# IT AND IT ENABLED SERVICES INDUSTRY IN INDIA
## Opportunities and Challenges present in Global trade

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## ABSTRACT

*The share of services sector in GDP in India has risen to around 52.9 per cent in 2018 from 38 per cent in 1980s. The information technology and information technology enabled services (IT-ITeS) sector is a field which is going under rapid evolution and changing the shape of businesses globally. This sector includes software development, consultancies, software management, online services and business process outsourcing (BPO). The share of IT and IT enabled services in total exports from India, which was negligible in 1990s, has risen to 16% in 2018. India's IT exports are around $137 billion with 4 million employees working in this sector. Eventually, this sector has become a prominent sector of Indian economy. This Paper examines the experience of India in exporting information technology and information technology enabled services. It also highlights the role of policy initiatives and institutional interventions undertaken by the government in achieving this success. The Paper concludes that the strong IT industry and wide availability of skilled manpower provide India a great opportunity in the global trade in IT services.*

**KEYWORDS:** *Information Technology, Services, Export, Software Development and BPO*

**JEL Classification:** *L86, F21*

## I INTRODUCTION

Indian IT industry offers a wide gamut of IT services including system management and maintenance, mobile applications, cloud computing, next generation user interfaces, GPU computing, consultancy services, system integration, chip design, E-commerce, E-governance, IT enabled services covering banking, finance, insurance and other sectors. IT enabled services include Multimedia, animation work, BPO assignment, call centre related assignments, knowledge processing outsourcing (KPO), legal process outsourcing (LPO), medical lab, diagnostic and dental services, medical transcription services, typesetting, copy editing, graphics, content and design, e-publishing data digitisation and others.

In 1990s, IT sector started off with an export of US $100 million with around 5000 employees. Now, this sector is flourishing globally and India's IT exports are around $137 billion with 4 million employees working in this sector. IT sector is expected to grow at rate of 7-9% in coming couple of years as per report of National Association of Software and Services Companies (NASSCOM). New markets have opened up in the Middle East, Africa, Eastern Europe, and South and South East Asia. India is now a major destination for IT outsourcing. In fact, India has more software developers than the U.S. Bengaluru, Delhi, Noida, Guru Gram, Hyderabad, Chennai, Mumbai, Cochin and Chandigarh are some of the places which have developed into prominent IT hubs of India. List of prominent IT companies in India is given in Appendix 1.

India's gross domestic product (GDP) at current prices is estimated to be US $ 2602.10 billion. Computer software/ services production estimated at US $146.5 billion accounts for a share of 5.6% in India's GDP at current prices during 2017-18. The global IT and ITeS market (excluding hardware) reached US $ 1.26 Trillion in 2017-18, while the global sourcing market increased by 1.7 times to reach US $ 178 billion. India has remained the world's top sourcing destination in 2017-18 with a share of over 55%.

The strong foundation of IT industry and huge availability of skilled manpower at low cost as compared to developed countries provide India a great opportunity in global trade in IT services. This paper explores the trade performance of Indian IT industry and deliberates on the policy of government along with opportunities and challenges ahead for the industry.

This paper has been divided into seven parts. Part one- introduction describes the IT and IT enabled services industry. Part II reviews the literature available on India's external trade in IT and IT enabled services. Part III deals with data sources and methodology including different modes of supply of services. Part IV is concerned with the export performance of India in IT and IT enabled services and the business carried out by overseas affiliates of Indian IT firms. The opportunities and challenges ahead for computer software and IT industry are discussed in Part V. Part VI deals with the initiatives undertaken by the government to promote computer software and IT industry. Part VII concludes the paper by providing the main findings.

## II REVIEW OF LITERATURE

Some informative papers are available on the external trade of India in IT and IT enabled services. Dongier and Suman (2009) say that the winning policy efforts are characterized by adaptation to the rapidly evolving need of the industry and by ongoing engagement between government leaders and industry. The private sector can provide the government with invaluable information and insights on the available opportunities, market trends and future skill requirements. They opine that engagement between private and public sectors can also help overcome investment constraints in the key areas of infrastructure and human resource development. Further, a focus on quality of education in close alignment with local and global industry needs is essential for skill development which the main driver of IT and IT enabled services. The growth of industry is supply constraint. The globalization of market for skills will allow developing countries the cost advantage of in terms of labour and to make investment in expanding the skills of their labor force.

Singh Sanjay K. (2006) study says that the IT industry has potential of not only accelerating the growth of Indian economy but also promoting the broad based economic development. To realize this, besides standard policy initiatives such as improving infrastructure, strengthening training and education system, and introducing flexible labour laws that affect every sector of the economy including IT sector, the government need to take specific measures to promote IT use and to make it accessible to every section of the society.

Singh, Nirvikar (2014) study provided a review and overview of various facets of IT in India's economy. The most apparent of these is the IT sector itself, including IT enabled services such as BPO. This sector has proved to be resilient and innovative, continuing to expand and upgrade its contributions. The export orientation of the sector has contributed to its competitive discipline and success, that success has never been a foregone conclusion.

Das and Datta (2017) study aims to evaluate the performance of Indian ITes industry during 2000-01 to 2014-15 by employing two stage empirical method. The study shows that managerial inefficiency is the major contributor to the overall inefficiency as compared to the inefficient sales of production. Moreover, the Indian ITeS industry is found to be dominated by the firms exhibiting decreasing returns to scale for most of the study period. The empirical results also shows that public limited and non-group firms are more efficient than their private and group counterparts, respectively.

Paramasivan et al. (2017) highlight the growth and performance of IT and ITeS industry. They also examine the contribution and development of IT and ITeS industry. They concluded that the IT and ITeS sector is the most wanted and highly contributing in the GDP of the economy.

Bhattacharjee et al. (2015) investigate the factors instrumental in imparting a competitive edge to the Indian IT & ITeS sector using Porter's diamond model. The study suggests that the sector is likely to retain its technological prominence in the probable future. Strong macroeconomic fundamentals, fabourable resource endowments, technological advancements, emergence of new models, and supportive government policies would help in exploiting this opportunity.

Meenu (2016) study is basically to evaluate the performance and contribution of IT and ITeS industry in Indian economy. The paper finds that IT and ITeS sector is predominantly contributing to the growth of the economy and helping the modernisation of other sectors of the economy.

The Institute of Company Secretaries of India (2018) conducted an exploratory research on this industry. The study noted that IT services and ITeS-BPO segments have been responsible for impact on growth of Indian economy. The study highlighted industry profile, business scenario and the legal framework of the industry.

Some Institutions and organisations, like Reserve Bank of India, National Association of Software and Services Companies (NASSCOM), Software Technology Parks of India, Electronics and Computer Software Export Promotion Council of India (ESC) carried out reports on IT industry and exports of IT and IT enabled services from time to time.

## III DATA SOURCES AND METHODOLOGY

This study is based on secondary data. Data related to exports of services from India are based on Handbook of Statistics on Indian Economy published by the Reserve Bank of India.

Data on production of IT and IT enabled services have been procured from Statistical Year Books of Electronics and Computer Software Export Promotion Council of India.

Data on various aspects of IT and IT enabled services exports is based on the Annual Surveys conducted by the Reserve Bank of India for IT firms. The RBI Surveys collect details on export of computer software as per the activity, type of services and countries of destination along with the four modes of supply of services, as per the Agreement on Trade in Services (GATS).

There might be some discrepancy in data published by different sources. The plausible reason of discrepancy is difference in the number of IT firms on data were collected or surveys were conducted by different agencies.

The exports of IT and IT enabled services have been analysed on the basis of the World Trade Organisation (WTO) classification. The WTO's General Agreement Trade in Services takes a very comprehensive view of trade in services. Trade in services for the purposes of this agreement consists of four types of transactions:

- Mode 1: supply of a service from the territory of one Member into that of another, i.e. supplier and consumer interact across distance (cross- border trade).
- Mode 2: consumption of a service by consumers of one Member who have moved into the territory of the supplying member (consumption abroad).
- Mode 3: services are supplied by foreign suppliers that have commercial presence in the territory of another member (commercial presence).
- Mode 4: services are delivered through persons of a Member country temporarily entering the territory of another Member Country (presence of natural persons).

The performance of exports of IT and IT enabled services by Indian firms on various aspects has been analysed as per the four modes of supply as mentioned above.

The study of policy initiatives, opportunities and challenges ahead for IT industry in reference to external trade

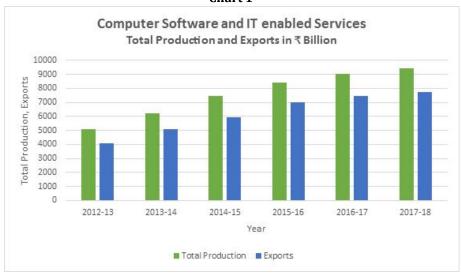is based government reports, newspapers and other articles available.

The study covers the period spanning from 2010 to 2018.

## IV EXPORT PERFORMANCE OF INDIAN IT AND ITeS INDUSTRY

Chart 1 shows the production of computer software and information technology enabled services in India spanning from FY 2012-13 to FY 2017-18. During this period, the production of computer software and information technology enabled services increased from Rupees 5096.9 billion to Rupees 9443.4 billion showing growth year by year. One important trend is evident from the chart 1, that is, the share of exports in total production of computer software and information technology enabled services has been around 80%. This shows that only 20% of total production is for domestic consumption. On the global front, India accounts for the sourcing destination of 55% of BPO services worldwide.

**Chart 1**



*Source: Electronics and Computer Software Export Promotion Council of India- Statistical Year Book 2018*

Table 1 shows India's total exports and shares of services in these exports during FY 2011- FY 2018. The table indicates that share of services, as well as share of software services, in total exports of India has been increasing year over year. Therefore, IT and ITeS sector of India has potential to reap the benefits present in global trade. The share of software services in total exports of services from India, which was 13.9% in 2010-11 increased to 17.6 percent in 2015-16. The WTO report has predicted further growth in the share of information services in global trade. Thus, India has a good opportunity on this front.

**Table 1**
**India's Exports**

(Millions of U.S. $)

| Item | 2010-11 | 2011-12 | 2012-13 | 2013-14 | 2014-15 | 2015-16 | 2016-17 | 2017-18 |
|---|---|---|---|---|---|---|---|---|
| Exports total | 380795 (100) | 452099 (100) | 452259 (100) | 470082 (100) | 472189 (100) | 420676 (100) | 443261 (100) | 504059 (100) |
| Services total | 124636 (32.7) | 142325 (31.4) | 145678 (32.2) | 151475 (32.2) | 155448 (32.9) | 154311 (36.7) | 163123 (36.8) | 195089 (38.7) |
| Software services | 53100 (13.9) | 62212 (13.8) | 65867 (14.6) | 69439 (14.8) | 73108 (15.5) | 74153 (17.6) | 73651 (16.6) | 77325 (15.3) |

Note: Figures in parenthesis are percentages.
*Sources: RBI: Handbook of Statistics on Indian Economy*

Table 2 reveals the composition of India's computer and IT services exports from 2010-11 to 2017-18. Though the major share of India's computer and IT services exports is accounted by software development and IT services, but the increasing share of IT enables services and BPO over the years is noticeable. The share of IT enables and BPO services, which was 22.1% of total IT and computer services exports in 2010-11 has increased to 26.1% in 2017-18. The share of Software Business of Foreign Affiliates of Indian Companies remained on average 17% of global exports and business of India's computer and IT services Industry.

**Table 2**
**India's IT and IT enabled Services Industry**

(₹ Billion)

| Service | 2010-11 | 2011-12 | 2012-13 | 2013-14 | 2014-15 | 2015-16 | 2016-17 | 2017-18 |
|---|---|---|---|---|---|---|---|---|
| **Indian Software Services Exports** | | | | | | | | |
| A. Computer Services (Modes 1, 2 & 4) | 1598.4 (61.7) | 1867.1 (61.8) | 2447.8 (61.3) | 3181.7 (66.7) | 3610.8 (61.7) | 4104.4 (57.8) | 4506.7 (55.8) | 4809.9 (56.3) |
| (i) IT Services | 1492.2 | 1661.8 | 2256.7 | 2936.7 | 3399.7 | 3862.8 | 4300.0 | 4572.8 |
| (ii) Software Dev | 106.2 | 205.3 | 191.1 | 245.0 | 211.1 | 241.6 | 206.7 | 237.1 |
| B. ITES/BPO Services (Modes 1, 2 & 4) | 571.7 (22.1) | 617.2 (20.4) | 957.4 (24.0) | 1141.1 (23.9) | 1403.2 (24.0) | 1658.7 (23.4) | 2003.3 (24.8) | 2241.3 (26.3) |
| (i) BPO Services | 468.7 | 523.0 | 789.6 | 934.2 | 1089.2 | 1336.8 | 1539.0 | 1739.1 |
| (ii) Engineering Services | 103.0 | 94.2 | 167.8 | 206.9 | 314.0 | 321.9 | 464.3 | 502.2 |
| Total (A+B) | 2170.1 | 2484.3 | 3405.2 | 4322.8 | 5014.0 | 5763.1 | 6510.0 | 7051.2 |
| **Software Business of Foreign Affiliates of Indian Companies** | | | | | | | | |
| C. Subsidiaries Abroad (Mode 3) | 421.2 (16.2) | 536.8 (17.8) | 587.5 (14.7) | 448.5 (9.4) | 841.7 (14.3) | 1339.7 (18.8) | 1567.8 (19.4) | 1485.1 (17.4) |
| **Total (A+B+C)** | **2591.3 (100)** | **3021.1 (100)** | **3992.7 (100)** | **4771.3 (100)** | **5855.7 (100)** | **7102.8 (100)** | **8077.8 (100)** | **8536.3 (100)** |

Note: Figures in parentheses are percentages.
*Sources: RBI Bulletin, various issues.*

Table 3 shows Modal pattern of India's IT and IT enabled services exports spanning from 2010-11 to 2017-18. Mode 1 has been India's main channel of supply of IT and ITeS accounting for 70% of total exports of IT and ITeS. The share of Mode 2 has been negligible. There is somewhat decline in the share of Mode IV- service provided by presence of natural persons abroad, indicating the introduction of protection by developed nations through tough immigration rule. The share of Mode 3 is almost stagnant over the period, facing the same problem that is being faced in case of Mode 4. Establishing an Indian firm abroad would be beneficial if hiring of low cost Indian manpower is permitted by overseas authorities. But, this is not happening due to protective policies of the foreign economies. India should raise this issue at appropriate forum.

**Table 3**
**Modes of Supply of IT and IT enabled Services**

(%)

| Mode | 2010-11 | 2011-12 | 2012-13 | 2013-14 | 2014-15 | 2015-16 | 2016-17 | 2017-18 |
|---|---|---|---|---|---|---|---|---|
| Mode I | 67.4 | 69.0 | 74.7 | 69.1 | 68.4 | 64.8 | 66.6 | 69.5 |
| Mode II | 0.1 | 0.5 | 1.6 | 0.1 | 0.1 | 0.2 | 0.2 | 0.1 |
| Mode III | 14.8 | 15.4 | 9.4 | 13.7 | 14.4 | 18.9 | 19.4 | 17.4 |
| Mode IV | 17.7 | 15.1 | 14.3 | 17.1 | 17.1 | 16.1 | 13.9 | 13.0 |
| Total | 100 | 100 | 100 | 100 | 100 | 100 | 1000 | 100 |

*Sources: RBI Bulletin, various issues.*

Table 4 shows the organisational composition of Indian IT and IT enabled services exports from 2010-11 to 2017-18. It is clearly evident that the share of Private Limited companies in Indian IT and IT enabled services exports accounts for the majority and is increasing year over year. The probable reason may be the role of Start Ups in this sector.

**Table 4**
**Organisational Composition of Indian IT and IT enabled Services Exports**

(%)

| Organisation | 2010-11 | 2011-12 | 2012-13 | 2013-14 | 2014-15 | 2015-16 | 2016-17 | 2017-18 |
|---|---|---|---|---|---|---|---|---|
| Private Ltd. Companies | 38.5 | 41.2 | 35.3 | 36.0 | 43.1 | 44.3 | 49.2 | 51.7 |
| Public Ltd. Companies | 61.3 | 58.7 | 64.6 | 63.6 | 55.6 | 54.4 | 50.3 | 47.5 |
| Other | 0.2 | 0.1 | 0.1 | 0.4 | 1.3 | 1.3 | 0.5 | 0.7 |
| Total | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

*Sources: RBI Bulletin, various issues.*

The destination of Indian IT and IT enabled services exports during 2010-18 has been shown in Table 5. The main destination of Indian IT and IT enabled services exports has been the U.S. accounting for more than 60% of total exports. Europe has accounted for nearly one-fourth of the total exports. One clear trend in exports of Indian IT and IT enabled services exports is the increasing share of Asian nations. The share of U.S. and Europe is already high in total exports and there is also protection for further. Thus, the scope lies in increasing IT exports to other countries including Australia and New Zealand.

### Table 5
### Destination of Indian IT and IT enabled Services Exports

(%)

| Country | 2010-11 | 2011-12 | 2012-13 | 2013-14 | 2014-15 | 2015-16 | 2016-17 | 2017-18 |
|---|---|---|---|---|---|---|---|---|
| USA & Canada | 65.0 | 64.3 | 64.1 | 62.7 | 59.9 | 61.7 | 60.3 | 61.4 |
| Europe | 23.5 | 23.3 | 20.2 | 24.4 | 24.6 | 23.5 | 23.1 | 24.0 |
| Asia | 5.1 | 5.2 | 4.8 | 5.7 | 9.0 | 8.4 | 10.7 | 8.5 |
| Aus. & New Zealand | 2.7 | 3.5 | 3.5 | 3.9 | 3.4 | 3.4 | 3.3 | 3.4 |
| Others | 3.7 | 3.7 | 7.4 | 3.3 | 3.1 | 3.0 | 2.6 | 2.7 |
| Total | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

*Sources: RBI Bulletin, various issues.*

Table 6 shows the currency composition of Indian IT and IT enabled services exports from 2010-11 to 2017-18. The US Dollar has maintained the dominance by accounting for nearly three-fourth of the total exports denominated in it. The interesting fact is the increasing share of Indian Rupee in denomination of exports of IT and IT enabled services. The share of other currencies is also increasing in denomination of exports of IT and IT enabled services, but at slower pace as compared to that of Indian Rupee.

### Table 6
### Currency Composition of Indian IT and IT enabled Services Exports

(%)

| Country | 2010-11 | 2011-12 | 2012-13 | 2013-14 | 2014-15 | 2015-16 | 2016-17 | 2017-18 |
|---|---|---|---|---|---|---|---|---|
| USD | 75.3 | 76.4 | 73.6 | 72.6 | 72.6 | 73.9 | 73.0 | 72.7 |
| GBP | 7.0 | 7.0 | 8.5 | 9.4 | 9.3 | 9.4 | 8.0 | 6.9 |
| EUR | 9.8 | 8.7 | 7.1 | 7.4 | 7.1 | 7.6 | 7.2 | 7.8 |
| AUD | 2.9 | 3.5 | 4.2 | 3.0 | 3.0 | 3.1 | 2.9 | 3.0 |
| INR | 1.3 | 0.9 | 1.8 | 2.5 | 3.4 | 1.3 | 3.6 | 4.6 |
| Others | 3.7 | 3.5 | 4.8 | 5.1 | 4.6 | 4.7 | 5.3 | 5.0 |
| Total | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

*Sources: RBI Bulletin, various issues.*

Table 7 shows the software business conducted by foreign affiliates of Indian companies during 2010-18. The prominent position has been maintained by Indian affiliates in the U.S., accounting for about 65% of total business conducted by all foreign affiliates of Indian firms. The increasing share of business of Indian affiliates in German in the total business of Indian foreign affiliates is noteworthy. Opposite to this, the share of Indian affiliates in Singapore in the total business of Indian foreign affiliates has declined over the years.

### Table 7
### Software Business by Foreign Affiliates of Indian Companies

(%)

| Country | 2010-11 | 2011-12 | 2012-13 | 2013-14 | 2014-15 | 2015-16 | 2016-17 | 2017-18 |
|---|---|---|---|---|---|---|---|---|
| USA | 67.5 | 65.0 | 71.3 | 65.9 | 66.7 | 64.6 | 65.0 | 64.2 |
| UK | 6.8 | 5.3 | 6.6 | 7.9 | 8.0 | 9.2 | 6.7 | 7.2 |
| Canada | 2.7 | 3.6 | 4.1 | 4.1 | 3.3 | 2.4 | 3.6 | 3.5 |
| Germany | 2.5 | 2.9 | 3.0 | 3.5 | 2.4 | 2.9 | 3.3 | 4.0 |
| Singapore | 3.4 | 4.4 | 2.7 | 3.3 | 3.3 | 3.3 | 2.9 | 2.7 |
| Netherlands | 3.6 | 4.3 | 2.1 | 3.2 | 2.3 | 2.5 | 2.7 | 3.9 |
| Others | 13.5 | 14.5 | 10.2 | 12.5 | 14.0 | 15.1 | 15.8 | 14.6 |
| Total | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

*Sources: RBI Bulletin, various issues.*

## V OPPORTUNITIES AND CHALLENGES

As per the NASSCOM data, IT sector has increased its contribution to India's GDP from 1.2 % 1998 to 7.7% in 2017. WTO's World Trade Report finds that in the best scenario, developing and least developed economies' share in global trade is predicted to grow from 46% in 2015 to 57% in 2030. The share of services in global trade is projected to grow from 21% in 2016 to 25% in 2030. The digital technologies – namely the internet of things, artificial intelligence, 3D printing and Block chain- will have deep impact on global trade, adding up to 34 percentage points to trade growth by 2030 thanks to lower costs and high productivity. India remains the world's top sourcing destination for BPO services in 2017-18 with a share of over 55%.These facts indicate marvellous opportunity for India in global trade in IT and ITeS services and consequently enhancing the contribution of IT and ITeS sector to the GDP of India.

Mode 3 or 'establishment of commercial presence abroad' is the main mode of supply of services globally, accounting almost 60% of the total services trade according to the WTO report. However, India's services exports are mainly via Mode 1- services provided by phone, fax or electronic means- also called cross border supply.

The global information technology industry is on pace to reach US $ 5 trillion in 2019, according to Intelligent Directions Consultancy (IDC). The U.S. is largest technology market in the world. The U.S represents 31% of the total market amounting approximately US $ 1.6 trillion for 2019. Every fourth Dollar of technology spending occurs in the Asia Pacific region.

Table 8 shows exports of telecom, computer and information services for 2016 and 2017. India accounts for more than 10% of the world exports. In computer services alone, India accounts for more than 16% of world exports. This shows the prominence of India in IT and IT enabled services industry in the world.

**Table 8**
**World Exports of Telecom, Computer and Information services**
(Billions of US $)

| From | 2016 | 2017 |
|-------|------------|------------|
| World | 496 (100) | 527 (100) |
| Asia | 121 (24.4) | 125 (23.7) |
| India | 54 (10.9) | 55 (10.4) |

Note: Figures in parenthesis are percentages.
*Source: World Trade Statistics Review, World Trade Organisation, Washington D.C.*

The Indian IT services sector, today, provides employment to 4 million knowledge professionals. The IT industry also employs another 13 million people, indirectly.

The Table 9 shows the employment creation by Indian IT and ITeS industry.

**Table 9**
**Direct employment and exports' growth over the last five years in IT industry**
(Employment in million)

| | 2013-14 | 2014-15 | 2015-16 | 2016-17 | 2017-18 |
|---|---------|---------|---------|---------|---------|
| Exports growth[1] | 5.4% | 5.3% | 1.4% | -0.7% | 5.0% |
| Total employment | 3.267 | 3.485 | 3.690 | 3.863 | 3.968 |
| Net addition | 0.301 | 0.218 | 0.203 | 0.173 | 0.105 |

Note: 1: Growth calculated for exports in US $ terms.
*Source: 1. htpp://meity.gov.in/content/employment*
*2. RBI: Handbook of Statistics on Indian Economy*

The prediction about increasing global trade in digital technologies might provide good opportunity to India. India should get itself prepared to tap this foreseen opportunity. India has to keep up to meet the challenges in the global competitive environment. Even though, the position of Indian IT industry is sound, there are some issues to be tackled by India IT industry.

The strength of Indian IT industry can be summarised as below:

1. India has one of the biggest pool of technically qualified high class IT manpower.
2. India has huge skilled resources in comparison of developed countries leading to lower manpower cost resulting in comparative advantage for India. Manpower cost in India is 1/10th of cost in developed countries.
3. India offers a wide range of services from support and data processing to sophisticated software systems etc.
4. India has rich and wide experience of working with large multinational companies and enjoy high credibility.
5. Indian work force has expertise on wide range of platforms.
6. Indian IT work force has the accommodating nature.

The emerging challenges for the global IT and ITeS industry are:

1. Trade wars are happening and policy uncertainty is limiting the expansion of global trade in IT and ITeS.
2. Currency fluctuations hamper the smoothness in global trade in IT and ITeS.
3. No Brexit deal is also a factor leading uncertainty.

4. Weakening financial market sentiments world over are also a cause of worry.
5. Regulatory changes in new technology are creating new challenges for IT and ITeS industry.

The Indian IT and ITeS industry has been facing following issues:

1. *Re-skilling*: India has significant position in global trade in IT & ITeS. However, to maintain that it has to keep up with the latest innovations and has to re-skill its manpower.
2. *Collaborative economy/Rise of ecosystem*: The Collaborative Economy is a complex ecosystem composed of many unique players. These many players are jostling about, partnering, competing, and troublemaking each other. The management here needs to devise it appropriate strategy. It is key to understand the many players in this movement before blindly stumbling into this market.
3. *Increasing competition from emerging markets/small players:* Developing countries are entering in global trade in IT & ITeS. Being low cost players, they may pose competition to India.
4. *Threat from advance technologies like unethical Artificial Intelligence, Automation*: The growing sophistication and common use of AI applications has raised a number of ethical concerns. These include issues of bias, fairness, safety, transparency, and accountability. Without systems compatible with these principles, the worry is that AI will be biased, unfair, or lack proper transparency or accountability.
5. *Increased protectionist policies against India*: India's services exports are mainly via Mode 1-

services. India has very good scope to export services in mode 3 and 4. However, restrictions on movement of manpower through protective Visa system by developed countries are stopping India from exploiting the full benefit of low cost of services by using Mode 3- establishing firms abroad and employing low cost Indian manpower there, and Mode 4- Indian skilled manpower getting employment abroad.

AI and Advance Analytics, Block Chain, Cyber Security, IOT and Hybrid Cloud are new technologies which are changing business across the globe. India needs to re-skill its manpower on these technologies to remain in competition in the global trade.

## VI POLICY INITIATIVES

Computer software and hardware sector in India attracted cumulative Foreign Direct Investment (FDI) inflows US $ 37.23 billion between April 2000 and march 2019 and ranks second in FDI inflow, as per data released by the Department for Promotion of Industry and Internal Trade (DPIIT).

National Artificial Intelligence Strategy was announced in 2018. Today, India's competence in IT, more specifically in computer software and information technology enabled services is recognised globally. India has now become global leader in the out sourcing industry with the help of the world's back office being located here. More than 7200 Tech Start Ups were set up in 2018. Out of these Start Ups, about 400 were for Artificial Intelligence.

Over 300 Indian computer software and services companies have already obtained ISO 9000 or CMM level 2 certification. Majority of multinational companies in IT have either software development or research centre in India because of high quality of Indian IT industry. Over half of the Fortune 500 companies are outsourcing their software requirements to India.

Today, India have 23 IITs, 13 IIMs, 30 NITs, and 12 IIITs. In total there are 5672 engineering institutions. Approximately, 1.5 million engineering graduates pass out every year in India.

***Initiatives:*** A number of policy initiatives on institutional intervention have been taken to strengthen the infrastructure of IT industry and to up skill technology professionals and potential employees.

1. *Electronics and Computer Software Exports Promotion Council (ESC)*: ESC represents the interests of Indian electronics and IT sector at various forums including international trading arena of the electronics and computer software, Joint trade committees of ministry of commerce, as well as at joint Business Councils of various countries. ESC offers a basket of services to its members for enhancing exports.

2. *National Association of Software Companies (NASSCOM)*: This global trade body has over 2800 members from both Indian and multinational companies that have a presence in India. NASSCOM has created 7 dedicated industry councils representing the different industry segments- IT services, Software Products, BPM, Engineering R&D, Global in-house centres, Domestic market, Internet and Mobile. NASSCOM is implementing projects for making efforts to further strengthen existing markets and simultaneously diversify and increase presence in the new and emerging markets. NASSCOM has launched an online platform which aims to up skilling over 2 million technology professionals and skilling another 2 million potential employees and students.

3. *Software Technology Parks of India*: These parks were set up in 1991 as an autonomous society under the Ministry of Information Technology. The aim has been the promotion of software exports from the country.

4. *Special Economic Zone*: In 2005, Government of India has enacted the SEZ Act, with an aim of providing an internationally competitive and hassle free environment for exports. The Act envisions key role for the State Governments in export promotion and creation of related infrastructure. It offers a numbers of tax benefits to firms operating in SEZ.

5. *BPO Promotion Scheme*: This scheme is to incentivise BPO /ITeS operations across country and thereby creating employment opportunities. The BPO Promotion scheme has been branched into India BPO Promotion Scheme and North East BPO Promotion Scheme.

6. *Research and Development Promotion*: Support International Patent Protection in Electronics and IT (SIP-IT) scheme has been aimed at to support MSMEs and Technology Start Ups with seed capital and finance.

Further, up to 100% FDI is permitted under the automatic route in data processing, software development and computer consultancy services, software supply services, business and management services, market research services, technical testing and analysis services. The Government has identified information technology as one of the 12 champion services sectors for which an action plan is being developed. The Government has also set up a fund of [1] 500 crore to realise the potential of these service sectors.

As part of Union's Budget 2018-19, NITI Aayog is going to set up a national level programme that will empower efforts in A.I. and will help in leveraging A.I. technology for development work in India. The Government declared plans to launch a national programme on A.I. and setting up a National A.I. portal in the interim budget 2019-20. National Policy on Software Products 2019 was approved by the Union Cabinet to develop India as a software product nation.

## VII CONCLUSION

Indian IT and ITeS industry has evolved over the years from its infancy in early 1990s. Indian IT and ITeS industry is fundamentally strong on all aspects including infrastructure as well as skilled resources. India has one of the largest pool of technically qualified high class IT manpower. Now, it has created its own space in global trade in information technology services. From this study, it can be inferred that:

1. Information Technology & Information Technology enabled Services industry is contributing significantly to the GDP of the Indian economy, now its share in GDP of Indian economy has become 7.7%. IT & ITeS industry is becoming new and important source of employment, directly and indirectly, in Indian economy. The Indian IT services sector, today, provides employment to 4 million knowledge professionals. The IT industry employs another 13 million people, indirectly.

2. IT sector is expected to grow at rate of 7-9% in coming couple of years as per report of National Association of Software and Services Companies (NASSCOM).

3. Though the major share of India's IT and IT enabled services exports is accounted by software development and IT services, but the increasing share of IT enables services and BPO services over the years is noticeable. India remains the world's top sourcing destination for BPO services in 2017-18 with a share of over 55%.

4. Mode 1 has been India's main channel of supply of IT and ITeS accounting for 70% of total exports of IT and ITeS. The share of Mode 2 has been negligible. There is somewhat decline in the share of Mode IV- service provided by presence of natural persons abroad, indicating the introduction of protection by developed nations through tough immigration rules. The share of Mode 3 is almost stagnant over the period, facing the same problem that is being faced in Mode 4. Establishing an Indian firm abroad would be beneficial if hiring of low cost Indian manpower is permitted by overseas authorities. But, this is not happening due to protective policies of the foreign economies. India should raise this issue at appropriate platforms.

5. It is clearly evident that the share of Private Limited companies in Indian IT and IT enabled services exports is increasing year by year.

6. The main destination of Indian IT and IT enabled services exports has been the U.S. accounting for more than 60% of total exports. Europe has accounted for nearly one-fourth of the total exports. One clear trend in exports of Indian IT and IT enabled services exports is increasing share of Asian nations.

7. The US Dollar has maintained the dominance by accounting for nearly three-fourth of the total exports denominated in it. The interesting fact is the increasing share of Indian Rupee in denomination of exports of IT and IT enabled services.

8. Indian IT industry has its own strength. India has enormous skilled resources in comparison of developed countries leading to lower manpower cost resulting in comparative advantage for India. Manpower cost in India is $1/10^{th}$ of cost in developed countries. India offers a wide range of services from support and data processing to sophisticated software systems etc. India has rich and wide experience of working with large multinational companies and enjoy high credibility. Indian IT work force has accommodating nature. Indian work force has expertise on wide range of platforms.

9. India has taken a number of initiatives for the industry. Computer software and hardware sector in India attracted cumulative Foreign Direct Investment (FDI) inflows US $ 37.23 billion between April 2000 and March 2019 and ranks second in FDI inflow. National Artificial Intelligence Strategy was announced in 2018. More than 7200 Tech Start Ups were set up in 2018. Out of these Start Ups, about 400 were for Artificial Intelligence. Today, India have 23 IITs, 13 IIMs, 30 NITs, and 12 IIITs. In total there are 5672 engineering institutions. Approximately, 1.5 million engineering graduates pass out every year in India. Initiatives at institutional level or on policy creation have been taken to strengthen the infrastructure of IT industry and to up skill technology professionals and potential employees. For example, ESC, NASSCOM, STPI, SEZ, BPO Promotion scheme, R and D Promotion scheme, National Policy on Software Products 2019.

10. Re-skilling, Collaborative economy/Rise of ecosystem, Increasing competition from emerging markets/small players, Threat from advance technologies like unethical Artificial Intelligence, Automation and Increased protectionist policies against India are main issues before Indian IT industry.

11. AI and Advance Analytics, Block Chain, Cyber Security, IOT and Hybrid Cloud are new technologies which are changing business across the globe. India needs to re-skill its manpower on these technologies to remain in competition in the global trade.

12. Trade wars, Currency fluctuations, No Brexit deal, Weakening financial market sentiments world over and Regulatory changes in new technology are emerging challenges for the global IT and ITeS industry.

13. India accounts for more than 10% of the world exports of telecom, computer and information services for 2017 and 2018. In computer services alone, India accounts for more than 16% of world exports.

The digital technologies – namely the internet of things, artificial intelligence, 3D printing and Block chain- will have deep impact on global trade, adding up to 34 percentage points to trade growth by 2030 thanks to lower costs and high productivity. New markets also have opened up in the Middle East, Africa, Easter Europe, and South and South East Asia.

These facts indicates wonderful opportunity for India in global trade in IT and ITeS services and consequently enhancing the contribution of IT and ITeS sector to the GDP of India.

India's services exports are mainly via Mode 1. India has very good scope to enhance export of services in mode 3 and 4. However, restrictions on movement of manpower through tough Visa system by developed countries are stopping India from tapping the full benefit of low cost of services by using Mode 3- establishing firms abroad and employing low cost Indian manpower there, and Mode 4- Indian skilled manpower getting employment abroad.

The prediction about increasing global trade in digital technologies might provide good opportunity to India. India should get itself prepared to tap this foreseen opportunity. India has to keep up to meet the challenges in the global competitive environment. Even though, the position of Indian IT industry is sound, there are some issues to be tackled by the Indian IT and IT enabled services industry.

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## Appendix 1
### Top Indian Exporters in IT & ITeS Services, 2018

| Company | Exports ($ Million) |
| --- | --- |
| Tata Consultancy Services Ltd. | 14074 |
| Infosys Ltd. | 10233 |
| Wipro Ltd. | 6783 |
| Tech Mahindra Ltd. | 4663 |
| Cognizant Tech. Sol. (I) Ltd. | 3964 |
| IBM India Pvt. Ltd. | 3037 |
| Larsen & Toubro InfoTech Ltd. | 989 |
| Cisco Systems India Pvt. Ltd. | 948 |
| Mind tree Ltd. | 786 |
| RBS Services India Pvt. Ltd. | 522 |