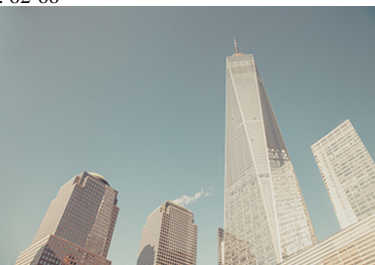


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Determinants of FDI in the computer software and hardware sector in India

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Abstract

India's has been a success story in the IT industry and the world has been recognising it and showing interest in investing in the computer software and hardware sector. The paper attempts to analyse the determinants of FDI in the computer software and hardware sector and to figure out the reasons for the locational preferences of the foreign investors. For this purpose, the states of India which are recipients of highest FDI inflows in the sector are studied with a view to determine the reasons for their attractiveness as investment destinations. The extent and availability of infrastructure facilities which are important to this industry and the presence of skilled workers which is a prerequisite to this industry are examined. The study finds evidence to support the proposition that presence of the required infrastructure and skilled labour which are crucial to this sector encourages foreign investors to put in their money in the locations where these are available.

Keywords: Computer software and hardware, infrastructure, skilled labour

Introduction

One of the fastest growing industries in India is the IT industry. It is extensive in that it encompasses not only the software and information technology but also the business process outsourcing industry. It had a market size of US \$177 billion in 2019, an impressive growth rate of 6.1 percent y-o-y. It's importance as a contributor to GDP is increasing, being 8% in 2017-18 and projected to increase to 10 percent by 2025. India has earned the reputation of being a digital hub and is home to around 75 percent of the global digital talent ^[1].

The IT industry has evolved to this commanding position after going through various phases. India, in the 1970's had been following a policy of protectionism for its industries where state ownership was encouraged. Similar was the case in the IT industry. State enterprises were encouraged, presence of private sector was insignificant, and the labour force was of poor quality. The software industry was not given much importance, in fact it was not even considered as an industry in its own right. There was a tremendous change in the policy with the introduction of NCP-84 whereby software industry was recognised as an industry, import tariffs on hardware and software were reduced to almost half from the earlier 100-135%, software technology parks were set up which would provide state of the art infrastructure for the smooth functioning of the industry. Foreign investment was encouraged ^[2]. Ever since then the software and electronics hardware industry has grown rapidly. For easing FDI approvals, a cell has been created in MeitY, Ministry of electronics and information technology.

The proficiency and soundness of the IT industry has been well recognised internationally also and has translated into significant investments from major countries across the globe. The computer software and hardware sector in India attracted cumulative foreign direct investment (FDI) inflows worth US\$ 44.91 billion between April 2000 and March 2020 ^[1]. FDI in this sector has been on the rise.

What makes the software and hardware sector so attractive to foreign investors? What are the factors behind this sector attracting substantial FDI inflows? We review the existing literature in this context.

Amitendu Palit & Shoukie Nawani (2007) ^[3] consider the quality of business climate as an important but not sufficient condition for attracting FDI. The more important comparative advantage that countries have are that of technological capabilities, IT based techniques and the quality of human resources that can handle such technology heavy processes.

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Thus, an advanced communications infrastructure and the presence of skilled labour to be able to use these ICT facilities are the dominant factors for inward FDI. The authors cite this as the reason for India's ability to attract more FDI, and a large amount of FDI going into skill based industries and services, than countries like Malaysia and Thailand which are much superior in terms of business environment and ease of doing business^[3].

According to Floyd, D., & McManus, J. (2006)^[4], the decisive factor in the Indian software industry is its highly skilled and low cost labour. India produces a good number of computer science graduates in a year. Also many employees are sent abroad and they have willingly shared their knowledge with their Indian counterparts on returning. A large number of English speaking population due to its colonial past has also attracted countries like US & UK which have a good presence in this industry. Also, Bangalore has been a favourable location because of good infrastructure. They cite other reasons also, like incentives in the form of subsidies & a low rate of taxation^[4].

Bhave in her paper FDI in IT and ITeS in India lists availability of qualified and technical labour force with proficiency in English language as an important growth driver. Also supportive infrastructure facilities and a good business environment are favourable pull factors for FDI. Among others factors she talks about attractive government policies, internet penetration etc.^[5].

According to Murali Patibandla, economies as a result of agglomeration effects arise due to presence of industrial clusters which influence the choice of location of multinational investment. They explain this to be the reason

behind Bangalore, in India, becoming an important FDI destination for the software industry. They ascribe two important reasons- first, it possesses the advantage of low cost skilled labour & second, the benefits of agglomeration due to the presence of high technology clusters. The productivity of the software engineers and programmers who are already there in large numbers, increased due to the presence of these clusters^[6].

On a review of the above literature, we can identify the major factors which are important for the software industry to prosper and thus attract foreign investment. One is the availability of skilled labour and second the presence of the relevant infrastructure. The pool of scientific and technical professionals available in a country is an important pull factor for foreign investment especially in a skill related industry like software development. A large pool of English speaking scientific professionals is a prerequisite to software development. There are workers needed for low skilled jobs like data entry to work requiring high and advanced skills like web based work^[7]. Software industry is always on the lookout for such skilled workers.

The software industry needs suitable infrastructure availability in the form of unlimited supply of power and bandwidth at reasonable rates. Software technology parks are much needed for the software and hardware industry to function well.

This paper looks into the locational advantages which act as pull factors of FDI. It studies the states of India which attract the highest FDI in the computer software and hardware sector and determines the comparative advantages these states possess which lure foreign investors.

Table 1: Show the top 5 states in FDI for computer software and hardware sector

Rank	Share of Top 5 states in FDI for Computer software and hardware sector	1% with total FDI	2 STPI Centres	3 GER in higher education	4 No. of Engineering colleges
1	Karnataka	25.18	5	28.8	160
2	Delhi*, part of UP & Haryana	23.14	NA	NA	NA
3	Maharashtra	22.3	6	32	239
4	Tamil Nadu	5.02	6	49	334
5	Andhra Pradesh	4.25	4	32.4	218
	All India	79.89	60	26.3	2231

Source:

1. FDI Newsletter Annual Issue 2019
2. Loksabhaph.nic.in starred question No 192, dt-4.3.2020
3. All India Survey on higher Education (AISHE) 2018-19, Table 19

*Delhi is excluded from the analysis because it includes part of Haryana & UP.

Objectives of the study

- To study the increasing amount of FDI flows into the computer software and hardware sector.
- To identify the states of India which have received the highest inflows and to find out the extent to which the facilitating factors of skilled labour and infrastructure are present in these states.
- To draw conclusions about the relation of the above factors with success of the computer industry and hence the capacity to draw higher FDI.

The paper is organised as follows: the introductory section (above) talks about the evolution of this industry, mainly the software industry. how from being an insignificant one in the 1970s it has grown in prominence to be a dominant one. We have concentrated our analysis on the software industry, because out of the total FDI received by the computer

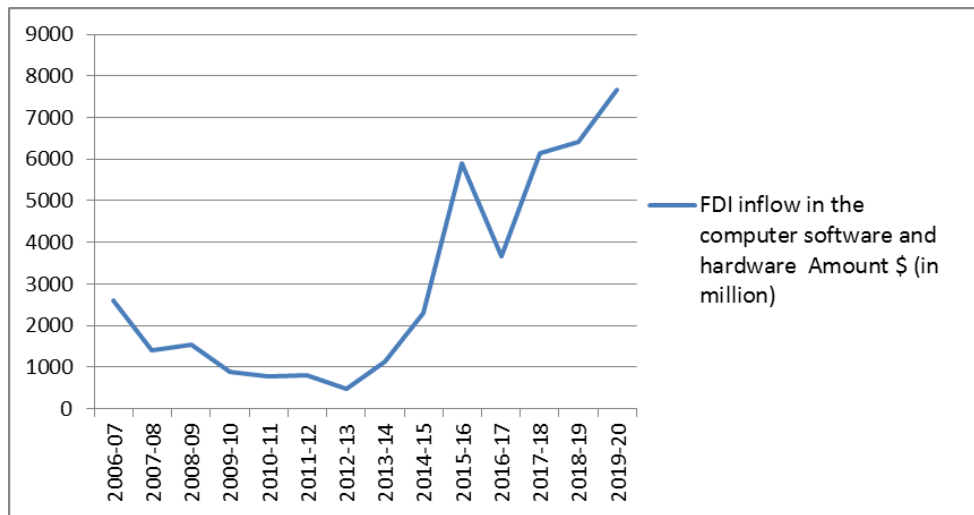
industry, the hardware received only 1.16%, the rest belonging to the software industry. The findings of the existing studies have been examined. Section two, that is the current section, spells out the objectives of the study. In section three, data regarding FDI inflow in this sector is observed, along with the states which receive the highest FDI in this sector and the presence of other supporting factors, that is skilled labour and infrastructure. In the last section conclusions are drawn on the basis of data evidence.

FDI in India's computer software & hardware sector and the presence of skilled labour and infrastructure – Data Analysis and interpretation

The success and capability of the Indian software industry has attracted the attention of the investors from many countries. As seen earlier, cumulative Foreign Direct Investment (FDI) inflows worth US\$ 44.91 billion between

April 2000 and March 2020 have been received by the computer hardware and software sector which is 10% of the total FDI inflows. This sector ranks second in terms of

inflow of FDI, as per data released by the Department for Promotion of Industry and Internal Trade (DPIIT).(fig 1)



Source: Computed from FDI in India, Annual Issues, 2010-2019

Fig 1: FDI inflow in computer software and hardware

Software Technology Parks provide state of the art infrastructure needed for the software industry. Software Technology parks of India (STPI) were established in June 1991 with a view to overcome the difficulties faced by the software industry. They provide the required facilities like world class Internet connectivity, single window clearance which is a big step towards enhancing the ease of doing business in the field of computer industry. They also provide incubation and other infrastructure facilities. Exemptions are allowed on customs duty on imports, central excise duty etc. Along with this, 100% FDI is permitted in STPs. They have in a big way promoted software and hardware exports by implementing the Software Technology Park (STP) & Electronic Hardware Technology Park (EHTP) Schemes [8]. STPI has given the much needed impetus to the computer software & hardware industry [6]. STPI has its presence in 60 centres across India. The presence of skilled labour is seen as an important factor for the success of the software sector [2, 7]. The GER ratio in higher education measures enrolment as percentage of

population in the age group of 18-23 years. The skill set of this section of the population is important for the development of the skill based industry. For computer software and hardware, which is also a skill based industry higher GER ratio can be considered an indicator of skilled labour [9]. The presence of engineering colleges gives a boost to producing more engineers which is an essential requirement of the software and hardware industry [7]. The availability of skilled labour/engineers is a boon to the software industry. The states of India which have received the highest FDI in the computer software and hardware sector are examined and also the presence of these facilitating factors. Infrastructure facilities are measured in terms of the STPI centres established in the state. For measuring the availability of skilled labour, the Gross enrolment rate in higher education and the number of technical and engineering colleges which produce engineers in the state are specified.

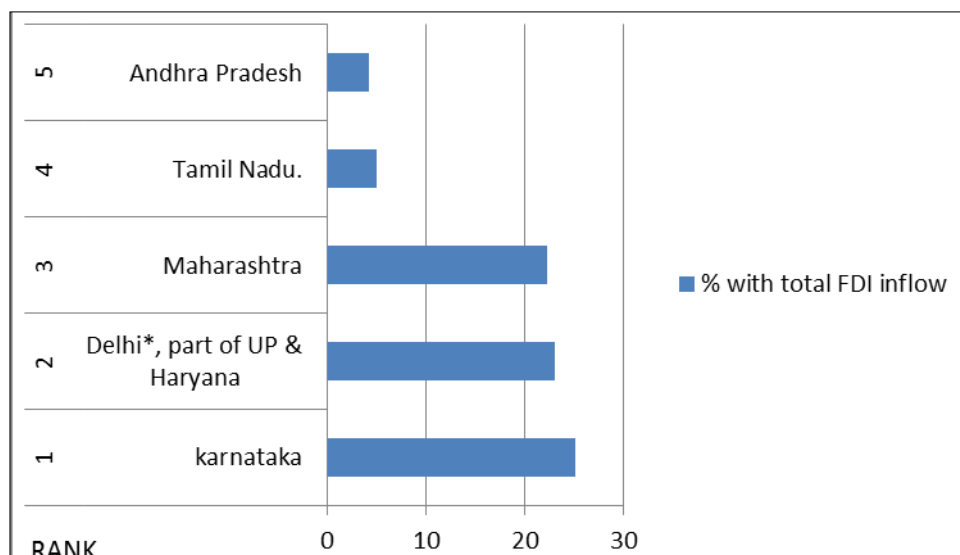


Fig 2: Rank and % with total FDI inflow

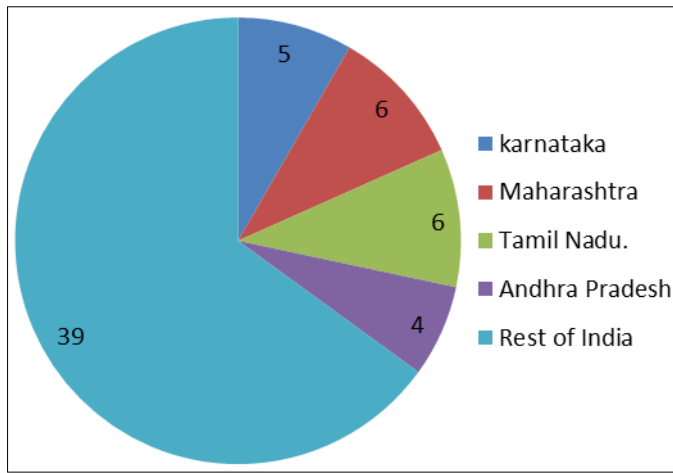


Fig 3: STPI Centers

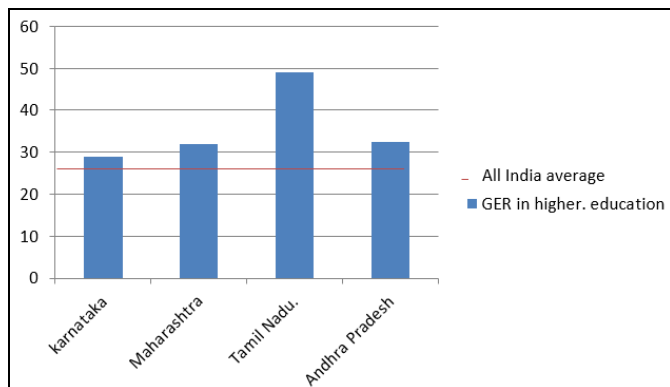


Fig 4: GER in higher education

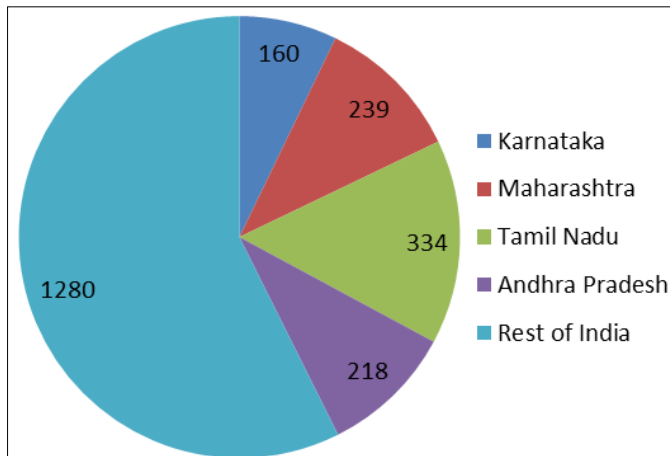


Fig 5: No of engineering colleges

The states of Karnataka, Delhi, Maharashtra, Tamil Nadu and Andhra Pradesh receive the highest amount of FDI inflows in the computer software and hardware sector (fig2). These states (we exclude Delhi from our study because data on FDI in Delhi region includes part of Haryana and UP also and hence data on other indicators would be incompatible) are examined for their performance in the other indicators that is, STPI centres (fig3), the GER (fig 4) and the presence of engineering colleges (fig5), as discussed above. It is seen that these states perform well in these indicators. The four states of Karnataka, Maharashtra, Tamil Nadu and Andhra Pradesh have a total of 21 STPI centres out of a total of 60 centres all over India, that is more than one-third. The GER in higher education in each of these

states is also higher than the all- India average, Tamil Nadu having the highest of 49%, much more than the all- India average of 26.3%. They also account for a large number of engineering colleges, 43% of the all- India total. Hence it can be seen that the four states which receive the highest FDI also perform well in the other indicators.

Summary and Conclusions

This paper examines the FDI inflows in the computer software and hardware industry, particularly on the Software industry which accounts for 99% of the total FDI in this sector, and relate them to factors which give them an impetus to grow. There are some basic conditions which are important for all industries to function efficiently like infrastructure in the form of water, roads, electricity, favourable business environment, a huge domestic market and presence of cheap and skilled labour. Though these are common factors important for the smooth functioning of all industries, yet some of them assume special importance depending upon the nature and type of industry. The computer software and hardware industry is a skill intensive industry where educated, skilled labour and digital infrastructure is of prime importance. This paper attempts to find out the importance of the factors of skilled labour and the relevant infrastructure in this sector in the Indian context in affecting the FDI decisions of foreign investors.

The study explores the a) presence of infrastructure relevant to the computer industry in the form of STPIs and b) availability of skilled labour by observing their GER in higher education and the number of technical and engineering colleges which produce engineers and skilled workers needed for the computer industry. It is ascertained that the states which receive a high percentage of FDI inflows in this sector perform well in these other parameters also, that is, these states also have a high gross enrolment rate and large number of technical institutes (which denote availability of skilled labour) and larger number of STPIs (signifying infrastructure availability). So, it can be inferred that skilled labour and the right infrastructure are favourable factors for FDI in the computer industry.

The software industry with it’s huge potential for creating employment and contribution to GDP, provides services across industries, be it healthcare, banking, education. The software industry has changed world’s perception of the India and it’s potential for growth.. State governments will do well in providing the infrastructure in the form of internet, bandwidth etc. and set up training institutes for imparting the requisite skills to labour, for the software industry to flourish.

This study has concentrated on the computer software and hardware industry which is a skill based industry. Further research can be done on FDI inflows in other industries and other sectors like manufacturing to assess the factors which promote their growth and hence draw greater inflows of FDI.

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