COMPETITIVENESS OF SOFTWARE INDUSTRY OF INDIA

A Thesis Submitted to Goa University for the Award of the Degree of

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In

Economics

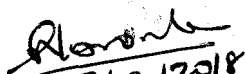By

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CERTIFICATE

This is to certify that Shri Prashant Vithal Kadam has worked on the thesis entitled **'Competitiveness of Software Industry of India'** under my supervision and guidance. This thesis being submitted to Goa University, Taleigao Plateau, Goa for award of the degree of Doctor of Philosophy in Economics is an record of the original work carried out by the candidate himself and has not been submitted for the award of any degree, diploma, a scholarship or fellowship of this or any other university.

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DECLARATION

I declare that the present thesis entitled 'Competitiveness of Software Industry of India' is a consolidation of an original work which has been carried out by me under the guidance of Dr. P.K. Sudarsan at the Department of Economics, Goa University, and that the same has not been submitted to any other university or institution for the award of any degree, diploma or any other such title.

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INTRODUCTION

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INTRODUCTION

1.1 Background of the Study

The Indian software industry has been playing played a important role in converting India's image from a protectionist and sluggish economy to an economy of dynamic business leaders and a global player in making world class technology solutions, business services and ITeS at low cost to the world. It has transformed India from a rural and agricultural economy to a knowledge based economy. The software exports in the late 1980s, was only USD fifty million. It crossed USD hundred billion in the year 2013. The share of software industry to Gross Domestic product has moved from 0.3% in 1980s to 1.2 in 1998 and to 9.5 in 2014-15. The Information Technology boom opened a window of opportunity in the early 1990s. Infact more than 82% of American companies have graded India as their first choice for software outsourcing (Madhani, 2008).

The software industry is broadly divided into IT services, Business Process Management (BPM), software products, engineering services and hardware. The Indian software exports account for sixty five percent of the total software revenue. Infact many of the emerging economies have benefitted from the exports of the large dominating industrial nations in terms of their economic growth and development. The Indian IT and ITeS industry, today, has become an important

destination for the different countries of the world. This is clearly evident from the fact that out of total US $ 124-130 billion software market of United States, India's share was 67%. It has also become an important source of employment, employing about 10 million workforces. India's cost competitiveness in providing IT services is approximately 3 to 4 times cheaper than the US, and it has established itself in its Unique Selling Proposition (USP) in the world market of sourcing. Furthermore, many innovation centres of foreign IT firms have started emerging in India because of the qualitative intellectual capital (IBEF, 2017). Further, according to the market research firm Gartner, infrastructure software spending in India is projected to surpass US $ 3.4 billion in 2017, a 10.2 per cent increase from 2016 and enterprise application software spending is forecasted to grow at 16.8 per cent in 2017.

The demand for the education mainly for the computer science and engineering has also increased due to the expanding role of IT industry The world at large has been witnessing India as an emerging leader in the digital economy of the world. Many reports and studies have highlighted India along with china to dominate the software services in the years to come. Every nation including their software firms has been taking various strategic decisions to enhance their competitiveness for their sustainability in the future. Various studies have tried to analyze the IT boom across the selective countries and the firms. Various factors responsible for the same have also been analyzed. The policy measures also have been supportive and playing an important role in

not only promoting the IT and ITeS but also has enabled it to diversify its business across the globe. This has greatly resulted into a type of imbalance in the economy of various countries like US, UK, Germany, etc. This imbalance has compelled some of the countries to regulate the visa rules in their favour and against the Indian software professionals.

1.2 Trends in the Software Industry of India

The Software industry of India made a very slow and gradual entry in the global software market. Measured by the age of many industries, the computer software industry in India is still in its infancy stage. Yet its growth and development has caught the attention of the world software market so much that India has now been regarded as a major powerhouse for incremental development of software. Since 1960,s the restricted policies of the government kept the software industry at abeyance in search of opportunities to expand and diversify. With a modest beginning in 1951, the inauguration of Indian Institute of Technology in 1951 in Kharagpur in West Bengal, the establishment of Tata Consultancy Services in 1968, in SEEPZ, Mumbai, adoption of the Information technology by the government in terms of acquiring of EVS ES machines from Soviet Union, today the software industry has emerged as one of the important sub-sector in the service sector of the economy. The growth of software services has contributed to the rapid rise in the GDP of India. The IT and ITeS industry revenue has seen a hike over the last decade. It has increased at an CAGR of

12.81%between 2011-16. The total revenue from IT and ITeS increased from 68.8 USD billions in 2011 to around 107.8 in 2015-16.

There has also been a change in the trends of hiring the IT professionals in the software industry. Engineers accounted for 57% employment, opportunities, followed by mixed graduates with 24%, management candidates 14%, diploma holders 4% and the vocational aspirants had a share of 1.46% in the total employment in the Software industry. (Narikar, 2017).

Furthermore, many nations including India have started improving its quality in the set of institutions which are presumed to facilitate the growth of IT and ITeS. Similarly at the national level, many software firms have started adopting dynamic approaches in their policies and strategies, aiming at improving the competing abilities of its employees and expanding and diversifying its production base and the market, though the pace has been slow and not uniform among all the firms of India. Further, the retention of the employees has also become a major challenge for the IT firms.

The government of India also has been proactive in promoting and facilitating the growth of the software sector. Its various measures such as establishment of SEEPZ, STPs, various departmental portals for various government transactions and payments, etc, has greatly boosted the software industry of India. The Internet of Things (IOT), Making of India, Cloud Computing, Start-up programs, etc, has greatly resulted in increase in FDI inflows. Furthermore it should be noted that the India

achieved a milestone of having 400 million internet subscribers as on May, 2016. Presently the expectations from IT and ITeS have also increased thereby boasting the growth of the software industry nationally as well as internationally.

1.3 India's Export of Software Services

The boom in the IT and ITeS sector has greatly contributed to the increase in the exports of services. It has propelled the engine of growth over the last two decades. As per the Reserve Bank of India Survey Report, 2014-15, India's total exports of IT and ITeS and BPO services grew at 14.8% to $ 82 billion (Rs. 5.01 lakh crores) in 2014-15. Further, the exports of computer services and ITeS and BPO was 72% and 28% respectively. The share of the public limited companies was 55.6%. Further, US and Canada were the major export destinations with 60% and Europe was 25% out of which UK share was half of it.

From a modest exports of US $ 0.004 billion of exports in 1980 today it reached to US $ 74.8 billion in 2014-15 (Heeks, 2015). It should be noted that though it has grown over the years, there are indications that this increase may disappear. India has now been recognized the emerging capital of global software industry. The Indian software industry and export have been projected as one, which could address all of India's chronic development ills. As per the Reserve Bank of India Report, the pace of growth of India's export of computer software and ITeS as well as BPO companies has sharply moderated in 2015-16

in US dollar terms. Further, Nasscom has also cut down its perceived growth rate from 10-12% to 8-10% on account of decline in earnings of the IT companies. Its contribution to GDP has increased from 1.2% in 1998 to 7.5 in 2012 and was around 9.5% in 2014-15. However the expectations from the IT and ITeS are on a higher side. As per the India Brand equity foundation, the exports of Business Processes is expected to grow at an CAGR of 9.5% (US $ 300 billion) by 2020.

1.4 Competitiveness of India's Software Industry

The software industry of India has been in the limelight in the growth story of the Indian economy since the last two decades. It has emerged as the most growing and dynamic sector since 1990s. the exports also has shown a increasing trends. Various software firms have expanded and diversified their trade in software services both in the international as well as in the domestic markets. India has emerged as one of the most competing nation in Asia and across the globe in the trade in software sector.

The competitiveness in international trade has, nowadays, acquired a lot of strategic importance. The most powerful nations are not necessarily the countries with the advanced defence equipments, but a nation with economic efficiency. Here comes the strategic importance of international trade. India is more known for its software exports, than the domestic trade. The people from all walks of life have now recognized the importance of software exports and its competitiveness,

for facing challenges from other parts of the world by which it can address India's balance of payment deficits, technological backwardness, retarded growth of the economy and unemployment.

Though India has been much appreciated for its success in information technology, but the pace of its growth has been very slow as compared to her competitors like china, Ireland, Israel, etc. A host of both internal as well as external factors have influenced the competencies of the software industry of India There has been minimal domestic demand for internally. Further, externally, the various institutions like that of IPR, foreign ownership, availability of infrastructure, qualified human capital, number of internet users, etc has influenced the competitiveness of the software industry. The advanced economies are presumed to have better performances in this basic set of institutions which has helped them to do good in the software industry and lead in the software market globally.

1.5 Statement of the Research Problem

The Indian software industry of India has become very innovative and dynamic. The present study seeks to analyse the competitiveness of the software industry of India and how it is being influenced by various parameters of competiveness both at the national and at the international levels. Many academicians and researcher have been debating on the increasing role of the IT and ITeS services in India as well across the globe. Most of the studies have emphasized on the

factors influencing its performance and its contribution to the GDP of the country, employment and economic growth at large. However some of the questions still remain unanswered in terms of the competitive abilities of India today and the challenges ahead in the future. The competitiveness of the software industry of India and its sustainability in the future assumes a lots of significance as hardly any study has been undertaken to evaluate its competitiveness.

In this context, the main research issue hinges on the question as to whether India is competitive globally in the software industry or not. The study analyses India's position in the race of being competitive among the advanced and the emerging economies across the globe. This macro analysis would enable us to know the competitive positioning of India among various countries like China, Ireland, Egypt, United States, etc. Further, it is important to examine the competitiveness of the software firms at the national level. The study has analysed the competitiveness of firms in terms of various select parameters of competitiveness. Further, it's very much important to identify and examine our domestic firm's competitive abilities and constraints in select areas for further improving its competitiveness and sustainability in the future. The present study examines the impact of various training and development programs of human capital adopted by software firms on its competitiveness. The study investigates systematically the competitiveness of the software industry of India at global level, national and firm level and also at the level of the management of human capital.

1.6 Objectives of the Study

This research aims at evaluating the competitiveness of the software industry of India. The research evaluates the software industry of India at the micro as well as at the macro level in terms of its competitiveness and its sustainability.

Specifically, the objectives of the study are as follows

1) To analyze the growth of software industry.

2) To analyze the international competitiveness of India's software industry

3) To analyze the Competitiveness of the software firms of India

4) To study the impact of training and employee development programs on the employees competitiveness of software industry.

1.7 Hypothesis of the Study

The study of competitiveness of the software industry of India is based on certain hypothesis as follows:

1) Software Industry of India has made remarkable Progress

2) India has a globally competitive environment for the growth of the software industry as compared to the other software exporting countries

3) Some IT firms are more competitive compared to others in software services, efficiency and profits.

4) Demographic factors influence the competitiveness and salary of employees in IT firms.

5) Training and development, Induction programs and performance appraisal are important factors in firms competitiveness of IT firms.

1.8 Data and Methodology

Data

The study on competitiveness of software industry has made use of both primary as well as secondary data. The secondary data is compiled from various reports such of World , Handbook of Statistics, Reserve Bank of India, Companies, Electronics and Computer Software Export Promotion Council (ESC), etc.

Methodology

The prime object of the current thesis is to analyse the competitive strengths of both advanced as well as emerging economies at the macro level. The analysis was with the help of 32 variables for 20 countries, consisting of both advanced as well as emerging economies. Further, in order to know the relative competitiveness of India across the world, a index is constructed on the basis of three sub-indices, namely, Business Environment Index, HR Environment Index and Technological Environment Index. These three sub-indices go to make Software Competitiveness Index. Similarly the micro level analysis of the competitiveness of the software firms has been done on the basis of the annual reports of the top 20 software firms for a period of 16 years from 2000-01 to 2015-16. The total number of 17 variables have been analysed for the purpose of constructing a National Software

Competitive Index, in terms of three broad sub-indices namely, Performance Index, Human Capital Index and Financial Efficiency Index. The management of Human capital has been analysed with the help of a structured questionnaire which was administered online in terms of specially created URL (www.softwarecompetitiveness.co.in) for the employees of the software firms across India. Further, T-test, Chi-square test and ANOVA test have been used to analyse the data collected through questionnaire.

1.9 Relevance of Study

The study of the competitiveness of the software industry is governed by a host of factors that has to do with cost-effectiveness, quality, high reliability, rapid delivery and, above all, state-of-the-art technologies in software development and services. The development of the software services and its application by the Indian vendors has made India a centre of attraction in software services from the major parts of the world. Thus, it is this very much important to analyse the future prospects of this sector. Infact the gains from the trade in software services have greatly given a boost to the service sector of our economy. Further, many of the developing countries have also started making their impact in the global software market. Thus, the need to study its competitiveness and future sustainability becomes very much important. However, a great deal will depend as to what extent the software industry adopts dynamic approaches in this modern globalised world.

The performance of the software industry has driven the world's attention for skilled professionals and offers hope to many developing countries which are struggling to manage with the highly competitive strategies in a post-WTO global economy. How India will manage in this kind of a competitive environment is considered to be crucial.

Further, this is an area which has attracted the attention of policy makers and the government. The software industry has greatly contributed to the inflows of FDI and has a great bearing on India's economic future. However, studies of serious outlook and a systematic approach in studying its competitiveness are hardly done before.

This study was inspired by the need to understand the set of institutions and the factors that influence the competitiveness of the software industry of India. This is very much important as the strategic loopholes could be identified plugged in through adequate remedial measures.

A large number of factors, which influences the future prospects of the competitiveness of the Indian software industry and export, have been spelt through a number of studies. This study aims to identify such problems.

1.10 Outline of the Thesis

The thesis is bifurcated into seven chapters. The first chapter consists of introduction followed by the second chapter consisting of different studies done by the researchers and the academicians in terms of

review of literature. The overview of the software industry of India has been done in the third chapter. Chapter IV, V and VI are the major chapters of the study that analyses the software industry on the basis of its set objectives of the study. Chapter VII summarizes the study with the major findings, conclusion and implications.

The **Introductory** chapter provides a wider framework of the study and consists of introduction of the research problem, followed by the objectives of the study, significance of the research problem, methodology, chapter scheme and limitation of the study.

The **"Review of Literature"** chapter **consists of different** reviews and developments in the studies on software industry and its competitiveness.

The third Chapter titled **"Software Industry of India"** discusses the software industry of India in detail. It analyses its conceptual and theoretical frameworks and the classification of software industry.

The competitiveness of the software industry at macro level is evaluated in the fourth chapter. The objective of this chapter is to evaluate the international competitiveness of the software industry of India at the international level.

Chapter V evaluates the Competitiveness of Software Industry at the national level among the top software firms of India.

The role of human capital and its management in It firms has been analysed in sixth chapter titled **"Human Capital management in IT.**

Chapter seven consists of **Summary of Findings, implications of Suggestions and Conclusion**.

1.11 Limitations of the Study

Firstly, major part of the study is based on the secondary data. Study collected country specific data in order to construct Global competitiveness index from the world Economic Forum. The reliability of the Global Competitiveness Index of the Software Industry would, therefore, depends on the reliability of data provided by the world Economic Forum.

Secondly, Competitiveness Index prepared at the National Level for the software firms of India is based on the Annual Reports of the software firms. In this case also, the reliability of the Index is based on the reliability of data reported by the software firms. Under reporting or over reporting of any variable used in the making of the Index, might have affected the index values and conclusions.

Thirdly, the study of human capital competitiveness is based on the primary data collected from the employees of the software firms across the select cities. Mostly the data collected is qualitative in nature and is subject to the individual bias. This might have affected the findings and conclusions of the study.

CHAPTER II

REVIEW OF THE LITERATURE

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REVIEW OF THE LITERATURE

2.1 Introduction

Trade in software services has created an impact on the economies of both the developing as well as advanced economies of the world. Initially in international trade, mostly the trade in goods had been emphasized for many years and no specific attempts were made to segregate goods and services by any objective criteria. The IMF, world Bank, WTO, UNCTAD, academicians, etc have tried to give an uniform meaning to the services in terms of inclusion and exclusions, with the latest being in terms of modes of supply (cross border, consumption abroad, commercial presence and movement of natural person) where the services have been defined in terms of four modes of supply. Even the Reserve Bank of India has started classifying its services under its eleven classifications separately under its Balance of Payments manual. This has been mostly necessitated by the growth of trade in IT and ITeS and services.

These developments were not a routine matter; but was necessitated by the rapid growth of the services in the emerging economies across the globe and were combined with the liberalized policies of the governments. In India, since 1990-91, the growth of services has also been very significant on account of governments various supportive policies designed to encourage and promote its growth. No doubt the

growth of other sectors, namely agriculture and industry has been very sluggish, but the growth rate of services has shown a rising trend

The IT and ITeS industry infact has been at the forefront in contributing to the service trade, which in turn has propelled the economic growth rate of the economy. Many mergers, acquisitions have taken place at both national as well as at international level. It is this contribution that has enabled India to create its brand on the international globe in software services like BPO, KPO, packages, etc. The number of firms entering into IT business sophistication and the expansion of the existing Indian IT organizations overseas has also been on the rise. The FDI inflows off late on account of very encouraging policies like Internet of Things, Making of India has also shooted up significantly from 2014 to 2016. The number of Companies with CMM level 5 and 3 has been on the rise. The competitiveness at the national level among the IT software firms has been witnessing a major change. Further, at the international level many countries including India have been competing with each other for the share in the world software market. The nations at large have been witnessing India as an emerging super power in IT and ITeS in the decades to come. The growth rate of the Indian economy has been on an average 8% since the last decade. The competitiveness of the nations as well as the software firms has become more severe than before.

The review has been broadly categorized as follows:

1) Growth and the contribution of the software industry

2) Competitiveness of the Software Industry

3) Management of the Human Capital in the Software Industry

2.2 Growth and the Contribution of the Software Industry

Kumar and Joseph (2005) analysed the increasing role of the software industry in the service sector in terms of an active role of the state in promoting its growth. The study highlighted the role of the software industry in her contribution to not only the export earnings, GDP and employment but also found that it has resulted in creating an new entrepreneurial class which has reversed the brain drain. The study further pointed out that the software and service sector has raised India's brand equity and attracted foreign direct investment (FDI) thereby leading to host of other associated benefits.

Chakraborty and Jayachandran (2001) examined the software companies of major cities of India in terms of a survey. The study found that the Indian software industry lacked diversification in types of export, and relied mainly on software services exports only. Further, it also held that the software industry can reap the maximum benefits and economies both domestically and internationally if it undertakes major reforms in infrastructure planning and regulatory rules.

Joseph and Harilal (2001) evaluated the increasing role of the information technology amidst the liberalized regime across the countries on account of the booming software market in the world. The

study analysed the software industry in terms of her performance in software exports, its implications on other sectors competing for skilled manpower and finally in terms of threats to the software industry if any. The study found that the reform measures of India have greatly helped India to boost her performance in the software exports. Further, the study also cautioned India in terms of relaxation in the visa restriction for Indian Software manpower initiated by the developed economies as it is likely to pose a major threat for the sustained growth and competitiveness of India's IT exports. The study emphasized on more IT diffusion in different sectors of the economy, including governance which will help in achieving the twin objectives of enhanced productivity, international competitiveness and growth on the one hand and sustained growth of IT export sector on the other.

Arora and Athreye (2001) attributed the rapid growth of software exports of India to her comparative advantage in its production rather than a result of an absolute advantage in terms of wage differentials alone. The study pointed out that the sluggish growth of the manufacturing sector and the low domestic demand for the software services has boasted the growth of the exports of the software industry. The benefits also have been uneven on account of the undifferentiated structure of the software industry which has forced the firms to increase the cost in improving the quality of human resources and the demand for the same.

Mukharjee (2002) examined India's trade potential in audio-visual services within the GATS framework and found that India has significant potential for expanding exports to countries with large NRI and South Asian population to export post-production facilities, computer animations and graphics. The study further recommended various domestic reforms and measures, which will enable the country to gain from liberalization commitments under the GATS and enhance the efficiency, productivity and global competitiveness of this sector.

Singh (2002) analysed the possibilities for broad-based IT-led economic growth in India in terms of increasing value-added, using of better telecom links to capture more benefits domestically through offshore development for developed country firms, greater spillovers to the local economy, broadening the IT industry with production of telecom access devices, improving the functioning of the economy through a more extensive and denser communications network, and improving governance. The study also suggested that the government should concentrate on removing labor market distortions and infrastructure constraints, rather than providing output or export subsidies to the software industry which will not only benefit the IT sector but also the entire economy as a whole.

Gengler (2003) examined the scope of software development for Ukraine in terms of its cheap labour cost as India had experienced lots of economies. The study examined the technological infrastructure (specifically data connectivity), financial and a distant vision for its

success in terms of direct observation, structured interviews and document reviews. It recommended strongly the need to improve the educational and the technological infrastructure of Ukraine to get the maximum benefits from the software trade.

Nath and Hazra (2002) found that there has been weak linkages of software industry with the domestic manufacturing industry. The study emphasized for the development of more linkages which will not only help the software industry, but infact will facilitate the other sectoral growth and thereby promote the domestic software market. The study emphasized on building greater applications of IT in the manufacturing electronic sector.

Welsum (2003) analyzed the measurement of tradable services in different manners by academicians and researchers and stressed on the need for the proper integration of the data and its collection. The study pointed out that on account of the increasing diversification of services in terms of its inclusion and exclusion, some part of transaction of the multinational firms under mode 3 and intra-firms transactions go unrecorded. The study called for a systematic approach in the measurement of various components of trade in services.

LI, Greenaway and Hine (2003) investigated the causality between the import of services and economic growth on the basis of dynamic model of growth on the basis of the panel data for 82 countries for both developed and developing countries. The findings indicated a strong significant and positive impact on economic growth for developed

economies and had a negative impact on economic growth for developing economies.

Mohapatra (2003) on the basis of the primary data from interviews of senior executives of Indian software companies in Bangalore and the US and secondary data examined the demand and supply constraints of the Information technology workforce which can act as a threat to the competitive advantage of India in her software industry. The study further emphasized that though the government of India the has taken many proactive assessments of existing policy gaps and has designed interventions to remedy those, there is an urgent need for greater interaction among industry, academia and the government to reorient the formal and non- formal education delivery systems toward the constantly evolving market needs.

Costa (2003) examined the differential innovative capability, the uneven diffusion of technical education in India, and the increasing economic integration of the software industry. as sources of uneven development and stressed on the balanced inclusive development by doing away with the structural problems that plague the successful software industry.

Joseph and Parthasarathi (2001) explored the increasing usage of information technology in terms of enormous opportunities for growth, enhanced productivity and improvement in efficiency in all spheres of human activity. The study found a greater digital divide between the advanced and the developing economies in terms of the IT diffusion in

both the two parts of the world. They also contended that the developing countries hardly make any attempts to encourage and promote the innovative capability of the firms to enable them to move up the software value chain.

Contractor and kundu (2004) evaluated the size and the competitiveness of software and Information technology industry of china, Taiwan and India. The study stressed on the entrepreneurship role of the IT sector and held that it can serve as a base for the drawing and the formulation of the government policies.

Dossani (2005) explained the evolution of India's software industry since its origination in 1974, wherein the environment for the growth of the software industry for the private sector was very hostile and restrictive. It was only after 1980s that supportive mechanism from the state contributed to the growth of the software industry. The study further stressed upon the need to improve the skills in offshore development and measures in direction to give a little liberty to TNCs so as to facilitate the growth of software industry of India.

Illiyan (2008) explored the growth, performance, the opportunities and the challenges of the emerging software sector of India. The study found that the proactiveness shown by India in terms of her qualitative software services and facilities such as Y2K conversions, international linkages, etc, combined with the supportive measures of the government in terms of tax concessions, tax holidays, technology parks, etc played an important role in the in the growth and the

promotion of the software industry of India. Further this process was asl facilitated by her demographic advantage in terms of English speaking population and the zonal difference of time. The study further emphasized on the improvements in R & D, following international standards in facilities and a need for the inflow of the foreign capital to revive the IT industry of India.

Magdeleine and Maurer (2008) emphasized on the growing importance of the service trade for mature economies and the growing exports of the developing economies in service trade. The study discussed the benefits of service trade of major developed economies especially in software and telecommunication which has facilitated their process to connect economies to global networks. The study held the view that these services can help in transforming the emerging and developing economies into centers of offshore services, as is the case of India and Mauritius.

Banga (2005) analysed the growth of services over the 10 years (1994-2004) period in terms of its contribution to GDP, employment, trade and FDI. The study found that the growth rates attained by the different sub-sectors of services has not been uniform and has been lop-sided. It was also pointed out that in the absence of balanced growth of sub-sectors of the services, it will not lead to any linkages, which can really undermine the overall growth of services thereby having its own multiplying effect on the economic growth in the long run. A strong and financially independent regulators and economy-wide efforts to

improve business environment can go a long way to sustain the dynamism of India's services sector.

Costa (2006) analysed the software industry of Bangalore and observed that that Bangalore has serious innovation challenges with weak university-industry linkages, lack of inter-firm collaboration, and absence of cross-fertilization between the knowledge-intensive defense/public sector and the commercial IT industry. The study stressed on the need to diversify the geographical and product markets, stemming international and internal brain drain and to improve the urban infrastructure.

Banga and Kumar (2011) analysed the significance of the demand and the productivity of the exports of software services with reference to India from 1994-95 to 2007-08 .The study using the Data Envelopment analysis found that the growth of software services in India has been on account of high income elasticity and technological innovations of 2000. The study further highlighted that the higher productivity of the software sector will and can yield better linkages and productivity in manufacturing and others sectors of the economy.

Dara and Ji (2012) analyzed the marketing strategy, the performance of Chinese software industry between 2005-2012, and the challenges it faced in terms of language barriers, emphasis of government on the hardware sector, lack of intellectual property rights protection, etc. The study found and recommended that china instead of following India in the export software market should focus more on domestic market in

software services and take a balanced approach in the long run so as to gain more from the software industry.

Vij (2014) analysed the various factors influencing the exports of services in IT and ITeS and greatly highlighted the role of the manufacturing units in supplementing the success of IT by its applications in its various processes of manufacturing. The study further emphasized on the need for strengthening the IT services in terms of diffusion in other areas of IT, which have been still not explored. The study was purely theoretical.

2.3 Competitiveness of the Software Industry

Brunner (1995) had a thoughtful and explorative study on the details of technological change of India's computer industry. The study discussed the reasons as to why economies like India will, in future, have to close the technology gap in microelectronics and communications technologies in order to improve their performance and increase their industrial competitiveness. The study further pointed out that with all the developing economies having an advantage in human resources, the advantage which India boasts in her software industry because of its cheap skilled manpower may disappear in the long run if India does not takes appropriate steps to sustain it.

Corea (1996) analyzed the factors that influenced the viability of an export-oriented software industry in developing countries and found that not only the software market and the conditions to participate in it

are heterogeneous but the strategies followed by firms and promoted by governments in developing countries to foster their software exports also vary considerably. The study emphasized that the strategies and policies need to be defined in accordance with the particular strengths and shortcomings of the local software industry in each country, with a clear understanding of their different benefits and the long-term impact on industry. The study also suggested the different software export strategies and their relative advantages for developing countries.

Srinivas (1997) analysed the urban competitiveness of Bangalore in terms of telecommunications infrastructure, government policies, and availability of industrial/office space, skilled labour and specialised services. Though he appreciated Bangalore in his study, but did not rule out that if the infrastructural facilities are not improved, then it may lose its competitiveness in the long-run. The study made use of both primary and secondary data in terms of surveys for both the IT professionals and the employers.

Dayasindhu (2002) developed a theoretical framework for global competitiveness to assess the competitiveness of organizations in the Indian software industry and stressed on the need for creating of trust and encouraging inter-organization relationship in terms of tacit knowledge transfer implementation of mentoring programs and build general management capabilities. The study also observed that embeddedness and knowledge transfer are key determinants of industry clusters that lead to global competitiveness. Further, it held that the

organizations in order to become globally competitive have to evolve a strategy to encourage building relationships with other organizations and promote knowledge transfer among organizations which helps in creating industry clusters that ultimately sustains global competitiveness of organizations.

Kapur and Ramamurti (2001) analysed the various business opportunities emerging from the liberalized regime of India. The study emphasized on the competitive advantage of India in software industry and its linkages in other knowledge based industries which will make India as a leader in the short run in back office and in the long run as a supplier in tradable knowledge based services. The study further also stressed upon the need to develop IT infrastructure in all the states of India as FDI in software will not only depend on central government's policies, but also on the infrastructure available in other states.

Hira (2003) held that India's IT industry grew because of its use of U.S. immigration regulations as a competitive business practice and acted as an important variable shaping the future direction of the industry as was reflected in the increase in H-1B visas for IT use, and at firm's levels, with the increase in revenues and earnings for Indian IT firms. The study however cautioned India that in case of any changes in the immigration laws of US, India may lose her competitive advantage and as a result may be compelled to increase their offshore to onsite leveraging ratio, utilizing alternative visas, improving their product differentiation, or partner with U.S. based businesses.

Ajitabh (2003) analysed the competitiveness of software firms in India at national and international level and found that most of the software firms have weak understandings of the concept of competitiveness as they have evaluated it mostly in terms of financial parameters and readily available framework and models because of its reliability. The study further found that the top management leadership, formal strategic planning, innovations, quality, intangibles management, customer's repeat orders and timely delivery acted as important sources of firm's competitiveness.

Ambastha and Momaya (2003) examined the reviews of literature at the firm level and study of competitiveness-related frameworks and models. The study further evaluated the different criteria's and sources of competitiveness at the firm level. Select frameworks and models of competitiveness were reviewed and categorized, in terms of the World Competitiveness Yearbook (WCY), Global Competition Review (GCR) and National Competitiveness Report (NCR) at the country level. The study held that such reports and reviews can be useful tools for the research on competitiveness.

Heeks (2006) applied the Porters competitive advantage theory to analyze the IT sector in developing countries like India, which possesses a competitive advantage based on variables such as ever increasing advanced skills, domestic rivalry and clustering and government policy vision. The study held that the Porters framework can be applied to study all the aspects of the software industry

including its performance, problems etc; but at the same time the theory may be modified so as to suit the study, but the basic framework will remain the same.

Kochukunnele (2006) studied the competitive positions of India, Israel and Ireland in the software industry and held that India should specialize in products and packages and high-end services, rather than concentrating on customized services alone. The study further held that the policy makers and the government machinery have to give more importance to the development of domestic hardware and electronics industry than the factors such as the upgrading of legal system etc.

Nath (2008) studied the emerging knowledge based software industry and the sluggish manufacturing industry of India. The study found that the political process of India has created a big gap between the software industry and the manufacturing sector thereby resulting into great loss to its global competitiveness. The study also held that such a trend needs to be reversed so as to capitalize on the gains of the software industry across the whole economy.

Madhani (2008) examined the competitive position of the Indian software industry and argued that in view of emerging competition from IT savvy countries, increasing raw wages along with appreciating rupee, etc, India needs to develop a parallel product oriented industry along with the service oriented industry & climb the value chain. Only nations which can predict the future and initiate changes to prepare

themselves for the challenges ahead can survive in an era of competition and globalization.

Schmuck (2008) analysed the concept of competitiveness on the basis of the questionnaire and developed a competitive Index to measure micro level competitiveness for the companies. The index was based on certain factors such as motivation of the employees, changing of target markets and its impact, etc. The study used discriminant analysis to test the index and multivariable logistic regression to analyse the different competitive groups.

Dhingra, Sinha and Singh (2010) proposed a generic theoretical framework with variables affecting the firm's performance. The study further identified the variables for assessing the impact of location strategy on the competitiveness of the firm, established in an SEZ. Using structural sequential modeling, the study found that investments in improving the infrastructural set ups plays a significant role in determining the competitiveness of the SEZs.

Smith (2010) analysed the concept of international competitiveness at the country level within in the context of Porter's (1990a) thesis that countries, like companies, compete in international markets for their fair share of the world markets. The study held that though the Porter's Diamond Framework has been extensively discussed in the management literature, its actual contribution to the body of knowledge in the economic and management literature has never been clarified. The study observed that the Porter's Diamond Framework is not a new

theory that explains the competitiveness of countries but rather a framework that enhances our understanding of the international competitiveness of firms.

Modwel and Jelassi (2010) investigated as to whether the rising labour costs are being compensated by rising productivity amidst India's comparative advantage in IT offshore outsourcing. A sample of six firms including the big three in Bangalore was selected for a field survey, and the total factor productivity (TFP) approach was used to look at trends of output, capital employed and wage costs per unit labour, enriched by insightful discussions on site. The study found that though the decreasing age profile of the work force has succeeded in maintaining mean salary per capita constant but the productivity performance in TFP has not been uniform across the sample. The study further held that the low wages of skilled IT staff in India may erode over time and companies may shift their attention to other value-adding benefits as opposed to looking in off shoring countries for just lower cost provision of IT tasks and services.

Danuvasin (2012) investigated the issues of software industry of Thailand in terms of various secondary sources and focus groups. The study found that the software has become an enabling factor in determining the competitiveness of every sector, but at the same time is faced with many challenges and constraints in Thailand. The study emphasized on the criticality of the ICT cluster to the continued

competitiveness of the nation and the necessary efforts to be taken by the Prime Minister to get the maximum from the ICT clusters.

Bhattacharjee and Chakrabarti (2015) evaluated the factors that have enabled India to have a competitive edge over its competitors in IT-ITeS using Porters Diamond Model. The study emphasized that the strong macroeconomic fundamentals, favorable resource endowments, technological advancements, emergence of new business models, and supportive government policies would help the Indian software industry in exploiting this opportunity. It concluded on a positive affirmative note that India will retain its position over its competitors in the near future as well.

2.4 Management of the Human Capital in the Software Industry

Silva (1997) evaluated the reasons for the importance given by Asia-Pacific countries to the HRD in the process of their economic development and competitiveness. The study emphasized that the Asian countries should accord priority to HRD in terms of their training and developing human resources through education and training, deploying human resources and providing the incentives to ensure that they are productively deployed. Further, the study also pointed out that foreign investment can be used as a means of raising the stock of human capital - a fact which escaped the inward-looking import-substituting countries which were more engrossed in political ideologies and the fear of economic imperialism.

Arora and Athreye (2001) analysed the contribution of software industry to India's economic development in terms of the absorption of labour and its development in the economy. The study pointed out that the lower wages of the Indian software professionals internationally compared to that of US and other European countries and higher wages of the software professionals within India as compared to other sectors have greatly attributed to a steady supply of software professionals. This has increased the relative value of professional workers of not only programmers, but also managers and analysts. Thus, the growth of the software industry has resulted into effective entrepreneurship and facilitated industrialization in other sectors of the economy.

Basant and Palni (2004) analyzed the Nasscom and National Sample Survey (NSS) data to explore the processes that deepen the IT labour market in India, and found that the transition to the off-shore model, growth of the ITES sector, competition and infrastructure led movement of IT activity to smaller cities and hiring of workers with diverse education backgrounds and of women workers has facilitated the deepening processes which however needs to be enhanced. The study further held that the policies should focus on education along with firm level incentives for quality up gradation and training which would improve the absorption capacity to benefit from alliances. The deepening of the labour market will be a by-product of this process.

Shah and Parikh (2005) stressed on the need for more liberalized approach in Mode 4 of the supply of services, especially in direction

with computer related services, particularly the software sector, which is one of the most crucial and booming sectors of the Indian economy. The study discussed the various issues and limitations of software industry of India in relation to the movement of natural persons (Mode 4) so that proper policy initiatives and measures are undertaken to address the same. The study further recommended that the members of the WTO should consider the possibility of a GATS visa for service professionals working overseas on a temporary basis based on their horizontal and sectoral commitments.

Arora and Bagde (2007) examined the role of human capital in the regional location of the software industry in general and the capacity of the engineering colleges to absorb students at it's under graduate levels in different states of India in line with the growth of software industry of India between 1990 and 2003. The study found that human capital accompanied by an equal size of electronics hardware industry had a significant impact on the growth of the software industry.

Syed and Ge (2008) investigated the factorial validity of strategic human resource management practices and their impact on company performance in a sample of 465 Chinese enterprises. Their study found that a set of strategic HRM practices (training, participation, results-oriented appraisals, and internal career opportunities) have positive impact on both product/service performance and financial performance whereas profit sharing contributed to financial performance.

Friedmann, Holtbrügge and Puck (2008) took a resource based view (RBV) for HRM in terms of a sample of 80 foreign firms of IT (originating from France, Germany, the Netherlands, and Switzerland). The study found that foreign firms in India are able to increase the number of qualified applicants by personnel marketing and by enhancing their employer image. This is important since there is a strong competition among foreign and local firms on the Indian labor market for a very small number of qualified employees. Only those firms which are able to recruit the most qualified employees may realize sustainable competitive advantage. The study also found that that high attrition rates in foreign firms can be reduced by individual performance evaluation and reward systems. Since the loyalty of Indian employees to their employer is low, attrition can be reduced by individual performance evaluation and reward systems.

Singh Kumar (2009) analysed the impact of various HRM practices on the organizational culture. The study was done in terms of a structured questionnaire for the managerial level employees of two big private sector organizations. The questionnaire consisted of 69 items related to HRM practices and 21 items related to the organizational culture. The study found a strong correlation between the HRM practices and the organizational culture, but the degree of the influence in terms of certain variables varied between both the firms.

Marimuthu, Arokiasamy and Ismail (2009) critically evaluated the significance of human capital in the performance of the firms. The

study emphasized on increasing the investment in different aspects of human capital which will enable the firms not only to increase its profitability but also enable the firm to be competitive for its long run survival. Further, the study also developed a model to explain the relationship between human capital and firm performance.

Chaudhury (2010) studied the extent to which intellectual capital enhances organisation performance and adds value to the bottom line of the organisation .This was done in terms of an survey method for 466 respondents of junior and middle level management employees of IT organizations. Using regression model, the study found that knowledge management plays a significant role in the performance of the organization and held that the firms who implement it will go much beyond their vision.

Kumar (2010) analysed the growth and development of the software industry in three states of India, namely, Tamilnadu, Kerala and Andhra Pradesh in the post-reform period. He emphasized on availability of adequate skilled labour and specialized infrastructure, pro-employer labour and policy reforms, ethnic linkages of immigrant professionals abroad who returned to establish firms in their native states, and their existing technological capabilities at the beginning of reforms as the core factors for the success of software industry in these states. The study further held that the most important strategy adopted by the successful states was to provide specialized factors of production (skilled labour and infrastructure) for the industry.

Ganu (2013) in her thesis studied the different motivators in IT and ITeS at different levels of management, namely, junior level management, middle level management and senior level management in terms of five IT and ITeS organizations by taking a sample of 50 employees each from all the levels of management and found that there exists a lots of variations in the motivators among the different levels of management. All levels of employees valued achievement as the most, but the proportion of senior management employees doing so was significantly higher than the Junior and Middle management employees. Further, while self development was valued as the most by the junior management and the middle management employees; it was the lowest motivator amongst the senior management employees. Power/Influence was found to be very important among senior management employees following the Need to Achieve.

Veerankutty (2011) in his thesis revealed that employees motivation and retaining the talents in the organization are the main challenges faced by the software companies in Kerala. The study found that job security is not an important concern among the software professionals to opt for a career in a particular company. The overall working conditions, a fair and equitable pay package, challenging nature of the job, career growth, work life balance, participation in decision making process, motivational training, etc are the important factors in attracting and retaining employees in the organization.

Bhatt and Reddy (2011) explored the existing literature on studies showing relationships between HR practices and firms performances. The study used secondary data to evaluate the relationship between the firm's performances and the HRM practices in terms of management styles, social capital and culture pertaining to the organization. The findings indicated a positive correlation between the Human Management Practices and the firm's performance.

Ray and Ray (2011) explored the impact of HR practices on employees' job satisfaction in the context of selected iron and steel firms of India. The analysis was done with the help of an structured questionnaire drafted on the basis of a likert scale The study found that the traditional factors like performance appraisal, participation in decision making, training and development, empowerment, have positive impact on employees' job satisfaction, whereas job rotation, self-directed work teams, recruitment and selection have been found to have very less impact on job satisfaction.

Patil, Patil and Waje (2011) examined the challenges faced by software industries in HR. Their study emphasized on not only improving the present HR set up, but also going on innovating in HR practices not only to retain and motivate its employees, but also to sustain its competitive advantage over its rivals. The study further stressed on managing the knowledge workers in a tactful manner. The role of HR practioners and professionals becomes very important as they have to

devise strategies and policies not only to retain its present employees, but also try to have a competitive edge over its competitors.

Joseph (2012) in his thesis analyzed the human resource outcomes in software firms in Kerala as consequences of Innovative Human Resource Practices (IHRP) in terms of Structural Equation Modeling (SEM) for the data obtained in terms of a questionnaire on a 4-point rating scale. However both the primary as well as secondary data were used for analysis, but the units were confined to Kochi and Thiruvananthapuram as representative Techparks of software sector in Kerala. The study found that majority of the software employees were males and further were technical graduates. It also found that majority of the employees were less than thirty years of age and had tenure of less than 2 years in any software firm specific and overall 4years of professional experience in the software industry as a whole. The study was of the view that the new competitive economic realities have put pressure on the HR functions and its programs.

Chaudhuri (2011) gave the importance to knowledge management as a tool for organization and effectiveness in a sample of 194 software industries in Hyderabad and Kolkata. Data were collected from 20 companies which was 9.70%. The study found that Knowledge management, if initiated and cultivated at the top level is bound to bring positive change in the organization, its people, process and practices.

Hussain (2012) analysed the effectiveness of Strategic Human Resource Management Practices in 25 software companies of Chennai and Bangalore. The Percentile, Chi-square, Mean, SD and Factor analysis were used to analyze the data. The study found that most of the software companies practice the Strategic HRM focus, functional areas covered by SHRM, SHRM facilities, treatment of employees, adopted SHRM activities and SHRM activities.

Demo, Neiva, Nunes and Rozzett (2012) evaluated the perceptions of the employees on various HR practices in terms of scientific methods of factor analysis and likelihood method. Scale reliability was assessed by Cronbach's alpha Jöreskog's rho. A six factor model was generated showing high reliability and good fit. Construct validity was provided through convergent and discriminant analyses. Further, the factors were consistent with the literature review and explained about 58% of the construct's total variance. The study ratified the use of Human Resources Management Policies and Practices Scale (HRMPPS) as a tool to measure the employee outcomes from various HR practices.

Shanmugam and Babu (2016) evaluated the relationship between organizational factors of attrition and attrition level of the employees of IT companies. The study found that the team dynamics, opinion about their superior performance appraisal, training and development, physical conditions of work environment, interpersonal relationship, self-esteem, recognition, growth and development, work life balance, and job satisfaction are negatively associated with attrition level of the

employees of IT companies. The study further stressed on the fact the IT industries have to concentrate on these factors to reduce the level of attrition and to improvise the employee enthusiasm.

Sani (2012) analysed the impact of strategic HRM practices on organizational performance of insurance companies in Nigeria and also examined the impact of the working environment if any on the organizational performance. A multi-respondent survey of 18 insurance companies was undertaken and data collected was subjected to regression and correlation analysis as well as descriptive statistics. Organizational climate was measured through a set of questionnaire. The study found that strategic HRM alignment, line management training, career planning system and job definition are the key strategic HR practices that influence organizational performance in the Nigerian insurance industry. The results also suggested that the relationship between strategic HRM practices and organizational performance in the Nigerian insurance industry is moderately influenced by organizational climate.

Kumar (2013) analysed the HR practices in TCS, Infosys, Wipro and HCL Technologies and emphasized on supplementing the traditional HR practices with organizational capability in terms of hiring and retaining competent employees and developing competencies through effective human resource management practices.

Singh and Jain (2014) in their study analysed the role of HRM practices on the growth and the development of the organization in the

textile industry. Their study found that out of the Eight main HRM practices six practices namely manpower planning practices, Training and development practices, performance appraisal practices, compensation and incentive practices, unionization practices, team work and employee participation practices helped in achieving business objectives and therefore have positive effect on the growth and development of Textile industries. On the other hand, two practices namely Staffing practices and working conditions and other related practices does not help in achieving business objectives and therefore have no effect on growth and development of textile industries.

Francis (2013) emphasized on the significance of human resource management technology transition in today's competitive business environment focusing on the telecommunication industry in Nigeria. The study in terms of an structured questionnaire with a response rate of 61.5% found that HRIS functions have a relationship with HRM functionalities; that the independent variables (strategic integration, forecasting and planning, human resources analysis, and communication and integration) have no relationship with human resource functionalities; and that the dependent variables (performance development, knowledge management, and records and compliance) which are dimensions of human resources information systems have a relationship with human resources functionalities.

Nagaraju and Nandini (2013) measured the satisfaction levels of females and the relationships between occupational stress, health and

job satisfaction among the female insurance employees. The study found that that the job satisfaction level of females is dependent upon education level, age and is independent of the company name, marital status and nature of job. Further, most of the females suffered from high stress levels because of pressures and unrealistic targets to be achieved in the insurance companies.

Salau, Falola, Ibidunni and Igbinnoba (2016) evaluated the employee's awareness about the induction programs in terms of valid 271 questionnaires completed by academic and non-academic staff of Olabisi Onabanjo University, Ago Iwoye, Ogun State Nigeria. It aimed at finding out the role of Induction programs in motivating the staff in terms of their attitude and contribution towards the organizational goals. The findings revealed that induction significantly influences staff attitude and behavior towards organizational effectiveness. It was recommended that induction programmes should be reviewed and improved upon from time to time to earn employees loyalty and positive attitudes towards work.

Saif (2014) evaluated the effectiveness of employee orientation on performance and satisfaction of the employees. The study used the survey method to analyse the responses of the employees. It found was that there existed a strong relation between employee orientation programs and the performance of the employees. Further, it is important for every organization to have an effective induction program for the new employees as it greatly affects their performance

and satisfaction, and in turn the overall performance of the organization as a whole.

Sinha and Mishra (2014) examined the differences in use patterns of e-HRM (electronic human resource management) tools in both private and public organizations and manufacturing services. The researcher used one sample t-test, paired sample t test, and one way ANNOVA for analyzing the results. The study found that all the e-HRM tools are not fully utilized in Indian organizations and private organization are ahead of public organizations in application of e-HRM tools.

Jeet and Sayeedduzzafar (2014) evaluated the effect of HR practices in terms of job satisfaction of private sector banking employees, with special reference to HDFC bank. The study in terms of the regression model found certain practices like Training, Performance Appraisal, Team Work and Compensation has significant impact on job satisfaction. On the other hand Employee Participation has no significant impact on job satisfaction of the employees of HDFC banks.

Keser (2015) investigated the effects of higher education on the global competitiveness certain. The study conceived factors such as the level of development of R & D activities and productivity, performance of various sectors, the country's trade surplus, producing goods of high-tech in nature, availability of expert and skilled labor force which can contribute only in terms of existence of qualified labour in terms of higher education thereby resulting into enhancement of productivity, which enables the countries to become more competitive.

Ejaj and Waqar (2015) studied the effectiveness of HRM Practices in insurance Companies in Karachi in terms of a structured questionnaire based on a likert scale. The study with the help of SPSS analysis found that HRM practices i.e.; training and development, performance appraisal, compensation and empowerment have a positive impact on employee retention.

Shaukat, Namrah and Ghafoor (2015) evaluated the contribution of Human Resource Management (HRM) practices including selection, training, career planning, compensation, performance appraisal, and job definition and employee participation on perceived employee performance. The study comprehensively explained the links between the systems of high performance work practices and firm performance. The study on the basis of the national sample found that these practices have an economically and statistically significant impact on employee performance.

2.5 Insights from the Review of the Literature

Trade in services in general and trade in ITeS and software services in specific has significantly contributed to the growth of advanced as well as emerging economies of the world. It has also attributed to an increase in the economic growth rates of the developing economies like India. It has led to the emergence of a new class of entrepreneurship in India. To some extent it has also reversed the brain drain. Further, Software services in IT and ITeS has enabled India to increase its

brand image in the global software market. The FDI also has been found to be increasing. But it should be pointed out that the growth of software services has also been accounted for the slow growth of the manufacturing sector and a very low domestic demand for the software services in India. The literature on the software services in specific and services in general emphasized on a greater degree of liberalization in rules and regulations influencing the software industry in terms of removal of infrastructural bottlenecks and diversifying her exports to the other continents and countries. The diffusion of IT in different sectors can also play a important role in achieving a higher degree of competitiveness and sustained growth. The role of building educational and technological infrastructures was also greatly emphasized. Some studies also felt the need for greater degree of linkages between the IT industry and the other sectors of the economy. Further, it was also found that the developed countries had benefited a lot from services as compared to the developing economies. This may be due to lack of proper and timely initiatives by developing to facilitate the innovative capabilities of the firms to enable them to move up the value-chain in software's. The service industry in general and the software industry in specific can go a long way provided it is supported with a strong business environment.

The review also analysed the literature on the concept of Competitiveness which infact was found to be multi-dimensional. In economics literature, mostly it was evaluated in terms of financial parameters and readily available frameworks and models because of its

reliability. No specific attempts are made to evolve or develop a new concept of competitiveness. In some cases, the Porter's Competitive theory had been used in a modified manner. It was further found from the review that Porter's Diamond Framework was not a new theory that explains the competitiveness of countries, but rather a framework which explained the international competitiveness of firms. In some cases the world competitiveness year book, National competitive Report and Global Competition Review were referred as tools for research on competitiveness. However the policies and the strategies adopted by the developed countries varied in line with their software industry. In case of India to enhance and sustain its competitiveness in software industry, it is very much essential to fill the technological gap in terms of appropriate steps in microelectronics and telecommunication technologies. There is also a need to improve the infrastructural facilities to promote the growth of software industry of India. Furthermore, the political process of India has created a gap between the software industry and the manufacturing sector, thereby adversely affecting its global competitiveness. But some of the top IT firms have managed to develop software's at global standards which has helped them to compete at the international levels. However it was pointed out that the low wage advantage of Indian software professionals may erode over time as the companies may concentrate on value added benefits in the long run. The supportive role of the government also becomes much essential to make the software industry competitive over the years to come.

The quality of human capital is significant in influencing the competitiveness of IT and ITeS firms. The human capital should be productively deployed with a balanced training and incentives. In fact it was suggested that many of the Asian Countries can use foreign investment to raise the stock of qualitative human capital amidst the fear of economic imperialism. Further, the growth of software industry of India has resulted into the growth of an entrepreneurial class and has facilitated industrialization in other sectors of the economy. The different educational backgrounds of the IT employees and the development of IT in smaller cities has led to the deepening of the labour markets in the IT sector. The different training programs, and practices directed at the improvement of human capital infact has greatly contributed to the performance of the software firms. There also existed a greater degree of correlation between the organizational culture and the HRM practices, but it varied from firm to firm. The degree of motivators also varied from firm to firm. The individual performance evaluation and the reward systems were found to have helped in minimizing the attrition in foreign firms. The team dynamics, opinion about their superior performance appraisal, training and development, physical conditions of work environment, interpersonal relationship, self-esteem, recognition, growth and development, work life balance, and job satisfaction were found to be negatively associated with attrition level of the employees of IT companies. At the same time, the working environment, equitable pay structure, challenging nature of job, participation in the decision making process

greatly helped in retaining its employees. It was also suggested that the software firms should adopt innovative approaches in improving its human capital as it helps in not only retaining and motivating its employees, but also in sustaining its competitive advantage over its rivals. This was very much essential as the new competitive economic realities has put pressure on HR functions and its programs but such a knowledge management should be initiated and cultivated at the top level to be more effective. Apart from these, the induction programs also needs to be reviewed at regular intervals for its effective contribution to the employees positive attitudes. Further, the concept of e-HRM has not been fully utilized by the Indian Public sector as compared to the private sector firms The education can also contribute to a larger extent towards a qualitative labour which will enable the countries to become more competititive.

2.6 Missing Gaps

The studies conducted in software industry at national and international levels has been mostly based on the different types of frameworks such as Porters frameworks, models, its exports, and the role of the government in integrating and promoting the software industry at the national and the international levels. Thus, no doubt, most of the literature, has analyzed the software industry from various dimensions. But the concerns in terms of the present scenario of the software industry and its future sustainability has become a puzzle which needs to be resolved. The concept of competitiveness has been

hardly measured in terms of a uniform criterion. Most of the studies have relied on old databases, which do not reflect the competitiveness in a concrete and standard manner. The studies have also been country and firm specific rather than relative. The parameters used to evaluate the degree of competitiveness of software industry of India has been almost uniform in most of the literature. Further, the human capital and its impact has been evaluated in terms of the existing measures on records of books. There are few studies which has studied specific employment development programs such as job satisfaction, job enrichment, etc. There are has hardly any studies which has evaluated the human capital in terms of its both demographic factors and training and development programs in totality and that too in terms of information at first source.

It is with these frameworks of questions in mind that the thesis has explored the software industry in terms of her competitiveness both at the national and the international levels. The concept of competitiveness is defined in terms of the basic institutions necessary for the growth and the promotion of an highly competitive software industry that can sustain itself for many years. The various parameters believed to influence the competitiveness of the software industry of India are evaluated with the help of newly created index at the national and international level. The index will be constructed on the basis of the new parameters uniquely selected to represent the relative degrees of competitiveness of different countries internationally and firms nationally. The study explores the competitiveness of the software

industry in terms of the index, specially designed and created to know the extent of competitiveness of software industry of India.

CHAPTER III

SOFTWARE INDUSTRY OF INDIA

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3.1 Introduction

The software industry has become one of the most dynamic industry in the India today. It consists of IT Services and Business Process Outsourcing (BPO). Begun in 1974, today the IT-BPM industry contributes to 9.5% of GDP and has been the largest employer, greatest contributor to the service exports and has been in the limelight since 1990s. Further, it is forecasted that the Indian economy is expected to grow by almost five times to reach US$ 10 trillion by 2030 as compared to the current US $ 2 trillion (Panagariya, 2016). Therefore IT-BPM industry is going to play a crucial role in Indian economy. In another significant development, a recently released report from Accenture said that US, China and India are expected to dominate the digital platform economy by 2020 (McGuinness, 2016). The exports of the software industry have also been on the rise. The outreach also has been well diversified to some extent. The FDI inflow in the service oriented software industry has shown an increasing trend. Further only certain cities like Hyderabad, Chennai, Bangalore, Pune, etc account for about 90% of IT exports. Among all this cities, Bangalore is considered as a silicon valley, in which more than 5000 IT companies do their business at regular intervals.

3.2 Software: Meaning and Types

In technical terminology software is the interface between computers and human commands. It is a programme that translates the system of human logic into a set of electromagnetic impulses. In general the term software refers both to the instruction that directs the operation of computer equipment and the information content or data, that computer manipulates.

In terms of its usage, it is classified into system software and application software. The former is used to manage the parts of computer system and the latter is used to apply computer power to the performance of tasks such as materials and facilities in hospitals, budget and payroll administration, computer aided designs, etc. Application software is further divided into three broad groups namely, customized software, shrink-wrapped software packages, and embedded software. Customized software is primarily application software that is used to customize the user's computer system so that it can fulfill particular user needs or functions. Customized software is used for data processing and interpersonal/inter-organizational communication for routine operations and management. A shrink-wrapped software package is used on personal computers and allows the user to work independently. It addresses genuine user need, ease of use, flawless documentation to allow the user to be self-sufficient, etc. Operating systems like Windows, spreadsheets like Microsoft Excel or Lotus 1-2-3 and word-processing programmes like, MS

Word and Word Perfect are some examples of packaged softwares. Embedded software is a key element in a complex industrial product. It is increasingly being used in all aspects of existing business to improve or enhance the existing product by new functionality based on software. This type of software is the core of industrial automation, machine tool industries, precision control systems, power generation and distribution, electronic products and telecommunications.

Further, Software in this category comes as part of capital goods and consumer goods. Innovative use of microelectronics devices in industrial automation and industrial products has made embedded software a key to competitive advantage of the industrialized and newly industrialized countries. Generally, development and application of embedded software forms part of a company strategy for enhancing production efficiency, new product development and product differentiations.

3.3 Software Producers and Markets

Producers of software can be categorized in three broad divisions:

1) Software Made By Users
Users themselves create in-house software development capability as a part of its business plan, to enhance its operational efficiency, and also for various control systems and optimization problems. There are examples where the original developer has created independent profit

centers or a spin-off firm for dealing with the successful software developed for internal use. Examples are Attendance Software, Payroll Software etc.

2) Software Made By Hardware Makers

Here hardware means machine and not the computer hardware. Such hardware has inbuilt computing system and associated highly specialized software with new features, efficiency, dependability and intelligent performance of both capital goods and consumer durables. Such firms possess highly skilled hardware and software professionals capable of closely integrating software with hardware design. This is the embedded software segment described earlier. It is to be noted that embedded software segment needs matching capabilities of both hardware and software.

3) Software Made By Independent Software Firms

Independent Software firms have their own projects for use specific (and not only user specific) software development. Packages for word processing, statistical exercises, account keeping, etc, are the examples of products from such projects.

3.4 Evolution of Software Industry in India

The IT-BPM industry had a long journey from a protectionist era to a liberalized regime. Local markets hardly existed and government policy toward private enterprise was not very encouraging in the 1970s. This

protectionist regime had adverse impact on the software industry. However, the various conglomerates of Mumbai began the industry by sending programmers to work for global IT firms abroad (Subhash, 2006). The Indian Institute of Technology was inaugurated at Kharagpur in 1951 in West Bengal. Further, some of the Indians also took the benefit of the immigration laws of United States in 1960. Some of the engineers also ventured into other countries. This developments led to the realignment of the wages of the software professionals so that they are retained. (Publications, 2008).

The protected environment restricted the growth of project management and domain skills so that, despite access to a large pool of programmers, the industry could not grow in value-addition (Dossani, 2005). However slowly and gradually, the software industry started emerging. The government of India also started making use of EVS EM computers, which were imported from erstwhile USSR. Further TCS was formed and established in SEEPZ in 1968. Further, in 1970s, the mainframe based programming and manufacturer specific operating systems and languages gave way to workstation programming and standard operating systems and high-level languages across the globe (Vij and Batra, 2014). This was coincident with policy reforms in India that reduced tariffs on imported hardware and software and encouraged foreign firm entry. This led to the firm's in-house programming for software products. This model was tested

but not widely adopted by the domestic software industry, due to their lack of overseas presence (Dossani,2005).

The National Centre for Software Development and Computing Techniques was started at the Tata Institute of Fundamental Research in Mumbai. Further, many more institutions emerged in the late 1980s and 1990s. some of them were The National Informatics Centre (1975), the Computer Maintenance Company (1976), etc. In 1986-87 three computer networking schemes namely, INDONET, NICNET and ERNET were also started. In 1991 Software Technology Parks of India (STPI) was established with the aim of setting up of software technology parks in different cities of India. Election results were displayed via National Informatics Centre's NICNET. In 1993 the government also permitted individual companies to have their own dedicated links which facilitated their processes, to be transfer the information abroad directly.

The Indian National Task force on Information Technology and software Development was also formed as a part of facilitating the growth of software development in India. The policy reforms of 1990 further gave a push to the growth of telecommunication and other infrastructure required for offshore work (Chandra, 2006). The idea of STPs has also enabled the smaller firms to grow and expand their investments.

3.5 Significance of the Expansionary Role of Software Firms of India

The number of software firms in India has been on the rise. The liberalized policies of the government have positively played its role in the expansion of the existing and the new firms in India. This has greatly resulted in improving the quality and in building of linkages and host of benefits to the Indian economy at large. The scope of the expanding software industry in terms of her increasing number of firms is briefly discussed as follows:

1) Better Scope for Entrepreneurship

Apart from creating jobs for highly qualified professionals as well as ordinary college pass outs, the rise of the software firms has provided opportunities for expanding the local base of entrepreneurship. As the initial starts up costs in the sector, lesser emphasis is given to the economies of scale, thereby having lesser entry barriers especially for the service enterprises. Hence, the entries barriers are low. This has helped a number of technical professionals to start on their own. Even the smaller firms in the informal sector has been on the rise. Many of the leading software enterprises of today were started by first generation entrepreneurs. Infosys, Satyam, Mastek, Silverline, Polaris, etc were started by software professionals and engineers with small savings and loans at a modest scale to begin with. Though the local talent proved to be

strong, but the educational infrastructure was found to be inadequate to fill the gap.

2) Impact on Brain Drain

The rapid rise of software industry in the country has helped to reduce the extent of the brain drain by creating rewarding opportunities within the country, a trend also supported by the availability of venture capital to implement new ideas and innovations. A large portion of top level management positions in the Indian software sector are filled by Indians who left the country and immigrated mainly to the USA in the 1960s, 1970s and 1980s. In 2000, ten out of the 20 most successful software enterprises in India (representing more than 40 per cent of the total revenues within the industry) were set up and/or are managed by former Non-Resident Indians returning from the USA. Four additional enterprises (Mahindra-British Tele-com, IBM, i-flex, Cognizant Technology Solutions) are joint ventures between Indian and foreign companies. The remaining six companies are old-established Indian companies (Tata, Wipro, HCL, and their respective sister companies). Today, 19 of the 20 top software companies in India have Non-Resident Indians at the top level management positions, and an explorative internet survey shows that half of all Indian enterprises within the entire software industry were founded and/or managed by NRI's.

With initiatives undertaken all around to boost ease of doing business in the country the reverse brain drain has gained more momentum. With the government loosening its purse strings to boost the entrepreneur wave and several renowned international companies having committed to make India their manufacturing hub as part of the 'Make in India' project, things couldn't get better.

3) Brand Value

Today, India has claimed supremacy in the software service industry market globally because of which is known as the back office of the world. Software developments and Information technology enabled services including BPO, KPO industry in India overtime has emerged as one of the most vibrant and dynamic sector in the Indian economy. With a small beginning in 1980s, it has now grown into a broad based comprehensive industry employing millions of people.

Further, with the United States being in the limelight of India's software export, off late the Indian companies have realized the potential of moving to markets such as Europe, Middle East, Africa, etc. The new global players have also affected the traditional software exporters of India, which has compelled many of the firms to re-orient their ways of doing their business. Today the Indian software industry has moved beyond from destination India to brand India as Indian software services are considered to be the best in the world. The Indian software firms are

capable of offering unmatched software Services such as managing of systems, cloud and GPU, e-commerce, etc.

4. Flow of Foreign Capital

The development of the software industry has led to an increased flow of capital to the country in three forms namely, Foreign Direct investment (FDI) by outside MNEs in their subsidiaries, joint ventures in India and Foreign Institutional Investments (FIIs) in software Companies in India.

4) Regional Distribution of the software industry.

The development of the software industry in different parts of the world is characterized by a strong tendency towards clustering because of agglomeration economies. In India, the software industry developed initially in Mumbai. Bangalore subsequently emerged as a centre of software industry development, after the entry of Texas Instruments in the mid 1980s. In addition to Bangalore and Mumbai, Delhi and the suburban communities of Noida and Gurgaon emerged as the third most popular location for software units. As Bangalore has become saturated owing to the limits of its infrastructure and the scarcity of space, Hyderabad and Chennai have started to provide alternative locations in the south. The top five cities together account for 80.5% of the top 600 software firms in India.

5) Prominence of Indian IT Software Services

The Software industry of India is not only growing exponentially but is also moving up the value chain. It is evolving from the initial staffing to software development services. Today the Indian software industry has become one of the most important suppliers of technically qualified high class IT manpower and is having (16) IITs, (30) National Institute of Technology and 5672 engineering Institutions in 27 states and Union territories. Approximately 1.5 million engineering graduates pass out every year in India. The domestic software market however requires more penetration across India.

3.6 Software Services and the Issues in Its Measurement

Computer Software and IT-enabled services have become an important activity in the Indian economy not only in terms of her net exports, but also in terms of her contribution to the GDP and its linkages in other sectors of the economy. As per balance of payments (BoP) statistics, India's software services exports (other than on-site exports), stood at ₹ 4,472.8 billion in 2014-15, which constituted nearly 47 per cent of total services exports of India and stood at around 3.6 per cent of GDP (RBI, 2016).

But the measurement of trade in software services in specific has many issues. Under the Balance of Payments format, services come under invisibles. They are further subdivided into Travel, Transportation,

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Insurance, Government Not Included Elsewhere and Miscellaneous services (including IT/BPO exports). Among these, outsourcing of ITES and Business Process has become prominent in recent years; but there is no uniform comparable data for outsourcing to and from different countries in the global context. However, a broad comparison was attempted using the IMF data. In its BOP statistics, the IMF reports services, to include the categories most closely related to outsourcing 'computing and information services' and other business services. According to IMF (2006), 'computer and information services' comprised of transactions between resident and non-resident related to hardware consultancy, software implementation, data processing, etc. The item 'other business services' covers transactions between residents and non-residents relating to professional and technical services, miscellaneous business services, merchanting and other trade-related services, with the latest being given in terms of MSITS, 2010.

However, the problem arises in terms of not only the availability of proper reliable statistics, but also the uniformity in the approaches adopted by different institutions to measure trade in services. Though we can rely on some extent on the IMF yearly statistics from its year Book, but it subjects its data to its annual revisions, which makes it incomparable and the database is limited to the OECD countries only. GATS notion of residency includes nationality, territorial location and ownership or control of the economic agent (Karsenty, 2000). Therefore,

GATS adapts a broader concept of residence compared to BOP. Further, there have also been inconsistencies in the reporting of data between countries.

The IMF database is based on the BOP which does not give data mode-wise. For instance, apart from travel and government services, all other categories of services can be considered as Mode-1 but this could also include a part of Mode-4 transactions. The consumption abroad (Mode-2) is measured in terms of travel. The BoP also does not record activity wise dis-aggregation of natural persons. Further, the data on the number of foreigners and locals employed in a foreign affiliate firm will be useful in getting a clear picture of Mode (4) trade which the IMF's Balance of Payments does not capture. However to a certain extent the data on commercial presence underestimates the trade. Though attempts are made in terms of inclusion/exclusion, with the latest being in 2010, it provides only the guidelines for the measurement of trade in services.

Further, as per the MSITS, international trade in services can be conducted through four different modes, however, as per the BoP manual, foreign affiliates established abroad are treated as the domestic units in the host economy and hence the services delivered by them are not considered as the exports of the home country. To this extent, data on services exports in BoP differs from those in the Foreign Affiliates Trade in Services (FATS) statistics. The need of the hour is to adopt a uniform approach by all agencies and countries to have a unified system of

recording data mode wise so that policy decisions can be effective to encourage and boost trade in services.

3.7 Software Exports of the Indian IT industry from 1980 – 2014 (US $ Billions)

Previous researchers have pointed to factor endowments especially the availability of an adequate supply of relatively highly skilled English-speaking labor; to infrastructure suitable for the production and export of modern services such as the adequacy of telecommunications services and extent of internet penetration and to supportive policies specific to services such as favorable tax treatment and special economic zones, of which India's Software Technology Parks (STPIs) are an example. However in recent times, Software development and technical competence, domain knowledge, information technology enabled services experience and expertise for offering quality IT (ITeS) including business process outsourcing services, and their exposure to working on (BPO)/knowledge process outsourcing various platforms and systems .services (KPO) industry in India has emerged as one of the most dynamic and vibrant sectors in India's economy. With a small beginning in early 80s, it has now grown into a broad based comprehensive industry. Today, India's competence in IT, more significantly in computer software and information technology enabled services has been recognized globally. It is evolving from the initial staffing to software development, from ad hoc

to chaotic software development - where it is currently the world's major supplier of engineers integration and IT business consulting. But its concentration is only in few countries.

It was only in the early in the 1980s that the government of India started its favourable policy towards the software industry, which has greatly contributed to the increasing revenue from the software services as indicated from Table (3.1).

Table 3.1: Software Exports for the Indian IT industry
from 1980 – 2014 (US $ Billions)

Years	US $ Billions	Years	US $ Billions	Years	US $ Billions
1980-Jan-Dec	0.004	1992-93	0.305	2004-05	12.4
1981	0.0068	1993-94	0.447	2005-06	17.06
1982	0.014	1994-95	0.631	2006-07	23.43
1983	0.018	1995-96	0.794	2007-08	32.89
1984	0.025	1996-97	1.31	2008-09	36.03
1985	0.028	1997-98	1.92	2009-10	36.23
1986	0.039	1998-99	2.55	2010-11	41.1
1987	0.054	1999-00	3.71	2011-12	48.63
1988-89(Apr-May)	0.07	2000-01	5.43	2012-13	56.33
1989-90	0.105	2001-02	6.3	2013-14	63.24
1990-91	0.131	2002-03	7.25	2014-15	74.8
1991-92	0.194	2003-04	8.86		

Data Source: Heeks, R. (2015), Centre for Development Informatics, University of Manchester (https://ict4dblog.wordpress.com/tag/software-exports)

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Figure 3.1: Software Exports of India In US $ Billions
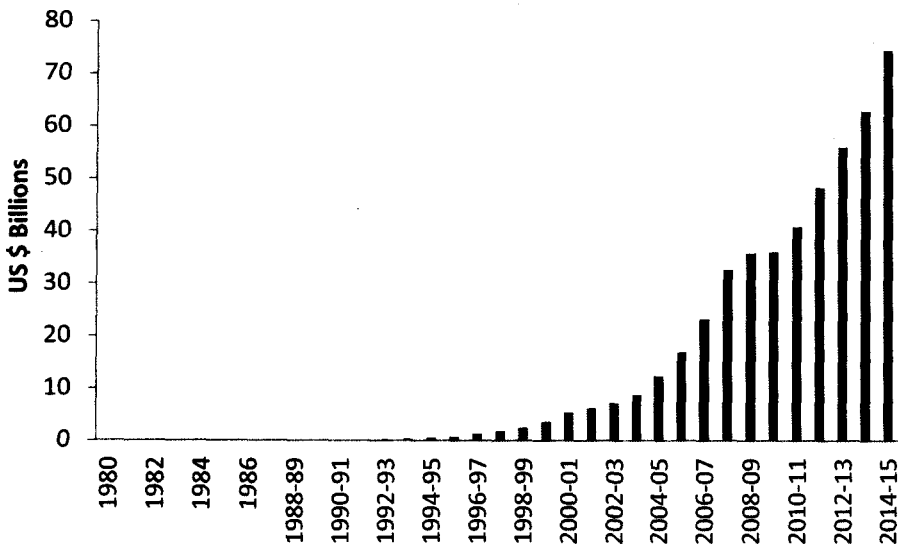
The statistics of software exports as shown in the table (3.1) above clearly depicts the unique competitive edge which India possesses in her export industry. It should be noted that the period 1980 onwards till 1988-89 measured their revenue annually at January-December of every year. However since 1988-89, it started measuring from April May onwards of every financial year. The total exports of software has increased from 0.004 US $ billions in 1980 to 74.8 US $ billions in 2014-15. Her contribution to GDP also increased from 0.3% in 1990s to 1.7 in 1998 and was around 9.5% in 2015-16. Apart from her favourable policy frameworks from 1990s, India also reaped her demographic dividend, combined with cheap labour and a favourable time zone. This benefit gave India a comparative advantage in computer software, production and exports. Whilst such expertise combined with low salaries is a distinct advantage, it cannot by itself guarantee the continued expansion and

technological upgrading. Other considerations, too, may have considerable bearing on the long-term outcome for the computer software sector in India (Lakha, 1994).

Thus, the striking aspects of India's recent growth has been the dynamism of the service sector, particularly information technology (IT) and IT enabled services (ITES), while, in contrast, manufacturing has been less robust. While the genesis of such revolutionary changes could be traced to the technological changes in microelectronics, it has been sustained by the developments in software. The cumulative effect has been emergence of ICT as the General Purpose Technology (GPT) of the new millennium that is instrumental in enhancing efficiency, competitiveness and growth in all sectors of the economy regardless of their stage of development and help achieving the millennium development goals by the developing countries (Joseph, 2012). India's services exports has grown much faster than that recorded by the world during the past decade and a half and infact become an inspiration for other developing economies. Due to such rapid growth in services exports, India has succeeded in raising its penetration in global markets more rapidly for services than for goods. It has also been shown that the Indian strategies and styles and innovations by the IT firms have been copied by firms in other industries contributing to their enhanced performance (Arora and Athreye, 2002). Further, it should be noted that the rise in the share of the software services of India has greatly affected the developed countries as well.

The Indian software export industry has grown at an annual compound growth rate of 45 per cent during the last decade and continues to show robust growth even today (Illiyan, 2005). The India's pool of young manpower is the key behind this success story. Presently there are more than 500 software firms in the country which shows the monumental advancement of the Indian Software Industry. The increased presence of foreign subsidiaries of Indian companies however has resulted in higher share of Private Limited Companies in total software exports. But Public limited companies continue to have the dominant share of the total software services exports but their share declined to 55.6 per cent in 2014-15 from 63.6 per cent in 2013-14 (RBI, 2016). Amidst its competitors like Russia, China, Singapore, Ireland, etc.

The basic question before the Indian software industry is not only the sustainability of its present growth rate, but also as to how to increase its share across the globe and attribute to the linkages which are very much important. According to Nasscom President Som Mittal, there has been increasing level of specialization within the industry both in IT services and BPO, exhibiting signs of a rapidly maturing industry. However, there are global macro-economic challenges, talent, manpower and infrastructure issues that needed to be addressed and resolved collectively.

3.8 Destination of Software Services Exports

It should be noted that the destination of the Indian software services exports of India shows a very disturbing picture of its overdependence and the absence of a widened market for her services. The Indian software market has been confined to few economies of the world like that of USA and Canada and some European countries. This is highlighted in Table (3.2)

Table 3.2 Destinations of software Services Exports (US $ Billions)

Regions	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
USA & Canada	30.9	33.3	40.1	44.8	49.1	54.3
Europe	11.1	12.1	12.7	17.4	20.2	20.7
UK	7.1	7.4	7.2	9	10	10.4
Asia	2.5	2.7	3	4.1	7.4	7.4
East Asia	1.9	2.1	1.1	1.6	5.8	6.3
West Asia	0.5	0.5	0.4	1.1	1.5	1.0
South Asia	0.1	0.1	1.4	0.3	0.1	0.1
Australia &New Zealand	1.3	1.8	2.2	2.8	2.8	2.3
Other Countries	1.8	1.9	4.6	2.4	2.5	2.6
Total	47.6	51.8	62	71.4	82	88

Data Source: *RBI Survey & Reports (2010-11, 2011-12, 2012-13, 2013-14, 2014-15 & 2015-16)*

Figure 3.2: Destinations of software Services Exports

Bar chart showing destinations of software services exports for years 2010-11 through 2015-16, with categories USA & Canada, Europe, UK, Asia, and East Asia.

India's trade with different countries over the last five years or more has remained sluggish, though it has been marginally and gradually shown a rise. The maximum trade of software services however has been with United States and Canada, followed by Europe and UK to some extent. There is however some improvement and diversification in her software trade with east Asian countries as over the last two years it has taken a little jump from1.6% to 6.3%. The net exports of software services however has shown an increasing trend from 47.6 US $ billions in 2010 to 88 US $ billions in 2015-16. This shows a very unsatisfactory picture of the trade in software services, which though increasing, but within the limited boundaries to the same nations which it used to transact earlier.

3.9 Contributions of Software Services in total Service Exports.

The share of India's software service exports in its total exports has shown a rise from 2000-01 to 2015-16. Its contribution has been shown in Table (3.3) This is largely due to the increased demand from developed countries like US and EU, which are outsourcing their non-core activities to take advantage of the low-cost high-skilled professionals from the developing countries like India.

Services exports in country's GDP in general are associated with higher levels of development, but not all developing countries including India are yet in a position to be large-scale exporters. At the same time, developed countries are increasingly outsourcing their services to developing countries, thereby showing some services trade complementarities between the two income groups as well as reflecting their rising trade competitiveness.

Table 3.3 Contributions of Software Services in Total Service Exports ($ US Millions)

Year	Invisibles	Software Services	% Share	Year	Invisibles	Software Services	% Share
2000-01	11791	NA	-----	2008-09	91,603	43,736	47.75
2001-02	13,485	7,556	56.03	2009-10	80,022	48,237	60.28
2002-03	17,047	9600	56.31	2010-11	79,269	50,905	64.22
2003-04	25,425	12,200	47.98	2011-12	1,11,604	60,957	54.62
2004-05	31,232	16900	54.11	2012-13	1,07,493	63,504	59.08
2005-06	42,002	23,170	55.16	2013-14	1,15,212	66,958	58.12
2006-07	52,217	31,300	59.94	2014-15	1,18,081	76,529	60.56
2007-08	75,730	36,942	48.78	2015-16	107928	71454	66.21

Source: RBI Annual Reports

Figure 3.3 Contributions of Software Services in Total Service Exports
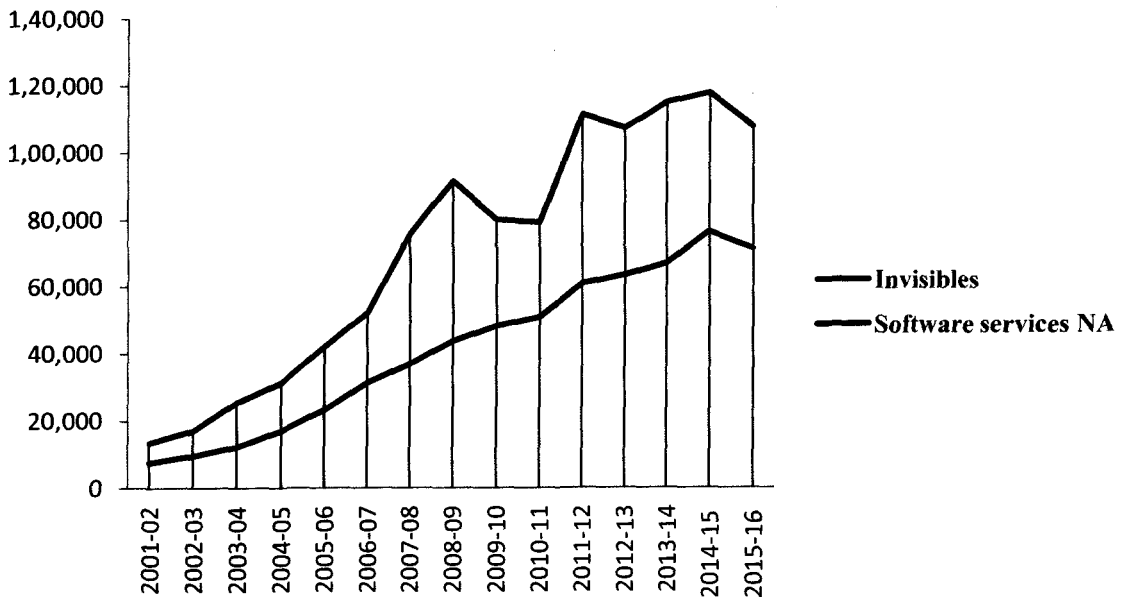
Data Source: RBI Annual Reports

Table (3.3) shows the contribution of the software services to the total

services exports of India. It can be seen that during 2001-02, out of the

total indivisibles (Net) of $ US 13,485, the contribution of software

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services was $ US 7556 (56.03%).In 2015-16(P) the share of software services was 66.21% with a contribution of $ US 71454 out of total invisibles of $ US 1,18,081.

3.10 Expectations from IT & ITeS Sector

As per the DIPP and Various Press Reports, the expectations from the IT and ITeS sector has increased over time. It is believed that the Indian IT sector is expected to grow at 12-14% in 2016-17 in constant currency terms. Further by 2018, worth Rs. 10 trillion (146.72 US $) is expected to come from internet business and it is expected to triple its current revenue to US $ billion by 2025. it should be noted that the number of internet users in India had reached 400 million on May 2016 (3rd largest in the world). Public Cloud services revenue is expected to reach US $ 1.26 billion in 2016 and is growing by 30.4% on a year to year basis. The public cloud market alone in the country was estimated to treble to US $ 1.9 billion in 2018 from US $ 638 million in 2014. The Indian healthcare Information Technology (IT) market is valued at US $ 1 billion currently and is expected to reach US $ 700 billion by 2020.

3.11 Recent Policy Initiatives by the Government of India

1) Mr.Ravi Shankar Prasad, Minister of Communication and Information Technology announced the plan to increase the number of common service centers to 2, 50,000 from 1, 50,000 for better dispersal of information and to facilitate e-services distribution point.

2) The Minister for Railways has introduced bar-coded tickets and most of the railway coaches and stations have been eanabled with wi-fi in terms of Global Positioning Systems.

3) The e-Tourist Visa (e-9V) schemes have been extended to 37 more countries, thereby taking the total count of countries under the scheme to 150.

4) The Department of Electronics & Information Technology & M/s Canbank Venture Capital Fund Ltd plan to launch an Electronic Development Fund (EDF), to provide risk capital to firms developing new technologies in the areas of electronics, nano electronics and IT.

5) The HRD Ministry has entered into partnerships with private companies to open three IIT in different parts of the country.

6) Government of India is planning to develop five Incubation centers for Internet of Things (IOT), start-ups in line with its program of

Digital India and having at least two centers in rural countryside for smart Agriculture.

7) The GDP of India is also expected to get a push from US $ 500 billion to US $ 1 trillion by 2025 on account of the drive of Digital India by the government.

8) India and US (top in Software industry) has agreed to work together in the area of Digital India, a project worth Rs. 1.13 trillions.

9) In India, Social Mobility, Analytics and Cloud (SMAC) are collectively expected to offer a US $ 1 trillion Opportunity, which is increasing at a rate of 30% to around US $ 650-700 billion by 2020.

3.12 Summary of the Chapter

The industry is a pioneer in terms of adapting and perfecting the new business model of outsourcing services. This model was based around contractual sub-servicing for companies located mainly in USA and different variants of it were developed with time. Later on, off shoring was born which was applied to other areas like call centers, financial services, content management services, etc. India now enjoys a comparative advantage in this model.

The Indian software industry has impacted the economy far beyond the boundaries of the sector. It has placed the nation on the world map in terms of entrepreneurial and technological capabilities. It has set precedence for other emerging nations who are looking to succeed in this industry. It is an example for other industries in terms of export orientation, strategic alliances and foreign investment. It provides a stiff challenge to many developed nations in terms of quality software service provision and has reformed the liberalization and modernization processes in the country. The study of such a young and successful industry in an emerging economy where drawbacks such as huge population were converted into competitive advantage provides important insights into a highly competitive and growing industry. The software industry has made its impact in the global software market. This has to sustained and improved over time in terms of adequate supportive policies from the government and the institutions.

CHAPTER IV

COMPETITIVENESS OF INDIA'S SOFTWARE INDUSTRY – A MACRO LEVEL ANALYSIS

CHAPTER IV

COMPETITIVENESS OF INDIA'S SOFTWARE INDUSTRY: A MACRO LEVEL ANALYSIS

4.1 Introduction

India has become one of the fastest growing economies in the world over the last two decades. However the striking aspects of India's recent growth has been the dynamism of the service sector, particularly information technology (IT) and IT enabled services (ITES). India's services exports has grown much faster than that recorded by the world during the past decade and a half and in fact became an inspiration for other developing economies. India's services trade currently constitutes about 32 per cent of the country's total trade (Raychaudhuri and Ajitava, 2008). Due to such rapid growth in services exports, India has succeeded in raising its penetration in global markets more rapidly for services than for goods.

The Indian software export industry has grown at an annual compound growth rate of 45 per cent during the last decade and continues to show a robust growth even today (Illiyan, 2005). The India's pool of young dynamic talented manpower is the key behind this success story. India has shown a rapid growth in the field of IT. The Indian IT industry has taken the world with surprise. It has shown that the strategies, styles and innovations adopted by the IT firms have been copied by firms in other industries contributing to their enhanced performance (Arora and

Athreye, 2001). More and more IT companies are hiring the Indian professionals today. This can be attributed to talented, affordable and technically sound work force. But then since the past 2-3 years China, Malaysia, Singapore, Philippines have emerged as the strong competitors to Indian IT industry.

The study focuses on the competitiveness of the Indian software industry vis-à-vis its competitors across the globe. The objective of the chapter is to develop a competitiveness index for India's Software Industry.

4.2 Theoretical Background

The concept of competitiveness has been defined in different ways by various researchers, academicians and economists. There is no standard definition of competitiveness. It has been examined at different levels of firm, industry, country, etc, with corresponding measures and indicators. Infact, competitiveness has been the subject of debates in the late 1980s and the early 1990s (Krugman 1994, Porter 1990).

Initially, the literature on competitiveness had its sources in international Economics and industrial organization. In international Economics, it was analysed in terms of measures such as Revealed Competitive advantage, domestic resource cost ratios and Balassa Indexes (Tsakok). In case of national competitiveness, it has its roots in the theories of Industrial organization, particularly in the work of Porter who analysed competitiveness in terms of four credentials,

namely, factor/resource endowment, home demand conditions, related and supporting industries and firms strategies, structure and rivalry. However Krugman was very much critical about Porters framework. He held that the competition between the firms is an poor analogy to examine national and regional economies. It also fails to analyse the effects of CAP (Competency Assessment Program) on the competitiveness and the interaction between the sector and the environment.

Further, the Resource Based Theory (RBT) also explains the competitive advantage at the firm level in terms of unique and distinct resources and capabilities that performs better than other available factors with other firms. It should also be noted that both endogenous as well as exogenous factors determine the degree of competitiveness. The former are within the control of the firm and includes factors such as ownership, factor intensity, attributes of labour (age, education, gender and experience), product specialization, marketing strategy, etc. The exogenous factors include factor/resource endowments and the role of the government.

The World Economic Forum has defined national competitiveness as the 'set of institutions, policies, and factors that determine the level of productivity of a country'. The level of productivity is regarded as the main determinant of a country's returns on investment and long-run prosperity.

Regarding indicators, the most comprehensive approach is offered by the World Economic Forum which over several decades has sought to benchmark national competitiveness, through the construction of its GCI. The GCI is based on 12 sets of indicators, termed pillars, relating to: institutions, infrastructure, macroeconomic environment, health and primary education, higher education and training, goods market efficiency, labour market efficiency, financial market development, technological readiness, market size, business sophistication and innovation. The theoretical basis of the GCI is a three stage model of economic development, in which the different pillars are attributed higher relative weights that are regarded as of greater significance for a country's particular stage of development.

Furthermore the competing notions of competitiveness in software industry has also found in the applied work on competitiveness. While there tends to be a clear focus on one or the other in the work of specific institutions, the definition of competitiveness applied often tends to combine aspects of both conceptual ideas. ECB President Mario Draghi, for example, defined a competitive economy as one in which 'institutional and macroeconomic conditions allow productive firms to thrive and in turn, the development of these firms supports the expansion of employment, investment and trade" (quoted in Altomonte/Bekes, 2016). This perspective is open to both cost/market share and productivity-oriented considerations; it is more explicit on macroeconomic outcomes and specific policy conditions than on the mechanisms that connect them.

4.3 Performance of India's Software Industry and its Competitiveness

The software industry has four major sub-components namely, IT services, Business Process Outsourcing (BPO), engineering services and R & D, and software products. As per the estimates of the National Association of Software and Services Companies, the IT and BPO sectors (excluding hardware) revenues were USD 132 billion and grew at 11 per cent in 2015, generated direct employment of 3.5 million and indirect employment of over 10 million.

India's IT-ITES exports was estimated to gross USD 107.8 billion in 2015-16, growing by 9.0% over 2014-15 and contributed nearly to 83% of the total IT-ITES revenues (excluding hardware). India's share of export of computer and information services in the total service exports is high compared to other countries. This indicates the importance of this emerging sector within the growing services sector. Regarding import of telecommunication, computer and information services in the world, the top ten importers in 2014 were European Union, Extra European Union, US, Switzerland, China and Singapore. India occupied 10th position with import valued at US $ 4318 million and China stood at 5thth position with import of US $ 13,422 million. However in terms exports, the top five countries had been European Union, Extra European Union, India and US. India occupied 3rd position with exports valued at US $ 55666 million and China stood at 5thth position with

export of US $20173 million dollars (Commission, European Union, 2015).

Furthermore it should be noted that the share of ICT in the total service exports has been on the rise. India's share of ICT in total services as compared to the other leading ICT exporters is given in Table (4.1).

Table 4.1   ICT Exports as a percentage of Service Exports (2000 – 2014)

Countries	2000	2001	2002	2003	2004	2005	2006	2007
Brazil	47.6	53.6	47.3	44	41.3	43	42.7	47.9
Cannada	33.8	33.5	35.3	39.1	37.5	39.3	39.1	39.2
China	11.9	10.2	11.4	25.2	29.4	20.9	21.6	23.3
France	33.2	34.9	36	36.3	33.2	36.3	35.8	33.2
Germany	30	31.1	28.6	34	32.9	32.9	32.9	34
India	55	59.5	61.5	61	65.3	67.2	68.3	68.1
Ireland						57.2	54	57.5
Israel	53.1	57	57.6	58.3	68.3	55.4	57.6	54.7
Italy	26.6	31.9	29.8	32.1	31.4	34.2	34.5	34.3
Japan	29	28.4	29.2	25.4	23.9	19.8	21.7	21.7
Pakistan	23	22.8	21.9	15	18.1	17.9	19.5	16.9
Phillipines	8.6	11.9	12.3	13.7	12.8	59.8	56.5	52.5
Poland	15	15.7	14.5	17.1	15.7	17.4	20.1	20.4
Russia	19.3	16.7	19.7	22.7	22.3	23.7	25	28.2
Singapore	20.4	21.2	21.2	22.1	23.6	22.2	26.3	23.7
Turkey				2.3	2.3	2.2	2.1	2.5
UK	30.1	31.8	33.9	33.4	33	30.4	31.6	31.7
US	18.2	20.8	21.5	21.7	20.5	19.8	20.6	21

Data Source:data.worldbank.org/indicator/BXGSR.CCIS.ZS

ICT service exports include computer and communications services (telecommunications and postal and courier services) and information services (computer data and news-related service transactions).

Table Continued...

Table 4.1 Continued

ICT Exports (% of Service Exports)							
Countries	2008	2009	2010	2011	2012	2013	2014
Brazil	49.2	51.9	51.5	52.9	55.7	54.2	57
Canada	41.8	43.7	43.2	42.4	40.9	42.8	42.4
China	28.3	31.8	31.3	32.8	34.9	35.9	38.4
France	20.6	30.6	31	30.4	30.3	36.1	38.1
Germany	31.8	32.2	32.4	32.9	33.7	38.4	39
India	69.3	66.3	61.6	61.5	65.9	68.1	67.5
Ireland	61.2	64.3	64.9	62.1	67.1	68.4	67.5
Israel	53.8	60.3	56	57.4	58.9	63.1	62.7
Italy	31.8	30.5	33.7	34.9	34.9	31.8	31.9
Japan	24.4	29.8	25.5	28.1	29	23	24.9
Pakistan	17.8	23.2	16.3	23.4	20.1	32.6	28.3
Philippines	50.7	61.5	63.5	71.7	67.3	70.9	70.4
Poland	27	30.8	36	33.7	33.9	29.7	31.1
Russia	29.3	30.6	30.4	30.7	31.8	32.2	32.3
Singapore	23.7	25	22.9	23.7	24	27.1	27.1
Turkey	2.6	2.4	2	1.6	1.7	1.5	1.3
UK	36.1	37.8	41.6	39.3	39.5	33.4	35.9
US	19.8	21	20.8	20.3	20.5	22.8	23.3

Data Source:data.worldbank.org/indicator/BXGSR.CC

ICT service exports include computer and communications services (telecommunications and postal and courier services) and information services (computer data and news-related service transactions).

It is reflected from the Table (4.1) that India's total share of software exports towards its total service exports has increased from 55% in 2000 to 68.3% in 2006, but however has marginally declined to 67.5 in 2014, whereas in case of Ireland it has increased from 57.2% from 2005 to 67.2% in 2014. It should be noted that in case of Philippines, it increased from 8.6% in 2000 to 70.4% in 2014. Further, It was also found that the countries which has been leading in their ICT exports as a percentage of Service exports has taken a lot of directional steps to promote the ICT sector in their countries in terms of their economic policies and infrastructural developments. These countries seems to have realized the IT as the emerging sector and its prospects, but India appears to have forgotten to do its homework that whatever is achieved had to be sustained in these competitive world in terms of building the required infrastructure for the competitiveness of IT and ITeS sector.

The Indian software exports have grown in spectacular fashion. Its success has, for the most part, been attributed to a combination of resource endowments, active encouragement from the government, and good timing. After more than two decades of the economic reforms, since 1990's, the software industry has come a long way by absorbing external shocks. The contribution of the software industry has been on the higher side. India has been successfully participating in the global division of labour in different services and has emerged as a leading player in the export of software services.

The Revealed Comparative Advantage (RCA) Indices calculated by Brijesh Pazhayathodi (2010), has shown India's growing service trade vis-à-vis goods trade. The study found that Ireland and India were having clear revealed comparative advantage in service trade vis-à-vis other countries. It should be noted that the comparative revealed advantage in case of computer information related services, India has taken a lead from Ireland. In 2000 the RCA index of Ireland was 13.8, which however had come down to 6.4 in 2008 vis-à-vis India which has been robust at 9.4 to 9.2 during the period.

Given the external and the internal factors affecting the software industry, the basic question as regards Indian software industry is whether the Indian industry enhanced its quality. More importantly, the question is whether India's software has improved its competitiveness in relation to its competitors like Ireland, China, Russia, Singapore etc. The present chapter attempts to study competitiveness of India's software industry vis-a-vis its competitors.

4.4 Software Competitiveness Index

An important question is whether India is competitive enough to face challenges from other dominant players as well as contingencies of future. What is the degree or extent of impact factors such as business environment, the respective countries quality of human resource component, the technology, etc; have upon performance of software industries. The infrastructure, technological readiness combined by

factors like availability of latest technology, firms technological absorption, FDI and technology transfer, internet users, etc; greatly determine the competitiveness of the IT and ITeS industry. Countries like Ireland, Singapore and Brazil, etc are perhaps to be dominating in such criteria, which has really enabled them towards the competitiveness of the software industry. Further, the state of cluster development has also been an important factor in the development of the software industry. Many of our competitors like Brazil, Singapore, China, Indonesia are having an edge over India in cluster development. Most of the Indian companies have their outsourcing market in the US (62%) which however accounts for just 5% of the total global outsourced market. This shows that India is yet to exploit the software market across the globe.

Various research studies have shown and studied different factors which have been affecting the software industry of India vis-à-vis of its competitors like that of Ireland, Singapore, China, Russia, and Brazil etc. But apart from nations, other nations like Ireland and Singapore has been becoming major competitors for India in the growth of the software exports and its performance.

4.4.1 Preparation of Software Competitiveness Index

The purpose of any Competitiveness Index is to compare countries in different regions of the world on the extent to which they possess the

conditions necessary to support their growing industry. To achieve this, different countries and institutions have adopted different models. The concept of competitiveness is a dynamic one, changes with time at regular intervals in different economies across the globe. The concept of competitiveness is defined as the set of institutions, policies, and factors that determine the level of productivity of an economy, which in turn sets the level of prosperity that the country can achieve (Schwab, 2016).

The growth of software trade has created its impact on the GDP growth rates of the nations. In fact many economies have changed their foreign policy both domestically in terms of economic reforms and RTAs internationally to reap maximum economies of scale from the software industry. This is basically on account of different sectoral set-ups of the economies across the globe. As per the Annual Report of The National Association of Software and Services Companies (NASSCOM), 2015, among the IT and ITeS companies, 57.6% catered to the IT services, 21.62% BPO, and 20% catered to Software Products, Engineering Services and R&D in 2014-15. Further, there has been a rise in the number of companies who has obtained the quality marks in the IT manpower. Over 75% of the world wide SEI CMM level 5 certified companies are Indian (Nasscom, 2015). India has been one of the economies which has been gaining maximum benefits from the trade in services in general and more specifically in the software market which was projected to reach $5.3 billion in 2016 and now to

$3.5 Trillion in 2017 up by 2.9 percent from 2016, It is this widening of IT spending across the globe that the IT spending in India is forecasted to reach $72.4 billion in 2017, up 6.9 percent from 2016 estimated spending of $67.7 billion according to the latest forecast by Gartner, Inc. It is also evident that the Indian government is serious about leveraging information technology for effective governance. Though India has been shining on the front of its software exports, it has been equally facing a severe competition from its competitors in terms of different factors which are bound to influence the future sustainability of the software industry of India vis-à-vis of its counterparts. The variables affecting the competitive abilities of the nations at large have been broadly classified into 1) Business Environment Index 2) Performance Index and 3) Human resource Index.

4.4.2 Data and Methodology

Various studies on software industry had used the data base made available by The National Association of Software and Services Companies (NASSCOM), Reserve Bank of India (RBI), and Electronics and Computer Software Export Promotion Council (ESC) etc. However, the present study used data from various reports like Global Competitiveness Reports from 2008-09 to 2015-16, Global Information Technology Reports, World Development Indicators, World Bank, etc; The present study is with a purpose to know the competitive strengths

of various economies, broadly classified as Advanced and Emerging Economies in terms of the various parameters that keep the capacity to influence the competitive sustainability of the economies to become leaders in the Software market.

The study uses 32 variables for 20 countries divided into Advanced Economies (AE) and Emerging Economies (EE). The advanced economies consist of 8 countries such as Singapore, United States, Germany, Canada, United Kingdom, Japan, France and Ireland, whereas the emerging economies include India, china, Israel, Brazil, Mexico, Russia, Philippine, Italy, Poland, Turkey, Pakistan and Egypt. An emerging economy may be understood as one which is progressing in terms of its growth and has been expanding its role both in the world economy and on the political frontier. Whereas developed/advanced economies are to be understood as those who have a high level of GDP per capita as well as significant degree of industrialization.

In order to bring about the relative competitiveness of the Indian economy in the software market, a new index is created based on three sub-indices, namely, Business Environment Index, HR Environment Index and Technological Environment Index. These three sub-indices go to make Software Competitiveness Index. The Business Index is, obtained in terms of 17 variables (Bi, Bii, Biii.........Bn) whose mean scores on 1 – 07 scales are obtained for 20 countries, both Emerging and Advanced economies. The mean scores are taken from 2008-09 to 2015-16 only, as some of the variables under study were found to be

Table 4.2 Software Competitive Index: Sub-Indices

Code	Parameter	Code	Parameter	Code	Parameter
Code B	*Business Environment*	B12	Quality of Management Schools	H6	Cooperation in Labor-Employer Relations
B1	Availability of Scientist and Engineers	B13	Quality of Scientific Research Institutions	H7	Pay and Productivity
B2	Brain Drain	B14	State of Cluster Development	*Code T*	*Technology*
B3	Burden of Government Regulations	B15	Strength of Investor Protection	T1	Availability of Latest Technologies
B4	Business impact of Rules on FDI	B16	University-Industry Collaboration	T2	Firm-Level Technology Absp
B5	Capacity for Innovation	B17	Level of Transparency	T3	FDI and Technology Transfer
B6	Company Spending on R & D	*Code H*	*Human Resource*	T4	ICT use includes usage of IT by individual. govt and business
B7	Firm Level Technology Absp.	H1	Life Expectancy	T5	Internet users : Per Hundred People
B8	IPR	H2	Quality of the Educational System	T6	Broadband Internet Subscriptions Per Hundred People
B9	Local Supplier Quality	H3	Education Expenditure	T7	Govt. Prioritization of ICT
B10	Prevalence of Foreign Ownership	H4	Local Availability of Research and Training Services	T8	Importance of ICT to Govt. Vision for Future
B11	Quality of overall Infrastructure	H5	Extent of Staff Training		

Data Source : Compiled by the Author- Data pertaining to the above variables are collected from Global Competitiveness Reports, World Economic Forum & World Development Indicators, World Bank (from 2008-09 to 2015-16)

not included in previous years or were included after 2008-09. All the values of the given variable are then averaged for the period of eight years to get an individual value of the given variable for the country concerned. The HR Sub-Index is similarly obtained from 07 variables and the Technological Sub-Index is obtained from specific software competitiveness related 9 variables. A New Competitive Software Index has been prepared with the help of said variables in terms of assigning weights i.e., 40% to the sub-index of Business Environment, 30% to HR sub-index and 30% to Technological sub-index. The variables considered for the above three categories are listed in Table (4.2).

4.4.3 Business Environment Index

The Business Environment index is prepared by taking into account the mean scores of various sub-variables on 1-07 point scale for a period from 2008-09 to 2015-16 only as some of these variables were excluded in the previous periods. All the mean scores of individual variables are then individually averaged for the above period to get a unique value of each sub-variable. This process has been followed for all the variables in their respective categories. All the unique values are then added of respective countries. The result is given in Table (4.3).

	Table 4.3 Mean Scores on Business Environment of Various countries																		Ranks	
	Business Environment Variables																			
	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	B16	B17	Total	AE & EE	Overall
	Advanced Economies																			
US	4.95	5.85	3.41	4.80	5.51	5.49	6.06	5.29	5.63	5.14	5.81	5.64	6.05	5.31	5.41	5.78	4.61	90.73	2	2
UK	5.41	5.05	3.35	5.60	5.00	4.78	5.68	5.75	5.36	6.08	5.36	5.73	6.07	5.06	5.28	5.60	5.15	90.30	3	3
Japan	5.73	4.63	3.41	4.63	5.70	5.81	6.23	5.64	6.19	4.74	6.00	4.14	5.56	5.31	4.39	4.91	5.11	88.12	4	4
Ireland	5.10	4.6	3.68	6.56	4.28	4.43	5.53	5.61	5.31	6.04	4.61	5.21	5.40	4.51	5.59	5.08	5.13	86.66	7	7
Singapore	5.14	5.45	5.49	6.41	4.60	5.00	5.90	6.15	5.16	6.23	6.51	5.76	5.58	5.19	6.29	5.55	6.20	96.60	1	1
France	5.00	3.85	2.66	4.75	5.05	4.73	5.53	5.73	5.50	5.50	6.31	5.71	5.45	4.35	3.89	4.35	4.48	82.83	8	8
Canada	5.38	5.1	3.58	4.89	4.39	4.01	5.53	5.59	5.55	5.55	5.79	5.81	5.48	4.88	5.92	5.06	5.29	87.77	6	6
Germany	4.85	4.7	3.36	4.85	5.75	5.56	5.86	5.60	6.04	5.09	6.16	5.00	5.66	5.23	3.87	5.26	5.01	87.85	5	5
	Emerging economies																			
India	4.96	4.05	3.20	4.78	3.79	3.70	5.03	3.71	4.59	4.56	3.59	4.86	4.43	4.43	3.77	3.80	4.25	71.48	3	11
China	4.53	4.25	4.05	5.14	4.19	4.19	4.85	3.98	4.58	4.40	4.23	4.04	4.30	4.63	3.46	4.48	4.55	73.81	2	10
Israel	5.24	4.08	3.08	4.99	5.46	5.21	6.08	4.55	5.14	5.16	4.65	4.81	6.19	4.04	5.58	5.23	4.25	83.72	1	9
Brazil	3.74	4.2	1.91	4.45	3.89	3.66	5.11	3.33	4.90	4.56	3.25	4.26	4.06	4.38	3.09	3.96	3.78	66.53	6	14
Mexico	3.88	3.4	2.86	4.93	3.24	3.04	4.61	3.43	4.83	5.48	4.01	4.35	3.89	3.98	3.56	3.79	4.05	67.29	4	12
Russia	4.16	3.05	2.64	3.60	3.54	3.19	3.97	2.79	3.93	3.49	3.70	3.70	3.94	3.09	3.43	3.60	3.76	59.56	12	19
Philippines	3.78	3.05	2.98	4.48	3.43	3.26	5.11	3.33	4.45	4.66	3.36	4.63	3.46	3.86	2.00	3.51	3.80	63.14	9	17
Italy	4.56	2.8	2.09	3.53	4.15	3.55	4.34	3.78	5.19	3.93	4.06	4.78	4.08	5.45	3.51	3.53	3.03	66.33	7	15
Poland	4.19	2.9	2.69	4.40	3.41	2.98	4.41	3.71	4.88	4.86	3.55	4.16	4.03	3.21	3.63	3.45	3.61	64.06	8	16
Turkey	4.38	3.15	3.21	4.83	3.43	3.04	5.19	3.25	4.68	4.49	4.81	3.78	3.64	3.90	3.40	3.55	4.41	67.12	5	13
Pakistan	4.10	3.13	3.28	4.60	3.40	3.01	4.47	3.01	4.11	4.09	3.35	4.06	3.45	3.81	3.89	3.28	3.54	62.58	10	18
Egypt	4 41	2 44	2.80	4.10	2.88	2.63	4.50	3 35	4.04	3.90	3.58	2.68	2.74	3.94	3.27	2.63	3.95	57.81	11	20

Data Source: Calculated by Author

Figure 4.1 Business Environment Index of Advanced Economies

Figure 4.1 Business Environment Index of Advanced Economies

- US 90.73
- UK 90.30
- Japan 88.12
- Ireland 86.66
- Singapore 96.60
- France 82.83
- Canada 87.77
- Germany 87.85

Figure 4.2 Business Environment Index of Emerging Economies

Figure 4.2 Business Environment Index of Emerging Economies

- India 71.48
- China 73.81
- Israel 83.72
- Brazil 66.53
- Mexico 67.29
- Russia 59.56
- Philippines 63.14
- Italy 66.33
- Poland 64.06
- Turkey 67.12
- Pakistan 62.58
- Egypt 57.81
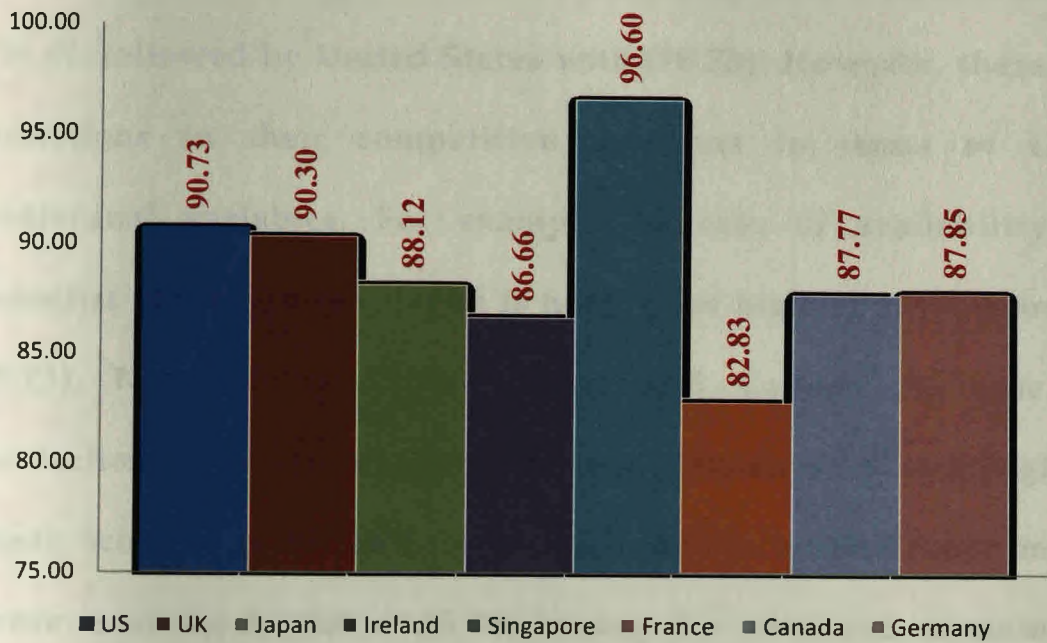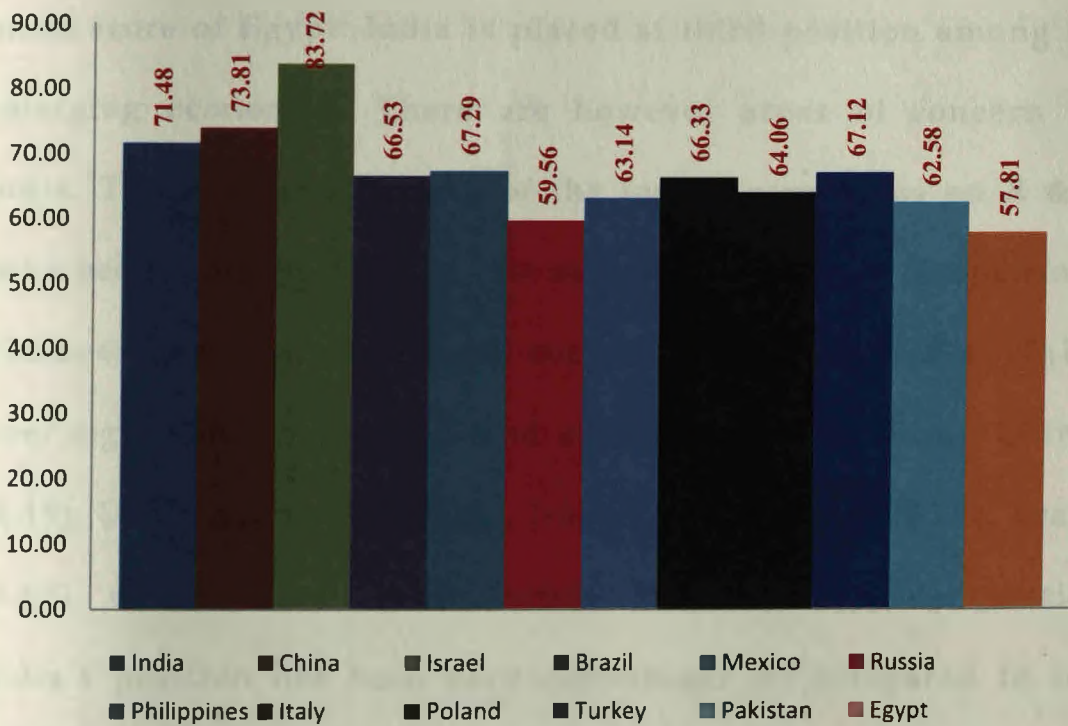
It can be seen in Table (4.3) and Figures (4.1) that the countries have been divided into two, namely advanced economies and the

emerging economies. Now amongst the advanced economies, it can be seen that Singapore has been leading with a total score of (96.6), followed by United States with (90.73). However, there are variations in their competitive positions in terms of their individual variables. For example, in case of availability of scientist and engineers, Japan is having the highest mean score of (5.73), followed by United States and Canada. In case of protection of investors, Singapore and Canada possess a highest mean score of (6.29) and (5.92) respectively; while France mean score is at the lowest at (3.89) among the advanced economies. Further, even in terms of emerging economies Israel is found to be at top with a mean score of (83.72) against (57.81) the lowest mean score of Egypt. India is placed at third position among the emerging economies. There are however areas of concern for India. The average spending of the Indian companies on R & D have been found to be very low as compared to her competitors. The average mean value of the company spending on R & D (B6) over eight years has been found at (3.70) as compared to Chinas (4.19), US (5.49), Singapore (5), Ireland (4.43), Israel (5.21), Brazil (3.66), etc. In case of intellectual Property rights protection India's position has been very disturbing. As compared to her competitors, the mean value in IPR has been (3.71) as against that of Chinas (3.98), Italy (3.78), Israel (4.55), Japan (5.64), Ireland

(5.61), Singapore (6.15), Germany (5.60), etc. The level of assessing the quality of the local suppliers in India has also been very low at (4.59) as compared to (5.14) of Israel, (4.90) of Brazil, (5.31) of Ireland, etc. In terms of the prevalence of foreign ownership, India's mean value is also disturbing compared to her competitors such as Ireland with a mean value of (6.04) out of (7), Israel (5.16), etc. The mean value of India in terms of the prevalence of foreign ownership was (4.56), which however was marginally higher than that of china with (4.40). Furthermore in terms of the quality of Infrastructure, India has to do lots of improvement as it was found that her performance was very low with a mean value of (3.59) as compared to that of (4.23) of china, (4.65) of Israel, (4.81) of Turkey, (6.51) of Singapore, etc. Thus, apart from these parameters, India's performance also has not been satisfactory in terms of the quality of scientific research institutions, state of cluster development, university-industry collaborations, etc.

4.4.4 Human Resource Index

As companies reorganize to gain competitive edge, human resources plays a key role in helping companies deal with a fast-changing competitive environment and the greater demand for quality employees. Human Resource management is an art of

having and retaining a competent and dedicated workforce which enables to achieve the goals of the organization in a dynamic environment. Human resource development is critical in software companies, where 95% consists of formal trainings. However, with the entry of the MNCs, there has been competition for retaining the best talents as it influences the competitive abilities of the software firms as a whole which in turn influences the competitiveness of software industry of the countries. It is here however that the innovation capacity, availability of qualified scientist and engineers is a must. The relative performance of the parameters influencing the competitiveness of human resources is stated in Table (4.4).

Table 4.4 Human Resource Environment Index

Advanced Economies										
Human Resource Environment variables									Ranks	
Countries	H1	H2	H3	H4	H5	H6	H7	Total	AE & EE	Overall
US	7.84	4.72	5.78	9.17	5.17	4.93	4.9	42.51	3	3
UK	8.03	4.69	5.73	9.76	4.98	4.93	4.65	42.77	2	2
Japan	8.28	4.38	5.53	6.34	4.97	5.63	4.82	39.95	8	8
Ireland	8.01	5.37	4.98	10.97	4.88	5	4.35	43.56	1	1
France	8.13	5.37	5.63	9.97	4.58	3.6	4.02	41.3	7	7
Canada	8.1	5.48	5.53	8.53	4.85	4.93	4.48	41.9	5	5
Germany	8.03	4.95	6.02	8.22	5.07	5.1	4.27	41.66	6	6
Singapore	8.15	5.97	5.38	5.44	5.45	6.02	5.67	42.08	4	4
Emerging Economies										
India	6.53	4.35	4.43	5.66	4.22	4.5	4.18	33.87	5	13
China	7.34	3.94	4.43	3.69	4.27	4.45	4.75	32.87	8	16
Israel	8.15	3.78	4.98	10.29	4.3	4.82	4.33	40.65	1	9
Brazil	7.29	2.97	4.73	9.28	4.33	4.23	3.73	36.56	3	11
Mexico	7.67	3.02	4.33	8.49	3.68	4.33	3.67	35.19	4	12
Russia	6.85	3.53	4.03	6.61	3.72	3.88	4.22	32.84	9	17
Philippines	6.9	4.13	4.15	4.73	4.53	4.52	4.05	33.01	7	15
Italy	8.15	3.42	4.7	7.6	3.23	3.57	2.97	33.64	6	14
Poland	7.63	3.78	4.78	8.77	3.98	4.03	3.82	36.79	2	10
Turkey	7.35	3.39	4.05	4.6	3.82	3.78	3.98	30.97	10	18
Pakistan	6.52	3.43	3.48	4.66	3.85	4	3.78	29.72	11	19
Egypt	7.1	2.35	3.75	5.31	3.12	3.12	3.42	28.17	12	20

Data Source: Compiled & Calculated by Author

Figure 4.3 Human Resource Index of Advanced Economies

Bar chart values:
US 42.51, UK 42.77, Japan 39.95, Ireland 43.56, France 41.3, Cannada 41.9, Germany 41.66, Singapore 42.08

Legend: ■ US ■ UK ■ Japan ■ Ireland ■ France ■ Cannada ■ Germany ■ Singapore
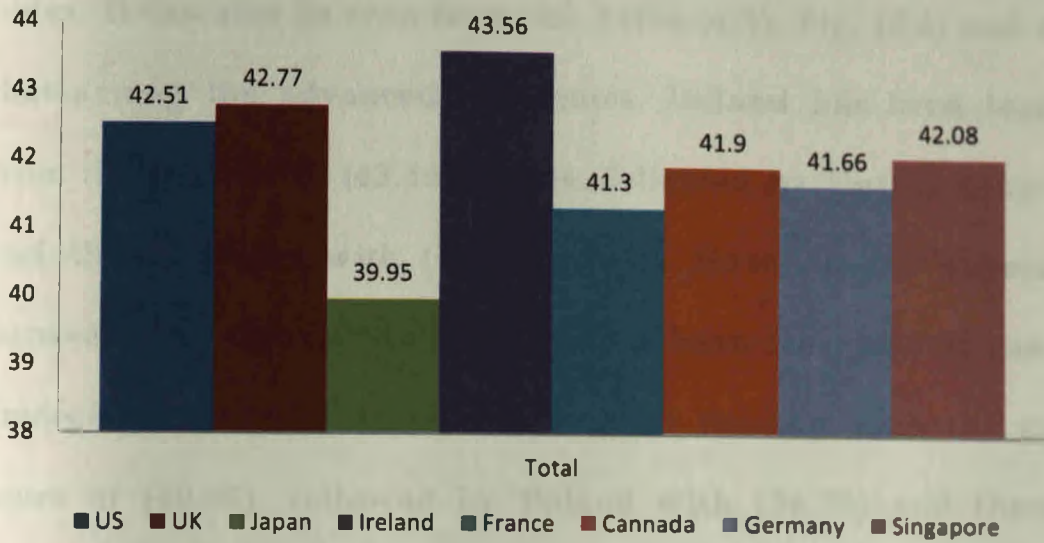
Figure 4.4 Human Resource Index of Emerging Economies

Bar chart values:
India 33.87, China 32.87, Israel 40.65, Brazil 36.56, Mexico 35.19, Russia 32.84, Phillipines 33.01, Italy 33.64, Poland 36.79, Turkey 30.97, Pakistan 29.72, Egypt 28.17
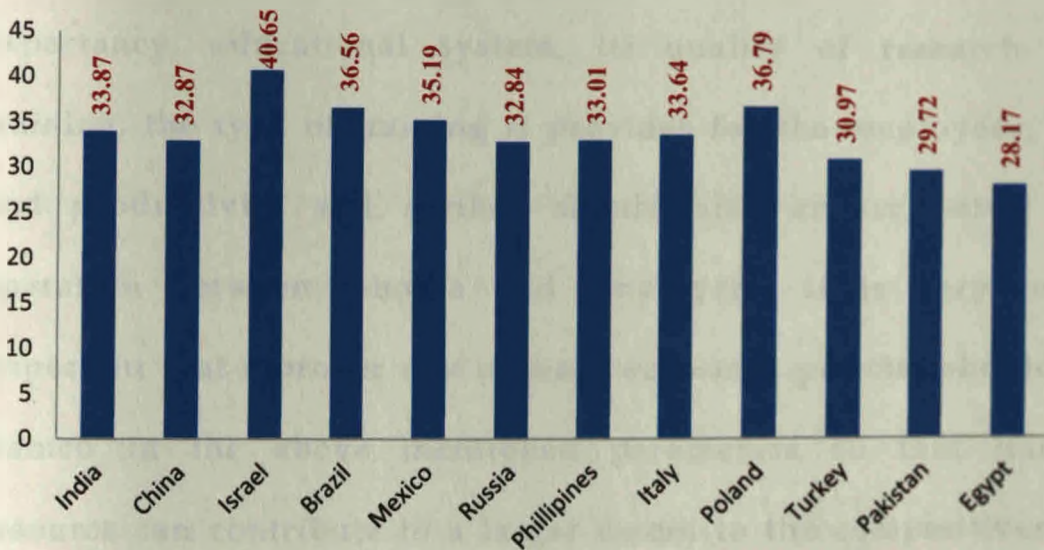
Some of the variables which can affect the competitiveness in terms of HR in software industry have been recognized. The Quality of the educational system, educational expenditure, local availability of research and training services etc. are some of the variables which are taken for the purpose of evaluation of the HR competitiveness. The methodology adopted in analyzing the HR

sub-index is the same as that of the Business Environment sub-index. It can also be seen from the Table (4.5), Fig. (4.3) and (4.4) that among the advanced economies, Ireland has been leading from the front with (43.56) points, followed by United Kingdom and United States with (42.51) points. However the difference between the countries on HR score has been marginal. In case of emerging economies Israel has been at the top with the mean score of (40.65), followed by Poland with (36.79) and then by Brazil and Mexico. India's position was 5th. It should be noted that India has to upgrade or bring improvements in her life expectancy, educational system, its quality of research and training, the type of training it provides for the employees, pay and productivity and further should also ensure better co-operation between labours and employers. It is very much important that a proper mix of macroeconomic policies should be framed in the above mentioned parameters so that human resource can contribute to a larger extent to the competitiveness of the software industry of India as a whole.

4.4.5 Technological Index

Technological Environment means the developments in the field of technology which affects business by new inventions of productions and other improvements in techniques to perform

the business work. It may also mean as a cluster of IT, software/hardware companies suggesting an environment of technological fervor, showing latest technological upgradation and its applications in practical life. Technology is an increasingly important element of globalisation and of competitiveness and that, developing countries because of their lack of competitiveness and technological change cannot effectively participate adequately in the technological world (Karodia, Dhiru and David, 2014). The information revolution is sweeping through our economy. No company can escape its effects. Dramatic reductions in the cost of obtaining, processing, and transmitting information are changing the way of doing the business. As more and more of time and invested capital are absorbed in information technology, executives have a growing awareness that the technology can no longer be the exclusive territory of EDP or IS departments. As they see their rivals use information for competitive advantage, these executives recognize the need to become directly involved in the management of the new technology (Porter and Millar, 1985). However, it should be noted that it is not the information technology that gives a company a competitive advantage; it's the way they use information technology that makes the difference. Companies need to use information technology in

an innovative manner (Ramey, 2012). Thus, the usage of ICT not only by the business firms, but also by the people and the government in its various transactions for the present as well as future does plays an important role in influencing the competitiveness of the software industry

With the help of series of review of literature, on the technological aspects of the competitiveness, eight variables have been identified to affect the software market in terms of its base and applications. These variables have been coded as T1 to T8. The mean values of the different parameters used to frame the technological index is given in Table (4.5).

Table 4.5 Technological Index

Countries	Technological Environment Variables											
	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	Total	Mean	Ranks	
	Advanced Economies										AE &EE	Overall
	T1	T2	T3	T4	T5	T6	T7	T8				
US	6.44	6.04	4.98	5.56	5.52	2.63	5.23	4.60	40.98	5.12	3	3
UK	6.46	5.69	5.13	5.37	5.89	3.15	5.12	4.61	41.42	5.18	2	2
Japan	5.51	6.23	4.75	5.43	5.67	2.63	4.98	4.62	39.83	4.98	6	6
Ireland	5.94	5.53	6.36	4.71	5.23	2.13	4.69	4.32	38.90	4.86	7	7
France	6.24	5.58	4.88	4.95	5.54	3.43	4.84	4.38	39.83	4.98	6	6
Canada	6.28	5.56	5.05	5.14	5.83	3.07	4.95	4.37	40.25	5.03	4	4
Germany	6.18	5.69	4.69	5.21	5.77	3.13	5.06	4.41	40.14	5.02	5	5
Singapore	6.25	5.89	5.96	5.70	5.10	2.44	6.17	5.98	43.49	5.44	1	1
	Emerging Economies											
India	4.94	4.88	4.74	3.38	0.74	0.09	5.01	4.29	28.05	3.51	10	17
China	4.36	4.81	4.56	3.91	2.66	1.06	5.17	4.93	31.47	3.93	2	9
Israel	6.31	6.09	5.31	5.14	4.80	2.35	5.18	4.44	39.62	4.95	1	8
Brazil	5.09	5.08	5.05	3.91	3.21	0.80	4.26	3.82	31.21	3.90	4	11
Mexico	5.04	4.65	5.14	3.58	2.45	0.95	4.12	3.78	29.70	3.71	7	14
Russia	4.11	3.99	3.81	3.70	3.37	1.24	4.33	3.58	28.14	3.52	9	16
Philippines	5.08	5.11	4.85	3.46	1.90	0.38	4.24	3.64	28.65	3.58	8	15
Italy	5.01	4.30	3.85	4.03	3.86	2.07	3.49	3.21	29.82	3.73	6	13
Poland	4.59	4.35	4.81	3.73	4.37	1.45	3.46	3.14	29.91	3.74	5	12
Turkey	5.33	5.21	4.84	3.70	2.93	0.98	4.53	3.88	31.39	3.92	3	10
Pakistan	4.58	4.46	4.14	3.09	0.67	0.04	4.24	3.47	24.69	3.09	12	19
Egypt	4.23	4.45	4.59	3.27	4.68	0.16	3.66	2.41	27.44	3.43	11	18

Data Source: Calculated by Author

Figure 4.5 Technological Index of Advanced Economies

Bar chart legend: US, UK, Japan, Ireland, Singapore, France, Canada, Germany

Values shown: US 5.12, UK 5.18, Japan 4.98, Ireland 4.86, Singapore 5.44, France 4.98, Canada 5.03, Germany 5.02
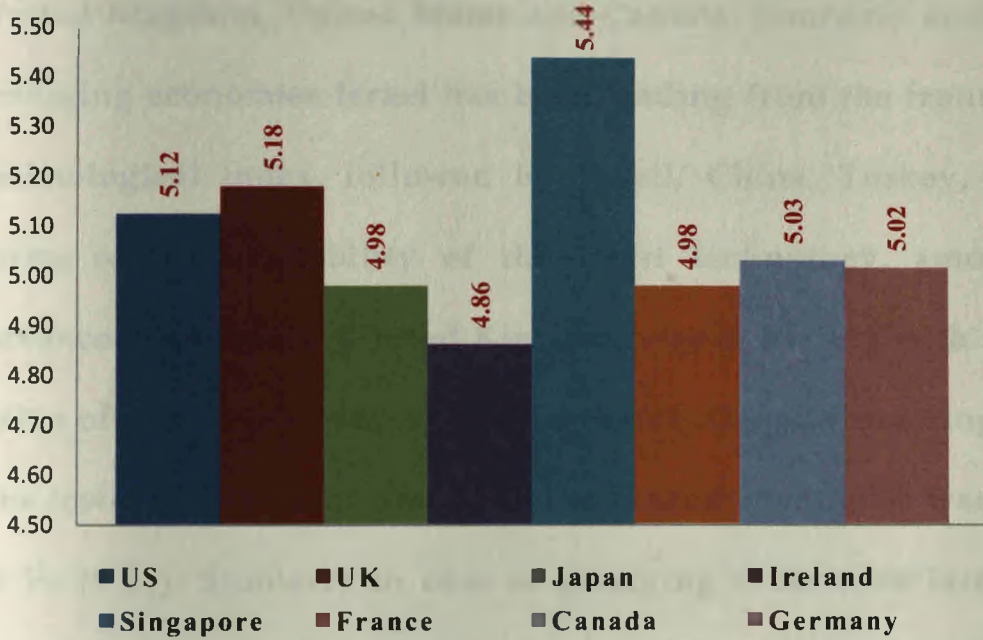
Figure 4.6 Technological Index of Emerging Economies

Values shown: India 3.51, China 3.93, Israel 4.95, Brazil 3.90, Mexico 3.71, Russia 3.52, Phillipines 3.58, Italy 3.73, Poland 3.74, Turkey 3.92, Pakistan 3.09, Egypt 3.43
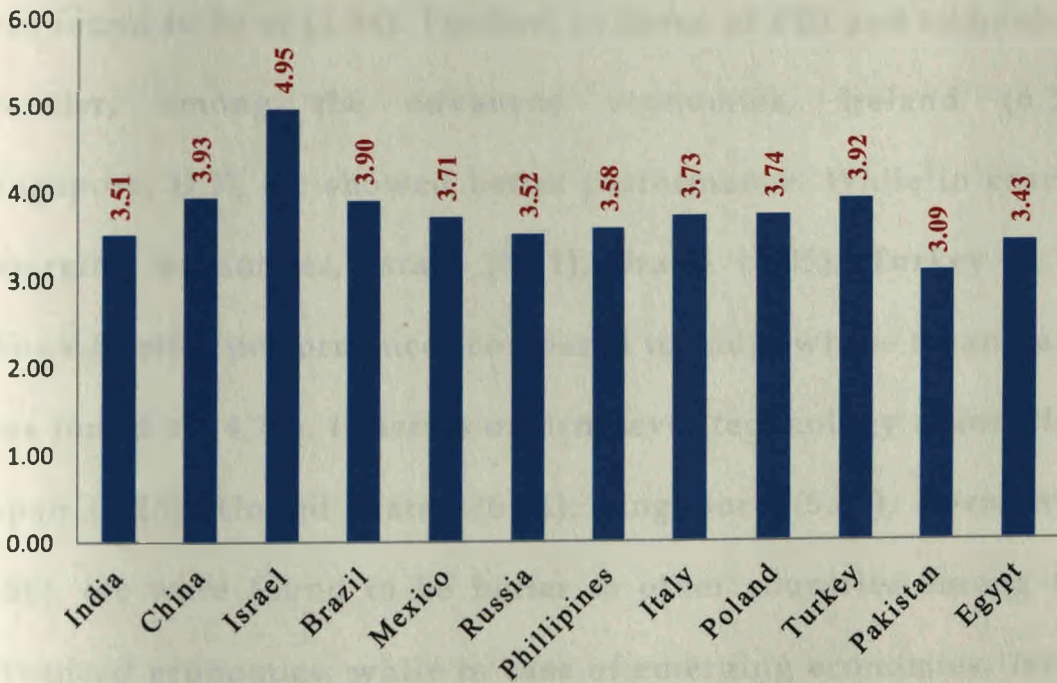
In the Table (4.6), (fig.4.5) and fig. (4.6), it can be seen that among the advanced countries, Singapore has been leading from the front in terms of overall performances among the advanced

economies of the world. They have been closely followed by United Kingdom, United States and Canada. Similarly among the emerging economies Israel has been leading from the front in the technological index, followed by Brazil, China, Turkey, etc. In terms of the availability of the latest technology, among the advanced economies, United Kingdom was at the top with a mean value of (6.46), followed by United States, Canada and Singapore. The lowest mean value among the advanced economies was found to be (5.51). Similarly in case of emerging economies Israel was found at the top with a mean value of (6.31), followed by Turkey, Philippines, etc. India's mean value over the period of eight years was found to be at (4.94). Further, in terms of FDI and technology transfer, among the advanced economies, Ireland (6.36), Singapore, U.K, etc showed better performance. While in case of emerging economies, Israel (5.31), Brazil (5.05), Turkey (4.84) showed better performances compared to India whose mean value was found at (4.74). In terms of firm level technology absorption, Japan (6.23), United States (6.04), Singapore (5.89), Germany (5.69), etc were found to be better to other countries among the advanced economies; while in case of emerging economies, Israel (6.09), Brazil (5.08), Philippines (5.11), etc were better off compared to its competitors. Furthermore in terms of the usage of ICT by the individuals, business and the government, India

showed a very dis-satisfied performance. India's mean score was (3.38) as compared to Israel's (5.18) and Chinas (3.91). Overall, Singapore showed a much better performance in the usage of ICT with a mean score of (5.70). In terms of internet users also India showed a dismal performance with a mean value of (0.74) as against that of (4.80) of Israel, (2.66) o china, etc. In terms of broadband subscription as well, the performance of India was not very much satisfactory. It was (0.09) as compared to that of (1.06) of china, (2.35) of Israel, (3.15) of United Kingdom, etc. Amidst the low performance by India in most of the technological parameters, however in terms of government's prioritization to ICT, India has shown little better performance along with her counterparts like Israel, China and Russia. it should be noted that among the emerging economies, India has been placed at tenth position. However her performance in terms of the availability of the latest technology FDI and technology transfer, the usage of ICT by the government, firms and the public at large has not been satisfactory. The advanced economies like United States, United Kingdom, Singapore, Germany have shown much better competitiveness at the technological front in terms of excellence in the technological parameters. India needs to put more efforts in this direction so as to enhance her competitiveness in the technological field and its diffusion in the country.

4.5 Ranking of Countries on the basis of Competitiveness Index

The advanced and the emerging countries competitiveness rankings are shown in Table (4.6). The competitiveness Index used for ranking of the countries is a combined Index of Business Environment, Human Resource and Technological Environment.

Table 4.6 Rankings of the Countries Competitiveness

	Advanced Economies				Ranks	
	BE	HR	TE	Total	Overall	AE & EE
US	90.73	42.51	40.98	174.22	3	3
UK	90.3	42.77	41.42	174.49	2	2
Japan	88.12	39.95	39.83	167.9	6	6
Ireland	86.66	43.56	38.9	169.12	7	7
Singapore	96.6	42.08	43.49	182.17	1	1
France	82.83	41.3	39.83	163.96	8	8
Canada	87.77	41.9	40.25	169.92	4	4
Germany	87.85	41.66	40.14	169.65	5	5
Emerging Economies						
India	71.48	33.87	28.05	133.4	12	4
China	73.81	32.87	31.47	138.15	10	2
Israel	83.72	40.65	39.62	163.99	9	1
Brazil	66.53	36.56	31.21	134.3	11	3
Mexico	67.29	35.19	29.7	132.18	13	5
Russia	59.56	32.84	28.14	120.54	18	10
Philippines	63.14	33.01	28.65	124.8	17	9
Italy	66.33	33.64	29.82	129.79	15	7
Poland	64.06	36.79	29.91	130.76	14	6
Turkey	67.12	30.97	31.39	129.48	16	8
Pakistan	62.58	29.72	24.69	116.99	19	11
Egypt	57.81	28.17	27.44	113.42	20	12

Table (4.6) shows the competitiveness positions of both advanced as well as emerging economies. Among the advanced economies,

Singapore was at the top, followed by United States, United Kingdom and Canada. In case of the emerging economies, Israel occupied first position followed by China, India and Mexico. India's overall ranking is 12th ranking, though she occupies third position among the emerging economies.

Figure 4.7 Overall Ranking of the Countries
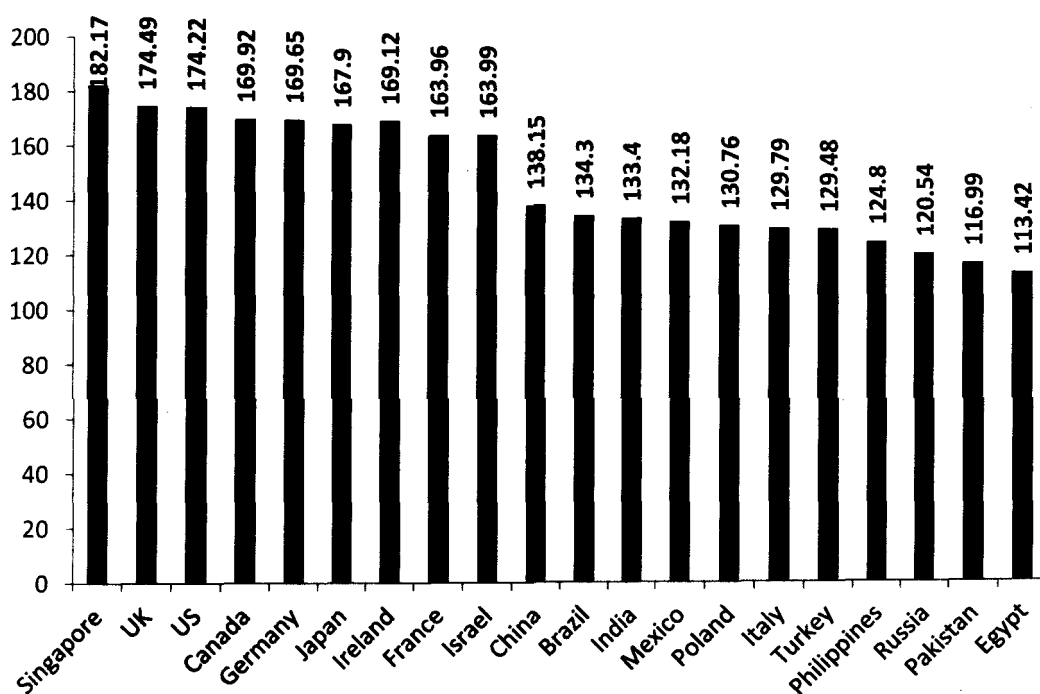
4.6 Weighted Software Competitiveness Index

The software competitiveness index has been calculated by combining all three indices namely, Business Environment Index, HR Environment Index and Technological Environment Index. All these three components are made up of total thirty-two variables, which are averaged for a period of eight years from 2008-09 to 2015-16

individually. The averaged value of each of the component has been assigned the due weights. The component of Business Environment has been assigned 40% of the weightage, with the Technological and HR environment being assigned 30% respectively. This has been shown in Table (4.7).

In Table (4.7) it can be observed that overall; Singapore leads in the aggregates of three major components, which go to make the competitive software Index. In fact among the advanced economies, the difference has been very marginal. But if one sees at the cases of Emerging economies, Israel is found to be efficient in the aggregates of the three variables, closely followed by China and India. India gets the third place only next to china, with a difference of (2.72) points.

Table 4.7 Weighted Software Competitiveness Index with Ranks

Countries	Business Environment		Human Resource Envrn.		Technological Environment		Total	AE & EE	Overall
	B.E	B.E (40%)	HR	HR(30%)	Tech.	Tech.(30%)			
Advanced Economies									
US	90.73	36.29	42.51	11.00	40.98	12.30	61.34	3	3
UK	90.30	36.12	42.77	11.12	41.42	12.43	61.38	2	2
Japan	88.12	35.25	39.95	10.51	39.83	11.95	59.19	7	7
Ireland	86.66	34.66	43.56	11.00	38.90	11.67	59.40	6	6
Singapore	96.60	38.64	42.08	11.24	43.49	13.05	64.31	1	1
France	82.83	33.13	41.3	10.19	39.83	11.95	57.47	8	8
Canada	87.77	35.11	41.9	10.84	40.25	12.07	59.75	4	4
Germany	87.85	35.14	41.66	10.79	40.14	12.04	59.68	5	5
Emerging Economies									
India	71.48	28.59	33.87	8.78	28.05	8.42	47.17	3	11
China	73.81	29.52	32.87	9.37	31.47	9.44	48.82	2	10
Israel	83.72	33.49	40.65	10.02	39.62	11.88	57.57	1	9
Brazil	66.53	26.61	36.56	9.04	31.21	9.36	46.94	4	12
Mexico	67.29	26.92	35.19	8.83	29.70	8.91	46.39	5	13
Russia	59.56	23.83	32.84	8.48	28.14	8.44	42.12	10	18
Philippines	63.14	25.25	33.01	8.65	28.65	8.60	43.75	9	17
Italy	66.33	26.53	33.64	8.39	29.82	8.95	45.57	7	16
Poland	64.06	25.63	36.79	9.29	29.91	8.97	45.64	6	15
Turkey	67.12	26.85	30.97	8.03	31.39	9.42	45.56	8	14
Pakistan	62.58	25.03	29.72	7.57	24.69	7.41	41.36	11	19
Egypt	57.81	23.13	28.17	7.13	27.44	8.23	38.49	12	20

Data Source: Compiled & Calculated by Author

Figure 4.8 Competitive Index of Advanced Economies with weights

Bar chart of Competitive Index for advanced economies:
- US: 59.59
- UK: 59.67
- Japan: 57.71
- Ireland: 57.33
- Singapore: 62.93
- France: 55.27
- Canada: 58.02
- Germany: 57.97
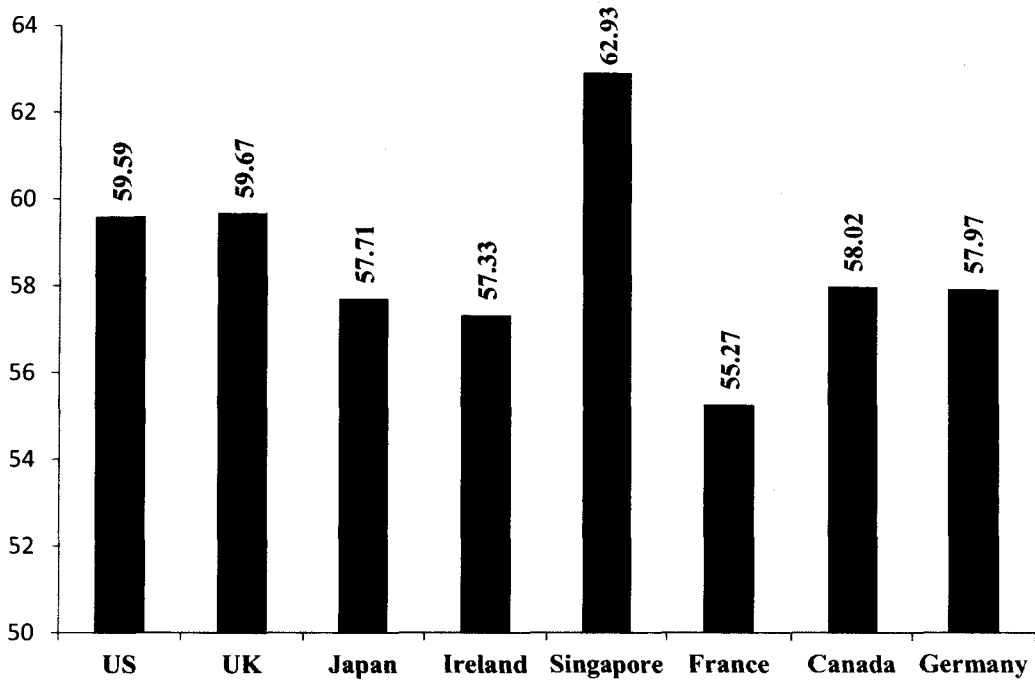
Figure 4.9 Competitive Index of Emerging Economies

Bar chart of Competitive Index for emerging economies:
- India: 45.79
- China: 48.34
- Israel: 55.39
- Brazil: 45.01
- Mexico: 44.65
- Russia: 40.75
- Philippines: 42.49
- Italy: 43.87
- Poland: 43.89
- Turkey: 44.29
- Pakistan: 40
- Egypt: 38.49
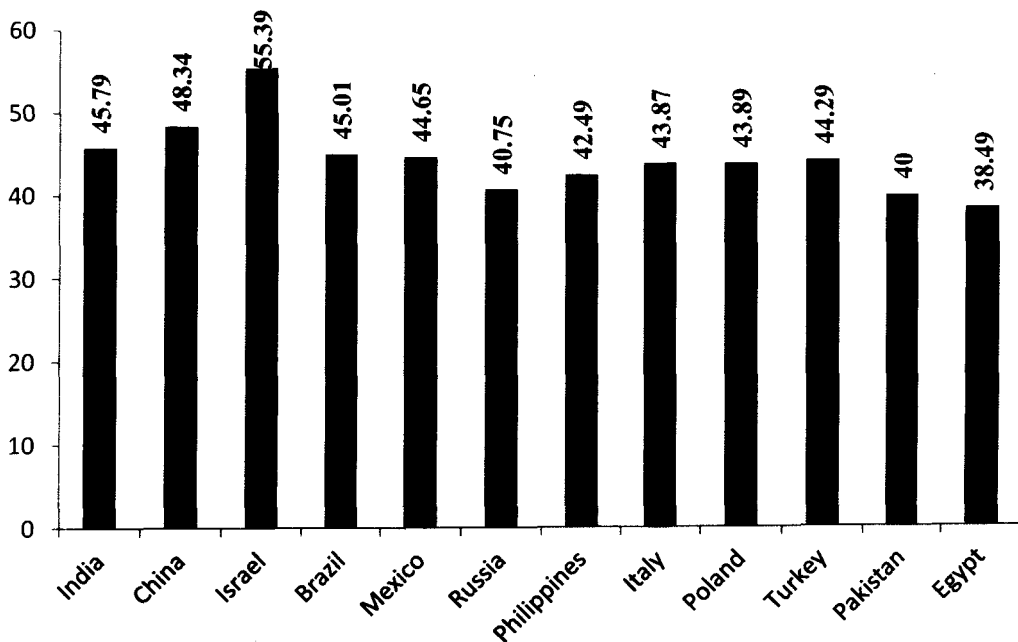
In Table (4.7), Fig.(4.8) and Fig. (4.9), it is found that, Singapore is the most competitive nation in the software industry with an competitive index of (62.93) followed by United Kingdom with (59.67) and then by United States with a competitiveness Index of (59.59).

Figure 4.10 Overall Rankings of Countries with Weightage
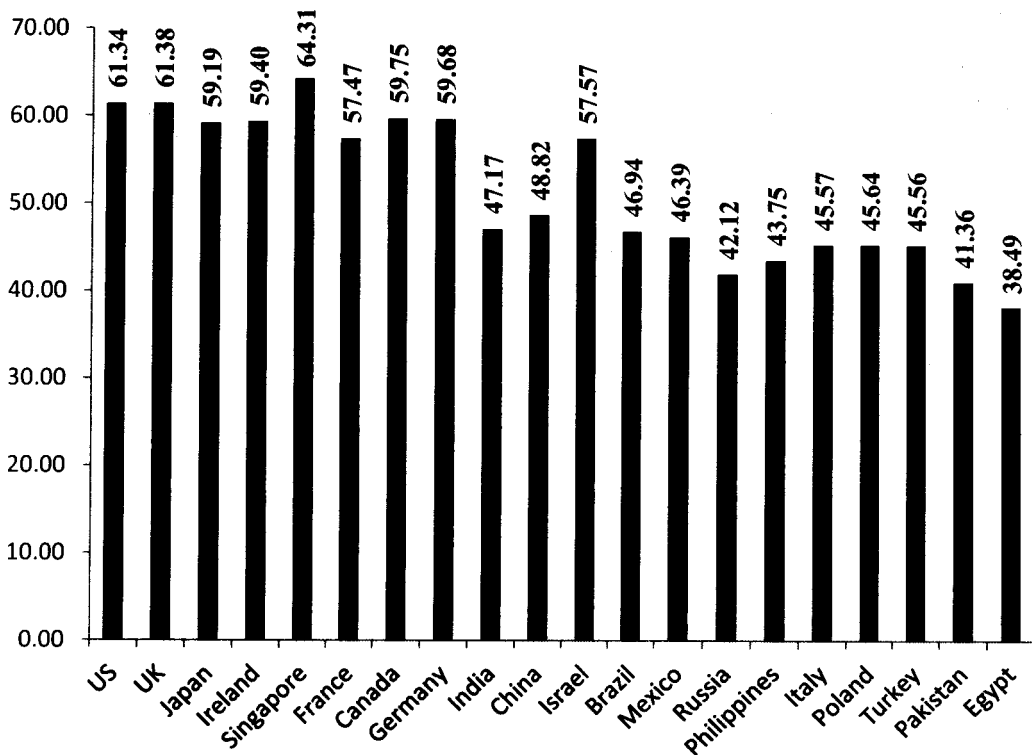
Similarly, in case of emerging economies, Israel is at the top with a competiveness Index of 57.57, followed by china with 48.82 and India with a competitiveness index of 47.17. However, when all the countries have taken together, the rankings of these emerging economies like Israel, china, India are 9th, 10th, and 11th respectively.

4.7 Summary of the Chapter

The major finding of the study is that Singapore occupies first position in the overall competitiveness of Software Industry in the world. Looking from the angle of business environment, human resource base and technology support, Singapore occupied the first position along with the overall position. Among the emerging countries, Israel has the

most competitive software industry. It also topped in other competitive sub indices. India's position among the emerging countries is 3rd and India's major competitor China achieved 2nd position among emerging countries. India's position overall is 11th. In the case of business environment among emerging countries India has third position. It has got only 6th position in the case of human resources though we thought we have greater comparative advantage on this. India competitiveness with respect to technology is very poor as India occupied 8th position among emerging countries and 11th position over all.

It is to be noted that the advanced countries are far ahead of emerging countries in the overall competitiveness position as all of them ranked above the emerging countries. Advanced countries have also ranked above emerging countries in all sub indices. Though the emerging economies are still in their infancy stages in terms of their leaderships in the software markets, but their increasing penetrations into the global software markets have started breaking the monopolies of the software leaders like US, UK, etc.

In fact most of the advanced countries have found to be dominating in the software trade because of their excellent basic infrastructure required for the promotion of the software industries in their respective countries combined with the balanced and the required type of business environment to promote and encourage the growth of the software trade. However at the same time it was also found that some of the emerging economies like that of Israel and China have been really in a

position to make a mark in the software trade vis-à-vis advanced economies. But in terms of countries like India, Brazil, Mexico, Poland etc; there are lot of infrastructural bottlenecks which needs to be done away with if it has to emerge or retain its present performance in the software industry across the globe. India has to strengthen its HR environment, technology support if India has to retain its performance in the software industry. India has to bring about a lot of changes in her software trade policies affecting international flow, both inward and outward FDI.

CHAPTER V

THE COMPETITIVENESS OF SOFTWARE INDUSTRY OF INDIA: A FIRM LEVEL ANALYSIS

THE COMPETITIVENESS OF SOFTWARE INDUSTRY OF INDIA: A FIRM LEVEL ANALYSIS

5.1 Introduction

The world today has become one global village due to the widespread use of Information Technology in almost every aspect of our lives. It has become a dependant resource with which organizations have created and sustained their competitive advantages over their competitors across the globe. The Information Technology sector consists of software services, Information Technology Enabled Services (ITES) and the different segments of hardwares. Among these, the software and services industry (a trillion dollar industry) have contributed tremendously towards the growth of the world economy. Infact, since the last two decades, the software industry has offered the developing countries an opportunity to break the shackles of economic under-development that has been existing in its different forms.

Poised to become a US $ 350 billion industry by 2025 (Nasscom, Livemint, 2015), the IT industry has played a significant role in putting India on the global map. In addition to fuelling India's economy, the Software industry has also directly and indirectly influenced the lives of many people. It has facilitated the process of transforming India from a protectionist rural agricultural based

economy into a global player providing qualitative software services to the world economy. (Meshram & Dubey, 2015). It has contributed substantially to increase in the GDP, urban employment and exports. This has enabled the nation to achieve the vision of a powerful and resilient India.

The share of the IT and ITeS industry has increased from 1.2% in 1998 to 7.5% in GDP in 2012 and was around 9.5% in 2015. Further, in terms of firms, the public limited companies accounted for 63.6% of the total software services exports during 2013-14, with an annual growth rate of 14.1%. Whereas the private limited companies accounted for 36% with an annual growth rate of 22.4% (Nasscom, Livemint, 2015). Further, in terms of type of software services, the percentage share of on-site services decreased from 20.7% in 2010-11 to 17.8% in 2011-12. However it increased to 19.8% in 2013-14. Unlike this, the %age share of off-site services increased from 79.3 in 2010-11 to 80.2% in 2013-14.

It should be noted that when the Indian economy was affected by the global slowdown in 2009, the software industry displayed resilience and tenacity in combating the volatile conditions and posted a growth of 16.5% in the year 2009 with an estimated value of USD 26.9 billion. The Indian software industry enjoys a very distinct advantage of a stable political environment, favorable government policies, a large base of english speaking graduates, healthy relationship with existing global clients, telecom

infrastructure and different industry lobbies. The most important of them is the NASSCOM (National Association of Software and Services Companies). Besides this, the Indian software industry also boasts of low cost advantage, variety of service offerings from low-end application development to high-end integrated IT solutions, high quality of service offerings and maturity in processes. Infact in terms of quality standards in 2005-06, there were 401 firms with different quality standards, with 82 of them having SEI CMM Level Five, the highest level of quality accreditation across the globe (Illiyan, 2008). As many as 123 firms had SEI CMM Level two certification or above and 330 had ISO 9001(Joseph, 2007). Today, the Indian software industry contributes to 7- 8% towards GDP with 45% of incremental urban employment (both direct and indirect). Thus, the software industry has been hailed as one of the emerging successful industry (Nasscom, Annual Report, 2015).

The composition of the software industry in India however consists of small, medium and large scale firms, all together making its mark in the international market of software services.

This Chapter is devoted to the analysis of the competitiveness of software firms of India in terms of select parameters such as revenue, operating expenses, employee cost, management efficiency, liquidity and solvency, etc. The data pertaining to the above variables are taken for the period of sixteen years to

construct a national level competitive Index of software firms of India.

5.2 Overview of Indian Software Firms

Today, India has the world's largest technical workforce with over 3 million engineers, scientists and the second largest English speaking technical workforce. This large number of technical talent has brought down the equilibrium wage rate in this sector. Further, with the Indian programmers available for less than $12 to $15 per hour, it has enabled the Indian firms to complete the software projects for less than half the cost of that in the United States (Dave, 1997). Thus, in terms of the comparative advantage theory therefore, the software industry expanded and the foreigners used this low wage to maximize their profits, thereby resulting into more jobs in the software industry which further attracted the talents from other sectors of the economy.

It should be noted that out of the total IT firms registered at Nasscom, 64% were catering to IT services, 22% to BPO, 32% to product development, 10% to engineering and embedded services and 20% others (Nasscom Annual Report, 2014-15). Further, at the global level, the Indian IT firms had 640 delivery centers till 2015 in 78 countries (Equitymaster.com, 2016). The top six IT firms (TCS, Wipro, Cognizant, Infosys, HCL tech and Tech Mahindra) accounted for 36% of the total industry revenue.

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5.3 Theoretical Background

The importance of competitiveness changes with time and context. Theories and frameworks must be flexible enough to integrate the change with key strategic management processes if their utility is sustained in practice. Research efforts towards competitiveness have brought many interesting perspectives and frameworks at the country, industry and firm level. Competitiveness is a multidimensional and relative concept and the significance of the factors of competitiveness change with time and context (Ajitabh and Momaya, 2004). However, there is more or less a consensus on which measures could be used to assess competitiveness.

Measurement can be made according to two disciplines: i) the neoclassical economics, which focused on trade success and measured competitiveness with the real exchange rate, comparative advantage indices and export or import indices and ii) the strategic management school which, emphasized on the firm's structure and strategy. In the latter, competitiveness is defined in terms of cost leadership and non-price supremacy in relation to various indicators of cost, productivity and efficiency (Latruffe, 2010) .

Further, competitiveness can be at three levels, at the firm level, the industry level and the country level (Depperu, 2005). The sources of competitiveness are the assets and processes within an

organization that provide competitive advantage (Momaya and Ambastha, 2004). Michael Porter's work on competitive positioning is also about firm level competitiveness measured by productivity growth either by cost leadership, differentiated products or focus.

Presently, Indian software firms compete on two fronts; one, at the global market – as majority of its revenue comes from exports and two at the growing domestic market. The intense level of global competition has acted as a huge push factor for enhancing firm level competitiveness. This has compelled the firms to constantly increase its performance standards in terms of its quality, cost, productivity, product introduction time and smooth flowing operations. Further, as the domestic market grows, the inter-firm competitiveness became stiffer but the regulated trade environment led to many synergetic alliances (Dileep Baragde, 2014).

5.4 Methodology of the Study

Various studies on software industry had used the data base made available by The National Association of Software and Services Companies (NASSCOM), Reserve Bank of India (RBI) and the Electronics and Computer Software Export Promotion Council (ESC). However, the present study used data from various annual reports of the companies (2000-01 to 2015-16), websites, publications, press releases, etc. This chapter is with a purpose to know the competitive strengths of the top twenty software firms at

the national level, in terms of the various variables that keep the capacity to influence the competitive sustainability of the firms in the Software industry of India.

The analysis of the competitiveness of the software firms has been done with the help of 17 variables for the top 20 firms. In order to measure the relative competitiveness of the software firms at the national level, a new index is formed on the basis of three sub-indices, namely, Performance Index, Human capital Index and Financial Efficiency Index. These three sub-indices go to make the Software Competitive index for software firms of India. The Performance Index is obtained in terms of seven variables such as operating income, net sales, revenue earned, capital invested, total expenses, total assets and current liabilities. These parameters have been narrowed down to three in terms of ratios of operating profit margin, Return on capital employed and the total revenue by gross revenue earned by the firms. The ratios are then averaged individually for top 20 firms over the period from 2000-01 to 2015-16. All the values of the given variable at a time are then averaged for the period of fifteen years to get an individual value of the given variable for the firm concerned. The Human capital efficiency Sub-Index is similarly obtained from 07 variables, namely, total expenses, total revenue, net sales, employee cost, total number of employees, revenue per employee and payroll to sales ratio (altogether 05 ratios). The Financial Efficiency Index is constructed

with the help of nine ratios namely, dividend payout net profit ratio, cash earnings retention ratio, investment turnover ratio, current ratio, quick ratio, debt-equity ratio, debtors turnover ratio, asset turnover ratio and earning retention ratio. A New Software Competitive Index is constructed with the help of said variables in terms of assigning weights i.e. 30% to the sub-index of Performance, 40% to Human Capital sub-index and 30% to Financial Efficiency sub-index. The variables considered for the above three categories are listed in Table − 5.1.

Table 5.1 Software Competitive Index of Firms: Sub-Indices

Performance Index		HR Index		Financial Efficiency Index	
Code	Parameter's	Code	Parameter's	Code	Parameter's
P1	Operating Income Net Sales	H1	Employee cost/TR	M1	Current Ratio
P2	Capital invested Net Sales Total Assets Current liabilities	H2	Employee cost/TE	M2	Quick Ratio
P3	Gross Revenue	H3	Employee cost/Net Sales	M3	Debt-Equity Ratio
		H4	Revenue Per employee = No. of employees/Net sales	M4	Debtors Turnover Ratio
		H5	Payroll to Sales Ratio	M5	Investment Turnover Ratio
				M6	Asset Turnover Ratio
				M7	Earning Retention Ratio
				M8	Dividend Payout Net profit Ratio
				M9	Cash Earnings Retention Ratio

5.5 Indices to Measure Competitiveness

Today the forms of competitiveness have undergone drastic changes. Most of the companies in fact keep on changing their strategies of sale and sustenance in the market by not only taking into account internal factors, but also external factors. Further, in the recent times with the intensification of competition, with the fastened business life, with the exhausting of natural resources the concept of competitiveness has started gaining importance (Schmuck, 2007). The way company performs, in terms of its managing of its resources, earning sufficient revenues, managing its debts and expenses in an efficient manner, retaining its precious human capital, etc, does play an important role in determining the competitiveness of the firms. The chapter has constructed three indices namely Performance Index, Human capital Index and Financial Efficiency Index.

5.5.1 Performance Index

The Performance of any firm greatly determines its economic viability vis-à-vis its competitors. The various annual reports through their financial statements, their Balance Sheets and other announcements at regular intervals do indicate the relative competitive positions across the firms at a national level. The study has taken into account important ratios such as gross profit margin, return on capital employed and the revenue earned by the software

firms under study. Operating margin is used to measure company's pricing strategy and operating efficiency. Profit margin is an indicator of a company's pricing strategies and how well it controls its costs. Differences in competitive strategy and product mix causes the profit margin to vary among different companies.

Similarly, ROCE (Rate of return on Capital employed) measures the Performance of a company by expressing its operating profit as a percentage of its capital employed. A higher value of return on capital employed is favorable indicating that the company generates more earnings per rupee of capital employed. A lower value of ROCE indicates lower Performance. A high ROCE is, therefore, a sign of a successful growth company. This greatly reflects the competitive abilities of the firms.

The construction of the Performance index can be seen from table (5.2)

Table 5.2 Performance Index

2000-01 – 2015-16	P1	P2	P3	Total	Performance Index	Ranks
TCS	27.07	65.04	0.31	92.42	18.48	1
Infosys	32.89	42.30	0.19	75.38	15.08	2
HCL	32.83	28.30	0.11	61.24	12.25	6
Wipro	23.27	28.68	0.46	52.41	10.48	7
Polaris	15.57	18.59	0.01	34.17	6.83	18
Cyient	25.73	23.64	0.01	49.38	9.88	8
Hexaware	22.43	23.72	0.01	46.16	9.23	10
Mphasis	23.77	19.48	0.03	43.28	8.66	12
Tech Mahindra	23.92	42.26	0.06	66.24	13.25	3
Mindtree	14.06	18.26	0.01	32.33	6.47	19
Zensar	20.57	27.90	0.08	48.55	9.71	9
Tata Elxsi	18.15	47.47	0.00	65.62	13.12	4
I-gate	19.51	16.99	0.01	36.50	7.30	13
Oracle Fin. Tech	38.70	25.10	0.02	63.82	12.76	5
KPIT	19.12	17.67	0.01	36.80	7.36	14
NIIT	18.13	18.22	0.01	36.36	7.27	15
Geometric	16.30	18.72	0.00	35.02	7.00	17
3i Infotech	30.09	5.47	0.00	35.56	7.11	16
Ramco	12.65	-1.68	0.00	10.97	2.19	20
Blue Star Info	16.47	29.15	0.00	45.62	9.12	11

Data Source: Compiled by Author

P1- Operating Profit Margin, P2-Return on Capital employed, P3-Total revenue Avg/Gross Avg

Figure 5.1 Performance Index
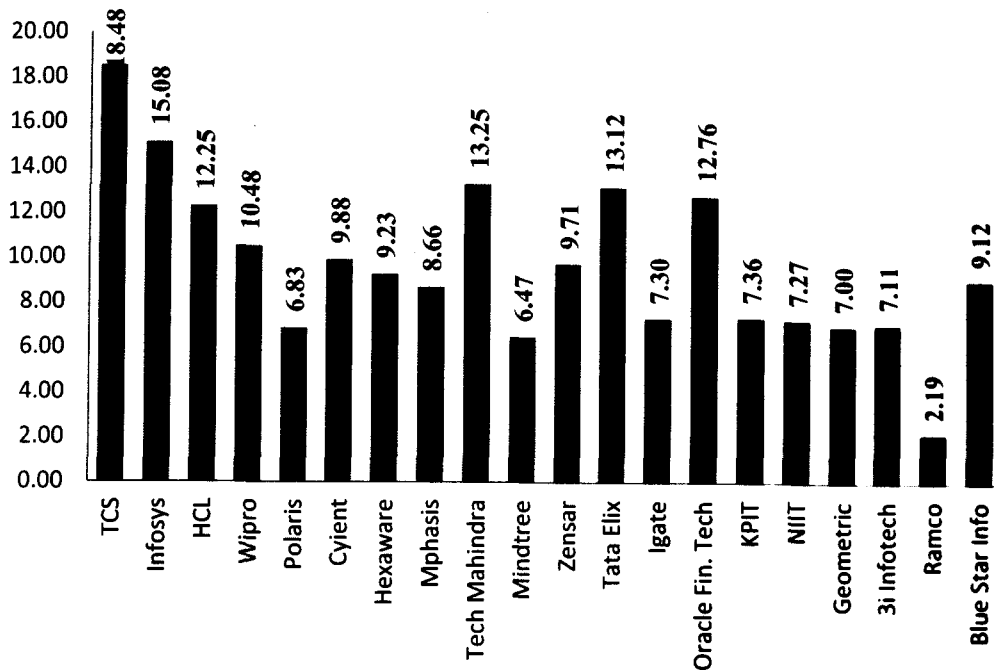
The data is averaged to get the mean score of each firm over a period of 16 years. Such a process is done for all two sub-indices P1 and P2, but except in P3, the total revenues average is taken in relation to the gross revenue of all the firms under study. In terms of its performance index, TCS, Infosys and Tech Mahindra have been found to be the top three firms, followed by Tata Elxsi, Oracle Financial Technology, etc. These firms have been found to be performing better as compared to other firms in the overall performance sub-index over a period of sixteen years. This Index has been categorized further for all the twenty software firms in terms of their performances on the basis of the following classification; Low Performance Index with a value of 0 to 6,

Medium Performance Index with a value of 7 to 13 and **High**

Performance Index with a value of 13 and above in table (5.3)

Table 5.3 Performance Wise Classification

Category	High Performance	Medium Performance	Low Performance
TCS	***		
Infosys	***		
HCL		**	
Wipro		**	
Polaris		**	
Cyient		**	
Hexaware		**	
Mphasis		**	
Tech Mahindra	***		
Mindtree		**	
Zensar		**	
Tata Elxsi		**	
I-gate		**	
Oracle Fin. Tech		**	
KPIT		**	
NIIT		**	
Geometric		**	
3i -Infotech		**	
Ramco			*
Blue Star Info		**	

It is observed in table (5.3) that most of the selected top 20 software firms performance falls in the category of medium performance, whereas Tata Consultancy Services, Infosys, and Tech Mahindra has shown high performance Index. The other firms such as HCL Technologies, Virtusa Polaris, Wipro Cyient, Hexaware

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Technologies, etc have shown medium performance. The least performance has been shown by Ramco systems. This clearly indicates that the software firms of India have a long journey to go in terms of their performance not only across India but also in terms of standards of its competitors.

5.5.2 Human Capital Index

The software service Industry is knowledge based industry and thus is the most human capital based industry in the world. Today the software firms generally face high turnover rate due to the existence of many job alternatives for IT professionals. This leads to a "turnover culture", which has drawn a considerable amount of academic studies in the discipline of information systems. Researchers have identified human capital variables such as working experience, IT experience and educational changes as the antecedents of the turnover of IT professionals. However, most of these existing studies are at individual level.

The notion of Human Resource Flows was coined by the work of Beer et al. (1984) as part of the "Harvard Model" in HRM. This seminal Harvard model states that people are the main assets within the company and therefore 'employee influence' plays a major role (Pinnington and Tony, 2000). As one of the key policy area of the "Harvard Model", human resource flows focus on business processes including recruitment, selection, placement, promotion,

appraisal and assessment, termination, etc. Specifically, the flow through organizations can be split into inflow (e.g. planning, hiring, recruiting, selecting and inducting), internal flow (training, developing, giving appraisal and rewarding) and outflow (retirement, lay-offs, dismissal and having a new job). Today, the software firms have started increasing their employee cost. A lot of expenses have been incurred not only to retain its talents, but also train the existing and get the new trained talents from its newly established subsidiaries. From recruiting to onboarding, from motivating and developing talent to supporting people managers and creating an engaged workforce, the effectiveness of employee management has a direct impact on competitiveness and business results and competitiveness. The cost of employee management is actually an investment in employees and their actual involvement in the conduct of the operations of the firms. This engagement of the employees increases workforce retention and thus decreases employee turnover costs. Further, more employees are considered as the most valuable as well as an expensive asset. The revenue per employee (RPE) identifies the revenue derived from the number of employees as a ratio and is considered helpful to measure the overall efficiency of an organization. An improvement in the ratio of revenue to employee numbers, suggests an improved productivity when benchmarked against the competitors.

Thus, the various types of costs associated with the employees needs to be examined in terms of the company's revenue, expenses, sales, and its number of employees to have an insight on its impact on the competitive abilities of the human resource. The human resource has become a primary source of competitive advantage. The positive relationship between engagement and performance (documented in hundreds of studies, with the evidence mounting every day) provides a way for HR to prove its contribution. The research is not inconclusive, not limited to one country or industry, and not contained to a few hundred people.

Human Resource has been considered as a critical resource as most of the attributes of the employees greatly influences the competitive abilities of the firms. The inflow of the human resource can bring lots of new ideas, skills either from their educational institutes of their previous employer, whereas the outflow of such experienced human capital can result into undermining the competitive abilities for the future.

The management of human capital in terms of its employee cost/TR, employee cost/TE, employee cost/Net Sales, revenue per employee, etc, has been framed in terms of Human Capital index. The index has been prepared in Table (5.4) for the top software/IT service providers in terms of five major variables such as total revenue, total expenses, net sales, employee cost and the number of its

associates. These variables have been further analyzed to get the mean values of H1 to H5.

Table 5.4 Human Capital Index

	H1	H2	H3	H4	H5	Total	Rank
TCS	5.72	8.55	4.11	3.39	0.01	21.78	15
Infosys	5.35	8.18	7.85	2.42	0.02	23.82	10
HCL	4.03	8.26	4.86	1.81	0.00	18.97	19
Wipro	5.67	7.54	5.85	3.65	0.04	22.75	13
Polaris	9.17	10.76	9.27	2.10	0.25	31.55	1
Cyient	6.49	10.02	5.68	1.40	0.48	24.07	18
Hexaware	6.94	1.29	7.23	4.23	0.03	19.72	17
Mphasis	6.25	10.01	5.53	1.55	0.53	23.88	9
Tech Mahindra	6.13	7.51	5.08	0.84	0.00	19.56	18
Mindtree	6.18	7.52	6.22	2.52	3.51	25.95	6
Zensar	8.39	10.76	8.75	1.49	0.01	29.39	3
Tata Elxsi	7.76	9.71	7.78	2.53	1.14	28.92	4
NIIT	6.26	8.22	6.51	2.41	0.00	23.40	12
Oracle	6.42	10.41	6.82	3.89	0.01	27.56	5
KPIT	5.94	7.44	6.02	1.98	0.02	21.39	16
Geometric	7.13	9.18	7.82	1.16	0.01	25.30	7
I-Gate **	9.41	10.71	9.18	1.63	0.00	30.93	2
Blue Star**	6.44	7.66	6.65	1.81	0.02	22.59	14
Ramco	6.84	8.22	7.54	1.04	0.01	23.65	11
3i Infotech	3.03	8.03	5.29	1.29	0.41	18.05	20

Data Source: Compiled by Author and calculated on the basis of the Values in the Annual Reports of select Software Firms (2001-16)
**l-gate Acquired by Capgemini in 2015 & Blue Star amalgamated with Blue star Ltd on May 2016

Figure 5.2 Human Capital Index
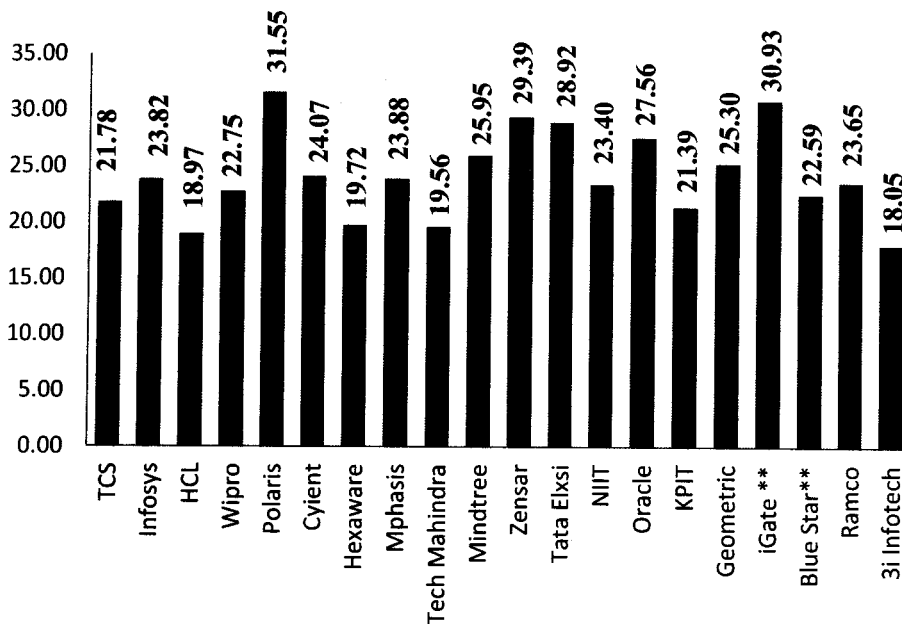
The firm I-Gate is found to be at the top with an index of (31.56), followed by Virtusa Polaris, Zensar, Tata Elxsi, etc. It should be noted that the variations in the HR factors have been basically due to its variations in the employee cost, revenue, expenses, number of employees, etc; in the select software firms. It is found from table (5.4) and fig. (5.2) that most of the firms who are in top five in terms of its operations and performance have been lagging in HR Sub-Index. it is very much important that firms like TCS, Infosys, HCL, etc should work on its human resource in terms of innovative thinking and strategies so as to sustain itself in the competitive race among not only among the firms of India but also to emerge among the foreign firms of its competitor countries.

This Index has been categorized further in terms of their efficiencies in managing and using its human resources on the basis of the following classification; Managed with Low Efficiency with the values between 0 - 17, Managed with Efficiency, the values between 18 - 25 and Managed with High Efficiency with the values between 26 and above in Table (5.5).

Table 5.5 Classification of Firms: Human Capital Index

Category	High Efficiency	Efficient	Low Efficiency
TCS		**	
Infosys		**	
HCL			*
Wipro		**	
Polaris	***		
Cyient		**	
Hexaware		**	
Mphasis		**	
Tech Mahindra		**	
Mindtree		**	
Zensar	***		
Tata Elxsi	***		
I-gate	***		
Oracle Fin. Tech		**	
KPIT		**	
NIIT		**	
Geometric		**	
3i Infotech		**	
Ramco		**	
Blue Star Info		**	

Data Source: Compiled and Calculated by the author.

Table (5.5) shows that most of the top 20 software firm's performance in terms of managing their human resources has been not much satisfactory. Majority of the firms including TCS, Infosys,

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HCL and Tech Mahindra has to improve the styles of managing her human capital if it has to maintain its competitiveness in the future.

5.5.3 Financial Efficiency Index

Many small and mid-sized companies are run by entrepreneurs who are highly skilled in some key aspect of their business, perhaps technology, marketing or sales, but are less savvy in financial matters. The purpose of this index is to analyze the financial health of the software firms. Infact the finance is said to be the life and blood in today's competitive world.

The use of financial ratios is a time-tested method of analyzing a business of any firm/company. The study has analysed the firms in terms of solvency and liquidity, efficiency and in terms of cash flow indicators.

The solvency and liquidity has taken three ratios namely, quick ratio, current ratio and debt equity ratio. The quick ratio is a measure of how well a company can meet its short-term financial liabilities. Higher quick ratios are more favorable for companies because it shows there are more quick assets than current liabilities. A current ratio measures a firm's ability to pay off its short-term liabilities with its current assets. The current ratio helps investors and creditors understand the liquidity of a company and how easily that company will be able to pay off its current liabilities. A higher current ratio is always more favorable than a lower current ratio

because it shows the company can more easily make current debt payments. Debt/Equity Ratio is used to measure a company's financial leverage, calculated by dividing a company's total liabilities by its stockholders' equity. The D/E ratio indicates how much debt a company is using to finance its assets relative to the amount of value represented in shareholders' equity.

The second category of sub-index has taken into account those ratios which assesses as to whether the assets are generating enough revenue relative to the amount of money invested. This is very much important for the competitiveness of the firm and its sustainability for the future. The ratios taken for study purpose are debtor's turnover ratio, investment turnover ratio and asset turnover ratio. The debtor's turnover ratio measures the efficiency of company's credit policies. It shows how efficient a company is at collecting its revenue from sales from customers. The investment turnover ratio is defined in terms of debt to equity, which shows the ability of the management to create revenue from the given funds. The investment turnover ratio tells the investor-analyst how effectively a company uses its resources to generate revenues. Debt consists of money borrowed from creditors, which includes both long and short term securities. The efficiency of the firm is also measured in terms of asset turnover in line with the sales and the assets of the organization. In other words, this ratio shows how efficiently a company can use its assets to generate sales.

Further, the inflow of cash or revenue from the amount of expenditure/money incurred on business also acts as an important component which determines the competitive ability of the firm. It provides a type of safety net to the software firms. Though there are many ratios to indicate the flow of cash to the firm, but the present research has taken mainly earning retention ratio, dividend payout ratio net profit and cash earnings retention ratio.

Earning Retention Ratio is also called as Plowback Ratio. It measures the amount of earnings retained after dividends have been paid out to the shareholders. The prime idea behind earnings retention ratio is that the more the company retains the faster it has chances of growing as a business. This is also known as retention rate or retention ratio. Dividend payout ratio discloses what portion of the current earnings the company is paying to its stockholders in the form of dividend and what portion the company is ploughing back in the business for growth in future. A low dividend payout ratio means the company is keeping a large portion of its earnings for growth in future and a high payout ratio means the company is paying a large portion of its earnings to its common shareholders.

Companies with ample reinvestment opportunities and a high rate of return on assets usually keep a large portion of earnings in the business and, therefore, have a low dividend payout ratio during the first few years of establishment.

Thus, it is with the help of these financial indicators that the financial efficiency index has been constructed in Table (5.6). The table indicates the relative positioning of different software firms under study in terms of their financial efficiency. The Index has been prepared in terms of nine variables which are said to influence the stakeholders, usually that of shareholders interest. Variables such as liquidity, solvency, efficiency and flow of cash have been taken to construct a sub index. Thus, in Table (5.6), it can be seen TCS has been the frontrunner, followed by, cyient, Mindtree etc.

Table 5.6 Financial Efficiency Index

Firm	M1	M2	M3	M4	M5	M6	M7	M8	M9	Total	Mean	Ranks
TCS	2.36	2.40	46.62	5.65	1.75	2.47	49.30	40.02	57.34	207.91	23.10	3
Cyient	3.75	3.67	1.23	4.32	0.97	0.91	84.06	16.05	88.44	203.39	22.60	4
HCL	2.29	2.29	1.00	4.72	0.88	0.93	40.58	54.83	50.59	158.11	17.57	19
Hexaware	3.07	3.14	0.50	3.81	0.72	0.82	56.96	42.21	64.17	175.39	19.49	15
Infosys	3.78	3.74	0.51	6.91	0.79	1.31	64.70	34.62	68.82	185.19	20.58	11
MindTree	2.61	2.75	0.83	5.26	1.55	1.90	90.36	12.31	91.50	209.08	23.23	2
Mphasis	2.32	2.34	0.32	5.30	0.57	0.89	63.68	38.06	67.55	181.03	20.11	13
Polaris	2.42	2.47	0.47	6.25	1.47	1.62	63.06	41.53	75.95	195.24	21.69	7
Tech Mahindra	1.95	2.08	0.44	4.51	1.46	2.99	73.32	28.78	78.02	193.55	21.51	8
Wipro	1.95	2.24	0.15	4.94	0.85	2.41	78.76	26.56	80.54	198.39	22.04	6
Zensar	3.44	3.30	0.77	4.02	1.43	1.57	71.89	27.04	78.08	191.54	21.28	9
Tata Elixi	1.46	1.79	0.35	4.54	1.89	2.90	47.76	53.43	60.15	174.27	19.36	16
KPIT	1.36	3.49	0.37	3.89	0.86	1.29	87.36	12.00	90.59	201.20	22.36	5
NIIT	1.76	1.88	0.24	3.34	0.88	1.27	53.59	44.62	74.40	181.99	20.22	12
Oracle	5.01	4.97	0.43	2.60	0.64	0.75	57.31	40.68	59.83	172.21	19.13	17
Geometric	2.32	2.95	0.32	5.20	0.80	1.03	76.99	21.79	75.38	186.78	20.75	10
3i Infotech	1.48	1.94	1.32	3.94	0.26	0.41	51.85	20.62	63.03	144.84	16.09	20
Ramco	1.36	2.82	0.90	2.02	0.58	0.36	95.73	8.05	47.44	159.26	17.70	18
I-Gate	2.55	2.75	0.40	2.05	0.75	1.46	119.50	4.89	89.48	223.83	24.87	1
Blue Star	2.43	2.43	0.54	3.58	1.09	1.66	57.42	41.69	66.56	177.39	19.71	14

Data Source: Compiled and Calculated by author from Annual Reports of Select Software Firms (2001-16).

M1- Current Ratio, M2-Quick Ratio, M3-Debt Equity Ratio, M4-Debtors Turnover Ratio,M5-Investment Turnover Ratio

M6-Asset Turnover Ratio,M7-Earning Retention ratio, M8-Dividend Payout Ratio Net Profit and M9- Cash earnings retention ratio

Figure 5.3 Financial Efficiency Index
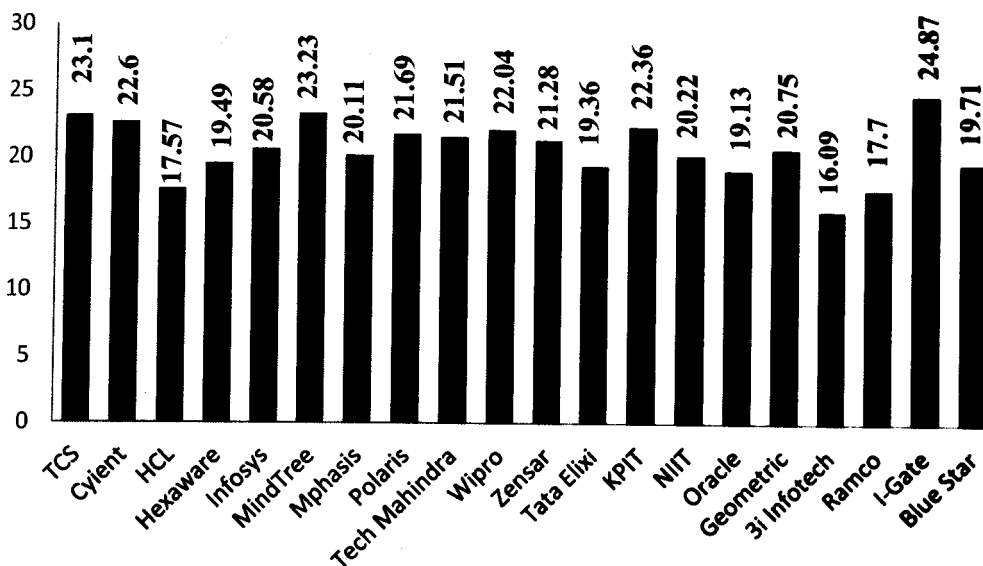
Table (5.6) shows efficiency in different parameters of study. In terms of current ratio, Oracle Financial Technology was at the top with a mean value of (5.01), followed by Infosys with (3.78), Cyient (3.75), Zensar (3.44), etc. The mean value of TCS was (2.36). Similarly in case of quick ratio, Oracle Financial Technology, Infosys, Cyient, Zensar and Hexaware technologies led from the front. Further, in debt-equity ratio, Infosys, Hexaware, Mphasis, Tata Elxsi, I-gate were found to have performed better than other firms. The mean value of TCS was however (1.18), higher than that of HCL at (1). In terms of debtor's turnover ratio, Infosys, Virtusa Polaris, TCS, Mindtree, etc showed a high ratio ranging from (6.96) to (4.72). In Investment turnover ratio, I-gate was at the top with a mean value of (1.89), followed by TCS with a mean value of (1.75), Mindtree (1.55), etc. The mean value of

Infosys was found to be (0.79). In case of Asset turnover ratio, Tech Mahindra with a mean value of (2.99) was found to have a better edge over other firms such as Tata Elxsi (2.90), TCS (2.47), Mindtree (1.90), etc. In terms of earning retention ratio it was found that I-gate was having the maximum value at 119.50, followed by Ramco Systems (95.73), Mindtree (90.53), Cyient (84.06), etc. The mean values of TCS, Infosys and HCL were comparatively lower at (49.30), (64.70) and (40.38) respectively. Furthermore in case of dividend payout ratio net profit HCL Technologies was found to have a mean value of (54.83), followed by Tata Elxsi with (53), Hexaware Technologies 42, etc. Finally in terms of cash earnings retention ratio, companies like I-gate, KPIT, Mindtree, etc showed better performances. Thus, in terms of solvency and liquidity parameters, Infosys has been found to doing better than other firms in terms of efficiency parameter, Polaris, Tata Elxsi, TCS on an average were found to better off then other firms. Similarly in terms of cash flow indicators, I-gate, Cyient, Mindtree, TCS were at the top compared to the other firms. Thus, there are lots of variations in the performances of the select software firms in the parameters of study. It is very much important that the firms like TCS, Infosys, HCL, and Wipro have to possess a deeper insight into the variables and bring out innovative changes so that their competitive abilities are nurtured and sustained in a proper healthy manner.

This Index has been categorized further for all the twenty software firms in terms of their efficiencies in managing and using its human resources on the basis of the following classification; Managed with High Efficiency: 22 and above, Managed with Efficiency: 17 - 22 and Managed with Low Efficiency: 10-17 in Table (5.7).

Table 5.7 Classification on the basis of Financial Efficiency

Category	High Efficiency	Efficient	Low Efficiency
TCS	* * *		
Infosys		* *	
HCL		* *	
Wipro	* * *		
Polaris		* *	
Cyient	* * *		
Hexaware		* *	
Mphasis		* *	
Tech Mahindra		* *	
Mindtree	* * *		
Zensar		* *	
Tata Elxsi		* *	
I-gate	* * *		
Oracle Fin. Tech		* *	
KPIT	* * *		
NIIT		* *	
Geometric		* *	
3i -Infotech			*
Ramco		* *	
Blue Star Info		* *	

Data Source: Compiled by the author

Table (5.7) shows that in terms of the financial efficiency index, TCS, Wipro, Cyient, Mindtree and KPIT are found to be highly efficient in managing their funds, assets and liabilities.

5.6 Competitive Index of Software Firms

A number of parameters have been studied to analyze the competitive abilities of the firm across India as well as that across the globe. Different research studies have taken mostly the HR component of the organizations to influence the competitive strength of the firms. However in this study, variables including that of human capital, new variables in terms of liquidity, solvency, Performance, efficiency have been taken. The basic purpose was to construct a competitive Index of software firms to measure its competitiveness across India. The index is constructed with the help of three sub-indices, namely, Performance sun-index, Human Capital Sub-index and Financial efficiency Sub-index. The newly constructed sub-index is shown in Table (5.8).

Table 5.8 Competitive Index of Software Firms

Firms	Performance Index	HC Index	Financial Eff.	Total	Ranks
TCS	18.48	21.78	23.1	63.36	1
Infosys	15.08	23.82	20.58	60.00	6
HCL	12.25	18.97	17.57	48.79	17
Wipro	10.48	22.75	22.04	55.27	10
Polaris	6.83	31.55	21.69	60.07	5
Cyient	9.88	24.07	22.6	56.55	8
Hexaware	9.23	19.72	19.49	48.44	18
Mphasis	8.66	23.88	20.11	52.65	13
Tech Mahindra	13.25	19.56	21.51	54.32	11
Mindtree	6.47	25.95	23.23	55.65	9
Zensar	9.71	29.39	21.28	60.38	4
Tata Elxsi	13.12	28.92	19.36	61.4	3
I-gate	7.3	30.93	24.87	63.1	2
Oracle Fin. Tech	12.76	27.56	19.13	59.45	7
KPIT	7.36	21.39	22.36	51.11	15
NIIT	7.27	23.4	20.22	50.89	16
Geometric	7	25.3	20.75	53.05	12
3i- Infotech	7.11	18.05	16.09	41.25	20
Ramco	2.19	23.65	17.7	43.54	19
Blue Star Info	9.12	22.59	19.71	51.42	14

Data Source: Compiled and Calculated by the Author.

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Table (5.8) shows the software competitive Index at the national level. It consists of three broad sub-indices, namely; Performance Index, Human capital Index and Financial Efficiency Index. It is found from the study that, TCS tops at the national level with a score of (63.36), closely followed by I-gate with a score of (63.10), Tata Elxsi (61.4), Zensar (60.38), Virtusa Polaris (60.07), Infosys (60), Oracle Financial Technology (59.45), etc.

The categorical explanations however show the results in little details. These have been aggregated in terms of classifying the economies on the basis of their relative scores in all three indices The top twenty software firms under study has been further categorized as Highly Competitive with a score of 60 and above; those with 50 – 59 as competitive and less than or equal to 49 as less competitive in the constructed index. This is shown in Table (5.8).

Table 5.9 Competitiveness at the Firm Level

Firms	Software Competitive Index	Indicators	Levels
TCS	63.36	***	Highly Competitive
Infosys	59.48	***	Highly Competitive
HCL	48.79	*	Lowly Competitive
Wipro	55.27	**	Competitive
Polaris	60.07	***	Highly Competitive
Cyient	56.55	**	Competitive
Hexaware	48.44	*	Lowly Competitive
Mphasiz	52.65	**	Competitive
Tech Mahindra	54.32	**	Competitive
Mindtree	55.65	**	Competitive
Zensar	60.3	***	Highly Competitive
Tata Elix	61.40	***	Highly Competitive
I-gate	63.10	***	Highly Competitive
Oracle Fin. Tech	59.45	**	Competitive
KPIT	51.11	**	Competitive
NIIT	50.89	**	Competitive
Geometric	53.05	**	Competitive
3i Infotech	41.25	*	Lowly Competitive
Ramco	43.54	**	Competitive
Blue Star Info	51.42	**	Competitive

Data Source: Calculated on the basis of Performance Index, Human Capital Index and Financial Efficiency Index

Figure 5.4 Competitiveness at the Firm Level

Legend:
- Highly Competitive
- Competitive
- Lowly Competitive

Firm	Value
TCS	63.36
Infosys	60.00
HCL	48.79
Wipro	55.27
Polaris	60.07
Cyient	56.55
Hexaware	48.44
Mphasiz	52.65
Tech Mahindra	54.32
Mindtree	55.65
Zensar	60.38
Tata Elix	61.4
Igate	63.1
Oracle Fin. Tech	59.45
KPIT	51.11
NIIT	50.89
Geometric	53.05
3i Infotech	41.25
Ramco	43.54
Blue Star Info	51.42
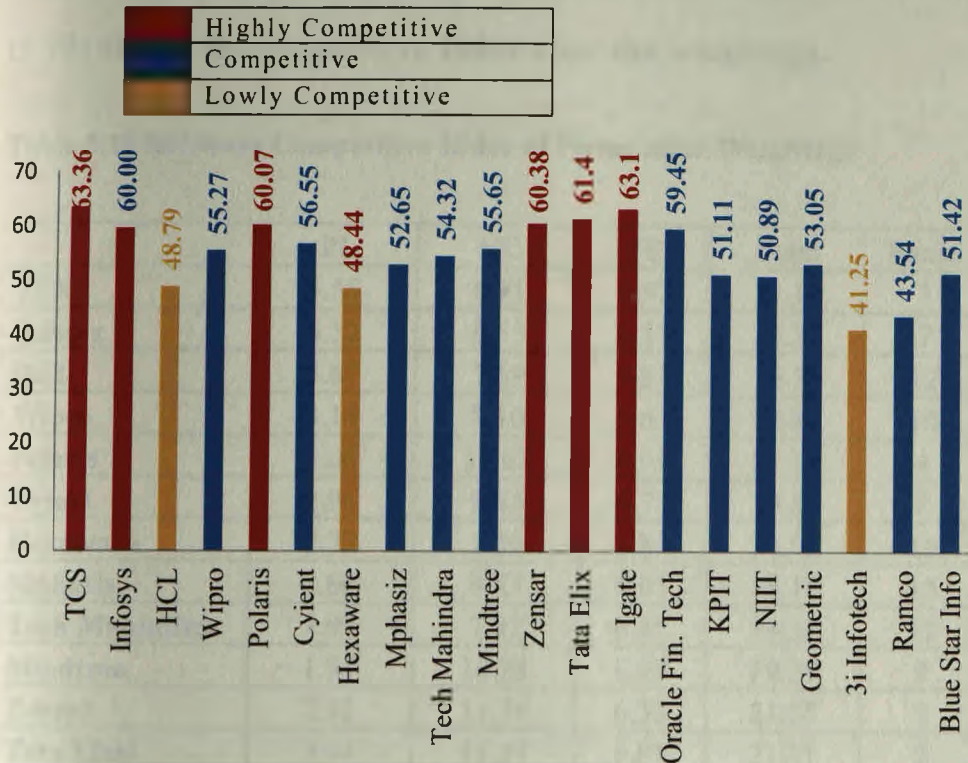
Table (5.9) indicates the competitive positions of the software firms under study. It shows that out of 20 software/IT firms six firms, namely, TCS, Virtusa Polaris, Tata Elxsi, Zensar, Infosys and I-gate are found to be highly competitive, whereas 12 software firms were found to be competitive and the remaining three were found to be lowly competitive.

Furthermore, it should be noted that as the employee cost on managing the human capital has been found to be increasing, the software competitive index of the software firms has also been constructed on the basis of the weightage at 40% in terms of human capital sub-index, 30% in terms of Performance Index and 30%

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weightage has been given to the financial efficiency Index. Table (5.10) shows the competitive Index after the weightage.

Table 5.10 Software Competitive Index of Firms after Weightage

	PI	HC	FE	Total	Ranks
TCS	5.55	8.71	6.93	21.19	3
Infosys	4.52	9.53	6.17	20.22	7
HCL	3.67	7.59	5.27	16.53	17
Wipro	3.14	9.10	6.61	18.86	10
Polaris	2.05	12.62	6.51	21.18	4
Cyient	2.96	9.63	6.78	19.37	8
Hexaware	2.77	7.89	5.85	16.50	18
Mphasis	2.60	9.55	6.03	18.18	13
Tech Mahindra	3.97	7.82	6.45	18.25	12
Mindtree	1.94	10.38	6.97	19.29	9
Zensar	2.91	11.76	6.38	21.05	5
Tata Elxsi	3.94	11.57	5.81	21.31	2
I-gate	2.19	12.37	7.46	22.02	1
Oracle Fin. Tech	3.83	11.02	5.74	20.59	6
KPIT	2.21	8.56	6.71	17.47	16
NIIT	2.18	9.36	6.07	17.61	15
Geometric	2.10	10.12	6.23	18.45	11
3i Infotech	2.13	7.22	4.83	14.18	20
Ramco	0.66	9.46	5.31	15.43	19
Blue Star Info	2.74	9.04	5.91	17.69	14

Data Source: Calculated by the author

Table (5.10) shows the competitive positioning of firms after giving weightages to all the three sub-indices. Thus, in terms of more weightage given to human capital sub-index, the ranking of the firms marginally changes. It should be noted that the top five firms remain the same even after the weightage, with only changes in their respective rankings. I-gate comes at the top, .followed by Tata Elxsi, TCS, Vitusa Polaris, Zensar, etc.

Figure 5.5 Software Competitive Index with & without Weightage
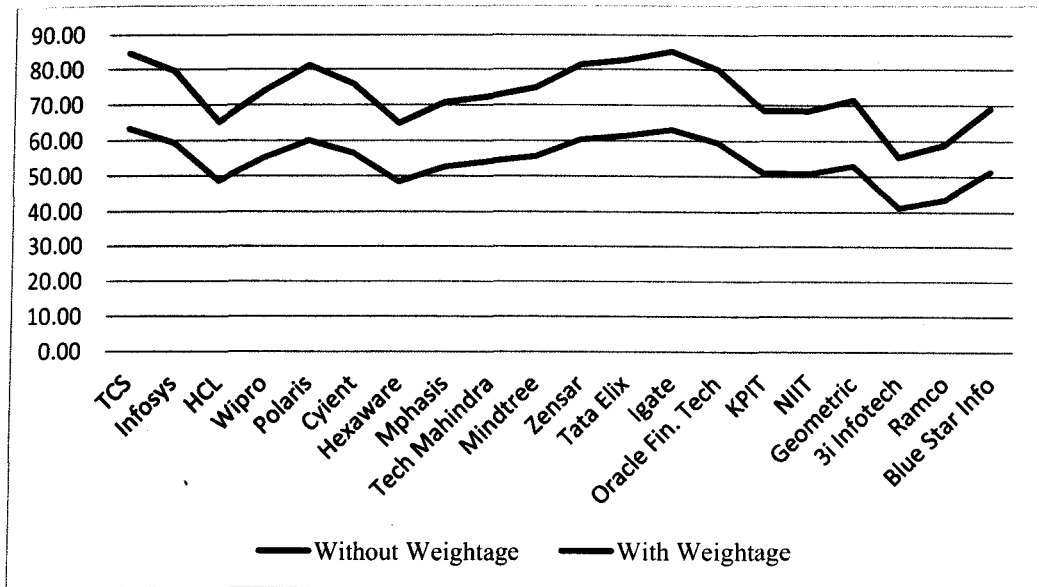
The graph shows the competitive positioning of the software firms with and without weightages. It can be seen that the positioning hardly varies with and without weightages. The top positions of I-gate, TCS, Polaris, etc have remained the same. This implies that that the human capital component, for which 40% weightage was given, along with other related factors, does plays a crucial role in determining the competitive abilities of the software firms of India.

5.7 Summary of the Chapter

In terms of overall National Competitive Index, I-gate has been at the top, closely followed by Zensar, TCS, Infosys, etc. In terms of Performance Index, TCS has been leading with an index of (18.48), followed by Infosys, HCL and others. In terms of HR Index, I-gate has been found to be at the top with an index of (31.36) followed by

Polaris, Ramco, Zensar and Tata Elxsi. It should be noted that the variations in the HR factors and its impact has been due to the variations in the employee cost of various software firms. It was also found that most of the firms who are in top five in terms of its operations and performance have been lagging in Human Capital Sub-Index. In terms of Financial Efficiency Index, Software firms like I-gate was found to be at the top with a index of (24.87) followed by Mindtree, TCS, etc. These firms have been found to do better in terms of their abilities in making use of capital more efficiently. These firms are the most innovative and dynamic in terms of their operations in the country.

Further, the expenses incurred and the revenue earned by the software firms has increased over the last fifteen years. An important component of the expenses i.e., employee cost also has shown a increasing trend over time. The R & D expenses however constituted a small portion of the expenses. This has greatly affected the competitive positioning of the software firms of India. The employee cost of most of the software/IT firms has shown an increasing trend. But the rate of increase in its employee cost has been much higher in case of Mindtree. In fact many firms have been trying to retain its talents by engaging their employees in various tasks, trainings and incentives for the deserving employees. The human capital has become one of the important assets of the

software firms, but it all depends on how the firm engages and makes the best use of it.

Firms like Tata Elxis, Virtusa Polaris, Zensar, etc have become highly competitive because of all round developments in its performance, human capital and the usage of funds. These firms have been strategically planning their policies to get the maximum from the software market.

The software firms of India managed to exploit the opportunities offered by India in terms of her new economic policies. Many firms have improved their competitive abilities as the liquidity; solvency aspects of the firms have shown improvements over the last 16 years. The efficiency of using the capital and the assets has improved over time. But all these improvements have not resulted into equal development of competitive abilities of the firms. The firm's innovative strategies in managing the human capital and making effective use of assets and capital have resulted into variations in the competitive positions of the firms under study. Furthermore it was found that though the traditionally TCS, Infosys, HCL, etc, have shown better performances in terms of their profitability and returns, but in terms of competitive abilities, these firms have found to be lagging behind in terms of overall parameters of competitiveness. Firms like I-gate (27.33), Polaris (24.33), Tata Elxsi (24.21), Zensar (23.99), TCS (23.37), etc have replaced the traditional giants of software industry.

CHAPTER VI

HUMAN CAPITAL AND COMPETITIVENESS OF IT FIRMS

CHAPTER - VI
HUMAN CAPITAL AND COMPETITIVENESS OF IT FIRMS

6.1 Introduction

The modern globalised competitive market has compelled the firms to leverage on the workforce as a competitive weapon. A strategy for improving workforce productivity to derive higher value for the firms has become an important task for the organisations. Firms have been optimizing their workforce through comprehensive human capital development programmes not only to achieve business goals but also for a long term survival and sustainability. To accomplish this, firms have to invest in human capital to ensure that the employees have the knowledge, skills, and competencies they need to work more effectively in a rapidly changing and complex environment (Marimuthu, 2009).

Further the constantly changing business environment requires firms to strive for superior competitive advantages via dynamic business plans which incorporate creativity and innovativeness. This is essentially important for their long term sustainability whereby human capital plays a significant role in enhancing the competitiveness of the employees, thereby directly influencing the performance of the software/IT firms of India.

The explosive pickup of the IT industry in the late 1990s brought India on the global map in the software industry. India became one of the

important competitors in the software industry. This explosion or what can be termed as boom in IT sector, however, brought many challenges and opportunities to the knowledge industry. The Challenge was in terms of managing the human capital across the firms at different levels. The employee cost incurred in the Software industry has been on the rise. This has become an important factor in influencing the degree of competitiveness as every firm has been offering lots of benefits to its employees in terms of incentives and other measures to upgrade their skills so that they become competitive to contribute towards the organizational success. But along with these there is a rise in the rate of attrition also. As per the report of the Press Trust of India, 2015, the attrition rate was expected to be in the range of 15 to 20% in the IT and ITeS sector. Thus the management of the human capital involved a better way for creating a pleasurable and satisfied working environment. Employees expected the company to give excellent opportunities for their personal growth through different incentives and schemes. A good balanced HR system becomes the backbone for ensuring career growth to the employees. This however has to be facilitated by an excellent training in terms of its planning for the future sustainability. Thus the management human capital and its development play a crucial role in the competitiveness of software firm's of India.

6.2 Theoretical Background

Human Resource (Capital) Management is the art of not only managing the human capital, but also trying to achieve a competitive edge over its competitors in terms of its strategic and well balanced practices directed not only towards the employees, but also towards the achievement of the organizational goals.

From the perspective of Classical economic theory, human capital considers labour as a commodity that can be traded in terms of purchase and sale. This classical theory was focused on the exploitation of labour by capital. However, unlike the traditional meaning of labour, human capital refers to the knowledge, expertise, and skill one accumulates through education and training. Emphasizing the social and economic importance of human capital theory, Becker (1993) noted that the most valuable of all capital is the investment in human capital. Becker distinguishes firm specific human capitals from general-purpose human capital which is knowledge gained through education and training in areas of values to a variety of firms such as generic skills in human resource development. Regardless of the application, Becker considers education and training to be the most important investment in human capital.

The competitive conditions in the business world however has made it difficult to acquire and retain the top talents. The compensation strategy is the extremely important piece of the overall human capital

strategy to keep the company competitive and successful. Infact today, the majority of firms pay at the market rate, which is the rate offered by most of the competitors for its employees. Those paying above the market rates are referred to as market leaders. These are typically those companies who possess the ability to pay and attract and retain the top talented employees. Those paying below the market rates are called as market laggards who generally do not possess the ability to pay higher salaries. Such companies often attempt to attract employees by linking pay to productivity or profits so that the employees can earn more if the company does well.

Further as per Garavan et al, (2001), human capital has four key attributes such as (1) flexibility and adaptability (2) enhancement of individual competencies (3) the development of organizational competencies and (4) individual employability. These attributes add values to individual and organizational outcomes.

From the individual level, Collis and Montgomery (1995) pointed out that the importance of human capital depends on the degree to which it contributes to the creation of a competitive advantage. From an economic point of view, transaction costs indicates that the firm gains a competitive advantage when they own firm specific resources that cannot be copied by rivals. Thus, as the uniqueness of human capital increases, firm gets the incentives to invest resources into its management and the aim to reduce risks and capitalize on productive potentials.

It should be noted that the human capital theory has undergone a rapid developments with more emphasis given on training its employees. Human capital investment in any activity improves the quality (productivity) of the workers. Therefore, training is an important component of human capital investment. The understanding of firm performance in relation to human capital should not be regarded as a phenomenon that only adds more zeros to a firm's profits but also as a process of transforming the workforce as the most valuable assets for the organization to pave ways for greater achievements via innovativeness and creativity. Hence, most of the companies should therefore, come up with some effective plans especially in investing in human capital for greater performance and to remain competitive for their long term survival (Marimuthu, 2009).

The software industry of India has been hailed as a successful industry over the last two decades or more on account of its efficient low cost human capital. In the present chapter, human capital is considered as one of the major factor which influences the competiveness of the software industry. The chapter examines the extent to which human capitals impacts the firm's competitiveness from various critical perspectives. An analysis has been carried out on factors influencing the human capital efficiency in the randomly selected IT and ITeS firms located at Hyderabad, Bangalore, Mumbai, Pune and Goa.

The chapter focuses on finding the effects of demographic and other factors, training and development programs, internal transfer of tasks, etc on employee's competitiveness in terms of the following three specific sub-objectives.

1) To find out the factors determining the salary as an important component determining the competitiveness of the employees.

2) To study the impact of selection, training and development on competitiveness of employees.

3) To study the impact of internal transfer of tasks, flexibility and potential for growth on employee competitiveness.

6.3 Methodology of the Study

The chapter consists of mainly primary data gathered in terms of a structured questionnaire which was administered online in terms of the specially created url (softwarecompetitiveness.co.in/ competitiveness /it-employees) to 2000 respondents. The questionnaire consisted the information on the demographic factors and its relation with the salary, educational qualification and salary, training and development, flexibility in working hours, etc. Out of 2000 respondents, 400 respondents filled the online questionnaires, but only 341 questionnaires were found to be valid in terms of their entries and attributes. Hence the analyses were restricted to 341 respondents only.

6.4 Demographic Factors and Competitiveness

The human capital plays a significant role in Information Technology industry. Being a service oriented and a knowledge driven industry the software/IT firms emphasize a lot on the quality of the human capital. But to attract the best quality, not only the environment of the firm, but also the salary plays an important role in getting the best talented employee for the firms. But salary in turn gets influenced by number of demographic and other factors such as gender, age, marital status, educational qualifications, etc. These factors are presumed to have its influence on the salaries of the employees which in turn influences the competitiveness of the firms. These factors are analysed and discussed here. Salary is taken here as a proxy for competitiveness of employees in IT firms.

6.4.1 Gender and salary

The differences in attitudes of both the genders may greatly influence their competitiveness. The differences in labour market for men and women are highly prevalent across the service industries like that of software industry. This may be not only due to existing discriminations, but also due to the differences in attitudes of males and females towards competitiveness. There are several other factors as well which account for such a gender gap, but are still debatable as some emphasize on biological

factors, some on social environment which influences the degrees of competitiveness among the male and the female employees. Further, it should be noted that over the years it has been observed that women's have exhibited higher levels of competitiveness among themselves rather than with the males. Further in most of the Companies in Silicon Valley of US, the men outnumbered the women. For example at Google, women constitute 17 percent of technical employees and at Facebook, it's just 15 percent. A less formal survey done in 2013 by Pinterest engineer Tracy Chou found that, women represented only 12 percent of engineers at major tech companies. Infact as per the Survey conducted online by Fusion from US in 2015, 92 percent of software developers were men and only 5.8 % were women's. This survey included respondents from 157 countries. Even in case of Indian top IT companies like Tata Consultancy Services Ltd., Infosys Ltd., Wipro Ltd., HCL Tech Ltd., Tech Mahindra and Mahindra, etc, the top level positions are hardly occupied by the females (Lanon, 2013). It is reported that the proportion of women into the various IT based industries in India is in the order of 19% in the software industry; 40% in the telecom industry; 80% in the airlines; 45% in the ITES; and 50% in the BPOs (Suriya, 2003). The above data reveals that the IT and ITeS industry is dominated by males and they are supposedly more competitive than females. The salary difference between the male and the female employees in the sample of study is shown in Table (6.1)

Table 6.1 Gender and Salary

Gender	No. of Respondents	%age	Mean Salary	S.D
Male	200	58.7	56875	25017.3
Female	141	41.3	48209	24080.1

Data Source: Calculated by the author

The study shows that there are 58.7% of males and 41.3 of females in the sample data. The mean salary between both the genders varied and it was found that males are paid more than the females.

Further, The IT employees are more or less similarly educated. Therefore the general presumption is that male and the female employees are paid more or less the same salary and have the same degrees of competitiveness. However the mean salaries of the male and the females in the given sample found to be different. The statistical significance of the differences in the salary between the males and the females in terms of the following hypothesis, using 't' test.

Ho – There is no significant difference between the male and the

female salary of Software/IT employees.

Ha- Salary of Male and Female employees are different.

Table 6.2 Gender and Mean Salary: T-Test

T – test for equality of Means		
t-statistic	Df	p-value
3.199	339	0.002

Table (6.2) shows $p < .05$. Thus the hypothesis that there exists no significant relation between the gender of the employees and their mean salary is rejected. It is found that there is statistically significant difference between the two in terms of their salary. The difference in sex has its own role in determining the salary and competitiveness of the IT employees. Thus men are found to be more competitive, the reasons of which are still debated across the globe.

6.4.2 Marital Status and Salary

It is usually perceived that married people do not give their 100% towards achieving the organizational goals as they get divided in their tasks both at organization and at homes. Most of the empirical studies also suggested that married employees mostly suffer from stress levels that undermines their competitiveness thereby adversely influencing the success of the organization. The respondents' profiles in terms of their marital status and salary is given in Table (6.3).

Table 6.3 – Marital Status and Salary

Marital Status	Number of Respondents	%age	Mean
Single	122	35.78	39508.2
Married	219	64.2	61089.4
Total	341		100597.6

Data Source: Calculated by the author

It can be seen from Table (6.3) that most of the respondents were married (64.2%) and the remaining 35.78% were single or not married. This indicates a high proportion of employees of software organizations who are married. Further the table also indicates that irrespective of family obligations the married employees are earning more than the unmarried. The study tries to test this in terms of salary of married and unmarried employees in terms of the following hypothesis.

Ho – There is no significant difference in the salary of married and unmarried employees.

Ha – The salary of married employees are higher than unmarried employees.

The rationale behind this alternative hypothesis is that the married employees are more experienced and mature enough to take more responsible jobs. Besides, very often, the husband and wife take up the job in the same IT Company. Therefore married employees are likely to be paid more than those who are not married.

This difference in the mean salary is tested for significance and the results are given in Table (6.4).

Table 6.4 Marital Status and Salary: T-Test

T – test for equality of Means		
t - Statistic	df	P-Value
8.384	338	0.000

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Table (6.4) shows $p < .05$ (it is $p = .000$). Thus the hypothesis that there exists no significant relation between the marital status of the employees and their mean salary is rejected. It implies that the married employees are paid higher salary as compared to unmarried employees. Infact most of the software firms employ married people, because being together in the same firm, the couples contribute more towards the firm and helps to improve the productivity and performance thereby enhancing its competitiveness.

6.4.3 Age and Salary

The age of the employees can act as an important determinant of the competitiveness of the firms. It is presumed that the young employees are mostly energetic, innovative and always prefer challenges in any given organization. But at the same time, the experienced employees of higher age can also be more productive in service oriented firms like that of IT. In today's modern globalised world the labour market has been facing three basic challenges, namely, (i) the aging workforce (ii) labour shortages and (iii) preference of many employees to work beyond their retirement age. The profiles of the IT employees in terms of their age and has been analysed in Table (6.5)

Table 6.5 – Mean Salary and Age

Age Groups	No. of Respondents	%age	Mean Salary	S.D
20 - 25	65	19.1	31500	22473.1
26 - 31	118	34.6	46038.2	21347.1
32 - 37	80	23.5	57562.5	14577.2
38-43	59	17.3	73940.7	15447.4
44 & Above	19	5.6	90789.5	17099.6
Total	341	100		

Table (6.5) shows that the respondents mostly belonged to the age group of 26 to 31 years, i.e., 34.6%. The aged population of 44 years and above was hardly around 5.6%. Thus this clearly shows India's demographic competitive advantage in the software industry. But it needs to be sustained if it has to be really competitive in the years to come. The difference in the mean salary with respect to age of the respondents is tested with ANOVA on the following hypothesis by using Anova test.

Ho – The salary of the different age groups is the same

Ha – The salary of different age groups are different.

Table 6.6 Anova Results of Age and Salary

Salary	Sum of Squares	df	Mean Square	F	p-value
Between Groups	90406750851.4	4	22601687712.9	62.5	.000
Within Groups	121529466157.5	336	361694839.7		
Total	211936217008.8	340			

The F-value of the ANOVA test is 62.5, which is highly significant and the null hypothesis is rejected. It implies that there is significant difference in the salary of the employees of different age groups. From Table (6.5), it is observed that, higher the age, higher is the salary. The age of the employees play a significant role in determining the salary of the employees. Firms are willing to pay higher salaries for experienced employees.

Thus age plays an important role in determining the competitiveness of the firms with a significance value of 0.000 in Table (6.6). The results reveals that higher the age of the workforce, higher the competitiveness of the employees.

6.4.4 Education and Salary

Education and salary usually goes hand in hand. The software industry cannot succeed without having an educated and talented workforce. Knowledge becomes a propelling force in the process of creating technology and providing sustainable development and further affects the competitiveness of firms directly. For this reason, knowledge strengthens change by being transferred to technology and provides competitive advantage to companies which can manage these processes. In every respect of the knowledge era, the pursual of the innovation and realization of economic development depends on the work force having received a quality education. But to get such an educated workforce it is very much

important to either retain the existing or attract the new entrants in terms of freshers by offering a perfect salary and incentives. Table (6.7) shows mean salary corresponding to different levels of education.

Table 6.7 Education and Mean Salary

Disciplines	No. of Respondents	%age	Mean Salary
BE/B.Tech	49	14.4	46887.7
ME/M.Tech	54	15.8	59675.9
MCA	109	32	54839.4
M.Sc	50	14.7	54800
MBA	29	8.5	59827.6
BA/B.Sc/BBA	50	14.7	44000
Total	341	100	320030.6

It is observed from Table (6.7) that the respondents belonged to different educational categories and specializations such as BE/B.tech, M.Tech; MCA; MBA, M.Sc, etc.

Furthermore, most of the time it is presumed that education and salary (income) usually goes hand in hand. This is tested in terms of the following hypothesis

Ho – There is no difference in the salary of the employees with
   different qualifications

Ha – There is difference in the salary of employees with different
   qualifications.

The hypothesis is tested in terms of ANOVAs and the result is produced in Table (6.8)

Table 6.8 Anova Results of Education and Salary

	Sum of Squares	df	Mean Square	F	p-value
Between Groups	10140927354.	5	2028185470.80	3.367	.006
Within Groups	201795289655	335	602373998.969		
Total	211936217008.7	340			

Data Source: Calculated by the author

The F-value of the ANOVA test is 3.367 in table (6.8) which is significant and the null hypothesis is rejected. It implies that there is significant difference in the salary of the employees with different educational backgrounds. The ANOVA results in Table (6.8) shows that education has a significant role in influencing the salary. The various programs of the firms are also directed towards the building up of requisite skills required for the achieving of the organizational goals and tasks through education combined with the compatible skills consistent with the firm's goals and objectives. This plays a crucial role in influencing the competitiveness of the employees of the software/IT firms, which in turn helps in becoming the employees highly competitive.

6.5 Work Experience and Competitiveness

Work Experience plays a significant role in determining and influencing the competitive abilities of the employees at work. In today's modern globalised world, having a degree is not sufficient, but its employability is very important. A perspective employer will always prefer an experienced employee as it gives them an edge over their competitors. Apart from soft skills, it also helps in differentiating oneself from others and thereby leading to the development of the personality in a professional manner.

The work experience of the employees of the software industry is given in Table (6.9). It was found that most of the employees have a work experience of 1-5 years.

Table 6.9 Employees and their Work Experience

No. of Years	No. of Respondents	Percent	Mean Salary
01 - 05 years	154	45.2	40113.6
06 - 11 years	136	39.9	57867.6
12- 17 years	39	11.4	75961.5
18 - 23 years	12	3.5	96875
Total	341	100.0	53291.8

The work experience also is presumed to determine their salary. It is tested in terms of the following hypothesis.

Ho – Work Experience has no role to play in determining the salary

Ha – Salary varies in terms of work experiences.

The above hypothesis is tested using the Anova test

Table - 6.10 --Anova Results of Work Experience and   Salary

	Sum of Squares	df	Mean Square	F	p-value
Between Groups	72428583190.4	3	24142861063.5	58.3	.000
Within Groups	139507633818.4	337	413969239.8		
Total	211936217008.8	340			

The F-value of the ANOVA test is 58.3, which is highly significant and the null hypothesis is rejected. It implies that there is significant difference in the salary of the employees with different years of experience at work. Thus work experience greatly acts as a determining factor for the salary of the software employees.

Further, it is presumed that the IT and ITeS employees possess specific attributes which differs from the employees of other sectors. The IT employees usually prefer to work in any given organization for a very short duration of time as they tend to move from one firm to another in search of better avenues in terms of salary, job security, better working environment, etc. Thus work experience is believed to have its impact on the employee preference toward job security, working environment, etc. Therefore, it is important to understand how employee preference towards job security, working environment, etc, changes with work experience.

Therefore, how work experience determines the employees preference for a particular organization is tested.

.6.5.1. Work Experience and Job Security

It is presumed that people who are highly experienced usually choose that firm which offers a lot of incentives and other measures. A important measure presumed to be mostly preferred by the employees has been the job security. But it should be noted as to whether all the employees having different work experience do prefer job security. The preference of the employees in terms for job security in terms of their work experience is given in Table (6.11)

Table 6.11 Preference of Job Security

Years of Experience	First Priority	Second Priority	Third Priority	Fourth Priority	Fifth Priority	Sixth Priority	Total
1 - 5 years	39	21	21	8	3	0	92 (58%)
6 - 11 years	8	21	14	7	2	1	53(33.3%)
12 - 17 years	1	1	6	4	2	0	14(9%)
Total	48	43	41	19	7	1	159 (100%)

Data Source: Calculated by author

Table (6.11) shows the preference of the employees for job security in terms of their work experiences. It is found that (58%) of the employees having work experience of five years or less gave more importance to job security. Among the 48 employees who have given first priority for job security, it was found that 81.25% were of 1-5 years of work experience. Further, it is presumed that employees with more working experience usually prefer organization which ensures more in terms of job security.

This presumption is tested with the help of the following hypothesis using Chi-square. The results are given in Table (6.12)

Ho-Work experience and preference for job security are independent

Ha-Work experience and the preference for job security are dependent

Table 6.12 Chi-Square Test - Work Experience and Job Security

	Value	Df	p-value
Pearson Chi-Square	28.208	10	.002
Likelihood Ratio	28.189	10	.002
Linear-by-Linear Association	16.204	1	.000
No. of Valid Cases	159		

The P-Value of chi-square test is < 0.05. It implies that the null hypothesis of no relationship between work experience and the job security in the choice of job is rejected. It implies that there is significant relation between the work experience and job security. Thus provision of job security can attract young, energetic and competitive employees.

6.5.2 Work Experience and the Firm's Environment

Employees who are well experienced in their jobs usually are presumed to choose the organization where good working environment persists. A very pleasant and a good working environment always makes the employees feel at the home, thereby contributing to their overall productivity and competitiveness. This greatly helps the organization to have a competitive edge over its competitors in terms of its productive

workforce. The employee's preference in terms of better working environment is given in Table (6.13)

Table 6.13 Preference for Better Working Environment & Work Experience

Years of Experience	First Priority	Second Priority	Third Priority	Fourth Priority	Fifth Priority	Sixth Priority	Total
1 - 5 years	25	40	22	9	3	1	100 (51.5%
6 -11 years	22	23	20	8	2	0	75 (38.7%)
12 -17 years	3	1	9	4	0	0	17 (9%)
18-23 years	0	0	2	0	0	0	2(1%)
Total	50	64	53	21	5	1	194

Data Source: Compiled by the author

Table (6.13) shows that most of the employees do prefer better working environment as one of the important factor in deciding which organization they prefer to join. It is found from Table (6.13) that out of 194 employees who preferred better working conditions, 100 (51.5%) belonged to the class of work experience of 1-5 years. But if we combine the work experience of the employees of 1-5 and 6-11 years, it was found that, 90.2% accorded importance to better working conditions. Among the 50 employees who gave top priority for better working conditions, 50% belonged the class of 1-5 years of work experience. The relation between the employees work experience and their preference for organization in terms of better working environment is tested using chi-square test based on the following hypothesis

Ho- Work experience and preference for good working environment are
    independent

Ho- Work experience and preference for good working environment are dependent

The results of the chi square test are given in table (6.14)

Table 6.14 Chi-Square Test for better working Environment and work experience

	Value	df	p-value
Pearson Chi-Square	43.141	15	.000
Likelihood Ratio	41.628	15	.000
Linear-by-Linear Association	13.959	1	.000
N of Valid Cases	341		

The p-value of the Chi-square test in Table (6.14) is < 0.01, which is significant and therefore the null hypothesis is rejected. It implies that there is a significant relation between the preference for work environment and their experience. The belief that experienced employees preferred those organizations which guaranteed better working environment was found to be not correct.

Infact as per the Global Workforce Study 2014, conducted by Towers Watson, a global professional services company. Salary, job security and career advancement opportunities are the top reasons that people consider for joining and staying in an organization. Globally, the top drivers of attraction and retention remain the same, indicating that Indian employees have similar preferences as their global counterparts for choosing their employers (Reporter BS 2015). Thus most of the organizations have been concentrating on these factors to make themselves more competitive in

terms of equipping and retaining its human capital so that their sudden exits do not hamper its competitive abilities of the software firms.

6.5.3 Work Experience and Better Salary

The employees who have given more years of service in a given line of profession is always presumed to be more capable in doing his work more efficiently and productively. This greatly enhances the competitiveness of the firms. But at the same time, it should be noted that experienced employees always prefer a host of benefits. One of such is a better salary compared to the inexperienced or with lesser experience employee. Table (6.15) shows the priorities of employees in terms of their experience and better salary.

Table 6.15 Work Experience and Better Salary

Years of Experience	First Priority	Second Priority	Third Priority	Fourth Priority	Fifth Priority	Sixth Priority	Total
1 - 5 years	30	32	19	4	2	2	89 (58.16%)
6 - 11 years	27	15	8	0	3	1	54 (35.3%)
12 - 17 years	0	3	2	1	1	0	7 (4%)
18-23 years	0	0	1	2	0	0	3(2%)
Total	57	50	30	7	6	3	153

Data Source: Calculated by the author

It can be seen in Table (6.15) that 58.16% of the employees who preferred better salary in joining the organization belonged to 1-5 years of work experience. The employees with experience of eleven years or more were found to be not much bothered about the salary packages. It is should be

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noted that most of the IT sector employees were found to working in the software industry for a maximum of eleven years period. The extent of relation between the work experience and the salary is tested using chi-square test and the results are shown in Table (6.16) on the basis of the following hypothesis.

Ha – Work experience do not influence Salary

Ho - Work experience do influence the salary.

Table 6.16 Chi-Square Test of work experience and salary

	Value	df	p-value
Pearson Chi-Square	42.087	15	.000
Likelihood Ratio	29.794	15	.013
Linear-by-Linear Association	2.099	1	.147
N of Valid Cases	153		

The p-value of the Chi-square test in Table (6.16) is < 0.00, which is significant and therefore the null hypothesis is rejected. It implies that there is a significant relation between the preference for better and salary and the work experience. The presumption that experienced employees preferred those organizations where better salary was offered was found o be not true.

6.6 Factors in Selection of an Employee

In general, the entrepreneurs build flourishing companies. Every famous entrepreneur has built a flourishing company with great employees by his or her side. In other words, every employer is aware of the fact that her company's productivity and profitability depend on the quality of workers it employs. The employer takes a number of factors such as education and merit, confidence, personality traits, set of skills in selecting the right employee/candidate and so on. Always employers look at the factors that would enhance their firm competitiveness in the selection and recruitment. The factors considered and analysed in the present study are shown in Table (6.17).

Table 6.17 Factors in Selection of Employees

Factors	No. of Respondents	Percent
Qualification & Merit	182	53.1
Work Experience	74	21.1
Personality Traits	85	24.9
Total	341	100

Table (6.17) shows that employers preferred the employees on the basis of their qualifications and merit. The study found that 53.1% of the employees of the different software organizations were selected on the basis of their qualification and merit alone. 25% of the respondents accounted their selection for their personality traits and very few i.e. 21% were of the view that work experience plays a significant role in the absorption to the organizations. The other factors like work experience

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and personality traits also played an important role in the selection and recruitment of employees.

In fact the human resource department is the driving force towards the building of competitive strength and the comparative advantage for the organizations. Further it is presumed that if an individual absorbs himself with the organization in terms of its culture and organizational goals, it can bring unpredictable benefits to the firm. But a poor or bad selection can also bring severe consequences for an organization.

It is presumed that educational qualifications and merits helps the organization to achieve its tasks and goals in a systematic manner. Higher and better the qualifications of the employees, better is the prospects of the firm to become efficient and competitive.

Work experience also played a major role in determining the selection of the employees in software companies across India. The employees with higher work experience do possess the maturity and the required skills to cope up with challenges and the stress factors without compromising the goals of an organization. In fact a well qualified and a experienced employee is always preferred over an fresher as this greatly builds the competitiveness of the organizations. The role of personality traits however was minimal.

6.7 Training, Development and Competitiveness

Training and development programs contribute directly to the enhancement of efficiency and competitiveness of employees in the organizations. To enrich their human capital, the companies organize various training and development programs to help acquire knowledge and the required skills to achieve the goals of the organization and make them more competitive. The choice of an organization by an employee also depends on the training and development programs available in addition to the salary and other benefits.

The increasing size and complexity of organizations, the intensive use of technology, combined with changing socio-cultural norms have contributed with immense complexity to Human Resources Management aspects of managing people in the organizations (Saxena, 2013). In fact the severe competition amidst attrition in the Information Technology industry within and outside India has compelled the firms to develop their human capital through continuous training and development programs. The major purpose of such programs is to minimize the performance deficiencies of the employees at the desired level.

Further evaluating the impact of training and development programme is a continuous process. It needs to be monitored on a regular basis. The present study intended to know the impact of training and development programmes initiated by IT firms. This chapter also looks into the

employee perceptions about the IT firms and the factors that determine the choice of the organization

6.7.1 Induction Programs and Management of Human Capital

When a new employee joins a company, more often than not, there is a period of time that is required for a person to settle in to the new role before they are able to operate at full capacity. This is a common scenario when one is exposed to a new working environment and culture despite the credentials and competencies a new employee brings into the company. A comprehensive and well-prepared induction program helps new staff quickly understand the responsibilities of their new role and the employer's expectation of them. Investing in such a program ensures that the learning curve is shorter, as not only are skills and knowledge of the company quickly obtained and understood, but interaction, communication and collaboration with others is likely to take place much quicker than if no program was outlined. Induction helps an employee to adapt to the organization easily in short period. This also helps to minimize the labor turnover.

The present study evaluated the role of induction programs in human capital management and its building up of competitive abilities of the employees. Induction Program and its performance towards achieving organizational goals are given in Table (6.18).

Table 6.18 Induction Program and its impact on Employees Expectations

Opinions	No. of Respondents	%age
Productivity	69	20.23
Competitiveness	68	20.1
contributed to org. Goals	116	34.2
Needs Upgradation	80	23.6
No Link to Job Tasks	8	2.4
Total	341	100

Data Source: Calculated by the author

It was found that induction programs enabled 34.2% of the employees to contribute towards their organizational goals. Further, 20% of the employees were of the view that it enabled them to be more competitive and enhanced their productivity. A small percentage of 23.6% of the respondents were also of the opinion that such induction programs run by the organizations require upgradations at regular intervals. This usually happens when the employees experience new innovative induction programs in their previous organizations and come across traditional programs at their current place of work. The competitiveness of the firms is, however, hardly influenced by these programs as a small marginal percentage of the employees considered as important. The impact of the induction programs on productivity of the employees is tested in terms of the hypothesis using chi-square tests in Table (6.19).

Ho – The productivity of the employees is independent of induction programs.

Ha – The productivity of the employees is dependent on Induction Programs

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Table 6.19 Chi-square Test of Induction Programs and Productivity

	Value	df	p-value
Pearson Chi-Square	61.761	16	.000
Likelihood Ratio	60.770	16	.000
Linear-by-Linear Association	16.056	1	.000
No. of Valid Cases	148		

Table (6.19) shows a chi-square test of independence of the relationship between induction programs and the productivity of the employees. The study finds a statistically significant relationship between the variables. Thus the null hypothesis is rejected. It implies that induction programs play a significant role in influencing the productivity of the employees.

Similarly the impact of the induction programs on competitiveness of the employees is tested using chi-square test and the result is given in Table (6.20).

Ho – Competitiveness of the employees is independent of Induction Programs

Ha- Competitiveness of the employees is independent of Induction Programs.

Table 6.20 Chi-square test of Induction Program and

   Competitiveness

	Value	df	p-value
Pearson Chi-Square	61.761	16	.000
Likelihood Ratio	60.770	16	.000
Linear-by-Linear Association	16.056	1	.000
N of Valid Cases	148		

Table (6.20) shows a chi-square test of independence of the relationship between induction programs and the productivity of the employees. The study finds a statistically significant relationship between the variables. Thus the null hypothesis is rejected. It implies that induction programs play a significant role in influencing the productivity of the employees.

Further the impact of the induction programs on the abilities of the employees to contribute to the organizational goals is tested in terms of the hypothesis using chi-square tests in Table (6.21)

Ho – The organizational goals of the employees is independent of Induction Programs.

Ha – The organizational goals of the employees is dependent on Induction Programs.

Table 6.21 Chi-square test of Induction Program and Organizational Goals

	Value	df	p-value
Pearson Chi-Square	128.294	16	.000
Likelihood Ratio	45.171	16	.000
Linear-by-Linear Association	.046	1	.830
No. of Valid Cases	193		

Table (6.21) shows a chi-square test of independence of the relationship between induction program and its contribution to the organizational goals. The $p < 0.01$, and thus the null hypothesis stands rejected. The study finds a statistically significant relationship between the variables. It implies that induction programs play a significant role in influencing achieving of organizational goals on account of the efforts of the employees.

6.8 Tasks, Responsibilities, Flexibility and Performance Appraisal

6.8.1 Awareness of the Tasks and Responsibilities

It is usually presumed that whenever an employee is inducted in any organization he is made aware of all his tasks and responsibilities towards the success of the organization. The frequency distribution of the employees in terms of their awareness of tasks and duties in the organizations is shown in Table (6.22)

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Table 6.22 Awareness of Tasks and Duties

Awareness	No. of Respondents	Percent
Not at All Informed	17	5.0
Insufficiently Informed	99	29.0
Sufficiently Informed	224	65.7
Total	341	100.0

Data Source: Calculated by the author

In Table (6.22), it can be seen that only 65.7% of the respondents were sufficiently informed about their tasks and responsibilities at the time of joining the organization; whereas 29% were of the opinion that they were inadequately informed about their tasks and responsibilities and a marginal 5% of the respondents were of the view that they were not at all informed about their tasks. Delegating improper tasks and responsibilities to its new recruits can very often undermine the productivity and the competitiveness of the software organizations.

6.8.2 Performance Appraisal

Performance appraisal provides important and useful information for the assessment of employee's skill, knowledge, ability and overall job performance. It helps to a great extent in managing ones human capital for the betterment of the organization. Though theoretically, it plays an important role, but in reality the analysis showed a different picture. The frequency distribution of the employees' opinions regarding the role of Performance Appraisals in facilitating productivity and competitiveness is shown in table (6.23).

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Table 6.23 Performance Appraisal and its significance

Opinions	No. of Respondents	Percent
Very Much Important	152	44.6
Not at All	131	38.4
No Link At All	58	17.0
Total	341	100.0

Data Source: Calculated by the author

It can be observed from Table (6.23), that 44.6% of the respondents were of the view that the performance Appraisals are very much important and it has greatly enabled them to contribute to the competitiveness of the firm. However 38.4 were of the opinion that it was not at all important. Furthermore 17% of the respondents were of the view that Performance Appraisals in no manner help in making them competitive, which can help the organization to a great extent.

The statistical significance of the performance appraisal in terms of its impact on employee's productivity and competitiveness is tested in terms of the following hypothesis.

Ho- Competitiveness is independent of performance appraisal

Ha- Competitiveness is dependent on performance appraisal

The hypothesis is tested using chi square test and the results are presented in Table (6.24)

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Table 6.24 Chi-Square Test of Performance Appraisal and Competitiveness

	Value	df	p-value
Pearson Chi-Square	11.995	6	0.062
Likelihood Ratio	12.171	6	0.058
Linear-by-Linear Association	5.290	1	0.021
N of Valid Cases	341		

Table (6.23) shows the p-value is 0.062. Thus null hypothesis cannot be rejected at 5% level of significance. It implies that performance appraisals cannot improve productivity and competitiveness.

6.9 Potential for Growth

Any organization in order to grow requires dynamism in her approach and opportunities for growth of its employees. This greatly influences the competitiveness of the employees. Unlike in other industry, in software industry, the degree of potential for the growth of employees was found on a little higher side as every employer has been trying to retain its best talents by offering them all the possible opportunities for their vertical growth. This is also proved by the existing rate of attrition of 15-16%. Further, opportunities for growth and development help employees expand their knowledge, skills and abilities, and apply the competencies they have gained to new situations. The opportunity to gain new skills and experiences can increase employee motivation and job satisfaction and help workers more effectively manage job stress. This can translate into

positive gains for the organization by enhancing organizational effectiveness and improving work quality, as well as by helping the organization attract and retain top-quality employees. By providing opportunities for growth and development, organizations can improve the quality of their employees' work experience and realize the benefits of developing workers to their full potential.

Table 6.25 Potential for Growth

Opinions	No. of Respondents	Percent
Yes	210	61.6
No	131	38.4
Total	341	100.0

It is found in Table (6.25) that only 61.6% of the respondents were of the view that there existed unlimited potential for growth in their organizations. However at the same time 38.4% of the employees under study were very much negative about the existence of the opportunities for growth in the organizations. In fact an employee's perception of internal growth and development opportunities is one of the more important predictors of employee engagement. In the absence of such opportunities within the firm, the competitiveness of the firm gets adversely affected. The existing employees can also move/leave the firm thereby hampering the growth of the firm and its competitiveness and performance.

6.10 Internal Transfer of Tasks and Responsibilities

One of the factors of the internal mobility of the employee is transfer which involves the shifting of an employee from one job to another without changing the responsibilities or compensation. Transfers of employees can be possible from one department to another from one plant to another. Transfer may be initiated by the organization or by the employees with the approval of the organization. It can be also due to changes in organizational structure or change in volume of work, it is also necessary due to variety of reasons. But it can be done either to suit the conveniences of organization and to suit the convenience of employees. But does it really contribute to the competitiveness of the human capital.

Table 6.26 Internal Transfer of Tasks and Responsibilities and Competitiveness

Opinions	No. of Respondents	Percent
Yes	208	61.0
No	133	39.0
Total	341	100.0

Data Source: Calculated by the author

The study found that the internal transfer of tasks and responsibilities within the organizations does contribute towards the competitiveness of the employees of the software industry. In table 6.27, it can be observed that 61% of the employees found the process of internal transfer of tasks and responsibilities facilitated their process of enhancing their competitiveness.

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6.11 Flexibility in Working Hours

Flexibility is about an employee and an employer making changes to when, where and how a person will work to better meet individual and business needs. Flexibility should be mutually beneficial to both the employer and employee and result in superior outcomes. It greatly benefits in terms of reduced levels of stress, increased employee morale, reduction in absenteeism, increase in productivity, reduction in costs, etc.

Table 6.27 Flexibility in Working Hours and Competitiveness

Opinions	Frequency	Percent
Yes	170	49.9
No	171	50.1
	341	100.0

Table (6.26) shows the perceptions of the IT employees in terms of flexibility in working hours and competiveness. It is found out that it is 50:50 basis, which contributes as well as does not. In other words, it reveals that the flexibility in the working hours has not yet reached that level at which it can contribute to competitiveness of the employees and firms.

6.12 Summary of the Chapter

The Human capital management in software industry plays an important role in determining the competitive edge of all the software firms. The

various HR measures such as Performance Appraisals, induction programs and training programs have a positive influence in determining the competitiveness of the employees. The findings of the chapter are as follows

1) **Salary** is greatly influenced by the age, gender, work experience, educational qualifications and marital status of the employees.

2) **The** employees who preferred to work in the organizations where conditions of better working environment prevailed belonged to those who had work experience of 1-5 years.

3) **Employers** preferred to select and recruit most of their employees on the basis of qualification and merit, followed by experience and personality traits.

4) **The** Induction programs greatly contributes to the productivity, competitiveness and in the achievement of the organizational goals.

5) **The** training programs and performance appraisals contributed positively to the competitive abilities of the employees.

6) **The** Flexibility in working hour's ant the internal transfer of tasks and responsibilities play an important role in building up of competitive abilities of the employees.

CHAPTER VII

SUMMARY FINDINGS, CONCLUSIONS AND SUGGESTIONS

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The Indian economy had adopted a restrictive protectionist policy towards the software industry in the early 1980s. This adversely affected the growth of software industry of India. However after 1980,s the government of India slowly started dismantling the shackles and bureaucratic controls over the software industry. But the actual impetus was provided in terms of the economic reforms initiated by the government in 1991. Since then the software industry has been expanding its role not only domestically, but also internationally. Among all the invisibles in the Balance of payments, the share of the software services has been the maximum and has been increasing. The current research was an attempt to evaluate the competitiveness of the software industry of India. The study aimed at studying the important component of the trade in services i.e.; software services and its competitiveness at both national and international level. The competitiveness at international level was studied in terms select parameters from the Global Competitiveness Reports, World Development Indicators, Technological Readiness Index, etc. The national level competitiveness of the software industry was analysed with the help of various annual reports of the firms under study during the period 2000-01 to 2015-16. The research aimed at finding the sustainability of the software industry of India, whose contribution to the GDP has increased from 1.5% in 1998 to 9.5% in 2015-16. The

study also investigated the impact of the various training and development programs initiated by the software firms on the human capital to improve its competitiveness and thus contribute to the organizational goals and tasks to be achieved.

7.1 Summary of the Thesis

In the last two decades or more, the software industry has greatly contributed to the growth of the service sector in the Indian economy. There have been radical changes in the economic policies of different governments not only in India but also in other countries. The success stories of the software industry in the growth of advanced nations has now started replicating in developing and emerging economies like china, India, Ireland, etc. The increasing penetration of the emerging economies in the global software markets has compelled many advanced economies like that of United States, Singapore, Japan, Germany, etc, to bring changes in their bye-laws and policies thereby giving rise to new global challenges, thus necessitating the emerging economies to be more competitive than before. The study critically examined the competitiveness of the software industry at both national and international levels. The role of human capital was also analysed in influencing the extent of competitiveness in terms of select parameters of study.

Having introduced the background of the study in Chapter 1 along with the research problem, hypothesis, methodology, significance and the

limitation of the study, chapter 2 has given a brief review of literature on various aspects of competitiveness of software industry and its growth.

Chapter 3 analyzed the pattern of the software industry of India, its growth over the last two decades, its forward and backward linkages to other sectors of the economy, the destinations of software exports and the policy measures taken by the government of India to promote the growth of the software industry of India both at the domestic level as well as at the international levels. Chapter 4 studies the international competitiveness of the software industry of India amidst top 20 countries, presumed to be leaders in the software industry; consisting of both advanced as well as emerging economies. The study further analysed the competitiveness of the software industry in terms three broad parameters, namely, Business Environment (consisting of 17 parameters), Human Resource (7 parameters) and Technological (consisting of 9 parameters); altogether accounting for 32 parameters, which are evaluated for twenty countries. Chapter 5 evaluated the competitiveness of the software firms of India in terms of top 20 software firms. The study has analysed select parameters in terms of its performance, investments in human capital and efficiency levels of the firms for a period of 16 years. Chapter 6 critically examined the impact of various training and development programs on building the competitive abilities of the employees of the software organizations at large. The study furthermore also analysed the impact of other

measures in influencing the abilities of the employees apart from their demographic profiles.

7.2 Findings of the study

The major findings of the research based on chapter 2, 3, 4, 5, 6 are given as follows.

1) The Indian software exports have grown in spectacular fashion. Its success has been attributed to a combination of resource endowments, active encouragement from the government, and good timings. The contribution of the software industry has been on the higher side. India has successfully participated in the global division of labour in different IT and ITeS as a leading player in the export of software services in Asia as well as across the globe.

2) The government of India has played a significant role in promoting the growth of software industry both at the domestic and the international level. These measures have enabled India to brand herself in the software services in US, UK, EU, etc. Though India has been a late entrant in the software services competitiveness, it has managed to progress in a slow and gradual manner.

3) As per the Software Competitiveness Index, among the advanced economies, Singapore was found to be at the top, followed by United States, United Kingdom and Germany. Whereas in case of emerging economies, Israel was found to be top. China occupied second position followed by India at the third position.

4) The advanced economies like United States, United Kingdom, Germany and Singapore are found to be highly specialized in the basic institutions such as availability of scientist and engineers, minimum burden of government regulations, facilitating rules on FDI, greater spending by companies on R & D, better quality of infrastructure, better industry-university collaboration, etc. In case of emerging economies China, India, Brazil, Mexico, Philippines, Poland, etc, have found to be lagging behind in the race of being competitive due to inadequate presence of these institutions. Israel has been found to be the only economy among the emerging economies, which has shown a satisfactory performance in these set of institutions, which have facilitated the growth of the software industry.

5) The greater degree of openness adopted by the advanced economies in terms of technology absorption, foreign ownership, offering protection to the investors, maintaining a higher degree of transparency in various dealings, etc, have enabled them to be at the top in the competitive positions. The emerging economies performance in terms of the above factors has been found to be low, with the exception of Israel.

6) Though India has been claiming the demographic dividend in terms of her young working population, but study has shown different results. As per the Human Resources Index, the performance of India in parameters influencing the human resources has not been

satisfactory compared to her competitors. India has fared very low in terms of her life expectancy, its quality of educational institutions, percentage of expenditure on education, employer-employee relations, pay and productivity relations, staff training and the quality of research and training services. India's ranking has been very low among the top 20 countries. It is placed at 13th overall and among the emerging economies it is placed at 6th. It should be noted that in the HR index, china's ranking is 9th overall and 2nd among the emerging economies. Thus, the demographic dividend in Software Industry can be exploited only if improvements take place in the above mentioned parameters.

7) India's performance in terms of her technological infrastructure has been very low as compared to her competitors. Its effectiveness in its usage in different sectors of the economy, its usage by the general public and prioritization by the government has been very low. In terms of ranking at the technological parameters, it is 17th among the top 20 economies and 10th among the emerging economies. China, however, is placed at 2nd place among the emerging economies, much ahead of India. Further, in terms of countries like India, Brazil, Mexico, Poland, etc, there is lot of infrastructural bottlenecks which needs to be taken care of on a priority basis, if they have to emerge or retain their present performance in the software industry across the globe. India has to strengthen its HR environment, technology support if it has to retain its performance in the software industry.

India has to bring about a lot of changes in her software trade and investment policies.

8) The competitiveness of India's top 20 software firms at the national level was also undertaken. As per the Competitiveness Index (without weightage) of the software firms, TCS has been at the top at the top, followed by I-gate, Tata Elxsi, Polaris, etc. When we add weightage to the index, the relative positioning of the top five firms changes marginally with I-gate at the top and TCS at the third position.

9) Tata Consultancy Services, Infosys and Tech Mahindra were found to be highly competitive in the performance sub index. These firms have high earning capacity in terms of their well diversified markets and services across India as well the world. Further, in case of Human Capital index, I-gate has been found to be at the top, followed by Polaris, Zensar, Tata Elxsi, etc. In terms of financial efficiency sub index, I-gate emerged at the top, followed by Mindtree, TCS, etc. These firms have been found highly competitive in managing and using the funds in a most efficient manner. These firms are the most innovative and dynamic in terms of their operations in the country.

10) The study at the firm level found that over the last 16 years the revenues earned and the expenses incurred by the firms have been on the rise. It was also found that the firms have increased the employee cost to enhance the competitive abilities of its employees

in terms of various employee oriented policies and strategies. But at the same time the extent of hike in employee cost varied across the firms.

11) The human capital has been an important component in software industry not only in India, but also across the globe. The study found that firms have been following the employee training programs, which no doubt has contributed to the competitive abilities of these firms, but not to the extent which it was supposed to be. There is a need for new innovative and effective training programs to improve its competitiveness and its sustainability.

12) The demographic factors such as age, gender, marital status, education, etc were found to have a positive impact on the determination of the salary which the study has considered as a proxy for the competitiveness of employees.

13) The management of human capital in software industry played an important role in determining the competitive edge of all the software firms. The various HR measures such as Performance Appraisals, Induction Programs and Training Programs had a positive influence in determining the competitiveness of the employees.

14) Most of the software firms have been found to be not upgrading its training and development programs in line with the trends and developments of the software industry. The net impact has been the

failure to retain its best talents, thereby giving greater scope for attrition in the IT industry.

7.3 Conclusions

Firstly, the contribution of the software sector to India's GDP has shown an increasing trend. Trade liberalization and reforms had a positive impact on the growth of trade in software services. This has given a boost to the growth engine of our economy. There has been increase in the exports of the net invisibles with a major contribution from IT and ITeS. The contribution to the GDP has also increased from 1.2% in 1998 to around 9.5 in 2014-15. The exports of software industry have shown an increasing trends from 0.004 US $ billion in 1980 to 74.8 US $ billion in 2014-15. The technological infrastructure has been on the higher side of expansion with more and more technical institutions coming up in India. The latest developments in IT such as Start-ups, Digital India, Internet of Things, etc, have also attributed to the increase in the FDIs and FIIs. The demand for the technical professional has become very high. Further, India has also started diversifying her exports to other countries other than United States.

Secondly, as per the findings, it may be concluded that the advanced economies such as Singapore, United States, United Kingdom, Germany, etc, are better performers as compared to that of emerging economies like Israel, china, India, etc. The competitiveness of India in software industry as compared to other leading countries has not been

satisfactory. India has lagged behind in various parameters such as business environment, technological infrastructure, and in qualitative aspect of human resources. There has been no proper emphasis on improving the quality of human resource in the country. India has been slow in initiating the reforms in this direction. Thus, the presumption that India has globally competitive environment for the growth of the software industry as compared to the other software exporting countries is not true.

Thirdly, at the firm level, it is concluded that the firms like TCS, Virtusa Polaris, Tata Elxsi, Infosys and I-gate are highly competitive; Wipro, Cyient, Mphasis, etc, are competitive and firms like HCL, Hexaware 3i-infotech are lowly competitive. TCS is highly efficient and competitive in performance and in the financial management of its assets. Infosys showed better efficiency in Performance but it showed an average performance in the management of its funds and human capital. I-Gate, Polaris, etc, showed all round efficiencies in the entire three indexes. It is, therefore, concluded that there have been variations in the competitive abilities and the efficiencies of the firms. Thus, the perception that some IT firms are more competitive compared to others in software services, efficiency and profits are validated.

Fourthly, the human capital plays an important role in influencing the competitiveness of software firms. The demographic factors such as gender, education, age and marital status have played an important role in determining the salary and the competitiveness of the employees. The training and development programs, Induction programs and

performance appraisals are important in building firms competitiveness. At the same time they should be more innovative and dynamic.

7.4 Implications of the Study

The software services will continue to be one of the important sector of economic growth contributing to employment, income and foreign exchange reserves. It is going to be an future engine of growth of Indian economy.

India's competitiveness in software industry is not satisfactory across the globe. The major factors responsible for India's poor performance are lack of quality infrastructure, low diffusion of IT, lack of university-industry collaboration, lack of transparency, low IPR protection, etc. this implies that India has to improve a lot in terms of the above parameters. It warrants huge investment in infrastructure, technology, education and development of skills.

There has been lack of uniformity in the firm's performance, management of its funds and human capital. Some firms are better than others in their competitive abilities. Unless majority of the firms come at the forefront in terms of their abilities, India may not be able to make its impact in the software industry at the global level in the future. It implies that the government may have to play a balancing role through proper mechanisms, so that all the IT and ITeS firms start

performing at an uniform level, and thereby increase the competitiveness of the software industry of India.

7.5 Suggestions

1. The days of cheap labour intensive programming is nearing to an end. Indian firms must innovate in its process and increase in its productivity. Not only that, global companies are also tapping other countries (like the Philippines, China and Ireland) for low-cost labour and talent. In these competing times, therefore, the biggest challenge for Indian software companies is to move up the software value chain and that too, rapidly.

2. Penetrating markets for high-end offerings like IT consulting, systems integration, package implementation and products will help Indian software companies establish long-term relationships with clients. Further, well designed campuses and buildings increase labour productivity. Indian firms have an advantage over process innovations, which however needs to be developed, nurtured and innovative.

3. The software industry must learn and document from its experience and further should exploit all the possibilities of acquiring the domain knowledge from firms abroad and further should invest in firms which can give such domain knowledge. It is in such knowledge that it must seek to differentiate itself from its competitors, who are not far behind.

4. The outsourcing industry has been adversely affected because of the political developments in US and European nations. Thus, the need of the hour is that it should diversify its market to other Asian continents and East African countries. It has to reduce its dependency on US and other European markets. For example because of the Brexit Impact, Infosys, suffered as the Royal Bank of Scotland shelved its plan to create a separate bank in the U.K., forcing Infosys to shift about 3,000 employees from that project.

5. The domestic IT market needs to be tapped more vigorously. As more customers drive the change towards off shoring and such activities become mainstream, Indian software companies are likely to gain immensely from the potential that exists. Further, the emergence of technologies such as cloud, Internet of Things and automation among others has created uncertainty as well as opportunity for the industry. This can act as a catalyst for the Indian IT services to go for acquisition and also make investments in the new age start-ups. However the industry may suffer on account of the lack of ready availability of skilled hands in the new domains.

6. It is very much important to increase the skilled manpower to reap the advantages of the new digital transformation. Further, India's market share continues to be at 7 per cent of the global software and IT services spend, and 57 per cent of global IT services are outsourced to India. Thus, more training and institutional support mechanisms are required to fully help the software industry in becoming more competitive.

7.5 Areas for Future Research

The present thesis has evaluated the competitiveness of the software Industry of India and not the software industry of the world. The study can be done with different additional parameters with different frameworks and models. It would be ideal to have more countries in the construction of the index, covering different regional groupings. The study can also be analysed in terms of Indian and foreign IT firms. The study on human capital can also be conducted in terms of the perceptions of the top level management employees.

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APPENDIX

Appendix (Questionnaire)

Human Capital and Competitiveness of IT Firms

Dear Respondent,

This questionnaire is exclusively for research purpose. Your participation is purely voluntary. However information provided is the premise of this study. I would be very much obliged if you spare a few minutes to fill up the questionnaire. I assure you that your response will be completely anonymous and be strictly used for the academic purpose only.

Thank you in anticipation of your favorable response.

With regards,

Mr. Prashant .V Kadam)   Dr.P.K. Sudarsan
Research Scholar,   *(Guide)*

Department of Economics,
Goa University.

Name of the Organization (Optional) _____

    1. Name (optional) :   _____

2. Sex   Male/Female (Tick, whichever not applicable)

3. Marital status (Tick, whichever not applicable)

Married [　　　]

Unmarried [　　　]

Divorced [　　　]

4. Educational Qualifications:

	Specialization
B.E/B.Tech	
M.Tech	
M.C.A.	
MSc	
M.B.A.	
B.A/BCA/BBA/BSc/BCom	

5. Total experience in the IT industry (in completed years):

————————

6. Total experience in the present company (in completed years):

————————

7. What are the reasons for joining this company? (*Number it in a ascending order*)

➔ Job security   [　　　]

➔ Better Salary   [　　　]

➔ Better Working Conditions   [　　　]

[　　　]

→ Challenging Job

→ Reputation of the Company

→

Because I could not get better offer in other company

8. Is your job as per your skills and abilities?

→ Yes

→ No

9. In your Opinion what was the deciding factor in your selection?
(Number it in a Ascending order)

→ Qualification & Merit

→ Work experience

→ Personality Traits

10. At the time of joining in this organization, has the management informed you about your duties, tasks and the nature of work?

Not at all informed

Insufficiently informed

Sufficiently Informed

11. What is your opinion about Induction program?
(Number it in a Ascending order)

→ Enabled me enhance my productivity

→ Enabled me to be more competitive

→ Enabled me to contribute more to the firms organizational goals and

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tasks

→ Needs Up gradation on regular basis ☐

→
No link with my job tasks and assignment. ☐

12. Do you think the Performance Appraisals are important in enhancing your Competitiveness.

    → Very Much Important   ☐

    → Not at All   ☐

    → No Link at All   ☐

13. There is unlimited potential for growth in your company.

   Yes   ☐

   No   ☐

14. Has the training programs of the organization enabled you to improve your competitiveness

   Yes   ☐

   No   ☐

15. Do the welfare schemes of the organization enable you to enhance your Competitiveness.

   Yes   ☐

   No   ☐

16. What are your strengths as a employee of an IT company (*In a Ascending Order*)

→ Confidence

→ Higher Salary & perks

→ Greater Opportunities

→ Others (Please specify)

17. Do you agree that your payment package has its influence on your Competitiveness?

Yes

No

THANK YOU

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