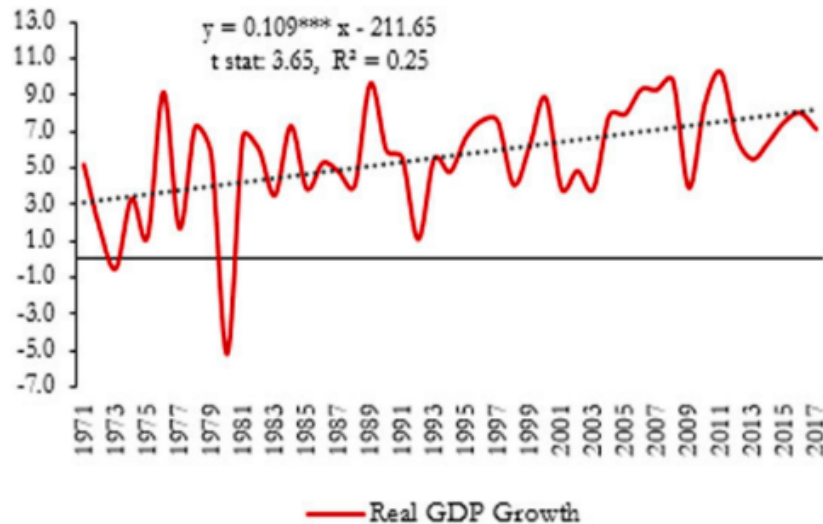


Indian IT Sector's Contribution

By Prof. Tulsi Jayakumar

IT AND STRONG, STABLE, DIVERSIFIED INCOME

India's IT sector has been the torch bearer of growth in India's services sector and has led to a strong, stable, diversified and resilient growth in the past 5 decades. India's growth averaged 4.4 percent a year during the 1970s and 1980s, it accelerated to 5.5 percent during the 1990s-early 2000s, and further to 7.1 percent in the past one decade. The acceleration of growth is evident not just for aggregate GDP, but even more strongly for per capita GDP. The average pace of per capita growth was 5.5 percent a year in 2000-2010. Interestingly, when compared with some of the world's largest emerging economies, this steady acceleration of growth stands out as being unique to India.



India's growth rate has consistently accelerated over the long run

Image: World Bank

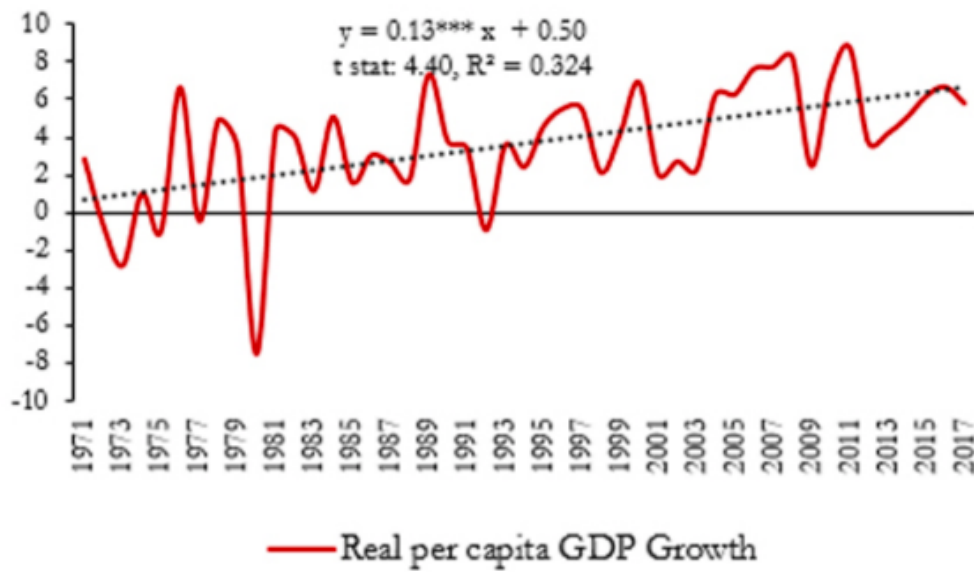
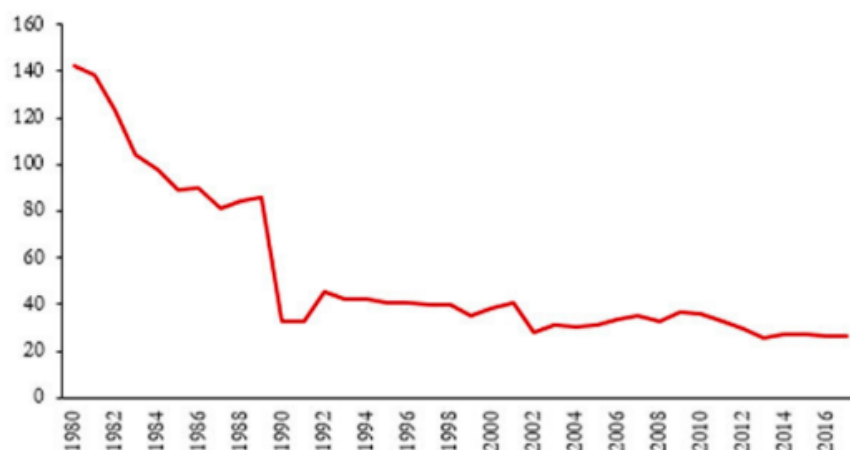


Figure 2: Growth acceleration has been faster in Per Capita Income

Second, India’s growth has become more stable. This is partly due to the stabilization of growth within each sector – agriculture, industry and services – and partly to the transition of the economy toward the services sector, where growth is more stable. Particularly interesting is the sharp increase in the stability of GDP growth since 1991. Before this, growth accelerated episodically, was punctuated by large annual variations, and often failed to sustain. Thus, growth has not just accelerated post liberalisation, it has also become more stable.

10-year rolling coefficient of variation



India's long-term growth rate has become increasingly more stable

Image: World Bank

Finally, growth has been broadly resilient to shocks, both domestic and external. The resilience of India's growth can be attributed to the country's large and spatially diversified economy, as well as to its diversified production structure that is not dependent on a few products, commodities, or natural resources. It can also be attributed to India's diversified trade basket and broad range of trading partners, wherein a slowdown in any one part of the world will not result in a large impact on India.

<https://www.firstpost.com/business/25-years-of-liberalisation-a-glimpse-of-indias-growth-in-14-charts-2877654.html>

Source:

<https://www.weforum.org/agenda/2018/04/india-s-remarkably-robust-and-resilient-growth-story>

THE IT SECTOR'S CONTRIBUTION TO INDIA'S INCOME TAX

In 2019, IT workforce was approx. 4.36 million, of which 52-55% were in the junior level, 36-39% in the middle level and about 9% in the senior level. The number of IT professionals thus was about 2.27m-2.39m, junior level IT professionals about 1.57-1.7 m and top level about 0.39 million.

With average CTC levels of INR 4.6 lakhs p.a. for junior level, INR 16.5 lakhs for mid-level and INR35.84 lakhs for top level professionals, the total contribution of Junior, middle and top professionals in India's IT was RS. 27429 m, 502762.5 m and 346203 m resp. Thus, the total personal income tax contribution of the IT sector was Rs.876394.5mn. Total personal income tax in India is Rs 4731210 million. The IT sector contribution to India's personal IT in 2019 was thus 19%.

Further, IT sector's domestic revenue (INR 41 billion) contribution to GDP (2.8 trillion) is about 1.4%, while that of the total IT sector (including exports) revenue of 191 billion is 6.8% of India's GDP.

As seen in Table 1 below: The IT sector's contribution to GDP has grown, even as India has changed the trajectory of its economic growth, and this has helped India move into the league of the top 5 nations in the world by GDP. IT sector's contribution increased from 1.2% of the GDP to 7.32% of India's GDP, which itself has grown to almost 2.8 trillion.

Table 1: India's GDP and IT sectoral share in India's GDP

Year	India GDP (current \$)	India GDP(USD billion)	IT sector revenue (USD billion)	IT share in GDP
1989	2.9604E+11	296.04235		
1990	3.2098E+11	320.97902		
1991	2.7011E+11	270.10534		
1992	2.8821E+11	288.20843		
1993	2.793E+11	279.29602		
1994	3.2728E+11	327.27558		

Year	India GDP (current \$)	India GDP(USD billion)	IT sector revenue (USD billion)	IT share in GDP
1995	3.6028E+1 1	360.28195 3		
1996	3.929E+11	392.89705 4		
1997	4.1587E+1 1	415.86775 4		
1998	4.2135E+1 1	421.35147 8	5	1.19
1999	4.5882E+1 1	458.82041 7	6	1.31
2000	4.6839E+1 1	468.39493 7	8.2	1.75
2001	4.8544E+1 1	485.44101 5	12.1	2.49
2002	5.1494E+1 1	514.93794 9	13.4	2.60
2003	6.077E+11	607.69928 5	16.1	2.65
2004	7.0915E+1 1	709.14851 5	21.5	3.03
2005	8.2038E+1 1	820.38159 6	28.2	3.44
2006	9.4026E+1 1	940.25988 9	37.4	3.98
2007	1.2167E+1 2	1216.7354 4	47.8	3.93
2008	1.1989E+1 2	1198.8955 8	52.1	4.35
2009	1.3419E+1 2	1341.8866	59.9	4.46
2010	1.6756E+1 2	1675.6153 4	64	3.82
2011	1.8231E+1 2	1823.0504 1	76.3	4.19
2012	1.8276E+1 2	1827.6378 6	87.6	4.79
2013	1.8567E+1 2	1856.7221 2	95.2	5.13
2014	2.0391E+1 2	2039.1274 5	106	5.20
2015	2.1036E+1 2	2103.5878 2	132.4	6.29
2016	2.2948E+1 2	2294.7979 8	143	6.23

Year	India GDP (current \$)	India GDP(USD billion)	IT sector revenue (USD billion)	IT share in GDP
2017	2.6528E+12	2652.75469	154	5.81
2018	2.7132E+12	2713.16506	167	6.16
2019	2.8751E+12	2875.14231	181	6.30
2020 (estimates)		2610	191	7.32

IT'S CONTRIBUTION TO MAKING INDIA'S TAX STRUCTURE MORE PROGRESSIVE

A greater proportion of direct taxes in the overall tax structure contributes to greater equity, since direct taxes are progressive, as compared to indirect taxes which are regressive.

India's direct taxes have increased manifold. Share of direct taxes in overall Central govt Taxes was only 22% in 1980-81. A large part of the direct taxes are Income Tax and Corporate Tax. From 1989-90, in just a decade, the development of a new industry helped in increasing the proportion of Central govt direct taxes tremendously to a position where Direct taxes today contribute to close to 54% of India's direct taxes. With the IT sector emerging as the sector paying the highest salaries, the sector can be said to have played a role in the transformation of India's tax structure.

Year	Centre (gross) - Direct Taxes	Centre (gross) - Indirect Taxes	Centre (gross) - Total Tax Revenue	Proportion of Direct taxes to overall taxes
2018-19	1200000	1048175	2248175	53.376623
2017-18	1002037	916971	1919008	52.2164056
2016-17	849713	866109	1715822	49.5222227
2015-16	741945	708013	1449958	51.170079
2014-15	695744	545680	1241424	56.0440314
2013-14	638542	495541	1134083	56.304684
2012-13	558658	474767	1033425	54.0589071
2011-12	493947	391232	885178	55.8019624
2010-11	445994	343178	789172	56.5141693
2009-10	377487	243881	621368	60.750956
2008-09	333854	269645	603499	55.3197271
2007-08	312243	279104	591347	52.8019927
2006-07	230249	241263	471512	48.8320552
2005-06	165249	199398	364647	45.3175263
2004-05	132847	170546	303393	43.7871012

Year	Centre (gross) - Direct Taxes	Centre (gross) - Indirect Taxes	Centre (gross) - Total Tax Revenue	Proportion of Direct taxes to overall taxes
2003-04	105090	147658	252748	41.578964
2002-03	83085	131581	214666	38.7043127
2001-02	69197	117177	186374	37.1280329
2000-01	68306	120040	188346	36.2662334
1999-00	57958	113794	171752	33.7451675
1998-99	46591	97197	143788	32.4025649
1997-98	48274	90946	139220	34.6746157
1996-97	38891	89871	128762	30.2037868
1995-96	33563	77661	111224	30.1760411
1994-95	26966	65328	92294	29.2175006
1993-94	20298	55445	75743	26.798516
1992-93	18131	56505	74636	24.2925666
1991-92	15207	52154	67361	22.5753774
1990-91	11024	46552	57576	19.1468668
1989-90	10005	41631	51636	19.3760167
1988-89	8825	35649	44474	19.8430544
1987-88	6748	30918	37666	17.9153613

Contrast this with the revenues of the other sectors:

Sub-Sector	Indicator	Unit	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
IT –BPM*	IT-BPM service revenues:	US\$ billion	118.6	129.4	139.9	151.4	161.8 (E)	-
	Exports	US\$ billion	97.7	107.8	116.1	125.1	135.5 (E)	-
	Domestic	US\$ billion	20.9	21.6	23.8	26.3	26.3 (E)	-
Aviation**	Airline passengers:	million	115.8	135.0	158.4	183.9	204.2	-
	Domestic	million	70.1	85.2	103.7	123.3	140.3	95.7 [#]
	International	million	45.7	49.8	54.7	60.6	63.9	15.6 [@]
Telecom	Wireless phone subscriptions	million	969.9	1033.6	1170.2	1183.4	1161.8	1154.6 ⁵
	Wireless internet subscriptions	million	283.3	322.2	400.6	472.7	615.0	665.4 [%]
Tourism	Foreign tourist arrivals ^b	million	7.7	8.0	8.8	10.0	10.6	8.6 [#]
	Foreign exchange earnings from tourism ^b	US\$ billion	19.7	21.0	22.9	27.3	28.6	24.0 [#]
Shipping	Port traffic	million tonnes	581.3	606.5	648.4	679.4	699.1	524.0 [^]

Source: Ministry of Tourism, Indian Ports Association, Ministry of Shipping, Directorate General of Civil Aviation, Telecom Regulatory Authority of India, NASSCOM.

IT SECTOR REVENUES

IT is one of the key sub-sectors within India's services sector, with the latter contributing a large part of India's GDP. IT sector revenues have been growing both absolutely, and as a proportion of GDP (Excel sheet). It may be said that the IT sector and the services sector that it is part of have propelled India into a high growth trajectory, wherein India now ranks the 5th largest economy by GDP in the world.

In 2020, IT sectors contribution is expected to be USD 191 billion, contributing 7.32% of GDP. Contrast it to the aviation sector, whose current contribution to GDP is \$72 billion (<https://www.investindia.gov.in/sector/aviation>) or even the tourism sector, which experienced a 24 billion USD foreign exchange earnings from tourism in 2019-2020. (Eco survey 2020)

Sector	Indicators	Unit	Period			
			2009-10	2015-16	2016-17	2017-18
IT –BPM**	IT-BPM service revenues	US \$ billion	64.0	129.4	139.9	150-152 ^P
	Exports	US \$ billion	49.7	107.8	116.1	124-125 ^P
	Domestic	US \$ billion	14.3	21.6	23.8	26-26.5 ^P
Aviation*	Airline passengers (Total)	Million	77.4	135.0	158.4	(76.1)86.7 [#]
	Domestic	Million	45.3	85.2	103.7	(49.5)57.5 [#]
	International	Million	32.1	49.8	54.7	(26.6)29.2 [#]
Telecom	Telecom connections (wireline and wireless) ^b	Billion	0.6	1.0	1.2	(1.1)1.2 ⁻
Tourism	Foreign tourist arrivals ^a	Million	5.2	8.0	8.8	10.2
	Foreign exchange earnings from tourism ^a	US \$ billion	11.1	21.1	22.9	27.7
Shipping	Gross tonnage of Indian shipping ^b	Million GT	9.6	10.9	11.6	12.7 [@]
	No. of ships ^b	Numbers	998	1273	1316	1374 [@]
Ports	Port traffic	Million tonnes	850.0	1071.9	1133.1	574.7 [#]

Sub-Sector	Indicator	Unit	Year				
			2014-15	2015-16	2016-17	2017-18	2018-19
IT –BPM*	IT-BPM service revenues:	US\$ billion	132.4	143.0	154.0	167.0	181.0(E)
	Exports	US\$ billion	98.5	108.0	117.0	126.0	136.0(E)
	Domestic	US\$ billion	34.0	34.8	38.0	41.0	45.0(E)
Aviation**	Airline passengers:	million	115.8	135.0	158.4	183.9	204.2(P)
	Domestic	million	70.1	85.2	103.7	123.3	140.3
	International	million	45.7	49.8	54.7	60.6	63.9
Telecom	Wireless phone subscriptions ^a	million	969.5	1034.1	1170.5	1188.9	1161.7
	Wireless internet subscriptions ^a	million	283.3	322.2	400.6	472.7	615.05
Tourism	Foreign tourist arrivals	million	7.8	8.2	9.1	10.4	10.6 (P)
	Foreign exchange earnings from tourism	US\$ billion	20.4	21.4	23.8	28.7	27.7 (P)
Shipping	Gross tonnage of shipping ^a	million	10.5	10.9	11.6	12.6	12.7 [^]
	Number of ships ^a	numbers	1210.0	1273.0	1316.0	1384.0	1400 [^]
Ports	Cargo traffic	million tonnes	1052.2	1071.8	1133.7	1208.6	1276.8(P)
	Cargo capacity	million tonnes	1560.5	1703.1	2147.6	2307.4	2405.9(P)

IT'S CONTRIBUTION THROUGH EXPORTS

India's Current Account Deficit grew by 491% between 1990-91 to 2018-19. However, the CAD would have been worse had it not been for the cushioning impact of the Software exports, salaries earned by IT professionals abroad and the remittances of Indians employed in IT services.

As can be seen from the Table, IT service exports increased by 4102%. Till 1996-97, India was a net importer of IT services. However, on the eve of the millennium, or just before it, India had turned a net exporter. Had it not been this impressive IT services growth, India would have had a CAD which would have been significantly higher. To get a sense of this, the absence of IT service exports in 2018-19 would have raised our CAD from 57256 USD million to USD 134910 million.

Further, Income of Indian nationals abroad is captured through the item 'Compensation of Employees'. This figure started from a modest USD 48 million in 1997-98 and rose to USD 4738 million in 2018-19. This has also helped in bridging the CAD. A large part of such income (approx 52%) would be on account of Indians employed in IT sector outside India. Similarly, assuming that 50% of Indians abroad are employed in the IT sector, remittances into India, the largest in the world¹, have been another major factor contributing to cushioning of the CAD. Remittances from across the world have grown by 3567% between 1990-91 to 2018-19.

Taking an approximate 50% of salaries and remittances component to be on account of Indians employed in the IT sector globally, we can say that India's CAD would have been USD 175477 million in 2018-19- a whopping 206% more.

Moreover, such CAD has been financed by FDI Equity Inflows into the computer hardware and software industries into India. (to be discussed in Proposition 5)

WEALTH CREATION BY THE IT SECTOR

The IT sector has helped in tremendous wealth creation in India , through both direct and indirect effects.

What has been the contribution of the IT sector to wealth generation? (IT services, Business Process Management, Software Products and Engineering services, Hardware).

Wealth creation is the process by which a company enhances the market value of the capital entrusted to it by its shareholders. It is a basic measure of success for any commercial venture.

(<https://morningstar.in/posts/56264/stocks-made-investors-rich.aspx>). In India, the exponential rise in India's GDP and GDP per capita, coincided with wealth generation in the stock market. The Sensex has not only grown after 1991, but has grown at an accelerating pace. Whereas crossing the first incremental 5000 points took over 13 years from its inception in 1986, the time taken to achieve each incremental milestone has substantially reduced over the years.

¹ In 2018, the World Bank estimated remittance of India to be [the highest in the world with \\$79 billion](#), followed by China and Mexico at \$67 billion and \$36 billion respectively. These remittances constituted [2.9 % of India's GDP](#) and remittances formed the country's foreign exchange money of roughly around 22% to 23%. (<https://www.compareremit.com/money-transfer-guide/the-nris-contribution-to-the-indian-economy/>)

Figure 2a: India's GDP (current US\$ tn) (1960-2018)

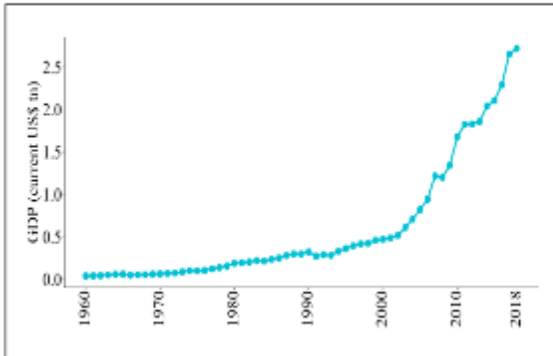
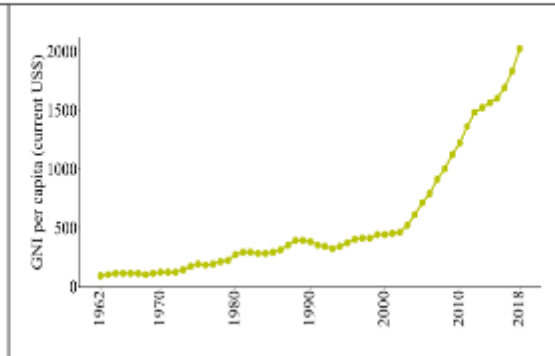
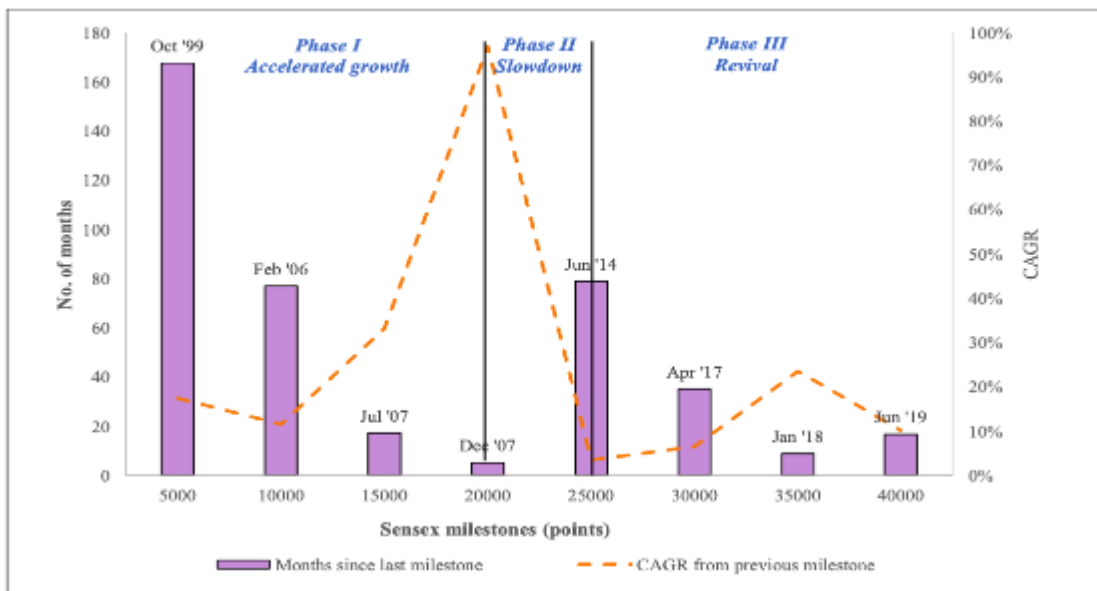


Figure 2b: India's GDP per capita (current US\$) (1960-2018)



Source: World Bank

Figure 3: Incremental months taken for Sensex to cross each 5000-point milestone



Source: BSE.

India had first entered the \$2 trillion market cap club of eight countries in May 2017. In January 2020, India was ranked 10 with a market cap of \$2.15 trillion, while in January 2019, with an aggregate market cap of \$2.08 trillion, it was in the seventh spot. (<https://www.livemint.com/market/stock-market-news/india-swings-back-to-2-trillion-market-cap-club-as-equities-recover-losses-11597413961612.html>)

The market cap contribution of Top 10 IT and service companies in India was= INR 3444028.96 crores (USD 471.78 billion / USD 0.47 trillion). So in 2020, about , 21% of the market cap was contributed by just the top 10 IT companies.

Companies like TCS have been the highest global employers, and In addition to the global ranking, TCS has been certified as the Number One Top Employer in three regions – Europe, MEA and APAC (<https://www.tcs.com/tcs-recognized-global-top-employer-fifth-consecutive-year-2020>).

IT Services & Consulting					
Company Name	Last Price	% Chg	52 wk High	52 wk Low	Market Cap (Rs. cr)
TCS	2,323.75	-1.07	2,389.50	1,504.40	871,960.40
Infosys	928.30	-1.25	986.00	511.10	395,399.66
HCL Tech	722.50	-0.35	738.80	375.50	196,062.30
Wipro	282.75	0.18	290.65	159.60	161,577.22
Tech Mahindra	753.35	0.16	845.70	470.25	72,803.95
L&T Infotech	2,457.55	-1.20	2,551.00	1,207.60	42,894.88
Oracle Fin Serv	2,919.95	-1.60	3,238.50	1,532.50	25,106.34
Mphasis	1,141.60	0.88	1,231.70	612.05	21,300.54
Mindtree	1,169.95	-1.37	1,224.35	667.30	19,266.03
Hexaware Tech	421.75	1.54	441.75	201.70	12,658.06
COFORGE LTD.	1,911.00	-1.77	2,079.35	739.05	11,575.99
Persistent	981.85	-1.03	1,128.35	420.00	7,503.79
Affle India	2,719.65	-1.65	3,083.00	805.00	6,934.12
Birlasoft	164.30	-5.38	187.60	47.60	4,552.94
Cyient	382.35	0.07	514.00	184.15	4,204.75
Zensar Tech	163.70	-2.41	229.80	63.70	3,690.55
Sonata	310.00	-2.61	354.40	148.10	3,259.94
Intellect Desig	185.70	-0.77	229.00	44.00	2,459.92
KPIT Tech	81.25	-0.55	111.10	34.45	2,227.42
Majesco	749.10	-1.04	802.95	170.55	2,218.30
Mastek	715.95	-1.26	764.70	170.05	1,757.24
R Systems Intl	104.80	0.96	120.20	34.00	1,253.79

References:

<https://www.moneycontrol.com/stocks/marketinfo/marketcap/bse/it-services-consulting.html>

<https://groww.in/blog/10-it-sector-stocks-you-can-bet-on-in-2019/>

The share of the top 10 services is 55.3 per cent of the cumulative FDI equity inflows during the period April 2000-March 2017 and 60.7 per cent of FDI equity inflows during 2016-17 (https://www.indiabudget.gov.in/budget2017-2018/es2016-17/echap09_vol2.pdf)

If the shares of another 5 services or service-related sectors like retail trading, agriculture services, education, ports, and air transport are included, then the total share of FDI equity inflows to the services sector would increase to 57.4 percent and 62.4 percent respectively for the above two periods.

Table 7.3 : FDI Equity Inflows in the Services Sector							
Ranks	Sector	Value (in US \$ million)			Percentage to total	Growth rate	
		2013-14	2014-15 (Apr. -Nov.)	Cumulative (Apr. 2000-Nov. 2014)		2013-14	2014-15 (Apr. -Nov.)
1	Services sector (financial & non-financial)	2225	1847	41307	17.5	-54.0	24.9
2	Construction development #	1226	703	24009	10.2	-8.0	-20.9
3	Telecommunications *	1307	2472	16635	7.0	329.9	7390.9
4	Computer software & hardware	1126	862	13679	5.8	131.7	62.9
5	Hotel & tourism	486	544	7662	3.2	-85.1	180.4
	Total top five services	6370	6428	103291	43.7	-37.6	105.8
	Total FDI inflows	24299	18884	236465	100	8.4	22.2

References:

<https://morningstar.in/posts/56264/stocks-made-investors-rich.aspx>

IT INDUSTRY HELPED INDIA LIFT ITS PEOPLE OUT OF POVERTY

McKinsey Global Institute (MGI) report (2018) ranked India among 18 “outperforming” emerging economies that have cumulatively lifted a billion people out of extreme poverty between 1990 and 2013. India made the second-biggest impact by pulling 170 million people out of poverty between 1990 and 2013, reducing the number of its citizens living in extreme poverty by 25%. It was one of only 11 countries that achieved GDP per capita growth of more than 5% annually for over 20 years².

Among the factors that drove such performance was highly competitive large companies, including the IT sector, which were:

- More successful- giving 40% more returns to shareholders
- Bolder innovators- 8pp more sales from new products
- Quicker decision makers- 32% faster investment decisions
- Aggressive growers- 27pp more cite entering new markets abroad as a priority

How have IT firms lifted India out of poverty, following the MGI proposition:

1. Leading information technology companies in India have been overly generous towards investors in the last five years, returning about 70% of the profits earned by them to the shareholders. [TCS](#), [Infosys](#), [HCL Tech](#), [Wipro](#), and [Tech Mahindra](#), the top five IT giants in India earned a total of Rs 3.3 lakh crore in profits between the financial year 2016 and 2020, of this, a massive Rs 2.3 lakh crore paid to the shareholders, said brokerage and research firm Motilal Oswal. “The business models of large-cap Indian IT companies are typified by the combination of low to moderate growth and very high profit to cash conversion dynamics,” Motilal Oswal said. TCS led the tally, paying Rs 1.1 lakh crore to investors over the last 5 years.
2. In India, IT and business process revenue has expanded at 9 percent annually since 2012, while employment has grown by more than 6 percent. Productivity has risen 4 percent annually since 2000.
3. The 18 outperformers identified in the report have almost twice as many large firms (publicly listed ones with annual revenue of over \$500 million) as other developing countries, adjusted for the size of the economies. So, clusters of innovation are popping up. For instance, the number of patents granted annually in Bengaluru, Beijing, and Shanghai grew more than twice as fast as in Silicon Valley, MGI found. In fact, around eight in 10 Chinese and Indian cities analysed, increased their number of patents by double digits annually while just three in 10 US cities managed to do so.
4. Over the years, the Indian software industry has matured from providing cost-effective back-office support to driving the digital transformation agenda ahead in global companies. Increasingly, leaders of more than a thousand global enterprises across the U.S., Europe, and

² During the same period, life expectancy in the country rose by more than a decade. China topped the chart with 730 million people.

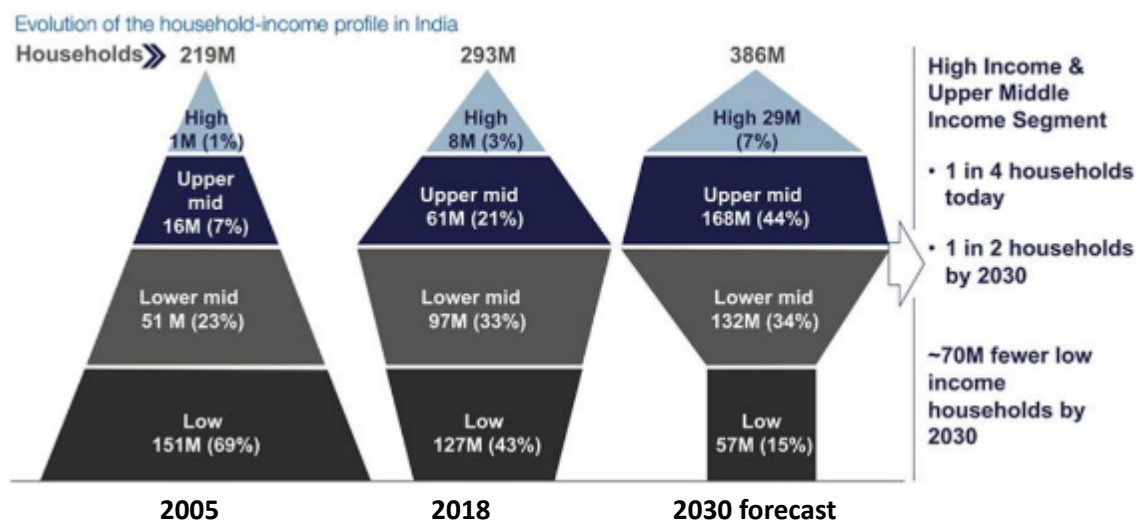
other locations have realised India's potential and have set up their own IT or R&D centres to take advantage of the vibrant Indian software ecosystem.

5. The current wave of Indian software entrepreneurs is focusing on building platforms and products for Indian and global markets. This has led to the creation of more than 7,000 tech start-ups in India. India is already home to 18 unicorns (start-ups valued in excess of US\$1 billion), and another 10 are expected to be added by the end of 2020.
6. The Indian software industry has accelerated the adoption of digital technologies in the country. The industry has played a crucial role in providing digital identities to over one billion people in the country, which is further enabling the provision of services across industries such as banking, healthcare, and education in an efficient manner. The next generation of Indian software companies is helping millions of small and medium businesses (SMBs) and individual workers such as cab drivers and delivery personnel move into the formal economy.
7. The IT industry has also created over four million direct jobs and 12 million indirect jobs in India. A testament to this growth is the fact that the largest Indian IT services company is currently valued at over US\$100 billion and generates over US\$20 billion in revenue.

IT INDUSTRY WAS A POWERFUL DRIVER OF INDIA'S MIDDLE CLASS

The total number of people in the middle class approximated thirty million in the 1990s or less than 1 percent of the population. The percentage of those in the middle class began rising steadily to about 5 percent of the population in 2004. During the eight-year period between 2004 and 2012, the middle class doubled in size from 300 million to 600 million. By 2015, the size of the middle class in India was between 300 and 600 million, according to Deutsche Bank Research.

In 2015, fewer than 19 percent of Indians lived below the poverty line, nearly a 10 percent reduction from 22 percent in 2011. The Indian household savings rates also tripled between 2005 and 2015, with many more households having a significant disposable income. The number of households in India with disposable incomes of more than US \$10,000 has risen twentyfold in twenty-five years, from 2.5 million in 1990 to nearly fifty million in 2015. This number has further risen in 2018.



Economists from Mumbai University in India defined the middle class as consumers spending from US \$2 to \$10 per capita per day. By this definition, approximately half of India's population of 1.3

billion is now in the middle class. The fastest growth is in the lower middle classes, who spend between US \$4 and \$6 per day. This group now includes, amongst others, data entry operators (2% of the population), as also IT sector professionals constituting the upper middle class. The Data entry jobs within the IT sector have minimal barriers to entry, and many from the lower classes can easily “move up” to this group.

According to Carol Upadhyay: The Indian software outsourcing industry has grown rapidly over the last decade or two, and has produced a fairly large population of ‘information technology (IT) professionals’ who can be said to constitute a new and socially significant segment of the ‘new middle classes’ in India.

IMPACT OF IT ON THE REST OF INDIA:

Are the benefits trickling down to non-English speaking Indians? Rural India?

Rapid innovations in the IT sector have made it a dynamic sector, which in itself has been a contributor to growth. A somewhat more special characteristic of IT is that it is a ‘general purpose technology’ (GPT, Bresnahan and Trajtenberg, 1995), distinguished by pervasiveness, technological dynamism, and innovational complementarities. Pervasiveness has to do with costs and access. The falling costs of computing point to Pervasiveness. Technological dynamism refers to the potential for sustained innovation that comes with new GPTs and is again illustrated by the dramatic fall in costs shown in Table 1³. IT has vertical complementarities since it has spurred innovation and lowered manufacturing costs in downstream sectors.

Table 1: Falling Costs of Computing (US\$)

Costs of computing	1970	1999	2012
1 Mhz of processing power	7,601	0.17	<0.01
1 megabit of storage	5,257	0.17	<0.01
1 trillion bits sent	150,000	0.12	<0.01

IT gave growth an extra kick. It helped in transforming India, through its several externalities:

- **Revolution in rural telecommunication in India based on IT:** This was the development of public telephone booths with microprocessor-based systems for billing telephone calls. These were called Public Call Offices (PCOs). The public could place local, long-distance, and international telephone calls from these PCOs and pay the charges to an attendant. A microprocessor attached to the telephone printed the cost of a call as soon as it was completed which enabled transparent toll collection. The cost of establishing such PCOs was

³ In this case, IT is one of a special few technologies: other examples of GPTs include steam and electricity (both advances in power delivery systems) and synthetic materials.

low which enabled a large number of entrepreneurs to enter this business. These privately owned PCOs became ubiquitous in small towns, villages, and on highways all over India leading to a communication revolution. Every nook and corner of India was connected within 5 years. The power of the microcomputer was visible to all.

- **Revolution in the education sector:** In order to cater to the IT sector, a Department of Computer Science and Engineering was started in all the IITs offering B.Tech, M.Tech, and Ph.D. degrees in Computer Science and Engineering. In the Indian education system, after graduation from high school, a large number of students enrol in a three-year B.Sc course with physics, chemistry, and mathematics as the main subjects or in a B.Com course with commerce, economics, and statistics as the main subjects. These degrees are general ones and do not prepare a student for a profession that requires specific skills. India needed a large number of persons to develop business/management information systems for use in organizations both in India and abroad. This required systems analysts with some breadth in education and specialization in software development. The curriculum was planned to encompass three disciplines: computer science with an emphasis on software engineering and systems analysis, mathematics to be able to develop systems that require operations research and application of statistics, and management science for the students to appreciate the nuances of business so that they can design systems understanding the language of managers. The programme design included a semester of actual system design in an organization. While B.Tech and M.Tech CSc students were expected to design 35 computer systems (hardware and software), MCAs were expected to design software systems for management and business applications. This programme which was uniquely Indian provided an opportunity for a large number of B.Sc/B.Com students to become professional information system designers. Initially, the Government of India decided to fully fund ten institutions to start this programme. The availability of well-trained MCAs was one of the contributing factors to the rapid growth of the software services industry in India.

At the same time, private initiatives giving non-formal training in software development and computer use also provided much-needed human resources. Aptech and NIIT Ltd. were pioneers in this area. NIIT was established in 1981 and started a franchising model to spread its courses to smaller towns in India in 1987.

- **Helped in international relations through assisting neighbouring countries in computerization:** CMC obtained funding from the UNDP of USD 2.75 million for a programme called the International Education and Research for Application of Computer Technology (Project INTERACT). It spread the use of computer technology to neighbouring developing countries by designing training programmes in software development and computer maintenance.
- **CAD centres which helped India build sustainable, self-reliant growth:** DOE obtained a grant from the UNDP of USD 1.5 million in 1984 and contributed Rs.340 million to establish CAD centres at IIT/Kanpur, IIT/Bombay, Indian Institute of Science, Bangalore and Jadavpur University. These centres developed software and human resources in various areas of CAD. Many scientists went abroad to get trained in the design and use of CAD tools and later on developed tools of their own and assisted the industry by offering short-term courses and providing trained human resources. During the mid-80s the US Government banned the export of CAD tools in electronics to even educational institutions in India. This helped in building self-sufficiency and self-reliance for India's growth.

For instance, the main goal of CDOT, formed in 1986, was to design digital exchanges of small capacity suitable for use in rural India which had problems of poor power availability and extreme weather conditions (45 degrees C in summer and -5 degrees C in winter). CDOT recruited a highly motivated group of engineers and developed a rugged switch and a digital exchange in a record time of 3 years. CDOT switches were widely deployed and they performed very well.

- **Teachers trained and hence new employment opportunities:** The DoE set up a committee in 1985 with S. Sampath as its chairman which suggested training teachers in Computer Science for the colleges which were being newly established. The DoE obtained funding in 1985 from the UNDP of USD 5.2 million and invested Rs.140 million to start a programme called the Knowledge Based Computer Systems (KBCS) development. The participating institutions were IISc, Bangalore, IIT/Madras, ISI/Calcutta, TIFR/Mumbai, and NCST/Mumbai. This programme led to the design of parallel computers, expert systems in medicine, soft computing including script recognition of Indian languages, and research in speech recognition and knowledge representation. A large number of scientists from these institutions were sent abroad for working at renowned Universities in the USA and the UK. This programme also improved the research infrastructure available in the participating institutions.
- **Large-scale computerization of banks in 1984:** The computer requirements of banks were large and gave an impetus to private computer manufacturing companies to design and develop minicomputers using UNIX as the OS.
- **Computerizing the ticket reservation system of the Indian Railways:** A major project to computerize the reservation of tickets in the Indian Railways began in 1984 and was completed in 1986. India has one of the largest railway networks in the world. In 1984 it handled over 5 million passengers travelling in over 600 long-distance trains with around 50,000 reservation requests. Passengers had to stand in long queues to obtain reservations. Clerks kept numerous ledgers, one for each train, and they had to juggle between ledgers depending on the choice of trains by the passengers. The area of reservation was ripe for computerization. CMC gave a proposal to the railways to computerize the reservation system. This was accepted by the railways and by 1986 a reservation system was developed and implemented at the New Delhi booking office. It had 50 counters and customers could go to any counter to get a reservation for any train. Reservations on connecting trains as well as return reservations could also be done. Cancellation of tickets and getting an immediate refund was simplified. This was perceived in 1986 by the general public as almost a miracle. Instead of waiting for hours to get a reservation and having to run from counter to counter the customers could get confirmed reservations within 30 minutes as there were 50 counters. The counter clerks were also happy as they could reconcile the collected cash against issued tickets with the help of the computer within 30 minutes after closing time whereas in the manual system it used to take at least two hours. There was also no reduction in staff; in fact, there was an increase as more counters were operated with more clerks working simultaneously. The system interestingly was developed on a VAX cluster connected to terminals at the counters. FORTRAN was used as the programming language. It was the first time in the world that such a system was developed for online transaction processing on a VAX cluster. The entire software effort was by Indian software engineers with no involvement of "foreign consultants. The reservation system using computers was an eye-opener to the general public as it demonstrated the advantages of using computers. There was an attitudinal change among both the general public and white-collar workers about

computerization. This was the beginning of the acceptance of computers and the realization that in a country that has large volumes of data to be processed the use of computers is inevitable. Some bank unions also accepted computerization, suggested by the Reserve Bank of India, which they had opposed earlier.

Reservation of tickets in trains which was first introduced in 1986 was a landmark in changing the perception of the general public about computerization in India.

The system became web-based in 2006 and by 2010 passengers could reserve their seats on any train and get the tickets printed at their homes using their Internet-connected PCs and credit cards. In fact, by 2010 airline tickets, bus tickets, theatre tickets, and many other tickets could be booked using the Internet.

- **Development and use of Electronic Voting Machines:** Another significant event that took place in 1982 was the use of microprocessor-based electronic voting machines (for the first time probably in the world) in a bye-election to the Indian Parliament held in Kerala. The electronic voting machine (EVM) was designed by two public sector companies: Bharat Electronics Ltd., and ECIL, for easy use by the illiterate electorate. The use of EVMs allowed the declaration of election results within two days after voting. (Since the general elections of 2004 only EVMs are used in India. The use of manually filled ballot papers has been discontinued.) The effectiveness of computers in three highly visible projects, namely, the reservation of train tickets, Public Call Offices, and computerized electronic voting, changed the perception of policymakers and the general public about computers and their relevance to India.
- **Opportunities to engage the Indian diaspora as tools for opportunity gain, rather than brain drain:** IIT graduates of the 60s and the 70s had gone to the USA for higher studies. Most of them had obtained Master's and Doctoral degrees in the Universities in the USA and chose to settle down there as opportunities in India, in their perception, were limited. There was a raging debate in India about whether public money spent on educating them was wasted. The "brain drain" of the 60s and the 70s became "opportunity gain" in the 90s when India liberalized its economy. The influential Indian diaspora provided an opportunity to many fledgling Indian software companies to get small contracts at the beginning which grew as the companies delivered good quality software applications. Many non-resident Indians also set up software companies in India with their relatives and provided capital, know-how, and introduction to clients in the USA.
- **Other areas which have been facilitated by IT:** E-commerce, e-mail correspondence, use of digital signature in documents, archiving legal documents in electronic form, linking of communication technology with IT- fibre to the home, cable networks, and Direct to Home satellite transmission (DTH), Wi-Fi, VoIP
- **Growth of other industries:** Besides the growth of software development companies there were also some new businesses that depended on software and fast worldwide communication which have grown rapidly. They were IT-enabled services (ITeS) and Business Process Outsourcing (BPO). IT e-enabled services included tasks such as checking insurance claims, filing income tax returns, medical transcription, remote support on bug fixing of software, call centres, etc. The call centres operating 24 x 7 for worldwide customers required language proficiency mostly in English and some European languages- boosting these industries as well.

- **BPO industry:** Business Process Outsourcing (BPO) is primarily performing the back-office work of a number of organizations, the largest segment being banks and insurance companies. The back-office work was typically accounts receivable, payroll processing, account reconciliation, inventory management, and similar jobs. American Express was the first organization to start BPO work in India in 1994 followed by GE Capital International Services in 1997. The success of these pioneers induced a large number of Indian companies to start BPO Centres for foreign clients in SEZs as the profit earned at these locations was tax-exempt. The cost of starting a BPO was as low as the cost of computer hardware as well as that of communication fell rapidly. The only requirement was trainable human resources with good knowledge of English (which was available in reasonable numbers) and identification of overseas clients. BPOs were established not only by Indian companies performing tasks for off-shore clients but also by many British and American companies who shifted their back-office data processing to India as they could get better quality employees and infrastructure at a lower cost. The falling cost of communication immensely helped the expansion of BPOs.
- **Fostering Innovation:** Another significant development in India from 1990 onwards was the establishment of research, design, and development centres of several multinational companies. The centres were being set up in India to take advantage of the availability of high-quality computer science graduates at a reasonable cost. It started with Microsoft establishing a software development centre in Hyderabad in 1998 and Motorola a design centre in Delhi. The multinationals operating in India obtained over 1600 patents during the period from 2006 to 2010
- **Impetus to MSMEs:** Another business that started during this period was “laboratory for hire”. In this model, Indian companies provided physical infrastructure, and trained engineers and project leaders for developing prototypes of products for small and medium businesses outside India. The product idea and the IP rights of the product belonged to the customer. The Indian laboratory developed a prototype and tested it. In some cases, even a new integrated circuit or programmable logic system was delivered as part of the contract.
- **Increasing use of computers in all walks of life:** Another important development during the period 1998-2020 was the increasing use of computers in all walks of life. All banks computerized their customer services as well as back-office functions. The feeling that computers would lead to the reduction of job opportunities was finally put to rest. The spread of banks to every nook and corner of India, the increase in the volume of transactions, and the number of customers could not have been handled manually. ATMs were introduced by private banks in 1998 and all nationalized banks soon after. All ATMs are now networked and a debit or credit card issued by an RBI-approved bank can be used in any ATM anywhere in India. With the advent of the Internet and the passing of the IT Act in 2000, anywhere anytime banking using the Internet was adopted by all the major banks. With the rapid spread of mobile communication, mobile banking started in 2010.
- **E-Governance grew rapidly during this period:** Citizen services such as property registration, paying property taxes, and obtaining various certificates from the government used to be manual, slow, and prone to corruption. The use of computers expedited these services and reduced corruption. Filing of e-returns is another area.
- **Building a pool of human resources:** All these could not have been achieved without educated human resources. There was a rapid expansion of engineering colleges between

1998 and 2010. The groundwork for the expansion of IT education was laid in 1980 with the introduction of MCA courses and the expansion of B.Tech courses as per Rajaraman committee recommendations. During the period from 1998 to 2010, there was a rapid growth of private engineering colleges and colleges offering MCA courses. In 1998 the number of engineering students was around 135,000 and in 2010 it grew to 1,300,000, a growth of almost 10 times. The number of MCAs graduating in 1998 was around 7000 whereas it jumped to 120,000 by 2010. Added to this were non-formal vocational courses given by commercial institutions such as NIIT and Aptech. The DoE started accrediting private training institutes in 1995 with a scheme called DOEACC. DOEACC later became an examining body giving certificates named 'O', 'A', 'B', and 'C' levels based on the competence of the candidates who wrote these examinations. This non-formal scheme was also added to the human resource pool. There was also a large pool of graduates with B.Sc. and BCA (Bachelor of Computer Application) degrees who were suitable for BPOs and ITeS companies. The IT companies' common complaint was that there were not enough employable graduates with computer science degrees. Instead, they recruited all engineering graduates with aptitude in computing; however, they could not be directly placed as members of project teams. All major IT companies had in-house training programmes ranging from 12 weeks to 6 months. The training schedule was gigantic as every major software company was recruiting around 8000 graduates each year. Another problem faced by the IT companies was "attrition" with increasing demand for experienced engineers and of project leaders. The average attrition rate was 15 to 20%. With many of these companies having a workforce of the order of 120,000, the replacement numbers themselves were over 15,000 each year.

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- World Bank Reports

Occupation	%
Vendors	30
Food Industry	13
Leather Work	8
Painters/Carpenters	7
Construction	6
Miscellaneous	7
Cloth/Shop Washing	5
Security Services	5
Unspecified	4
Welding & Repairing	4
Bangle Workers	2
Cable/Electrical Work	2
Data Entry	2
Driver/Transport Services	2
Imitation Jewellery Makers	2
Bangle workers	2

Source: *ATLAS: The Local Impact of Globalization in South and Southeast Asia*. See the *World Economic Forum* website at <https://tinyurl.com/y7tysq2q>.

“Rising prosperity in these countries has also enabled the emergence of a new wave of middle and affluent classes with enough money to save and consume,” the MGI report stated. In India, the number of consuming-class households has risen 10-fold in 20 years, rising from 3.4 million in 1995 to over 35 million in 2016.

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IT sector and the other sectors that it has propelled have helped in the urbanization of India. In the 40 years prior to Independence and before 1990 (i.e., 1950-1990), the rural population had come down from 82% to 75%. In 1990, 75% of India's population was rural. By 2020, it has come down to about 65%.

For the first time in history, the Census 2011 reported a decline in the population growth rate of rural India. However, at that time India was still predominantly rural, with the urban population being just 30 percent. Between Census 2001 and Census 2011, the number of Census Towns increased from 1,362 to 3,894. This indicates that people in rural areas are quitting farming or joining non-farm livelihoods.

Such urbanization and growth of the IT industry has spawned the real estate sector, retail sector, hospitality, etc. within India.

The Real estate market in India is one of the largest sectors in the world. The real estate sector's contribution to the gross domestic product (GDP) has been estimated at around 6.5 to 7 percent and the sector is expected to generate millions of jobs. The real estate sector is the second largest employer after agriculture and experts have stated that the real estate growth in India will be around 20 percent in the next decade. The real estate sector constitutes four sub-sectors - housing, retail, hospitality, and commercial. For the past decades, the high growth of the real estate sector is due to the growth of the corporate environment, since there is a demand for office space as well as urban and semi-urban accommodations.

One way of looking at it is the rental yields across cities: The IT cities of India- Bangalore, and Hyderabad enjoyed the highest rental yields

AVERAGE RENTAL YIELDS (%)	
City	Average Rental Yields (%)
Delhi	2.47%
Mumbai	2.55%
Bangalore	3.80%
Pune	2.67%
Chennai	2.81%
Kolkata	3.73%
Hyderabad	3.84%
Source: Magic Bricks	

Bangalore has witnessed one of the most robust growth and higher price trajectory patterns in comparison to other cities in India. Real estate in Bangalore has been signified with robust growth, steadiness in prices, and a positive purchasing pattern from customers who intend to purchase plots, flats, and villas in and around Bangalore.

Detailed studies by various real estate funds, management, and related research organisations have confirmed this pattern. This pattern, in simple terms, means, 'The real estate prices in the outskirts of the city (whichever city you are in) grow faster than in the inner city or CBD area'. The CBD stands

for the central business district of the city or metro concerned. The CBD area would consist largely of BBMP areas in Bangalore. Outskirts of Bangalore is the area where IT firms are located. As far as Bangalore is concerned, the outskirts include Sarjapur, Hoskote, Bidadi, and Devanahalli areas including the new international airport areas, and other areas covering Bangalore as a shell to the CBD area.

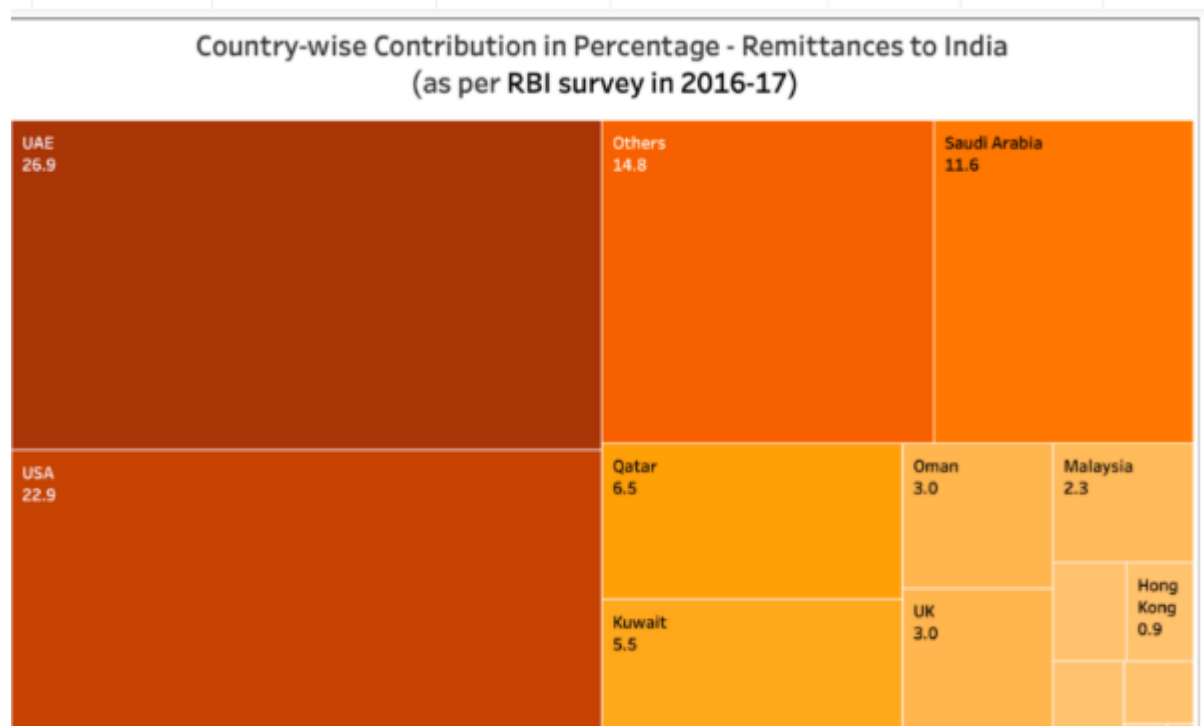
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Table: India's Current Account Deficit, IT sector service exports contribution and incomes and salaries and remittances

				(In US million\$)	
	Current Account (US million)	Telecommunications, computer, and information services (exports)	Telecommunications, computer, and information services (Net)	Compensation of employees (credit)	Personal Transfers (remittances) Credit
1990-91	-9680	1986	161		2083
1991-92	-1178	1981	165		3798
1992-93	-3526	1417	-68		3864
1993-94	-1159	1455	-664		5286
1994-95	-3369	1912	-594		8112
1995-96	-5912	2430	-1417		8540
1996-97	-4619	2354	-811		12435
1997-98	-5499	4163	355		11875
1998-99	-4038	7447	1286	42	10341
1999-2000	-4698	10153	3449	148	12290
2000-01	-2666	6341	5750	128	13065
2001-02	3400	7556	6884	125	15760
2002-03	6345	9600	8863	117	17189
2003-04	14083	12800	12324	130	22182
2004-05	-2470	17700	16900	469	21075
2005-06	-9902	23600	22262	179	24951
2006-07	-9565	31300	29033	382	30835
2007-08	-15738	40300	36942	460	43509

2008-09	-27915	46300	43736	825	46903
2009-10	-38181	49705	48237	915	53636
2010-11	-48053	53100	50905	1116	55618
2011-12	-78155	62212	60957	2,468	66129
2012-13	-88163	65867	63504	3074	67627
2013-14	-32296	69483	67002	3290	69638
2014-15	-26859	73108	70400	3558	69819
2015-16	-22151	74153	71454	3600	65592
2016-17	-14417	74350	70763	3937	61296
2017-18	-48717	77326	72186	4457	69129
2018-19	-57256	83466	77654	4738	76396



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This growth is available for the non-IT population, as much as directly to the IT sector.