns, learning & experience and imitating human behaviour. This technology will change the fundamentals of retail sector as it helps computers interact with customers, store owners and other retail vendors. According to a recent survey, 91% of retail sector officials, familiar with cognitive computing, expect that this will play a disruptive role in the industry.

- The global cognitive computing market is expected to reach at US$ 13.7 billion by 2020 from an estimated value of US$ 4.4 billion in 2016.
- Asia-Pacific region is expected to become a key market for this technology due to the rising trend of cloud-based services.

Internet of Things: Internet of things (IoT) refers to a network of identifiable devices and machinery of all forms and sizes with an intelligence to connect, communicate and control each other seamlessly to perform a set of tasks with minimum intervention. A lot of industry players are investing resources in developing capabilities to capitalise on emerging IoT opportunities.

IoT players are leading the way in opportunities like smart city development by developing smart and communicating tech solutions for revolutionizing the services and infrastructure of cities. They are also looking at revolutionising manufacturing while capitalizing on the concept of Industry 4.0. IoT would then be central to the vision to enable smart lighting, traffic management, commercial buildings, parking lots, and city surveillance systems, process life cycle management, etc. India's version of commercial IoT provides an opportunity to trim operating costs, improve efficiency and bringing new product innovations to market faster than ever. The IoT technology will help consumers lives through innovative solutions including smart refrigerators, self-driving automobiles, wearable fitness trackers etc. The Government of India plans to invest in IoT market to create a US$ 15 billion IoT industry by 2020.

- According to an industry report, the global IoT technology market is expected to grow from US$ 130 billion in 2015 to US$ 883 billion by 2022.
- The Indian IoT market is expected to grow at a CAGR of more than 28% during 2015–2020 and reach US$ 15 billion by 2020.

Augmented reality (AR): Augmented reality is a type of technology which enhances the real world experience with the help of digital technology such as 3D models and videos etc. This technology connects with smartphone, tablet, PC or connected glasses. A lot of established brands are moving towards the integration of AR technology with their products and services. For e.g. Tata Motors has introduced its new small car Tiago using virtual reality. The car is presented with a DIY (Do-It-Yourself) VR headset in select newspaper editions, providing a real feel. Similarly Axis Bank has used AR for its mobile application:

- According to a market report, the global AR market is expected to reach US$ 117.4 billion by 2022 from an estimated value of US$ 4.1 billion in 2016 and the global VR market is expected to reach at US$ 34 billion from an estimated value of US$ 2.2 billion in 2016. Further, according to industry experts, India's AR and VR market is expected to grow at a CAGR of over 55% during 2016-2021.
- Majority of global demand for the AR and VR technology is coming from various sectors such as consumer, aerospace, defence, commercial and medical.

Government's policy measures

The Government of India has taken a number of steps towards modernisation and improving the sustainability of e-commerce market:

FDI in B2B: The Indian e-commerce market is largely confined to the B2C segment (business-2-consumer). Hence, the growth of the B2B (business-2-business) segment is comparatively slower than the B2C e-commerce segment as a result of the entry barriers for the B2B segment. To promote B2B e-commerce businesses, the government has allowed 100% FDI for international companies such as Walmart and Alibaba who have shown interest in the country's B2B e-commerce sector. Further, an entity is permitted to undertake retail trading through e-commerce under the following circumstances:

- A manufacturer is permitted to sell its products manufactured in India through the e-commerce channel.
- A single brand retail trading entity operating through brick and mortar stores, is permitted to undertake retail trading through e-commerce.
- An Indian manufacturer is permitted to sell its own single brand products through e-commerce retail. The Indian manufacturer would be the investee company, which is the owner of the Indian brand and which manufactures in India, in terms of value, at least 70% of its products in house, and sources, at most 30% from Indian manufacturers.

Payments bank: Amid the rising penetration of mobile phones in India, the Reserve Bank of India (RBI) decided to allow companies to offer mobile wallet solutions in 2012. Airtel, Vodafone and others players received licenses to operate a semi-open mobile wallet segment.

Digital India: The Digital India mission was announced by the government in June 2015 with the objective of providing access to digital technology through easy accessibility to internet. Under this mission, the government has planned to provide access to its services through internet and mobile phone. The mission is expected to give a great boost to the e-commerce businesses by bringing larger number of people under the gamut of internet and broadband services even from the remote areas of the country.

E-Agriculture Market: With the rising penetration of mobile phone users, the government has decided to capitalize on the opportunity by reaching out to farmers through SMS, call and mobile apps. In April 2016, the government launched the National E-Agriculture Market which integrates various agriculture markets across the nation and brings them together under one roof. The farmers registered on the site will be able to sell their agriculture produce online in any of the markets offering a competitive price:

- As of July 2017, the government had launched the program in 455 mandis across 13 states in the country.
- It has a target of integrating as many as 220 markets in 2017 and a total of 585 markets by 2018.

The government has played an important role in the overall development of online marketplaces by easing out regulatory norms, introducing a number several flagship programs in the last 18 months (since 2015) and introducing a number of incentives to such businesses. These measures will provide further support to the Indian e-commerce industry.

Startup India: The Startup India campaign was officially launched in January 2016. It was started with the aim of promoting bank financing for start-ups and encouraging entrepreneurship. The 'Startup India Action Plan' has several initiatives to boost entrepreneurship and build an ecosystem for nurturing innovation, which include definition of startup, tax benefits, a Rs 10,000 crore 'Fund of Funds' etc. As of March, 2017, the Small Industries Development Bank of India (SIDBI) selected 17 alternative investment funds and announced to support them with a corpus amount of nearly US$ 96.5 million (Rs. 623.50 crore).

Corporate playbook

Indian consumers have been going through a lot of technological-led transformations which have given birth to numerous new business ideas. Many large corporates primarily e-commerce companies are investing in

technology to achieve operational and functional efficiency, thereby capturing larger market share etc.:

Shopping experience: Large e-commerce players including Flipkart, Amazon, and Snapdeal etc. are investing to improve the overall customer shopping experience. The objective of such investments is to provide the user with good experience with respect to ease of using the platform, delivery speed/consistency, ease of returns and/or cancellation, etc.

Mobile-based apps: The declining cost of smartphones, increasing number of smartphone users and declining cost of internet data plans brought a number of mobile-based applications in the market. The total mobile application downloads in 2016 for India stood at over 6 billion, as compared to 3.5 billion in 2015. Mobile apps are not limited to large players. Many small to medium scale businesses and startups are coming up with their mobile applications to leverage the growth trends and potential in the Indian market.

Multi-language content: Penetration of e-commerce/m-commerce is at a lower level in Tier-II and Tier-III cities compared to Tier I cities. More than 60% of India's population lives in these areas and most of them do not speak or understand English. To capitalise on such opportunities, online businesses are coming up with multi-language web content and mobile applications. For e.g. e-commerce players such as Snapdeal and Shopclues have launched regional versions of their sites.

Logistics: There are growing numbers of consumers who are looking at businesses offering one to two days of delivery time. Thus a number of online players are partnering with logistics companies for handling huge volumes of delivery, return orders and maintaining higher standards of customer services to remain competitive in the market. Many established e-commerce players have already set up their own logistics businesses for greater control on deliveries and for enhanced customer experience. According to industry experts, online businesses are expected to invest close to US$ 6-8 billion in logistics and warehousing during 2016-2020.

Big data analytics: Big Data analytics helps businesses in developing insights through customer data, accurate customer targeting, better management of operations and supply chain etc. The use of big data has become critical for retailers especially in times of campaigns or festive seasons to understand their target customers, thus growing their revenues. According to a recent survey, over 75% of businesses are investing or planning to invest in big data analytics during 2016-18.

Hyperlocal market: Hyperlocal companies get online orders from a consumer and they deliver the product through partnered local retailers quickly. Rising smartphone penetration and a sizable amount of untapped commerce especially in Tier II and III cities are making businesses shift their focus towards hyperlocal commerce. A lot of online players have started developing strategies for the offline part of the world with the use of mobile.

A true disruption is defined as anything that brings more than one change in the overall society. Corporates have been changing the way traditional businesses do trade, and there are companies focusing on technology and coming up with disruptive business solutions.

Advantages of E-commerce

Online businesses have been successfully changing the way people transact.

- **Ease of shopping** - E-commerce business provides 24x7 support to its consumers as they can do transactions for the product/services anytime, anywhere from any location. Customers need not travel to shop for buying any product which reduces traffic on road and air pollution.
- **Quick delivery** - E-commerce platforms ensure more options and quicker delivery of products. These businesses have been investing in their logistics and warehouses to further enhance the delivery experience in the country.
- **Product choices** – The online businesses including web aggregators provide users more options to compare and select the cheaper and better option. A customer can see what others are buying along with their review/comments before making a final purchase.
- **Readily available information** - Any customer can see the relevant detailed information within seconds rather than waiting for days or weeks.
- **Competitiveness** - E-commerce businesses increases competition among the manufacturers and sellers thus provides substantial discounts and improved products to customers.

- **Market reach** – Online businesses have enabled access to services and products to rural areas as well, which are otherwise not available to them. These businesses helps the government to deliver public services like healthcare, education, social services at reduced cost and in an improved way. E-commerce businesses offer great advantage to manufacturers and sellers. Manufacturer organizations can expand their market footprints to national and international markets by taking the help of e-commerce platforms. It helps in targeting more customers, best suppliers and suitable business partners across the globe.
- E-commerce businesses help organisations reduce the costs to create processes, distribute, retrieve and manage paper-based information by digitising the information.
- E-commerce businesses support "pull" type supply management. In "pull" type supply management, a business process starts when a request comes from a customer and it uses just-in-time manufacturing.

Conclusion

Among the BRICs, India is ahead of Brazil and Russia in terms of internet users. The country had nearly 420 million internet users in June 2017 as compared to 210 million in Brazil (2016) and 130 million in Russia (2016). In addition, a growing number of people across age groups are accessing the e-commerce marketplace in India. According to industry experts, it is expected that the Indian e-commerce industry will witness more than 300 million new online shoppers in the next 15 years i.e. 2015-2030. The e-commerce market will reach the US$ 300 billion mark by the end of 2030 from US$ 20 billion in 2015, with e-tailing segment emerging as the largest online segment. The e-commerce market will account for 2.5% of India's GDP by 2030. This changing consumer behaviour is definitely leading India along with the world into a new era of consumerism where on a click of a button people are able to shop, avail banking services, government services, etc. This is saving time and effort by providing a hassle free environment for the consumers within the comfort of their home/office. For marketers, it means enhanced reach at lower costs sans the need for heavy investment in traditional brick & mortar infrastructure as well as a more level playing field. E-commerce and m-commerce promise to usher in a massive transformation in the dynamics of Indian consumerism in the coming years.

Expert perspective

Dr. Ganesh Natarajan, Chairman of 5F World, Skills Alpha and Global Talent Track and NASSCOM Foundation

"The Digital India initiative has amazing potential to bridge the digital divide in three ways:

- Providing digital access to information sources and removing the asymmetry of information between the haves and have-nots.
- Bringing education and skills to every device owner.
- Creating jobs all over the country in areas ranging from digitisation to common service centres to ancillary units set up for BPOs, manufacturing, and even artisan work."

Citizen-friendly governance, enabled by technology

With a population of around 1.3 billion people, India has a wireless subscriber base of 1.12 billion (June 2017). Mobile penetration in India is expected to increase to 85-90% by 2020 from 65-75% at present (May 2017). As of February 2017, the smartphone penetration in India had reached 34 per cent, which is expected to increase to 65 per cent by 2020. This indicates that people at large are familiar with digital technology. As a result, the nation has witnessed a number of new technology-based business formats such as e-commerce, m-commerce, e-wallets, m-wallets, aggregators, etc. that emerged over the last decade (2006-16).

The Government of India (GoI) and various state governments, have been working towards utilising online and mobile platforms to enable public transactions, implement policies, schemes and initiatives and carry out effective knowledge sharing between the government and citizens. The government is focusing on technology as a key enabler to provide financial empowerment to its citizens, make existing processes more transparent and efficient and reduce subsidies. This entire digital drive has been capitalised well by the private sector players and they are contributing a great deal with innovation and efficient service delivery mechanisms. Hence, with the backbone of digital technology in every aspect of life, India is on a growth trajectory that is reflected in more citizen-friendly governance as well as economic growth of the country.

Snapshot: Digitisation and E-governance

India has a population of over **1.3** billion

Mobile user base - **1.03** billion
Mobile penetration - **80%**.

More than **1** billion Aadhaar card holders

Network of **89** Passport Seva Kendras (January 2017)

90 million passport records have migrated from traditional systems

GeM
Government e Marketplace

Rs 1,708.72 crore
Total procurement done from GeM portal as of October 10, 2017 with 34,514 sellers, 7,641 service providers & 13,019 government organisations.

Number of digital payment transactions till January 2017 was **1,569.3 crore**, an increase from **1,512.6 crore** in FY16.

Since the beginning of the year, close to **827 crore** e-transactions have taken place (as of July 11, 2017)

Expected broadband to reach to **2.5** lakh villages by 2020

Target to have **400,000** public internet access points by 2020

Digital India
Power To Empower

Digilocker registered users:
>46 lakh (March 2017)

Karnataka Mobile One app:
Total downloads:
>2.1 crore (2016)

The Government of India saved
Rs 36,000 crore
by digitising economic activities (CY 2016)

Note:
Passport Seva Kendra (PSK) provides delivery of passport and related services
Karnataka Mobile One app enables you to pay "electricity and water bills for service, pay income and property taxes, and scaffolding services, and reservation service for bus, rail tickets and others.
Under Digital India, all cities with over 1 lakh for population and tourist centres to have public wi-fi hotspots

Introduction

We are living in the age of information. India has seen a growth in the number of people accessing internet for a variety of information. Many companies in India have come up with their online platforms to interact within the organisation, communicate with their customers and with other stakeholders. The Government of India (GoI) has also moved along with this digital wave. Since 2000, the country has witnessed a rapid digitisation through greater adoption of internet for communication and data processing by the corporates and the government. Things which were previously being done physically are now being done through the internet at reduced time and cost. With a young demographic profile and growing internet penetration, India is expected to move towards increasing use of digital platforms.

Evolution of digitisation and e-governance

GoI set up the Department of Electronics in 1970 after recognising the increasing importance of electronics. However, the era of E-governance in India began with the launch of National Informatics Centre (NIC) by the Government of India in 1976. The objective of NIC was to bring e-Government/e- Governance solutions in the government sector by adopting best practices, integrated services and global technologies. During the 1980s and the early part of 1990s, the focus of NIC was on building MIS (management information systems) and DSS (decision support systems) in government departments and Ministries to promote e-Governance/e-Government. In late 1990s, the NIC took a number of initiatives to improve social and financial inclusion through the adoption of ICT channels and reaching- the-unreached market. In 1987, it was shifted to the Union Planning Commission and in October 1999, to the newly formed Central Ministry of Information Technology, which later became Department of Information Technology of the Ministry of Communications and Information Technology. The NIC has been involved in navigating e-Government/e-Governance applications in various Ministries and Departments at the centre, states, district and blocks level. It has been facilitating efficiency and accountability in government services by bringing transparency and promoting decentralised planning and management.

In 2006, GoI launched the **National e-Governance Plan** (NeGP) to make all of its government services available to the Indian citizens through electronic media. There were a number of mission mode projects such as MCA 21 (Ministry of Corporate Affairs), National Land Records Modernisation Programme (NLRMP), computerisation of Railways, Transport and National Registry, treasury computerisation, value-added tax, Mahatma Gandhi National Rural Employment Guarantee Act (MG-NREGA), India-Portal, e-Courts, Postal Life Insurance, etc. that were launched under NeGP. The government introduced Unique Identification Authority of India (UIDAI) in 2009 with an objective to issue Unique Identification numbers, **Aadhaar**, to every Indian resident. It is the biometric nature of the programme which is used as an identity for various documentation and verification purposes. The project was another flagship move of the government in the direction of e-Governance and digitisation. The first UID number was issued on September 29, 2010. In the same year, the government launched **Passport Seva Project** to improve the delivery of all passport-related services to its citizens through the online channel. The project was implemented in public-private partnership mode with Tata Consultancy Services.

There were a lot of other projects completed by the government to improve the delivery of public services. In line with this, the government introduced **"Direct Cash Transfers"** in January 2013 to automate disbursements to the beneficiaries of different government schemes such as Social Security Pension, Handicapped Old Age Pension etc, among others, by linking their Aadhaar card to various schemes. In addition, online systems were introduced for monitoring of almost all central schemes such as Integrated Watershed Management (IWMP), Indira Awaas Yojana (IAY), Swarnajayanti Gram Swarozgar Yojana (SGSY), National Social Assistance Programme (NSAP), Backward Regions Grant Fund (BRGF), Schedule Tribes and other Traditional Forest Dwellers Act etc. In 2014, the government launched an online platform called **MyGov.in** which was the first of its kind participatory governance initiative involving the common citizen at large. The objective of the platform was to bring the government closer to the common man through the online channel.

Mobile telephony is changing how people are catered by the corporates and the government in both rural and urban areas in the country. With increasing mobile penetration even at the grassroots level, GoI introduced **Digital India** in 2015 to make India a digital and knowledge-run country. The Digital India programme is based on digital facilities as a utility to every resident, governance and services on demand and digital empowerment of people. In the same year, the government approved the **National e-Governance Plan (NeGP) 2.0** as an important pillar of the Digital India campaign. The mission of NeGP 2.0 is to ensure that a government-wide transformation takes place and all government services are delivered electronically to citizens. Such initiatives are expected to smoothen the process of E-governance in India and ease the bureaucratic process across various government departments.

Stakeholders involved

Various stakeholders involved in the digitisation and E-governance initiatives can be divided into three categories i) key stakeholders, ii) primary stakeholders and iii) secondary stakeholders.

The key stakeholders are the organisations/people who have significant influence upon the initiatives being undertaken and steer the initiatives towards their successful implementation. The primary stakeholders are the ones who are directly affected, either positively or negatively by the initiatives. The secondary stakeholders are intermediaries who are indirectly affected by the initiatives. For digitisation and E-governance, they are classified as shown below:

Key Stakeholders:

- Government
- Different departments
- Domestic investors
- Foreign investors
- ICT firms partnering with the government
- Web hosting and domain name service (DNS) providers

Primary Stakeholders

- Business/corporates
- Citizens of India
- Government employees

Secondary Stakeholders

- Smaller agencies and touts
- Postal and courier services

Framework for digitisation

India started moving towards digitisation through the introduction of National Informatics Centre (NIC) by the Government of India in 1976. Between 1970s and early 2000s, there were numerous big initiatives such as the computerisation of railways, land records management, online pension payments etc. that were taken by the government to drive e-governance/e-government in the country. However, the country got its formal **National e-Governance Plan (NeGP)** in 2006, followed by **National e-Governance Plan 2.0** (also known as e-kranti) and **Digital India** in 2015:

- **National e-Governance Plan (NeGP):** It was launched by GoI on May 18, 2006. The mission of the plan was to improve the delivery of government services to citizens and business establishments, and make government services more accessible by ensuring efficiency, transparency and reliability at affordable costs. The plan had 27 mission mode projects (MMPs) and 8 components. Later, in the year 2011, 4 additional MMPs i.e. health, education, public distribution system (PDS) and Posts were added to increase the list to 31 MMPs spread across a wide range of domains, viz. agriculture, land records, health, education, passports, police, courts, municipalities, commercial taxes, treasuries etc. There were a number of policy initiatives and projects undertaken to develop and core support infrastructure. The major core infrastructure components are state data centres, state wide area networks, common services centres and middleware gateways i.e National e-Governance Service Delivery Gateway, State e-Governance Service Delivery Gateway and Mobile e-Governance Service Delivery Gateway.
- **National e-Governance Plan (e-kranti) 2.0:** The mission was launched in March 2015 to provide digital and wireless infrastructure to remote areas and villages of India. The vision of e-Kranti is "Transforming e-Governance for Transforming Governance". The mission of the programme is to provide all government services electronically to citizens through integrated and interoperable systems via multiple modes, while ensuring efficiency, transparency and reliability of such services at affordable costs. The key objectives of e-kranti are:
  - Redefine NeGP and make it outcome-focused.
  - Enhance the portfolio of citizen-centric services being offered.
  - Ensure optimum usage of core ICT.
  - Promote fast replication and integration of e-Governance applications.
  - Leverage emerging new technologies.
  - Engage more agile models of implementation.

All new and ongoing e-Governance projects as well as the existing projects now follow the key principles of e-Kranti.

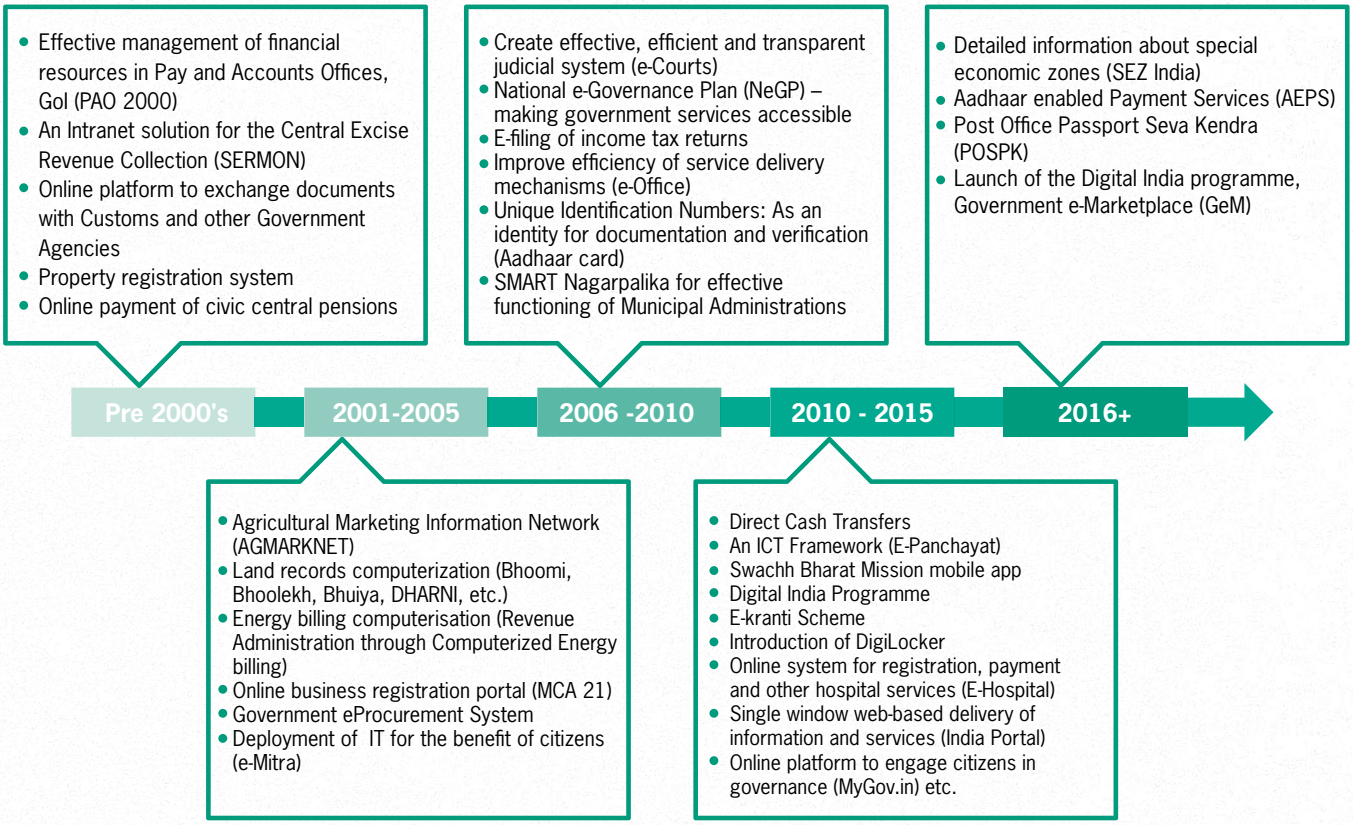
Digital India

The Digital India campaign was launched by the GoI on July 1, 2015 with the aim to create a participative, transparent and responsive government to transform the country into a digitally empowered knowledge economy. The Digital India programme focuses on the following areas: i) digital facilities as a utility to every resident, ii) governance and services on demand and iii) digital empowerment of people. The programme is based on the following nine pillars which form the foundation:

- **Broadband highways**: Spreading National Optical Fiber Network (NOFN) in all 2.5 lakh gram panchayats in India. The NOFN project is expected to be completed in FY 2016-17 with an estimated cost of Rs 201 billion.
- **Universal access to phones:** The government is making sure that all towns are covered through mobile phone connection by 2018 and it has set up 1,836 mobile towers to connect the unconnected areas.
- **Public internet access programme:** Extending the coverage of common service centres (CSCs) from 1.35 lakh to 2.5 lakh, one in every panchayat. All 1.5 lakh post offices are to be converted into multi-service centres in two years (FY 2017).
- **E-governance:** Business process re-engineering will be performed to enhance procedures and service distribution. Solutions will be integrated with UIDAI, payment gateway, mobile platforms. All platforms will be in electronic form. Public complaint redressal will be computerised end to end.
- **e-Kranti:** It concentrates on electronic delivery of services across education, health, farming, security, justice, financial inclusion, etc.
- **Information for all:** The focus will be on online internet hosting service of data and realistic participation through social media and web-based systems like MyGov.
- **Electronics manufacturing**: Focuses on very small aperture terminal (VSAT), mobile, consumer electronics, technology, medical electronic devices, intelligent energy meters, smart cards and micro ATMs.
- **Increase IT for jobs:**
  i. Plans to train 1 crore students from small towns and villages for the IT sector by 2019-2020.
  ii. Setting up BPOs in North Eastern states.
  iii. Plans are also to train 300,000 service delivery agents in 2 years (FY 2017) to run viable businesses.
  iv. Telecom service providers to train 500,000 rural workers in 5 years (FY 2020).
- **Early harvest programmes:**
  - Creating IT platform for messages to facilitate elected representatives and government employees.
  - Biometric attendance covering the Central Government offices.
  - To provide wi-fi in all universities on National Knowledge Network (NKN)
  - To provide secure email within government for 50 lakh employees and making email the primary mode of communication.
  - All cities with over 1 lakh population and tourist centres to have public wi-fi hotspots.
  - All schools to have eBooks, SMS-based weather information and disaster alerts.

Themes under Digitisation and e-Governance

There are various initiatives launched by the government to drive E-governance and digitisation across India. The below mentioned are details of flagship programmes:



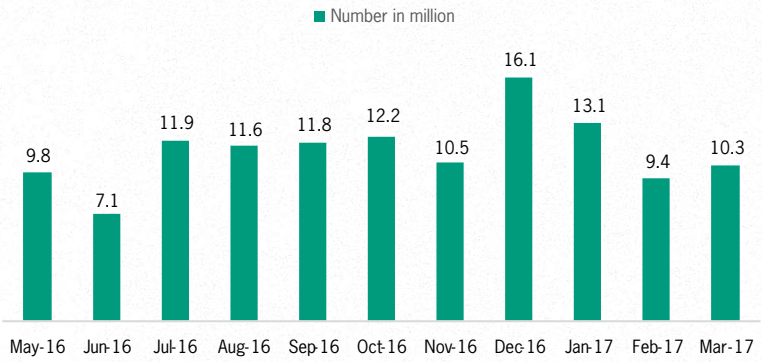
- **Property registration and valuation**: The government launched a project called CARD (Computer-aided Administration of Registration Department) in Hyderabad in 1996. The project provides a transparent way of property valuation and calculation of stamp duties. It has simplified the registration procedures, enhanced speed, reliability and consistency of the system. In 2011, the government took a decision to bring CARD into the CARD centralised architecture called CCA. There are a number of states who have been issuing property CARDs to their citizens. As of July 2016, the Government of Gujarat plans to make property cards compulsory for nearly 1.25 crore properties in urban areas. In November 2016, the Nashik Municipal Corporation also decided to issue smart cards to property-holders in the city to facilitate cashless transactions.
- **Agricultural Marketing Information Network** was launched by the Ministry of Agriculture in March 2000. The objective of the e-governance portal "AGMARKNET" was to facilitate collection and dissemination of information related to commodity price, commodity arrival information from agricultural produce markets, and web-based dissemination to producers, consumers, traders and policy-makers transparently and quickly. As of January 2017, AGMARKNET provides wholesale market prices for various agricultural commodities from 3,288 markets across the country. Key states with highest share of wholesale markets are Maharashtra (379), Gujarat (305), Madhya Pradesh (267), Uttar Pradesh (257), Punjab (248) and Karnataka (192).
- **Land Records Computerisation:** The computerisation of land records (CLR) scheme was launched in 1988-89 as a pilot project in 8 districts. By 1991-92, it was extended to 24 districts across different states such as Haryana, Himachal Pradesh Jammu & Kashmir, Kerala, Karnataka, Manipur, Punjab, Tamil Nadu, Tripura, Sikkim, Uttar Pradesh, West Bengal and Delhi. The scheme was implemented in joint collaboration with the National Informatics Centre. In 2008-09, the government launched the National Land Records Modernisation Programme (NLRMP). The NLRMP aims to accomplish the following factors:
  - Completion of all data entry related to digitisation of land records
  - Provision of legal sanctity to computerised Records-of-Rights

- Setting up computer centres at Tehsils
- Enabling web access

Different states in India have different land record computerisation projects such as Bhoomi (Karnataka), Tamil Nilam (Tamil Nadu), Bhoolekh (Odisha), Himbhoomi (Himachal Pradesh), Bhuiya (Chhattisgarh), Apka Khata (Rajasthan), DHARNI, etc.

- **Aadhaar card**: Aadhaar is the national identity programme launched by GoI in 2009 which provides a unique identity number to every resident in the country. It is managed by the Unique Identification Authority of India (UIDAI). The project aims at capturing complete data of every resident such as name, age, date of birth, address, finger prints etc. using biometric technology. The programme which is now used as an identity document for various purposes such as making passports, getting a mobile connection, booking travel tickets, applying for scholarship, getting utility connection, opening a bank account, identity for several central and state welfare schemes, etc. As of FY 2016, the total number of Aadhaar cards issued was over 1.1 billion which constitutes about 90 per cent of India's total population.

Month-wise Aadhaar enrolment



In order to drive cashless economy and digitisation mission, the government introduced Aadhaar card-linked payment mechanism in December 2016. Aadhaar-enabled transactions are card-less and pin-less. It would allow a smartphone user to digitally transact using their Aadhaar number and fingerprint/iris authentication. A mobile application is being developed in collaboration with Tata Consultancy Services which will facilitate Aadhaar enabled transactions. In February 2017, the government also decided to make it mandatory for all banks to launch their own Aadhaar-based payments apps. In this direction, the IDFC Bank launched India's first biometric payment system in March 2017. In this, a customer is required to have an Aadhaar-linked bank account and a thumb impression which shall act as a password. Other banks including State Bank of India, Syndicate Bank, IndusInd Bank, Bank of Baroda and Punjab National Bank are also in the process of launching the mobile application.

- **E-sign framework**: It is an initiative which enables Aadhaar card holders to digitally sign a document online using Aadhaar authentication and mobile number. For creating e-signatures, the signer is required to obtain a Digital Signature Certificate (DSC) from a Certifying Authority (CA) licensed by the Controller of Certifying Authorities (CCA) under the Information Technology (IT) Act, 2000.

Passport services: The Ministry of External Affairs (MEA) started the Passport Seva Kendra (PSK) project in May 2010 to provide passport services to citizens of India in a timely, transparent, more accessible and reliable manner. In March 2013, the MEA launched a mobile application 'mPassport Seva' with a view to provide mobile enablement of public services. It offers a wide variety of services to smartphone users such as passport application status tracking, locating the PSK and general information on various steps involved in obtaining a passport. In July 2013, online payment system for passport fee application was launched in India as a part of the MEA's e-Governance initiatives. Applicants were able to make payment at the time of booking appointment on the MEA website. Now the entire process for getting a passport has moved online. People can now apply, pay fees, track status and ensure grievance redressal online. It provides a quicker, certain and more transparent manner of getting a passport. As of January 2017, there is a network of 89 PSKs which offer passport-related services. Tata Consultancy Services (TCS) was shortlisted for this project through a public competitive procurement process. TCS helped the MEA re-imagine their existing system and transform passport services. TCS set up and managed the data centre and disaster recovery operations. The team handles the office networking, core passport applications, and the citizen portal. They have also set up a customer service support centre that manages customer queries in 17 different languages.

The MEA and the Department of Posts have come together to deliver passport-related services to the citizens through their vast post network in the country. Mysuru (Karnataka) and Dahod (Gujarat) have become the first to have a Post Office Passport Seva Kendra (POPSK) in January 2017. These POPSKs would offer passport-related services on the lines of PSKs. These POPSKs have been

managing 100 appointments per day with 100 per cent utilisation. In February 2017, the government decided to scale up the POPSK programme by opening up another 56 POPSKs in the country. The government also announced in January 2017 that the Indian citizen would receive new digital e-Passports with bio-metric feature in 2017. Hence, the traditional passports would be replaced by the new e-passports. This passport will have an electronic chip with every detail to be stored on that chip.

Digital Locker: DigiLocker, a key initiative under Digital India programme, was launched in February 2015 by the GoI. It provides Indian citizens with a shareable private space on a public cloud where he/she can store all his/her documents/certificates such as voter ID card, PAN card, BPL card, driving license, education certificates, etc. The DigiLocker is attached to a resident's Aadhaar number and citizens can also upload scanned copies of their important documents which can be electronically signed using the eSign facility. It provides a platform where issuance and verification of documents and certificates is done in a digital way, thus eliminating the use of physical documents. The government issued norms in 2016 to allow private players to obtain licenses to operate digital locker services. As a result, there are a number of private players including ICICI Bank, Kotak Mahindra, Next Gen Papers Solutions Pvt. Ltd etc. who are also offering digital locker or document management services. The Ministry of Information Technology is planning to allow private telecom players to provide DigiLocker services. As of March 2017, there were nearly 46.85 lakh registered users with a repository of more than 67 lakh documents. GoI launched the integration of DigiLocker with driving licenses and vehicle registration certificates in March 2017. This would eliminate the need for users to carry physical copies of their RCs and driving licenses.

Direct Cash Transfer: The government introduced direct cash transfers in January, 2013 to automate disbursements to the beneficiaries of different government schemes like NREGA, Social Security Pension, Handicapped Old Age Pension etc. by linking Aadhaar card to various schemes. The purpose of this scheme is to ensure that benefits go to individuals' bank accounts electronically, minimising tiers involved in fund flow thereby reducing delay in payment, ensuring accurate targeting of the beneficiary and curbing pilferage and duplication. The central government reported that they saved Rs 36,000 crore by digitising payment of subsidies and wages through Aadhaar during 2015-16.

E-Post office: India Post launched its online portal services "e-Post office" in March 2011 to provide postal transaction and tracking services online. The online portal provides electronic money order, stamps sale, postal information, tracking of express and international shipments, PIN code search and registration of feedback and complaints online. In March 2013, India Post partnered with Infosys to develop and manage a service delivery platform (SDP) which would allow all rural post offices to offer online services. In May 2015, India Post launched an e-commerce centre in New Delhi to handle the logistics of the e-commerce business. In FY 2015, India Post handled cash on delivery of Rs 500 crore, which crossed Rs 1,000 crore in January 2016. The government is investing on technological resources and plans to digitally connect all rural post offices by 2017. This initiative is expected to cost Rs 4,909 crore for digitisation of around 1.55 lakh post offices.

Biometric attendance: In September 2014, the government launched a Biometric Attendance System (BAS) using the Aadhaar number provided through the UIDAI. Around 50,000 central government employees are using the biometric system and there has been an increase in the presence time of 20 minutes daily. The central and state governments are keen on monitoring the studies of the students both in private and government institutions. There are a number of universities/colleges including Jawaharlal Nehru Technological University and 55 colleges in Indore, for instance, that have installed biometric attendance systems. In addition, Maharashtra announced in 2016 that all government-aided schools need to have biometric attendance systems in place to apply for salary and non-salary grants. In January 2017, the Government of Rajasthan has made biometric attendance system compulsory in all government hospitals coming under the health directorate. There are a number of private domestic and international players that have installed biometric attendance systems to improve their manpower utilisation.

Computerisation of judicial system: The Indian judiciary system has over 15,000 courts situated in nearly 2,500 court complexes throughout the country. The efforts for computerisation of courts have been going on since 1990s. During 2001-03, 700 city courts in four metros were computerised and during 2003-04, computerisation of another 900 courts was undertaken. The e-Courts project was a mission mode project being implemented in High Courts and district and subordinate courts of the country. The project was conceptualised in 2005 by the e-Committee of the Supreme Court of India. The overall objective of e-court was to make the existing judicial system more cost effective, efficient, assessable and transparent with the use of technological interventions. According to the Department of Justice, over 95 per cent of activities related to installation of hardware and software, connectivity and change management in 14,249 district and subordinate courts (phase-I) have been completed by the March 2015. The total cost of Phase-I was estimated to be around Rs. 935 crore. In July 2015, the government approved the phase-II project with an estimated cost of Rs 1,670 crore. Phase-II is expected to be completed by 2018-19 and includes a number of projects including enhancement of computer infrastructure in courts i.e. every court should have 8 computers installed, strengthening the system of serving notices and summons, hardware for computer labs in state judicial academies, information kiosks at each court complex, development of central filing centres with sufficient infrastructure, court libraries computerisation, service delivery through use of cloud computing, systems

for timely and regular updation of data, discontinuation of manual registers, mobile-based service delivery through SMS and mobile apps, digital signature certificates to all court officials, and court record room management automation. Progress of phase-II project as of December 2016:

- Video conferencing facility is deployed in around 500 courts and corresponding prisons.
- High Courts in India have started the process of procurement of computer hardware for cloud computing.
- A new version of case information software (NC 2.0) has been developed and all computerised courts are being migrated to it.

Similar to computerisation of Indian courts, the police stations in various states have been launching online FIR platforms. In October 2015, the Odisha police launched 'e-FIR' system under the Centre-sponsored Crime and Criminal Tracking Network and Systems (CCTNS) project. Under this, all 531 police stations were computerised to receive complaints online. As of March 2017, over 83% police stations across India were entering 100% FIRs via the CCTNS software. In all around 1.2 million FIRs had been entered in the system till date.

- **Online municipal service**: The government is focusing on employing digital platforms for various transactions across verticals such as land records, municipal records, date of birth records, service records of government employees, etc. There is an increased focus on storing information in a digital format. There are a number of states who have already established online municipality services. For e.g. in 2015, Maharashtra and Andhra Pradesh launched online public services including issuing birth and death certificates, caste certificates, etc. The state governments of Maharashtra and Andhra Pradesh also plan to add 100 more services in the next few years. Pune and Pimpri-Chinchwad offer municipal services through the online platform. In 2016, Patna Municipal Corporation and Surat Municipal Corporation launched e-municipality services including birth and death certificates, payment of property tax, submit right to information petition etc. using the online service. In April 2017, the Government of Madhya Pradesh launched "MP e-nagarpalika". It is a mobile based application which provides online access to 378 urban bodies services.
- **Single window clearance system:** The central government emphasised on single window clearance system at the time of launch of the Startup India Mission in 2016. Single window clearance system enhances efficiency, transparency and accountability in the process of clearances and ease of doing business. The Government of Telangana launched its single-window project approval system in 2015. In March 2016, Uttarakhand launched its online single window system. In June 2016, the Government of Rajasthan launched its online system which provides a single point of interface by acting as a one-stop information/registration/approval/tracking centre for clearances and approvals. During June 1, 2016 – March 14, 2017, the government received a total of 2,228 applications out of which 1,756 applications were approved. In March 2017, the government launched the online clearance procedure for all projects related to construction of infrastructure in coastal areas. There are a number of states that have been working towards building their own single window system in an attempt to increase economic activities, attract international investors and increase employment opportunities in their states.

Some other key initiatives

- **Swachh Bharat Mission mobile app**: Launched in 2015, this mobile application enables organisations and citizens to access information regarding various cleanliness drives and helps in achieving the goals of the mission. Total number of downloads of the app stood at 6,199 as of 2016.
- **National Scholarship Portal**: In July 2015, the government launched the National Scholarship Portal. It aims to make the government scholarship process easy. It encapsulates everything from submitting the application, verification, sanction to disbursal to the end beneficiary of the scholarship. Total number of fresh registrations received till 2016 were 1.28 crore.
- **MyGov.in**: In July 2015, the government launched MyGov.in. It is an online platform to engage citizens in governance through a "Discuss", "Do" and "Disseminate" approach. It has various groups, tasks, discussions, polls, etc. where a citizen of India can participate and help in building the nation.
- **E-Hospital**: As part of the Digital India programme, the government launched the e-hospital programme in June 2016. This allows the citizens to avail services like online registration, payment of fees and appointment, online diagnostic reports, checking on the availability of blood online, etc. A patient having an Aadhaar card can book an OPD appointment, see lab reports and blood availability in a government hospital through this portal.
- **Centre of Excellence on Internet of Things (IoT)**: It has been set up in Bengaluru and was launched in July 2016. It is a partnership of NASSCOM, Department of Electronics and Information technology (DeitY) and ERNET in Bangalore. It aims to enable rapid adoption of IoT technology in services like transport systems, parking, electricity, waste management, water management, women's safety etc. This will help in creation of smart cities, smart health services, smart manufacturing, smart agriculture etc.

Segmentation of e-Governance initiatives

There are various mission mode projects launched by the state and central government to support e-Governance and digitisation at the national level, which can be broadly classified into:

1. **Government to Government:** The government to government (G2G) e-Governance segment pertains to electronic sharing of data and information systems between government agencies, departments or organisations. The objective of G2G e-Governance is to improve communication, data access and data sharing in the government sector. Some key initiatives launched across India are as follows:

   - Khajane Project in Karnataka (2001) is an online treasury computerisation project of the Government of Karnataka. Under the project, the entire treasury related activities of the Karnataka government have been computerised. Through Khajane, the Government of Karnataka is now able to get information on accounting records very easily which enables them to take the overall monetary decisions quickly. In 2011, the Government of Karnataka appointed Tata Consultancy Services for a software solution facilitating integrated financial management of all Treasury funds under Khajane II. TCS created an integrated online platform for all stakeholders to carry out their financial transactions. The system helps the stakeholders in accounting, auditing of public finance, faster decision-making and enhancing transparency in management of public finances. TCS provides operational and maintenance related support to the government.

   As of December 2016, there are 216 treasury offices which are connected through Khajane to a single central office server using VSAT (very small aperture terminal).

   - GoI initiated an e-governance scheme known as e-Panchayats to improve the quality of governance across gram panchayats, block panchayat and zilla panchayats. There are various states including Rajasthan, Maharashtra, Karnataka, Telangana, Punjab etc. which have implemented the e-Panchayat model in their respective regions. The Ramchandrapuram village near Hyderabad became the first e-panchayat village in India in 2003 to settle disputes through an express web-enabled system. In October 2015, the Government of Telangana started its e-Panchayats initiative which provides e-governance facilities to villagers. By FY16, the state had set up over 1,000 e-Panchayats. These centres are being managed by women who know computers and software to operate the e-Panchayat programme. Each centre is provided PCs, laptops, printers, scanners and large-size LED TVs. Similarly, Punjab launched its E-Gram Panchayat programme in all 13,040 villages in June 2015.

2. **Government to Business:** The government to business (G2B) services include registrations under different statutes, licenses under different laws and exchange of information between government and business. The objective behind G2B e-Governance is to provide a congenial legal environment to business, expedite various processes and provide relevant information to business. Some key initiatives launched by the government are as follows:

   - GoI launched e-Marketplace GeM in August 2016 to help every government official in procuring goods and services and bring transparency to the procurement process. Also, it launched a training programme for procurement officers on newly-launched e-marketplace, GeM. The training was organised by Directorate General of Supplies and Disposals, National Institute of Financial Management and National e-Governance Division. In March 2017, the GoI made it compulsory for all government officials to procure goods and services from its online procurement platform. The initiative would boost transparency and streamline public sector procurement besides improving transparency and ease of doing business for companies. As of October 10, 2017, 197,993 products and 6 services were available. Procurement of Rs 1,708.72 crore had taken place; with 34,514 sellers, 7,641 service providers and 13,019 government organisations.

   - The Government of Andhra Pradesh introduced the e-Procurement project in 2003 to reduce the time and cost of doing business for both the vendors and the government. The system enables tenderers to access tender information and submit bids online. Later, it was introduced in many states including Chhattisgarh, Gujarat, Rajasthan, Orissa, etc.

3. **Government to Citizen**: The goal of Government-to-Citizen (G2C) e-governance is to offer a variety of ICT services to its citizens in most effective and economical ways. This type of e-Governance service helps in strengthening the relationship between the government and its citizens using technology. Some key initiatives launched by the government are as follows:

   - Aadhaar project was launched in 2009 with an objective to issue Unique Identification numbers to every Indian resident. As of August 2017, 1.17 billion

customers had received their Aadhaar numbers.

- Passport Seva online portal has been designed to deliver passport related services to citizens in a timely, transparent, more accessible, reliable manner.
- Bhoomi project (launched in 2000) provided online delivery of land records of 20 million rural land records to 6.7 million farmers through 177 government-owned kiosks in Karnataka by 2016.
- Gyandoot project in Dhar district of Madhya Pradesh (launched in 2000) to provide relevant information to the rural population acting as an interface between the district administration and the people.
- e-Mitra project was launched in 2002 in Rajasthan to facilitate the urban and rural population with maximum possible services related to different state government departments through Lokmitra-Janmitra Centers/Kiosks.
- In 2006, the government launched "e-filing" platform to ease out filing and management of taxes paid through online platform.
- In 2013, the government introduced direct cash transfers to automate disbursements to the beneficiaries of different government schemes by linking Aadhaar card of the beneficiaries.
- DigiLocker was introduced in 2015 under Digital India program. The objective of the program is to provide Indian citizens with a shareable private space on a public cloud where he can store all his documents/ certificates.
- Karnataka Mobile One app, which integrates 4,187 services - both government and private into one app wherein one can pay "electricity and water bills for service, pay income and property taxes, and scaffolding services, and reservation service bus, rail tickets and others.
- Another e-Governance project called SMART Nagarpalika (e-Nagarpalika) was introduced by various state governments to improve the effective functioning of municipal administrations. In 2015, Maharashtra and Andhra Pradesh launched online public services including issuing birth and death certificates, caste certificates, etc. In 2016, Patna Municipal Corporation and Surat Municipal Corporation launched e-municipality services in their region. In April 2017, the Government of Madhya Pradesh launched "MP e-nagarpalika". It is a mobile based application which provides online access to 378 urban bodies' services such as online payment of property tax, seeking building permission, birth/ marriage/ death certificates etc.
- In 2016, the government introduced "E-Hospital" which is an online registration system that enables people to avail services like online registration, fee payment, online appointment, online diagnostic reports etc.

Private sector participation in promoting digitisation and e-Governance

The government has invited various private players to help develop Digital India through public private partnership (PPP) model for implementation. Many large domestic and international players have been working with the governments (both central and state) in developing digitisation projects. For example, Infosys was appointed to develop "Finacle – e-Banking platform" for Punjab National Bank in 2001. Tata Consultancy Services was appointed, through a public competitive procurement process, for managing online platform for all passport-related services in 2008. TCS handles 40,000 plus applicants and 19,000 plus calls each day across 17 languages (as of 2016). Private telecom and IT companies have been investing and working towards a common goal to connect all citizens digitally and execute the adoption of a single e–governance system across the country. Large private telecom players including Bharti Airtel and Reliance Jio have been working to improve connectivity infrastructure for the effective implementation of e-governance initiatives.

Private sector participation in digitisation and e-governance is expected to increase. The government has made it clear that broadband highways are as important as national highways and e-infrastructure will be offered as a utility to every citizen, making them digitally empowered. There is also an increase in mobile based digitisation and mobile apps have become highly important for reaching out to people. The government would require creative solutions enabled by partnerships between government agencies and private companies. Under the Digital India programme, by 2020, broadband is expected to reach 2.5 lakh villages and 400,000 public internet access points are to be created with Wi-Fi in 2.5 lakh schools and universities. To support these government initiatives, private players come in with a PPP model where they can bring in advanced technologies and expertise, leveraging their experience of implementing these solutions around the world. They can also provide managerial services such as project management etc. and can also finance the projects in certain cases.

Conclusion

India has initiated potentially far reaching digitisation initiatives under the NeGP 2.0 and Digital India schemes. These are expected to attract significant investments and efforts, both from the government and private players. The government plans to invest over Rs 1 lakh crore in several large scale projects including providing broadband in 2.5 lakh villages, universal phone connectivity, 400,000 public internet access points, Wi-Fi in 2.5 lakh schools etc. by 2019-2020. The private sector has been a key player in developing the overall information and communication technologies infrastructure in the country. For e.g. Reliance Industries plans to invest Rs. 2.5 lakh crore in the digital space, including rollout of wireless broadband infrastructure and manufacturing of mobile phones; the Bharti Group plans to invest Rs. 1 lakh crore in their connectivity infrastructure and Aditya Birla plans to invest Rs. 54,000 crore in network rollout, broadband and WiFi deployment in the country. The Digital India programme is expected to create about 5 crore jobs in the country by 2019-2020. In addition, the country is witnessing a growth in the number of e-governance transactions by the citizens. According to government data, the total value of e-governance transactions crossed Rs. 1,000 crore in 2016 as compared to Rs 760 crore in 2015 and Rs 350 crore in 2014.

The Government of India, under the Digital India campaign, plans to reach out to over 100 crore people by 2020. The government is also working towards transforming citizen-government interaction at all levels through the electronic mode by 2020. This will increase the speed of communication and transaction between the government, businesses and the citizens. It will also improve the accessibility of government information to citizens which will allow them to make faster decisions affecting daily life. Industry experts anticipate that this campaign will play a key role in bringing socio-economic, educational and agricultural development. These initiatives have the potential to transform the lives of citizens across the length and breadth of the country.

Expert perspective

Dr. Srikanta Panigrahi,
Director General,
Carbon Minus India

"Clean and Green India is key to nation's growth and development, which is sustainable and builds a stronger foundation for the future. Swachh Bharat Abhiyan is a great initiative of the present government in partnership with people. We actually need such initiatives across sectors and across stakeholders. Every citizen needs to be serious and sensitive to the issues of cleanliness and greenery."

Dr Amiya Kumar Sahu,
Founder, National Solid Waste Association of India (NSWAI)

"The Swachh Bharat Mission has helped to bring a change in the mindset. The field of waste management is very promising in India. There is huge potential in three areas - waste to energy, processing and recycling (plastic, paper, metal, glass, etc). With the smart cities coming up, we need to have all three."

Powering the clean economy

The development of any nation centres on the welfare and health of its citizens. India is the seventh largest economy and second most populated nation in the world. The country has been growing at an average GDP growth rate of 7% per annum since 2006. With increasing population, rapid urbanisation, sprawling urban areas and rising rural segments, the nation has also endeavoured to addressed the growing need for clean and green resources and a healthy ecosystem. To this end, the Government of India (GoI) has implemented multiple initiatives to improve three major components of the natural environment i.e. land, water and air. The GoI aims to make the nation clean and green by achieving an open defecation free India by 2019. GoI also plans to achieve this by spreading awareness at the grass root level and by campaigning on the advantages of cleanliness and sanitation in rural as well as urban areas. These initiatives shall improve the image of the country as well as health and welfare standards of its society. This shall open avenues for sustainable industrial and commercial development in the country and bring in investments, thereby triggering the growth of GDP.

Snapshot: Clean India

Government allocated
Rs 16,248 crore for
Swachh Bharat Abhiyan
(FY 2017-18 - budget estimates)

Total fund under Swachh Bharat Kosh
Rs 476 crore (spent in two years as announced on March 2017)

Collection of **Rs 12,500 crore** by government under Swachh Bharat Cess (2016-17, as per Union Budget 2017-18)

Construction of
25,26,281 toilets
nationwide as
of July 2017

Production of compost from waste in 2016 was **164,891.6** metric tonnes

813 cities with open defecation-free status (July 2017)

325,912 registered users on the e-learning portal of Swachh Bharat Mission (July 2017)

111,056 registered users on the Swachhata mobile application (December 2016)

Revival of River Ganga planned with total budget allocation of
Rs 20,000 crore
(2015-2020)

Waste to energy (off grid/captive power capacity) cumulative achievement was **174.29 MWE** as of September 2017

Need and evolution of Clean India

It is known that a clean nation is a healthy nation. To ensure universal cleanliness and sanitation, a nation has to take measures to clean both rural and urban areas. Cleanliness and sanitation for India has been a gradual change story due to its large geographical coverage of 3.2 million square kilometres.

After independence, the nation addressed its sanitation targets by introducing the first Rural Sanitation Programme (RSP) in 1954 as a part of the first Five Year Plan. The United Nations announced 1981-1990 as the International Decade for Drinking Water and Sanitation. In the same decade, GoI launched Central Rural Sanitation Programme (CRSP) in 1989. The objective of the programme was to improve the quality of life of the rural people and safeguard the privacy and sanitation of rural women. This was followed by the launch of Total Sanitation Campaign (TSC) in 1999. The campaign aimed to create awareness of sanitation and cleanliness facilities among the rural population. The government provides financial support to below poverty line (BPL) households for the construction and usage of individual household toilets. It came out with an idea to acknowledge efforts in this direction, through Nirmal Gram Puraskars which were given to gram panchayats (GPs) for their initiatives to improve sanitation coverage and making open defecation-free GPs.

On April 1, 2012, the Nirmal Bharat Abhiyaan (NBA) was launched with the objective to accelerate sanitation coverage in rural areas. The vision of NBA was to cover the entire community and create Nirmal Gram Puraskars (NGMs) all across India. This was later merged into the subsequent Swachh Bharat Mission which was launched on October 2, 2014. The mission aims to further improve cleanliness, hygiene and achieve a cleaner India by 2019. It is very important from the viewpoint of the growing population in India. There is a need to address the issue of accessibility of its citizens to clean and hygienic conditions.

Key Stakeholders Involved

Various stakeholders involved in the Clean India campaign can be divided into two categories: key and primary.

Key Stakeholders

- GoI and its associated departments
- Corporates and funding agencies
- Non-Governmental Organisations (NGOs) and other agencies partnering with the government
- Swachhata doots, citizens and residents of India

The key stakeholders form the backbone of the entire Clean India mission. They provide the funding, manpower, infrastructure and the required initiatives to accomplish the tasks/objectives as envisaged under various initiatives and have a direct impact on its outcome.

Primary Stakeholders

- Citizens and residents of India
- GoI
- Businesses/corporates
- Tourists visiting any part of India
- Flora and fauna of India

The primary stakeholders are the direct recipients of the benefits which come along with a cleaner and greener India. They are the ones who are directly affected, either positively or negatively by the initiatives.

Key recent government initiatives for Clean India

Nirmal Bharat Abhiyan (NBA)

The Nirmal Bharat Abhiyan, earlier known as Total Sanitation Campaign, was introduced in 2012 to accelerate the sanitation coverage in rural areas. The main objectives were:

- Improve the general quality of life in the rural areas.
- Accelerate sanitation coverage in rural areas and extend access to toilets to all by 2022.
- Educate and motivate communities and panchayati raj institutions to promote sustainable sanitation facilities by creating awareness and health education.
- To cover the remaining schools not covered under Sarva Shiksha Abhiyan (SSA) and Anganwadi Centres in the rural areas with proper sanitation facilities and undertake proactive promotion of hygiene education and sanitary habits among students.
- Encourage cost effective and appropriate technologies for ecologically safe and sustainable sanitation systems.
- Develop community managed environmental sanitation systems focusing on solid & liquid waste management.

Under the Nirmal Bharat Abhiyan, the government was able to construct individual toilets in more than 87.9 lakh households in FY'12, 45.5 lakh households in FY'13 and 22.7 lakh households in FY'14. The total amount of expenditure (central share) incurred on the construction of individual household toilets under the NBA scheme was Rs. 847.31 crore in FY 2012, Rs. 1,090.54 crore in FY 13 and Rs. 794.95 crore in FY14.

In September 2014, the government gave its go-ahead to restructure "Nirmal Bharat Abhiyan" into "Swachh Bharat Mission.

Swachh Bharat Mission (SBM)

The government launched the SBM on October 2, 2014 with a view to focus on cleanliness and sanitation and accelerate the efforts to achieve universal sanitation coverage. The Swachh Bharat Mission aims to achieve a cleaner (covering over 4,000 cities and towns), India by 2019 through ensuring cleanliness and sanitation (solid and liquid waste management and making gram panchayats open defecation-free). The overall mission has two sub-missions i.e. SBM (Gramin) and SBM (Urban).

SBM (Gramin)

The SBM Gramin is an extension of the Nirmal Bharat Abhiyan. Its objectives are as follows:

- Improve the general quality of life in the rural areas, by promoting cleanliness, hygiene and eliminating open defecation.
- Accelerate sanitation coverage in rural areas to achieve the vision of Swachh Bharat by October 2, 2019.
- Motivate the communities and panchayati raj institutions to adopt sustainable sanitation practices and facilities through creation of awareness and health education.
- Encourage cost-effective and appropriate technologies for ecologically safe and sustainable sanitation.
- Develop where required, community-managed sanitation systems focusing on scientific solid & liquid waste management systems for overall cleanliness in the rural areas.

SBM (Urban)

The SBM Urban is targeted at improving the sanitation and waste management systems in urban areas. As of 2016, India had 33 per cent of the total population living in urban areas. The population of urban India is expected to increase to 600 million by 2031 and with increasing population migrating from rural to urban areas, urban India will also need focused attention. Thus, to provide better sanitation and waste management facilities in the urban scenario, this mission has been brought in. Its main objectives are:

- Elimination of open defecation
- Eradication of manual scavenging
- Modern and scientific municipal solid waste management
- Effect behavioural change regarding healthy sanitation practices
- Generate awareness about sanitation and its linkage with public health
- Capacity augmentation for urban local bodies (ULBs)
- Create an enabling environment for private sector participation in CAPEX (capital expenditure) and OPEX (operation and maintenance)

For FY 2017-18, the government allocated Rs 13,948 crore, under Swachh Bharat Abhiyan (Grameen), Rs 2,300 crore under Swachh Bharat Abhiyan (Urban) and Rs 6,050 crore for National Rural Drinking Water Programme.

Key achievements as of March 2017

- More than 1.78 lakh villages have been declared as open defecation-free (ODF) villages.
- Himachal Pradesh, Kerala, Sikkim, Haryana and Uttarakhand are top five states in terms of coverage of open defecation-free villages.
- There are 119 districts declared as ODF.
- More than 36.74 million households have at least one toilet. Himachal Pradesh, Kerala, Sikkim, Haryana, Uttarakhand and Chandigarh are the top five states in terms of households with toilets.

National highlights of Swachh Survekshan 2017

1. 404 cities where more than 75% of the residential areas were found substantially clean.
2. 297 cities have 100% door to door collection of garbage.
3. 227 cities where vacancy of staff in ULB for Solid Waste Management is less than 10%
4. 226 cities where more than 75% of commercial areas undertake twice a day sweeping
5. 190 cities where 75% or more CT/PT (Community Toilet/Public Toilet) are well lit (no dark areas), ventilated, have water supply/flush and electricity connection.
6. 174 cities where user charges are notified and collected in more than 75% of the wards.
7. 166 cities where more than 75% of garbage vehicles are tracked by GPS/RFID
8. 118 cities out of 500 have been found to be Open Defecation Free (ODF)
9. 85 cities where waste segregation is sustained at all processing stages in more than 75% wards.

- Ahmedabad, Anand, Dangs, Junagadh and Kheda are the top five districts in terms of coverage of toilets per household and open defecation-free villages.

The government introduced a Swachhata app, e-learning portals, social media and helplines for its citizens. These technological platforms will enable citizens to increase their awareness, get trained on the cleanliness drive of the government, engage with the government and assist in the overall objective of a cleaner India.

- In May 2016, the government launched a national-level telephone helpline for over 4,000 urban local bodies across the country. The helpline will help in spreading awareness among masses on the Clean India programme. Citizens will get every type of assistance including construction of toilets through this helpline.
- In August 2016, the government launched the Swachhata mobile application for Android and Apple iOS users to address complaints related to civic issues. The mobile app provides the exact location of the area of the complaint using geo-location of the pictures. As of May 16 2017, there were 1.15 million registered users on the mobile app.
- In August 2016, the government launched an e-learning portal on Swachh Bharat mission. The e-learning portal provides online courses on best practices to be adopted for improving cleanliness and sanitation. The courses are uploaded to train all municipal staffs in 4,041 statutory towns of the country. As of July 2017, there were 325,912 registrations and 252,709 certifications issued after completion of various e-learning modules.

Namami Gange

In May 2015, the Government of India approved the Namami Gange programme to arrest the pollution and revive the Ganga river, nearly 2,500 km long, with a total allocation of Rs 20,000 crore for five years (2015-2020). Under the programme, the government aims to clean, beautify and modernise a number of rivers and ghats. The government plans to construct new sewage treatment plants, launch river surface cleaning projects and using trash skimmer machines to clean floating waste. The programme's implementation is divided into three phases i.e. entry-level activities (for immediate impact), medium-term activities (to be implemented within 5 years), and long-term activities (to be implemented within 10 years).

Entry-level activities: The activities include river surface cleaning to address the floating solid wastes, rural sanitation to arrest the pollution, renovation, modernisation, and construction of crematoria etc.

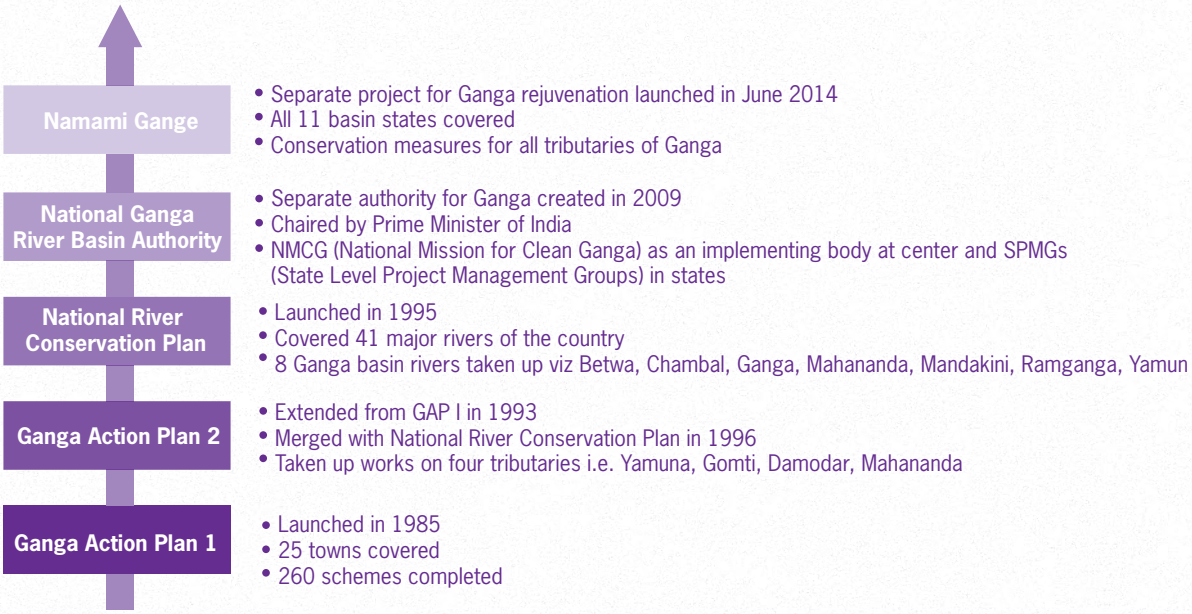
- River surface cleaning
- Rural sanitation
- Crematoria modernisation/renovation/new construction
- Ghat repair, modernisation and new construction

Medium-Term: The focus will be on capturing the municipal and industrial pollution entering the river. The government has planned to install an additional sewage treatment capacity of 2,500 MLD to address the pollution through municipal sewage.

- Municipal sewage management
- Industrial effluents management
- Other activities such as biodiversity conservation, afforestation and water quality monitoring

Long-Term: Under the long-term activities, the focus is on providing adequate flow to the river through determination of e-flow, increased water-use efficiency, and improved efficiency of surface irrigation.

Ganga conservation missions



In 2016, the government approved Rs 2,000 crore project for plantations over 1.34 lakh hectares along the banks of Ganga. The government announced the mission will be accomplished by 2020.

Key achievements - Namami Gange Mission (as of March 2017)

- A total of 123 new ghats across 5 states have been built under the Namami Gange Mission. In addition, 65 crematoriums were built during the first phase of the project.
- Nearly 1,115 km of sewer network has been built on the banks of Ganga river across 5 states (Uttarakhand, Uttar Pradesh, Bihar, Jharkhand and West Bengal). Construction of 35 sewage treatment plants has been completed.
- 331,936 toilets have been constructed across these five states.

Components of Clean India and its initiatives

Land: Land as a resource is an essential component for human and animal population. Hazardous activities like disposal of industrial and household waste (nuclear, industrial, garbage, and open defecation), improper sewage disposal and excessive use of pesticides and fertilisers are the primary causes of land pollution. To address the growing land degradation, GoI has imposed various strictures and implemented various initiatives:

Municipal Solid Waste Management (MSWM) rules, 2000: MSWM is a systematic process of waste segregation and storage at source. This is then made to go through a process of primary collection, secondary storage, transportation, secondary segregation, resource recovery, processing, treatment and final disposal of solid waste.

Hazardous Waste (Management, Handling and Transboundary), 2008: The hazardous waste management rule provides that the producer of hazardous chemicals and nuclear waste is accountable for its proper treatment. The rule suggests that the hazardous waste should be moved to a government authorised waste treatment plant or should be disposed of to an authorised waste disposal facility.

Open defecation-free country: Open defecation is a major problem in India and still a majority of the population in the rural and urban areas defecates in the open. The government has brought in various measures and is trying to make India open defecation-free by 2019.

Waste to Energy (W2E): India generates a total of 62 million tonnes of waste out of which 5.6 million tonnes is plastic waste, 0.17 million tonnes is biomedical waste, 7.9 million tonnes of hazardous waste and 15 lakh tonnes is e-waste on an annual basis. Most of this waste goes into land and water bodies without proper treatment, causing severe water and air pollution. The Government of India provides significant incentives for W2E projects, such as capital subsidies and feed in tariffs. In January 2016, the Ministry of Power amended the Tariff Policy 2006 under the Indian Electricity Act, 2003, making it mandatory for state DISCOMS to purchase power from Waste-to-Energy plants. The objective of such an initiative is to encourage conversion of solid waste to energy. India had a total off grid waste-to-energy capacity of 174.29 MW_{EQ} as of September 2017.

Waste to compost: India generates nearly 62 million tonnes of urban waste annually and processes nearly 13.13 lakh tonnes of compost from such waste. As of April 2017, there are 145 functional composting plants and another 150 plants are under construction. The total capacity to compost waste has increased manifold over the past year, from 1.5 lakh tonnes in March 2016 to 13.13 lakh tonnes as of April 2017. The government is focusing on promoting waste processing and sale of compost in the country. In January 2016, Ministry of Chemicals & Fertilizers came out with a policy on promotion of city compost which involves providing market development assistance of Rs 1,500 per tonne of city compost for scaling up production and consumption of the product.

Air: Air contamination is a threatening concern to the existence and life expectancy for every nation. Usage of fossil fuels, growing number of automobiles, unfiltered smoke emissions and use of biomass for cooking are further increasing the air pollution. The government has been taking comprehensive steps to continuously monitor the air quality. Some of the major initiatives to monitor air quality are:

National Air Quality Index (NAQI), 2014: The Ministry of Environment and Forests launched the National Air Quality Index (NAQI) in October, 2014 to continuously monitor the air pollution situation. It is a comprehensive evaluation system based on a set of 8 parameters. The NAQI considers eight pollutants (PM10, PM2.5, NO2, SO2, CO, O3, NH3, and Pb) during a short-term (up to an average period of 24 hours) for which national ambient air quality standards are prescribed. Based on these, the air quality is graded as one of the 6 categories which are good, satisfactory, moderately polluted, poor, very poor, and severe.

National Mission for Electricity Mobility: The government introduced National Mission for Electricity Mobility (NMEM) in 2013 with the aim of promoting the use of eco-friendly hybrid engine automobiles. GoI allocated Rs 1,000 crore in 2015 for the initiative with an aim to reduce carbon dioxide emissions by 1.2-1.5 per cent by FY 2020.

National Urban Transport Policy: GoI is promoting the use of public transport facilities in major cities. The National Urban Transport Policy aims at installing public transport facilities running on cleaner and greener fuels. These measures will lay the foundation for sustainable public transport infrastructure. As of FY 16, there were 14 mass transit rapid systems (MRTS) and 8 bus transit rapid systems (BRTS) that were operational.

National Biomass Cook-stoves Programme (NBCP): Biomass is the most common fuel used in India for cooking purposes with nearly 87% of the rural households and 26% of the urban households depending upon biomass for cooking. Therefore, the government introduced National Biomass Cookstoves Programme (NBCP) in 2009 which brought modifications in design and efficiency in the existing stoves. Later Unnat Chulha Abhiyan was launched in June 2014 to expand the reach of modified stoves. The programme aims to disseminate a total of 27.5 lakh improved cookstoves/chulhas (24 lakh at the household level and 3.5 lakh at the community level) by the end of 2017. According to the Ministry of Panchayati Raj, it has a target to move 150 million households from traditional to modern cooking solutions by 2030.

Renewable Energy: India is endowed with abundant sources of renewable energy and has the potential to produce 2.49 lakh MW of energy with its existing installed infrastructure. GoI aims to produce 1.75 lakh MW of green energy by 2022 (1 lakh MW of solar energy; 60,000 MW of wind energy; 10,000 MW of biomass energy and 5,000 MW of energy from small hydro projects).

Water: Water pollution has become a global concern due to increasing disposal of industrial and household waste as well as and contamination of water resources through toxins and hazardous chemicals. Hazardous activities have led to degradation of water quality for human consumption and other purposes like agricultural activities and farming. Contamination of water sources has led to scarcity of quality water. The government has undertaken various initiatives and implemented multiple policies to manage and monitor water quality like:

National Plan for Conservation of Aquatic Eco-system (NPCA): The NPCA was formed with the integration of National Lake Conservation Plan (NLCP) and National Wetland Conservation Programme (NWCP) in 2013 with an aim to treat sewage water, aquatic life conservation, lake beautification, etc. By January 2016, the government sanctioned projects for conservation of 63 lakes in 14 states at a total estimated cost of Rs 1,096 crores under the NPCA. The total funds released by the government were Rs. 64.1 crore in FY 13, Rs 55.2 crore in FY 14, Rs 36.6 crore in FY 15 and Rs.25.1 crore during April-December 2016 under National Plan for Conservation of Aquatic Ecosystems.

Inter-Linking of Rivers (ILR): Under the Inter-Linking of Rivers Mission, the government aims to provide equal distribution of water resources among all states. The overall implementation of interlinking of rivers would offer various benefits including irrigation on 35 million hectares of land, raising the ultimate irrigation potential from 140 million hectares to 175 million hectares and generation of 34,000 MW of power, apart from the incidental benefits of flood control, navigation, water supply, fisheries, salinity and pollution control, etc.

In December 2016, the National Board for Wildlife gave environmental clearance to the Ken-Betwa inter-linking of rivers project. The project will benefit Uttar Pradesh and Madhya Pradesh in terms of meeting irrigation, drinking water and electricity needs of its citizens. This project is the first ever inter-state river linking project in India and the estimated cost of the same is Rs 9,000 crore. As of March 2017, the government has created a Rs 20,000 crore fund under NABARD to improve irrigation facilities and to bring more than 76 lakh hectares of land under irrigation by the year 2019.

Other Initiatives: Essential initiatives like Yamuna Action Plan (YAP) and Jal Manthan have been launched by the Government of India with a universal objective to cleanse water sources and ensure quality and monitoring. In May 2016, the Minister for Water Resources, River Development and Ganga Rejuvenation launched Yamuna Action Plan Phase-III programme which involves an overall spending of Rs 800 crore. Phase III involves rehabilitation/modernisation of sewage treatment plants totaling 814 MLD capacity at Okhla, Kondli and Rithala. It also includes construction of a new sewage treatment plant (STP, in place of old STP) of 136 MLD capacity at Okhla, rehabilitation of sewer lines/rising mains in the catchments of Kondli and Rithala STPs and public outreach activities. The Jal Manthan programme organised by the government targets to achieve synergy of water resource development with environment, wild life and various social and cultural practices.

Funding for Clean India

GoI has been the primary source of funding for social initiatives. Clean India is one example. GoI takes policy measures which help in mobilising funds to undertake the missions as envisaged under the Clean India initiatives. GoI launched a fund Swachh Bharat Kosh (SBK) in December 2014. The funds will be used to build toilets in schools, rural and urban areas to attain the cleanliness objective across the country. As of August 2016, the funds mobilised under the Swachh Bharat Kosh stood at nearly Rs 444 crore with total funds that were disbursed being close to Rs 381 crore. During FY 2016-17, the state-owned public sector units, private businesses and philanthropic individuals contributed Rs 245 crore to the Swachh Bharat Kosh pool. In November 2015, the government also introduced Swachh Bharat Cess @ 0.5 per cent which will be levied over and above the existing service tax rate. Through this initiative, each and every citizen of India contributes towards a cleaner India. The government has collected nearly Rs 3,900 crore in FY 16 from Swachh Bharat Cess.

In FY 2016-17, the government allocated Rs. 11,300 crore for Swachh Bharat Abhiyan (both rural and urban areas). Out of this, Rs 9,000 crore was allocated for rural areas, while Rs 2,300 crore was allocated for urban areas. As per Companies Act, 2013 and CSR Rules, 2014, at least 2 per cent of the average net profit of the past three financial years needs to be spent on CSR activities during any financial year by a company falling under any of the following categories:

i) Net profit of Rs 5 crore or more;

ii) Net worth of Rs 500 crore or more

iii) Annual turnover of Rs 1,000 crore or more.

The government is planning to make it mandatory for the companies to spend 30 per cent of their CSR corpus on Swachh Bharat projects. According to industry experts, the government will be able to collect around Rs 2 lakh crore of funds within a period of three years from the approval of this policy.

Private sector participation in Clean India Movement

The government has contributed a significant portion of the funds for the Swachh Bharat Mission (SBM). SBM requires an equal participation from private entities, both in the form of funding support and through CSR project implementation. Since FY 2015-16, investors are allowed 100 per cent deduction under section 80G of the Income Tax Act for donations to the Swachh Bharat Kosh, other than the ones spent for CSR initiatives. Many large private and public companies have provided their support to the SBA and many of them are undertaking initiatives to clean up their surroundings, build toilets, etc.

For instance, in October 2015, Dabur India rolled out Swachh Toilet-Swachh Bharat Abhiyan with an overall objective to provide germ-free public toilets across various states like Uttar Pradesh, Uttarakhand and Himachal Pradesh etc. The company announced to contribute Re 1 from the sale of every pack of its toilet cleaning product towards building toilets in the country. Similarly, Unitech, a real estate developer, involved residents and other stakeholders in its real estate projects to clean up the areas around its properties.

There are a number of private sector players who have pledged to construct toilet facilities across various villages in India. In FY 16, Tata Consultancy Services was the leading private sector player that constructed 1,509 toilets, followed by Mahindra Group (1,171 toilets), Infosys Foundation (252 toilets), IFIG (150 toilets), CII (138 toilets), Toyota Kirloskar Motor (69 toilets), Imperial Tobacco Company (60 toilets), Titan Company (42 toilets), Federation of Indian Chambers of Commerce and Industry (38 toilets), among others. A number of public sector undertakings also pledged to build toilets. A number of private companies have been undertaking cleanliness drives as a part of their CSR initiatives and are spreading the message using social media. They are also tying up with schools to spread awareness and sensitise the common man about the benefits which come with a cleaner surrounding. For example, in FY15, Lemon Tree Hotels pledged for a 'Swachh Bharat, Swasth Bharat' across the company's hotels and announced that every employee will invest 100 hours a year to clean areas surrounding the hotel properties.

Conclusion

The Swachh Bharat Abhiyaan (SBA) and other policies and acts implemented by GoI have provided a strong framework for the foundation of a cleaner and greener India. The government has announced significant initiatives to improve the sanitation and cleanliness situation, thus ensuring a healthier and clean environment for its citizens. The Swachh Bharat Mission aims to eradicate open defecation by 2019 in India (restructuring the Nirmal Bharat Abhiyan) and plans to construct a total of 12 crore toilets in rural India with a projected cost of Rs 1.96 lakh crore (US$ 29 billion). This mission expects to attract significant investments from both the government and private sector players.

There are other major efforts undertaken by the government which further support these initiatives such as renewable power focus, waste management plants, sanitation and personal hygiene of citizens. The government is focusing on renewable sources of energy and has set an ambitious target to build installed renewable power capacity of 175 GW by 2022. Further to the existing scenario, India has witnessed a tremendous increase in number of compost plants from 45 compost plants (as of June, 2016) to 145 operational compost plants (as of April, 2017), resulting in an increase in the capacity to compost waste from 1.5 lakh MT in March 2016 to 13.13 lakh MT as of April 2017.

There are another 150 new compost making plants which are under construction and will add a total of 95 lakh tonnes of compost production capacity per year.

The successful implementation of such initiatives would further increase the attractiveness of India as a tourist destination and in turn increase the employment and economic growth of the country. In addition, more global businesses would draw their attention towards India, thus making the country a more favourable destination to do business, in turn helping the GDP of the country to increase and also generating more employment.

Goods and Services Tax

Foreword

At midnight on June 30, 2017, businesses and citizens across India witnessed the launch of India's biggest tax reform since Independence, the Goods and Services Tax characterized as 'The Good and Simple Tax' by the Prime Minister Mr. Narendra Modi. While the Goods and Services Tax (GST) is focused on ironing out the creases left by the predecessor tax regime and enhancing ease of doing business, it will involve a wave of short term adjustments like obtaining multi-state registrations, interpretation of provisions, determining the place of supply, transitional issues, etc.

GST, which is a destination-based tax, will subsume several state taxes like Value Added Tax, Entry Tax, Octroi, Luxury Tax, Purchase Tax, Entertainment Tax, etc. and federal taxes like Service tax, Central Excise Duties, Counter-vailing Duty, Additional Duties of Customs, etc. GST will thus replace all these taxes with one tax – Goods and Services Tax.

GST is poised to eliminate the cascading effect of taxes prevalent under the erstwhile indirect tax regime. Previously, Indirect Taxes were being administered by the Centre as well as the State independently. This had given rise to a cascading effect of taxes, wherein certain taxes paid on inputs were not available as credit against the output tax liabilities leading to an increase in consumer prices. The framework of GST provides for a seamless flow of credit which would greatly alleviate the cascading effect of taxes, thereby contributing to the growth prospects of the economy.

Overall Impact on Indian Economy

Expected to bring down inflation:

- Taking into consideration the intent of the regime, there is no doubt that inflation will remain low. GST rates on essential goods, household commodities and essential services have been either exempted or included in lower tax schedules.
- Another criterion which needs to be considered is that the proportion of most of the services in the CPI inflation basket is not high. Hence the higher GST rates may not get reflected on the retail price movement as measured by government data. Various services namely education, health, public conveniences, charitable activities are outside the ambit of GST. Hence the implementation of GST will have minimal impact on the CPI inflation index.

Long term economic growth:

- The immediate impact of GST cannot be predicted with certainty on account of the constant developments by the governing authorities based on the industry feedback. The new tax regime which is at a progressive stage will eventually fulfill its intent of making the Indian market more competitive than before and create a level playing field between large & small enterprises.
- But one aspect which is being faced by the majority of the industry constituents is that the current growth rate is well below expectations. There are various reasons for the same such as corporate operations are being restructured and compliance requirements with the anti-profiteering norms to name a few.
- To further elaborate, there will be a major overhaul in the supply chain of companies, which shall pose a challenge in the implementation of the new tax regime. This will be on account of the fact that under the GST regime, India as a whole shall act as an unprejudiced marketplace for the procurement of goods and services on account of the free flow of Input Tax Credit on supplies made across the nation. Hence, companies will be inclined towards reengineering their supply chain in order to take advantage of the above.
- Most analysts forecast the economy to grow close to 7.4% in 2017-18, the first year of GST rollout, which is slightly higher than 7.1% in 2016-17, but lower than 7.9% of 2015-16.
- Considering the short term timeline GST is unlikely to have a positive impact. With all the big companies reorganizing their businesses and as small firms lose revenue, the growth rate is slated to remain steady for a certain period.
- However, the GDP is anticipated to rise over the long run due to factors such as:
  - Expanding the tax base thereby leading to increase in tax collections to the exchequer
  - Significant improvement in the ease of doing business and reduction of costs, which will further attract investments
  - Having a unified national market offering significant opportunities and enhancing India's attractiveness as a foreign investment destination.

Ushering in Transparency:

- Consumers, on the other hand, will for the first time get a measure of the total central and state taxes levied on a product, bringing to an end the host of hidden and embedded taxes they were paying so far.
- The four tier rate structure, adopted for GST, is far from the international norm of instituting a single tax or two. Having said that, it is worthwhile to note that most of the goods/services have been taxed at a rate of 18% GST. The need for other tax rates was to ensure preferential taxing of specific goods/services such as consumer goods, luxury items, demerit goods, etc. and also to avoid retail inflation by keeping the incidence of GST in line with the tax incidence under the erstwhile regime.

How GST will work?

Goods and service tax is actually an indirect tax reform which ultimately aims to remove the taxation barriers between states. This helps create a unified market which is unprejudiced towards state boundaries and provides unrestricted access to the entire nation to buy, sell, import, and export within the country. Ultimately, GST aims to make it easier for businesses and consumers.

This will create a uniform market across the nation, wherein consumers will be benefited due to reduction in prices of goods and services, and there will also be ease of trade for businesses to operate locally or across the nation or to operate competitively over the globe.

Under GST there are two main benefits: firstly, all the taxes are directly collected at the point of consumption. Secondly, when tax barriers are broken between the states; the consumers would not need to end up paying tax on tax which is what happens when goods move across state borders – ultimately reducing the amount of tax paid.

GST works on the principle of ONLY taxing the vendor's contribution to the overall product's value. Also, the tax paid is not included in the price of the product sold to the vendor next in the chain. This uniformly distributes the burden of taxation to all vendors (in the chain) in proportion to their contribution (value added) to the end product – levelling the playing field especially for vendors at the end of the product chain. Also, the tax rate for a product category is the same across the country – preventing arbitrage.

Comparison with the conventional tax regime

Comparison between erstwhile Indirect tax laws and the Goods and Services Tax

Particulars	Conventional System (Rs.)	GST System (Rs.)
Manufacture to Wholesaler		
Cost of Production	5,000.00	5,000.00
Add: Profit Margin	2,000.00	2,000.00
Manufacturer Price	7,000.00	7,000.00
Add: Excise Duty @ 12%	840.00	–
Total Value (a)	7,840.00	7,000.00
Add: VAT @ 12.5%	980.00	–
Add: CGST @ 12%	–	840.00
Add: SGST @ 12%	–	840.00
Invoice Value	8,820.00	8,680.00
Wholesaler to Retailer		
COG to Wholesaler (a)	7,840.00	7,000.00
Add: Profit Margin @ 10%	784.00	700.00
Total Value (b)	8,624.00	7,700.00
Add: VAT @ 12.5%	1,078.00	–
Add: CGST @ 12%	–	924.00
Add: SGST @ 12%	–	924.00
Invoice Value	9,702.00	9,548.00
Retailer to Consumer:		
COG to Retailer (b)	8,624.00	7,700.00
Add: Profit Margin	862.40	770.00
Total Value (c)	9,486.40	8,470.00
Add: VAT @ 12.5%	1,185.80	–
Add: CGST @ 12%	–	1,016.40
Add: SGST @ 12%	–	1,016.40
Total Price to the Final consumer	10,672.20	10,502.80
Cost saving to consumer	–	169.40
% Cost Saving	–	1.59

The above table compares the GST System vs the Conventional System. As can be seen, the tax impact on the end consumer under GST is lower compared to the conventional system. This is on account of seamless flow of credit between the various stages of supply, which does not take place efficiently in the conventional system.

Apart from the lower impact on taxes to the end consumers there are various other benefits. To claim credits (for input tax paid) under the GST regime, the purchasing upstream vendor (buying from a downstream vendor) will force receipts, thereby increasing the tax base and causing reductions in the supply of black money.

Macro level overview of the products covered under various slab rates of GST*

Goods		Services	
0%	Essential commodities including food grains, salt, newspapers, etc.	0%	Services of general necessity such as education, healthcare, government services, etc.
5%	Common use items or items for mass consumption such as coffee, tea, spices and apparels below Rs. 1,000.	5% - 12%	Industry specific rates for specific services such as air transport, all restaurants, etc.
12%	Covering several products like cheese, fruit juices, tooth powder, cellphones, etc.	18%	Standard rate of GST for residual services such as telecom, IT, financial services, etc.
18%	Standard rate of GST covering majority of goods	28%	Private-run lotteries authorised by the states, race club betting, cinemas, etc.
28%	Luxury goods such as automobiles, dishwasher, vacuum cleaner, etc.		
28% + cess	Tobacco products, cigarettes, luxury automobiles, etc.		

Main benefits of GST

Higher threshold for registration:
As per the conventional VAT structure, any business with a turnover of more than Rs 5 lakh (in most states) was liable to pay VAT (different rates in different states). Similarly, for service tax, service providers with turnover less than Rs 10 lakh were exempted.

Under GST this threshold has been increased to Rs 20 lakh thus exempting many small traders and service providers.

Removing cascading tax effect:
An important benefit of the introduction of GST will be the removal of the cascading tax effect. In simple words, "cascading tax effect" means a tax on tax.

Under the previous regime, the service tax paid on input services could not be set off against output VAT. Under GST, the input tax credit can be availed smoothly across the spectrum of goods and services, thus reducing the tax burden on every subsequent entity in the value chain and removing the cascading effect.

Making it easier to do business for startups:
GST will bring about a uniformity in process and centralised registration that will make starting a business and expanding in different states much simpler. Since startups lack the resources to hire tax experts or a dedicated team for handling varied forms of tax compliance, GST's objective is to simplify the tax regime by reducing the multiplicity of taxes. This will not only bring compliance costs down but also make taxation transparent with digital tax processing. The Do It Yourself (DIY) model will enable startup founders to complete taxpayer registration, tax return submission, tax payments, and claim refunds online, thereby saving money for all sorts of enterprises irrespective of sector.

Increased efficiency in logistics:
The logistics industry in India had to maintain multiple warehouses across states to avoid the current CST and state entry taxes on inter-state movement. Most of the times, these warehouses were forced to operate below their capacity, thus increasing their operating costs.

When GST goes live, these restrictions on inter-state movement of goods will be lessened and the logistics sector might start consolidating warehouses across the country. As an outcome of GST, warehouse operators and e-commerce players have already shown interest in setting up their warehouses at strategic locations such as Nagpur, which is the zero-mile city of India, instead of every other city on their delivery route. Reduction in unnecessary logistics costs will increase profits for businesses involved in supply of goods through transportation.

*GST rates are updated till November 10, 2017

Impact of GST on few significant sectors is penned hereunder –

1 Impact of GST on real estate sector:

- Under-construction property attracted a cumulative indirect tax rate of 4.5%-5.5% as per the former Indirect tax legislation.
- Under-construction properties would now attract GST at the rate of 18% after allowing deduction of land value equivalent to one third of the total amount of under-construction property.
- Stamp duty and registration charges, being outside the ambit of GST would continue.
- Residential leasing continues to hold exemption under GST, thereby, not creating any ramifications on home rentals.
- Commercial renting of property would now attract GST at the rate of 18%.
- GST will standardise the taxes and ensure transparency along with reduction in the cost of logistics. Furthermore, availability of input tax credits would also ease the burden of conflicting cascading taxes on the overall costs for the buyers and investors.

2 Impact of GST on power sector:

- Electricity can be generated through different means like coal, hydro energy, wind energy, solar power, nuclear power, gas, diesel and a few others.
- Power industry has enjoyed several tax concessions from the Union and the state governments, under the former indirect tax regime.
- Excise duty of 6% was applicable on coal along with a nominal CST of 2%. The freight charges on coal received 70% abatement resulting in an effective tax rate of 4.5%.
- Power producers also pay a concessional rate of 6% on EPC contracts for the development of power plants, transmission grids and distribution networks.
- Electricity duty is levied by state governments against consumption by the end users. Further, the rate of duty may differ state-wise.
- Power has been kept out of the GST ambit and accordingly, the erstwhile duties would continue under the GST regime. However, considering that the power sector would be procuring goods and/or services from other sectors already encompassed within GST, such GST paid on procurements would increase the cost of generation of electricity.

3 Impact of GST on manufacturing sector:

- Standardization of taxes across states will lead to a level playing field for all manufacturers. Further, CST, which was a burden to manufacturers procuring goods from outside their state, would no longer be a cost under the GST regime.
- GST will unify the Indian market and assist free flow movement of goods within the country without the need of paying entry taxes or Octroi.
- In addition, availability of input tax credit on supply of goods and/or services may provide opportunity to manufacturers to re-engineer their supply chain management and create centralized warehouses for stocking of goods.
- Any stock transfers made in the GST regime will be considered as supply made to a distinct person which in turn will be liable to IGST as opposed to the earlier tax regime where transfers were made by issuing F-Forms without payment of CST.
- The above bearings will facilitate ease in operations in the manufacturing sector which in turn will help boost the "Make in India" initiative of the government.

4 Impact of GST on services industry:

- The former concept of centralized registration under service tax is no more imbued under GST. Consequently, separate registration needs to be obtained by service providers having place of business in different states which would increase their burden of compliance and administrative cost. However, the burden of increased compliance will be much alleviated owing to the implementation of a robust IT infrastructure supporting digitization of systems, automatic matching of credits, various online facilities, etc.
- Business support services provided by any entity to its branch(es) located outside the state would be construed as supply between two distinct entities which would attract IGST. Input tax credit would be allowed to the recipient without any restrictions on the same.
- Maximum services would attract GST at the rate of 18%.

5 Impact of GST on transport & logistics sector:

- One significant prominence of GST is that it absorbs Entry tax and Octroi. This comes out as a huge respite for the transport and logistics industry.
- Logistics players in India have been maintaining multiple warehouses across states to avoid CST levy and state entry taxes or Octroi. These warehouses may not be operating at their optimum capacity, adding to operational inefficiencies. However, under GST, India will become one single market wherein goods can move freely inter-state without levy of taxes, which will ensure more optimized supply chain management and centralised warehousing structures.
- As these companies gather scale, that will enable them to offer services at lower costs. As a result, companies for whom transportation is not a core part of their business will increasingly outsource their logistics operations to third party logistics (3PL) and fourth party logistics (4PL) service providers.

6 Impact on agriculture sector:

- The impact of GST on the agricultural sector is foreseen to be positive. It is essential to improve the transparency, reliability and timelines of supply chain mechanisms.
- An agriculturist who sells his produce would come under the non-taxable category. Suppliers of processed food or packed food sold under a brand name shall be liable to get registered once their turnover exceeds the prescribed limit of 20 lacs. The same shall be taxed at a rate of 18 per cent.
- All basic agriculture goods (not processed) which are not chargeable under current VAT laws would not be charged to tax in GST. GST is all set to increase the prices of most agricultural inputs like seeds, pesticides and farm equipments resulting into increase in cost of production for farmers.
- VAT at the rate of 2% was applicable on milk and certain milk products but under GST the rate of fresh milk is NIL and skimmed milk is kept under the 5% bracket and condensed milk is going to be taxed at the rate of 12%.
- GST implementation will play a favourable role for the National Agricultural Market by merging all the different taxations on agricultural products and the same will benefit farmers in the long run. GST would ensure that farmers in India, who are one of the major contributors to GDP, will be able to sell their produce for the best available price.

7 Impact of GST on banks and NBFCs:

- Under GST, banks and NBFCs will have to obtain de-centralized registrations across states in India.
- In addition to registration, compliance burden for filing GST returns would increase substantially compared to their compliance under service tax. However, compared to state-wise VAT compliance under the erstwhile regime, banks will be at a much comfortable place under GST since they will no longer have to deal with diverse state laws across the country.
- Further, most of the banking and financial services will see an increase in the incidence of tax from 15% Service Tax to 18% GST. Also, banks will have to reverse the Input Tax Credit (ITC) availed on capital goods by 50% which was not required under the erstwhile regime.
- Despite these drawbacks, the overall impact of GST on banks shall remain neutral on account of the expanded ITC eligibility which would increase the credit base of companies, possibly resulting in a reduction of prices.

8 Impact of GST on startups:

- GST regime has certain positives for startups and small dealers. Under GST the basic threshold limit is a turnover of Rs 20 lakh, exempting many small businesses including startups. GST also provides a 'Composition Scheme' which entails reduced compliance and lower tax rate, available for businesses having aggregate turnover more than Rs 20 lakh but less than Rs 75 lakh. The scheme is however optional at the discretion of the dealer, meaning, that the dealer may choose to pay tax as per the normal GST rates or may opt for the composition scheme.
- A dealer opting for the composition scheme shall pay tax at the following rates:
  - 2% in case of a manufacturer
  - 5% in case of restauranteur / caterer
  - 1% for residual dealers
- The entire GST process starting from registration to filing returns and payment of GST tax is online. Startups do not have to run around to tax offices to get various registrations under Excise, VAT, Service tax, etc.

9 Impact of GST on healthcare & pharma

- Several taxes were levied at various levels in the pharma industry, an amalgamation of all the earlier taxes into one uniform tax under GST would ease the way of doing business in the country, and also minimize the cascading effects of taxes that are applied to one product.
- Batch failure is very common in the manufacturing of pharma products. Since it a process loss, no input tax credit is required to be reversed. However, in GST if the input is lost or destroyed, input tax credit availed on the same will have to be reversed.
- As per provisions related to input tax credit (ITC), it is not available on goods disposed of by way of gift or free samples. This is one of the primary reasons which has led to major players opting out of the most used scheme of advertising by way of free samples and have instead started offering high discounts and/or incentives on specific quantity purchases.
- Moreover, GST would also improve the operational efficiency by the supply chain that could alone add 2% to the country's pharmaceutical industry.
- One more benefit likely to accrue due to GST is the reduction in the overall cost of technology. Currently, the technical machinery and equipment which are imported into the country by the healthcare sector are very costly. However, with GST this scenario might change. Under GST, duty charged on the import of such equipment and machinery would be allowed as a credit.

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National Stock Exchange

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Banking on universal access for overall prosperity

Press Information Bureau, Government of India, Ministry of Finance

Reserve Bank of India

National Stock Exchange

Bombay Stock Exchange

OECD

Ministry of Telecom

DIPP

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Press Information Bureau, Government of India, Ministry of Finance

Niti Aayog

Ministry of Road Transport and Highway

Dedicated Freight Corridor Corporation of India

Ministry of Railways

Airports Authority of India

Ministry of Shipping

Reserve Bank of India

DIPP

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Smart logistics for greater competitiveness

Press Information Bureau, Government of India, Ministry of Finance

Niti Aayog

Ministry of Road Transport and Highway

National Highways Authority of India

Ministry of Railways

Airports Authority of India

Ministry of Shipping

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Nerve centre for healthcare innovation

Press Information Bureau, Government of India, Ministry of Finance

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Leveraging the demographic dividend

Press Information Bureau, Government of India, Ministry of Finance

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Changing customer dynamics in the digital age

Press Information Bureau, Government of India, Ministry of Finance

Telecom Regulatory Authority of India

Internet and mobile association of India

Ministry of Consumer Affairs, Food and Pubic distribution

RBI

DIPP

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