

MICROECONOMICS OF COMPETITIVENESS

Project on

Karnataka (Indian State) Offshore I.T. and BPO¹ Services Cluster

by

Ioannis Gkionis, Kiran Gupta, Alison Jarrett, Pablo Jenkins, Sumeet Narang

This project has enabled the team to effectively use the course concepts to look at an offshore IT and BPO cluster, analyze its strengths and weaknesses/challenges in a robust framework in order to develop suitable recommendations. The course concepts were extremely useful in framing the relevant questions for primary research through interviews with industry leaders, which helped us to identify the nuances about the cluster history and current challenges.

We are thankful to the MOC faculty team for their continued support and dedication to make this project a great learning experience.

¹ Information Technology and Business Process Outsourcing

TABLE OF CONTENTS

INDIA	2
History & Political Outlook.....	2
Economic & Social Development	2
Productivity Challenge.....	5
India - National Diamond	6
India - Objectives.....	8
India - Policy Recommendations.....	8
KARNATAKA	9
Highlights	9
Economic and Social Performance	9
Karnataka Diamond – Strengths and Weaknesses	10
Karnataka - Policy Recommendations	11
KARNATAKA - OFFSHORE IT & BPO CLUSTER ANALYSIS.....	12
Description of Outsourcing – onshore and offshore.....	12
Global Market Size.....	12
Factoring Influencing Choice of Offshore Location	13
Global Offshoring Clusters.....	13
Comparison among Global Offshore Centers	14
Karnataka’s Significance in Global Offshoring Industry	15
BANGALORE CLUSTER HISTORY & EVOLUTION OF DIAMOND.....	15
CLUSTER VALUE CHAIN & FIRM ECONOMICS.....	18
CLUSTER MAP & DIAMOND ANALYSIS.....	19
Factor Conditions – Strengths & Challenges.....	20
Context for Firm Strategy & Rivalry – Strengths & Challenges.....	21
Comparing Bangalore with other Indian Cities	24
Related & Supporting Industries – Strengths & Challenges	24
Demand Conditions – Strengths & Challenges	26
Institute(s) for Collaboration	26
CLUSTER GOALS	27
CLUSTER CHALLENGES & RECOMMENDATIONS	27
REFERENCES	30

INDIA

History & Political Outlook

Although India's history goes back almost six thousand years (through many different societies and outside invasions), their modern history began in 1947, when it declared its independence from the colonialist British. Often referred to as the largest democracy in the world, India consists of 28 states and seven union territories. The states and territories are remarkably diverse with varying economies, resources and regional cultures. The political scene is dominated by numerous regional and national parties and in the last two elections, federal governments were formed on the basis of coalition. The leading parties are the Indian National Congress (which ruled from 1947 until the 1980s with populist and protectionist policies) and the BJP (which represents Hindu nationalism). A key challenge with a coalition government at the central level has been the difficulty in policy making and expediting reforms.

Economic & Social Development

The Indian economy represented a minimal fraction of the world's production at the time of independence. India's share of world income collapsed from 22.6% in 1700, almost equal to Europe's share of 23.3% at that time, to as low as 3.8% in 1952.² The country's growth performance was mixed during the 1960s-1980s. In 1991 India started to reveal its growth potential when it implemented outward-looking economic liberalization reforms that took place under the guidance of the IMF to address the balance of payments crisis. Among the most significant reforms was the dismantling of the Raj, the government system of regulations and excessive licensing that restricted business, and harnessed corruption and economic stagnation. The government has opened up FDI limits in multiple sectors in a phased manner since 1991.

² The World Economy: A Millennial Perspective, OECD 2001

Although it started from a low base, India has made progress in terms of its economic and social development in the last decade. However, challenges remain. Real GDP growth averaged 7.86% during the period 2003-2005, while the government and central bank (RBI) short-term projections are 7.5-8%. India's economy is now the fourth largest economy in the world with a US\$ 3.8 trillion GDP PPP-adjusted. *Social indicators* have improved significantly. The literacy rate doubled from one third in the 1980s to two thirds in 2004, while life expectancy increased from 50.4 years to 63.5 during the same period. However, poverty levels only decreased from 45% to around 30%, a modest decline for the rapid economic growth India has experienced. On the other hand, many economic reports suggest India can emerge as one of the key growth engines in the global economy. The country's emergence will coincide with the growth of what economists refer to as the **BRIC economies** (Brazil, Russia, India, and China). Over the next forty years, it is estimated³ that the BRIC countries will surpass the G6 economies (US, Japan, Germany, France, Italy, UK) in terms of GDP in US dollar terms. Also their total weight in the world economy is predicted to rise from 10% in 2004 to more than 20% in 2025. Below is a snapshot of the major development indicators of the BRIC countries:

Key economic and social ratios in the BRIC economies (2005 unless noted)

	Brazil	Russia	India	China
Nominal GDP (US\$ bn at PPP)	1,557.7	1,552.1	3,824.3	8,226.2
Real GDP growth rate	2.3%	6.4%	8.5%	9.9%
Population growth	1.3%	-0.4%	1.4%	0.6%
Real GDP/capita (PPP) in US\$	8,590	10,821	3,490	6,290
Inflation	6.9%	12.7%	4.2%	1.8%
Manufacturing Share/GDP	40%	35.2%	27.1%	46%
Fiscal Deficit/GDP	-1.2%	7.5%	-4.1%	-1.5%
Trade Integration (2004)	39.5%	44.4%	32.6%	79.4%
Listed comp. capitalization. /GDP (2004)	54.7%	46.1%	56.1%	33.1%
Time required to start a business (days)	152	36	89	48
Life expectancy (years) (2004)	70.9	65.2	63.5	71.4
Gini Index (different years)	57.9	39.9	32.5	44.7
Unemployment rate	9.8%	7.6%	8.9%	9%
Literacy rate (2004)	89%	99%	61%	91%
Secondary School Enrollment (2003)	109%	92.9%	52.7%	70.2%
Telephone lines per 1,000 (2004)	230.4	255.8	40.7	241.0
High Tech. Exports (% manuf.exports)	11.6%	9.1%	4.1%	29.8%

Source: WDI Indicators, EIU.

³ The term BRIC economies were first used by Goldman Sachs.

The data above indicates that despite achieving higher growth than Brazil and Russia (but not China), India lags significantly behind in areas such as infrastructure and educational attainment. The Chinese model favored economic reforms under the strict interventionist government role before any political reforms. *China's economic model* tapped into the vast reservoirs of domestic savings and leveraged FDI to build a huge manufacturing base. On the other hand, the *Indian economic model* results from low government regulation in non-manufacturing industries,⁴ creating the path for emerging knowledge-based industries. In addition, India invested considerable resources towards building democratic institutions: it will be interesting to see if these efforts pay-off in the next few decades.

Among the structural drivers of Indian economic growth are the favorable demographics, its high-skilled labor force, the rising integration with the world economy, and the stabilizing macroeconomic policies as well as institutional framework improvements. India's declining dependency ratio will result in a demographic yield that entails a huge increase in labor supply that can be translated into high-growth opportunities for India.

India has seen increased integration with the rest of the world. *Trade* as a percentage of GDP doubled from 15.7% in the 1980s to 32.6% in 2004, but still lags behind the rest of the BRIC economies. In this direction, India has attracted **less FDI** compared to the other BRIC economies, especially China. Average FDI inflows during 2001-2004 averaged US\$4.1 billion in India versus US\$53.4 billion in China. India has followed an idiosyncratic pattern of development, certainly compared with other fast-growing Asian economies (IMF). In terms of **GDP decomposition**, the Indian economy is primarily services-driven rather than manufacturing-driven, with almost half of the GDP originating from services, and the rest from manufacturing and agriculture.

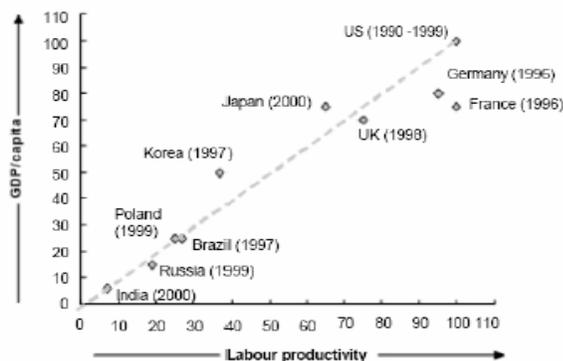
⁴Tarun Khanna, China and India: The race to growth. India's entrepreneurial advantage China has shackled its independent businesspeople. India has empowered them. (McKinsey Quarterly)

Productivity Challenge

Due to more than forty years of protectionism, India's labor and capital productivity lags behind other emerging and developed nations. Although labor productivity growth in India is higher than in the advanced economies, it needs to be stressed that its level in India remains quite low in many sectors.

Productivity & per capita are correlated Indexed to US = 100

PRODUCTIVITY AND GDP PER CAPITA ARE CLOSELY CORRELATED
Indexed to the US = 100 in 1996

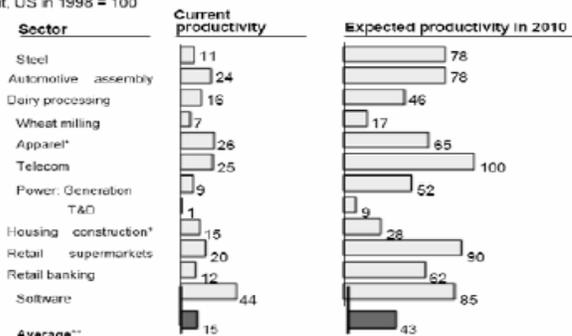


Source: Economic Intelligence Unit; OECD; MGI

With aggressive reforms, India can catch up

LABOUR PRODUCTIVITY IN MODERN SECTORS UNDER 'COMPLETE REFORMS'

Per cent, US in 1996 = 100



* Modern sector only - transition component excluded

** Extrapolated from the sectors studied to the overall economy

Source: Interviews, McKinsey analysis

For example, productivity per worker in India is only nine percent of the U.S. productivity level, while China's productivity level is fourteen percent.⁵ However, with aggressive reforms, which are outlined under "Recommendations", India can catch up in terms of productivity, GDP, and per capita growth rates.

Legal: India has one of the oldest legal systems in the world. Despite an extensive network of legal and judicial system, the enforcement of law in the business sphere remains low and this is reflected in the corruption perception index. In *innovation capacity*, India lags behind, if the number of annual US patents granted is used as an indicator, however India's growth rate in this area is high. China is also in a similar situation.

⁵ (Ark, Bart van 2005)

India - National Diamond

India is ranked 50th in this year's Growth Competitive Index in the Global Competitiveness Report⁶ 2005-2006, which is five positions higher than last year. Although India has made progress in a lot of areas, it still faces a series of challenges. Analyzing the national diamond and competitiveness rankings provides the correct diagnosis and solutions for India's growth dilemma.

Within **factor conditions**, India is significantly empowered by its vast and highly-skilled labor pool. India ranks first in the availability of scientists and engineers in the workforce. The existence of good research institutes and management schools (ranks 6th) has contributed to this success. In addition, the financial sector reforms in the early 1990s have strengthened India's banking sector and capital markets. (India ranks 1st in terms of access to credit and 2nd in term of equity market access). On the other hand, increased socio-economic disparities are encountered at the federal level fueled by state income inequality, the urban-rural divide, and ethnic language diversity. Furthermore, despite the availability of scientists, literacy rates are comparatively low (40% of the population is illiterate), and secondary and tertiary education enrollment is low at 53% and 12% respectively (India ranks 91st out of 117). In addition, the lack of adequate infrastructure has been identified as the major binding constraint to India's growth, according to multiple surveys including the World Economic Forum Executive Opinion survey (2005) and the World Bank Investment Climate survey (2003). The status of infrastructure is very poor according to the competitive rankings as well. (77th in overall quality of infrastructure). The extent of bureaucratic red tape (India ranks 60th) and excessive burden from government regulation (India ranks 76th) remains a serious problem for India. Finally, one of the areas of government policy that needs special attention is the fiscal policy. India has been running one of the biggest fiscal deficits in the world (10% of GDP, second only to Turkey) which is creating anxiety among international investors because it is not sustainable in the long-term. Under **Related and Supporting Industries**, has seen growth in the number of world class firms with growing global

⁶ World Economic Forum.

presence in IT services, pharmaceuticals, chemicals and engineering, with return on equities in excess of 20%. In addition, domestically focused firms have increased their competitiveness significantly and are competing successfully with MNCs firms (in telecom, consumer products, media, automotive, etc.). At the same time, global high-cap companies, but at the same time, a quarter of Fortune 500 companies have a R&D unit in India which creates a strong R&D base. On the other hand, the economy stumbles on low levels of innovation, evidenced by the low number of patents filed per capita, even though it has a number of strong emerging global industries.

Although India's **Context for Firm Strategy and Rivalry** has been improving, it is far from optimal. In factors such as the sophistication of company operations, strategy, and technology, Indian companies do rank favorably. The prevalence of foreign technology licensing, the companies' R&D spending levels, and technological readiness ratings are all very encouraging. However, these strengths are offset by low levels of IP protection (India ranks 43rd) and favoritism in the decisions of government officials (India ranks 53rd).

INDIA NATIONAL DIAMOND		
	Strengths (Rank /166)	Weaknesses (Rank/166)
Demand Conditions	Buyer sophistication (24); Capacity for innovation (30); Financial Market Sophistication (31)	Demanding regulatory standards (43)
Factor Conditions	Access to credit (1); Local equity market access (2); Quality of management schools (6); Quality of research institutes (17); Venture capital availability (24)	Overall infrastructure quality (77); Extent of bureaucratic red tape (57); Quality of public schools (82)
Context for Firm Strategy and Rivalry	Intensity of local competition (11)	Favoritism in government decisions (51); Trade Barriers (52); Intellectual property protection (42); Effectiveness of antitrust policy (32); Corporate Boards Efficacy (45)
Related and Supporting Industries	Local Supplier Quantity (5); Emerging world class companies (Infosys, Dr. Reddy's, Ranbaxy, Reliance, Tata group)	Local Supplier Quality (27)

Possible Clusters with Export Potential: Given India's diamond, the development and strengthening of the following clusters is possible.

India – Possible Clusters	
Natural Resources driven	Capability driven
<ul style="list-style-type: none"> • Tourism • Apparel • Mineral resources related • Dairy and food processing 	<ul style="list-style-type: none"> • Offshore IT/ BPO • Biopharmaceuticals • Automotive components

India - Objectives

India should set an objective to achieve 6-8% compounded annual growth rate for the next 20-40 years, while increasing social and human development indicators. This is an uphill task, and will require significant and quick improvements to the national diamond. Key recommendations include:

India - Policy Recommendations

Factor conditions: *Physical Infrastructure assets: Power:* Privatize electricity sector and all central and state government-owned companies; in power, start by first privatizing distribution; in all other sectors privatize the largest companies first. *Airports:* Privatization of airports and allowing FDI; *Road:* Separate funding pool for roads, contracts to private firms and concept of toll roads; *Civic amenities:* increase taxes and contract water project to private firms; *Land:* Resolve unclear real estate titles by setting up fast track courts to settle disputes, computerizing land records, freeing all property from selling constraints, and remove limits on property ownership. *Human capital & social assets:* Invest in primary education and basic healthcare systems; Reform labor laws and allowing full flexibility in contract labor use. **Context for firm strategy and rivalry:** Eliminate reservations for all products of small scale industry; start with 60+ sectors accounting for 80 percent+ of the output of the reserved sectors; Equalize sales tax and excise duties for all categories of players in each sector and strengthen reinforcement; Remove all licensing and quasi-licensing restrictions that limit competition; Reduce import duties on all goods to comparable to the levels of Southeast nations (10 per cent) over 5 years; Open multiple sectors for 100% FDI. **Demand conditions:**

Allow 100% FDI in retail to trigger consumer demand; Allow foreign banks to set up a rural banking network for extending microfinance credit to trigger rural demand; Increase employment by providing specific cluster specific training to high school students. **Related and supporting industries:** Focus on building cluster specific competitiveness councils.

KARNATAKA

Highlights

Situated on the West coast of India, Karnataka is the eighth largest state, both in terms of area and population. Although historically Karnataka had been primarily an agricultural state with rich natural resources it is now more famous as an Information Technology and emerging Biotechnology hub. While historically Karnataka's GDP had a modest growth rate, more recently it has been one of the fastest growing states in the country. Despite this growth the state continues to be extremely poor. A substantial part of the state economy is still agricultural driven which depends on natural sources of irrigation in the absence of required infrastructural set-up. While Karnataka has a lot of favorable factor and specific demand conditions, there is still considerable ground that the government needs to cover in terms of implementing policies that promote focused infrastructure development in order to drive sustainable growth for the state. Karnataka's *political performance* has been mixed, in terms of government stability.

Economic and Social Performance

As mentioned above, Karnataka has been one of the fastest growing Indian states with the state GDP increasing from 5.3% in the '80s (below national average) to 7.3% in the '90s (second highest among all states) to 8.3% in the late '90s (*highest* among all states). The growth in the late '90s was driven primarily by explosive growth in the industrial and service sectors, growing at 9.2% and 10.6% respectively. Relative to this, the agricultural sector continued to display modest growth of 4%. The agricultural sector growth was

due to diversification and increased productivity. Rapid expansion in manufacturing led to industrial growth. Services grew across categories, led by exports. Services were also the major contributor to the GDP constituting 50%, whereas the remaining portion was equally split between agriculture and industry. This overall growth was assisted by foreign investment. In fact, Karnataka was the third largest FDI recipient among Indian states, and the highest on a per capita income basis. The explosive growth in the late '90s moderated somewhat by the turn of the century. The GDP growth slowed down substantially between 2001 and 2003 due to severe drought conditions and the absence of substantial artificial irrigation and other infrastructural facilities. While the agricultural sector contributes approximately 25% of the state's GDP, it employs a disproportionate 65% of the population. This coupled with the high rain dependence of agriculture leads to very high poverty levels in the state. Poverty levels in Karnataka were 25.1% (Deaton-Dreze adjusted poverty estimates) in 1999-2000 compared to the national average of 22.7%. In conjunction, Karnataka's human development indicators continue to lag other comparable states in the region.

Poverty indicator - higher than India average							Human development indicators – average but improving						
	Rural		Urban		Combined		States	Literacy Rate (%)		Population growth (over the last decade, %)		Infant Mortality Rate (per 1000)	
	1999/00 reduction from 1993/94	2001 increase since 1991		2001 reduction since 1991	2001 reduction since 1991	2001 reduction since 1991							
Andhra Pradesh	26.2	3.0	10.8	7.0	21.7	4.5	Andhra Pradesh	61.1	17.0	13.9	10.3	65.8	4.6
Karnataka	30.7	7.2	10.8	10.6	25.1	8.1	Karnataka	67.0	11.0	17.2	3.9	51.5	13.9
Kerala	10.0	9.5	9.6	4.3	9.9	8.2	Kerala	90.0	0.2	9.4	4.9	16.3	7.5
Maharashtra	31.9	11.0	12.0	6.2	24.2	9.5	Maharashtra	77.3	12.4	22.6	3.1	-	-
Tamil Nadu	24.3	14.2	11.3	9.5	19.8	12.5	Tamil Nadu	73.5	10.8	11.2	4.2	48.2	19.5
All-India	26.3	6.7	12.0	5.8	22.7	6.5	India	65.4	13.8	21.3	2.6	67.6	10.9

Source: These figures differ from official estimates in a number of regards: see Angus Deaton and Jean Dreze (2002), 'Poverty and Inequality in India: A Reexamination', *Economic and Political Weekly*, September 7.

Source: Jean Dreze and Anurupa Sen, 2001, *India: Development and Participation*, OUP, Table A.3; 2001 Census

Karnataka Diamond – Strengths and Weaknesses

	Strengths	Weaknesses/ Challenges
Factor Conditions	<ul style="list-style-type: none"> Strong human capital base: 10% of India's graduate capacity - 134 engineering, 133 medical and 712 general colleges (mostly private) Immense natural resources: <ul style="list-style-type: none"> 90% of India's gold production Leading producer of limestone, iron-ore 70% of India's coffee production 70% of silk production 	<ul style="list-style-type: none"> Weak basic infrastructure (road, rail, airports) No effort to direct talent to focus sectors Weak social indicators
Demand Conditions	<ul style="list-style-type: none"> Leading and sophisticated coffee demand Leading and sophisticated silk clothing demand 	<ul style="list-style-type: none"> Weak domestic demand in other sectors

Context for Firm Strategy & Rivalry	<ul style="list-style-type: none"> • Focused IT policy since 1991 	<ul style="list-style-type: none"> • No targeted policies for focused sector development • Rigid land policies • Inefficient State enterprises
Related and Supporting Industries	<ul style="list-style-type: none"> • Heavy engineering (state owned & private) • Information technology • Biopharmaceuticals • 103 R&D centers in Bangalore (Indian firms & MNCs) 	<ul style="list-style-type: none"> • No machinery equipment industry for agro-processing, silk

Karnataka – Possible Clusters	
Natural Resources driven	Capability driven
<ul style="list-style-type: none"> • Coffee (and food processing) • Silk clothing • Mineral based industry • Tourism • Gold Jewellery 	<ul style="list-style-type: none"> • Offshore IT/ BPO • Biopharmaceuticals • Engineering • Automotive components

Karnataka - Policy Recommendations

While Karnataka registered impressive growth in the recent past, it is still vulnerable to agricultural fluctuations. In addition, the state policies continue to be generic and unfocused. Thus, the state government needs to design cluster-oriented development policies that create scale and sustainability in agriculture and drive focused growth, leveraging the inherent strengths of the state. In particular, the state should focus on silk and coffee production and market and brand creation.

Factor Inputs: Karnataka already accounts for about 70% of both India’s silk and coffee production. In addition, it has the skilled manpower needed to create efficient product, market and brand development in each of these industries. Thus, the key for the state is to special programs in educational institutes and create incentives for graduates to pursue opportunities in these sectors. In addition, the government will need to lead and funnel FDI in upgrading general infrastructure that will assist further development in these traditional sectors. **Demand Conditions:** The state already has leading and sophisticated coffee and silk demand. The objectives should be two-fold: to further drive demand and to focus policies for these sectors rather than trying to cultivate demand across multiple sectors simultaneously. The state government can drive demand by liberalizing land and labor rules to aid growth of the retail sector, and to assist microfinance

institutions to help trigger rural demand. **Context of Firm Strategy and Rivalry:** Not realizing Karnataka's inherent advantage in coffee and silk, both in terms of availability and demand, the government has neglected policies to create these clusters in the state. Thus, the government needs to provide incentives for businesses to prosper in both these sectors, and to attract FDI particularly for these sectors. Additionally, the government should develop a plan for fast track privatization of the inefficient state owned enterprises in these sectors to create a more efficient, competitive and attractive industry in the state. **Related and Supporting Industries:** While there are strong heavy machinery and IT industries in the state, these do not contribute to automating the state's silk or coffee industries. Thus, the government needs to provide incentives to create agro- and silk-processing automations, and attract foreign players to assist automating these sectors. **Institutes for Collaboration:** Similar to NASSCOM (as will be discussed in the next section), which is a successful IFC in offshore IT/BPO, additional IFCs and cluster competitiveness councils should be formed for public-private partnerships for each of the possible clusters in Karnataka.

KARNATAKA - OFFSHORE IT & BPO CLUSTER ANALYSIS

Description of Outsourcing – onshore and offshore

Outsourcing: The guiding principle of outsourcing is the transfer of process, which is typically not a core competence of an enterprise, to another organization that has expertise, scale economies and learning curve effects. The two broad models of outsourcing are onshore and offshore.

Global Market Size

Worldwide outsourcing & offshoring industry: The total market in 2005, for outsourcing services was approximately \$535 billion and the break-up between IT and BPO was \$400 billion and \$135 billion respectively. Out of this, the Offshoring potential was \$ 210 billion⁷ but the current penetration is between 13-16%, and hence the industry is expected to grow at double digit rates in the next few years.

⁷ Interview with a outsourcing consulting firm, Everest group

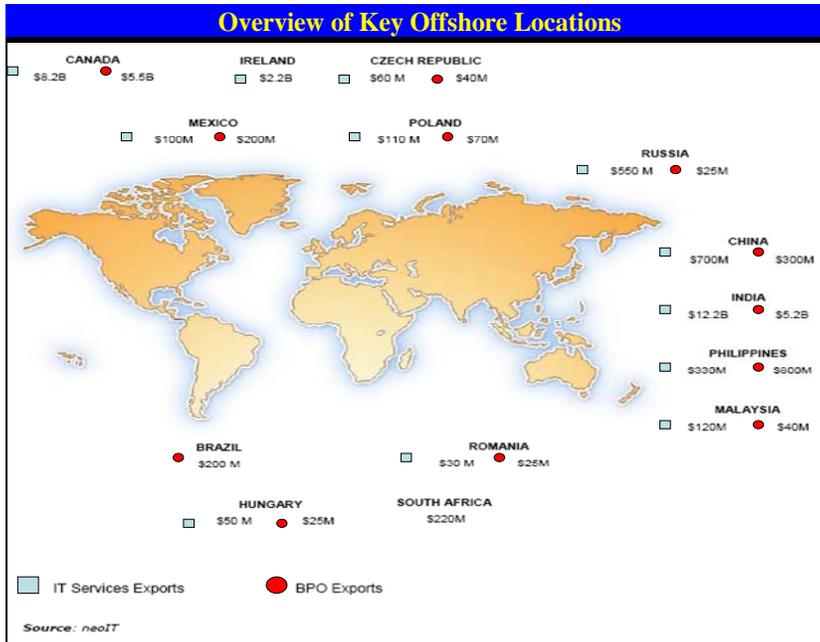
Offshoring Potential and Current Size – (USD billion)			
USD billion	Global Offshoring Potential	Current Size	Current Size as % of Potential
IT Services	120	19	15.8%
BPO	90	12	13.3%
Total	210	31	

Factoring Influencing Choice of Offshore Location

Factor conditions that matter are suitable and quality talent available at a low-cost, a sound educational system for continuous labor supply, physical and time zone displacement, cultural compatibility with onshore location, and language proficiency. Also, relevant and low cost basic and business infrastructure is a key decision making factor. **Context for firm strategy and rivalry** that matters most is a competitive environment resulting in process efficiencies, high quality standards, and process maturity. In addition, supportive and favorable government policies, geopolitical environment, and IP protection laws make a particular location much more competitive. **Related and supporting industries** include telecommunications infrastructure with high bandwidth and competitive costs, business services like consultants, training firms, legal services and customized hi-tech office space for scaling up the business in a particular location. Strong local **demand** adds to the competitiveness of a location as firms can market their services locally.

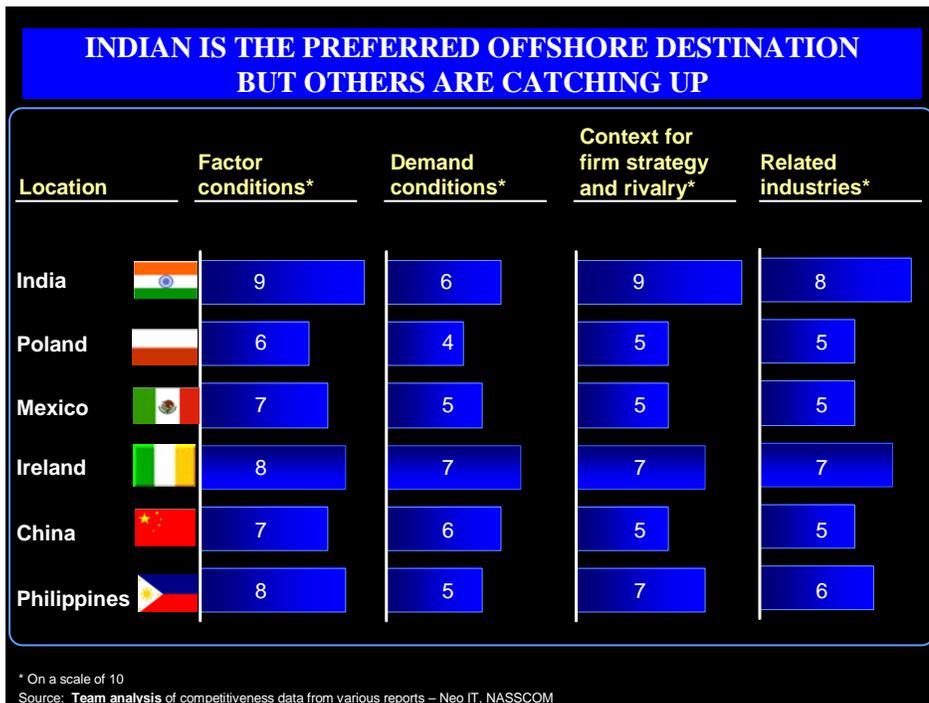
Global Offshoring Clusters

As the map below shows, there are more than ten different off shoring locations around the globe. The strength of the cluster diamond varies across these locations. India has the leading market share, with approximately 60% share in IT and more than 40% share in BPO.



Comparison among Global Offshore Centers

Based on the factors influencing choice of offshore location, the project team analyzed multiple locations using competitiveness data from various sources⁸. India scores high and offers a stronger diamond for an offshore location; however threats from other locations are increasing.



⁸ NeoIT, Nasscom, other IFCs, country websites

Karnataka's Significance in Global Offshoring Industry

Global epicenter of offshore cluster – Bangalore, capital city of Karnataka: Bangalore has a huge concentration of offshore IT/BPO related activity, accounting for **37%** of exports from India in 2005. Bangalore is the capital city of the state of Karnataka. It is India's fifth largest city, and home to over 6 million people and it often referred to as the "Silicon Valley of India".

Cluster in the context of Karnataka economy: The IT/BPO cluster be an important part of the overall GDP (approx. 20% of state GDP by 2010) and potentially create 2.7 million direct and indirect jobs by 2010⁹, which would contribute to urban city growth but have a minimal impact on rural Karnataka. Most of the indirect jobs will be created in construction, hospitality, retail and transport.

BANGALORE CLUSTER HISTORY & EVOLUTION OF DIAMOND

Bangalore's rise to a recognized offshore technology center is no accident. In 1947, after India won independence, India's prime minister, Jawaharlal Nehru, designated Bangalore as country's intellectual capital city. The government made Bangalore the headquarters for its aerospace company and defense research labs. This was a strategic defense reason. First, it was far from the Indo-Pak border compared to other metropolitan cities like Delhi and Mumbai. Second, Bangalore has a history of having a strong Army base for South India, since the British Raj, which made it a compelling location to do research co-ordination with Army professionals. The offshore IT industry requires skilled trained engineers, whereas BPO requires English speaking graduates from any discipline. Both these talent types are in abundant supply at low cost in Karnataka due to historical reasons.

Talent supply – 170+ years of history: Skilled engineering and managerial talent – supply for IT services:

As part of Jawahar Lal Nehru's (India's first prime minister) vision of a self-sustained India, he played a key

⁹ NASSCOM Strategic Review 2005

role in building a lot of engineering and managerial institutes in 1950s and 1960s to provide a large supply of engineers for the industrial plans and import substitution model of development.

Graduates: In the BPO space, India has an edge because of decent quality English speaking people who are willing to do routine work at a highly competitive price. This is a consequence of India's McCaulay System of Education, which is over 170 years old. As Karnataka was an important city under the British Raj and post-independence, it received a large share of educational institutes throughout its history.

McCaulay's education system: Thomas Babington McCaulay (1800-1859) was posted in India under Governor General Bentick and he laid the foundation for the Indian educational system. McCaulay outlined an educational system designed to train people who understood the English language and the British systems, so that they could fill the staff positions. Another important perspective about McCaulay education was that it churned out disciplined, obedient and productive staff for British government offices. This characteristic of the system has given India the talent needed to be a preferred choice for off shoring work. A *pitfall* of McCaulay system is that it doesn't encourage the challenging of ideas, and creative thinking. This partly explains why India's education system has low "creativity" which makes it difficult to increase the innovation capacity.

1970s - Nationalization and demand creation for local firms: The roots of the successful development of an IT industry in India go back to the late 1970s, when fearing nationalization, companies such as IBM pulled out, leaving the country with a small tech infrastructure but no one to maintain it. Since most of the infrastructure was in research institutions in Bangalore, it gave an edge to Bangalore based entrepreneurs to start firms to service this IT infrastructure.

1970s - License Raj regime – favorable for entrepreneurship in IT services: Under the protectionist License Raj regime, it was extremely difficult to start a manufacturing business, since time-consuming factory approval was needed from the government (even to manufacture safety pins). However, for the IT

services industry, government did not have many restrictions and it was much easier to set up a business. Hence, when IBMs and others left, many local entrepreneurs jumped to start a business in this sector.

1980s - Initial Champions – TI & GE: *Early 1980s - Texas Instruments (TI) – seeding the capability roots in Bangalore*¹⁰: During the 1970s, TI had Hindustan Aeronautics Limited (HAL) in Bangalore as a customer. During their visits, TI established alliances with Indian Institute of Science in Bangalore for research on embedded software. Having evaluated the capability of technical talent in India, TI was the first to establish their offshore center in 1984 in Bangalore, thus giving credibility to the location.

Late 1980s - General Electric: The genesis of the GE story¹¹ for Indian cluster lies in a breakfast meeting the then Chairman of GE, Jack Welch, had in September 1989 with an Indian delegation including the Prime Minister, Rajiv Gandhi. Welch had actually come to sell airplane engines and medical instruments in India, but the Indian delegation proposed that GE buy software from India since the country needed business for its sector. Looking to cut costs, Jack Welch took the idea forward. It became the pioneer in starting the outsourcing revolution in India. The main result was the long-term learning GE imparted to Indian companies. It was the trio of Wipro, Infosys, and TCS¹² who were the initial beneficiaries. GE gave Indian companies access to all their training methodologies, both technical and managerial. The initial projects mainly involved mainframes that required knowledge transfer and training since India was not a mainframe country. Also, by pitting one Indian firm against another in order to drive down costs, GE played a key role in increasing the competitiveness and productivity of the cluster.

Late 1990s - Inflexion point in demand – the Y2K urgency: The next major event that eventually led to the growth of offshoring was the Y2K phenomenon. Fearing the collapse of major computer systems as the new millennium dawned; there was a huge demand for technologists to help update systems quickly. Indian firms figured out to meet this demand and the whole industry took off in India.

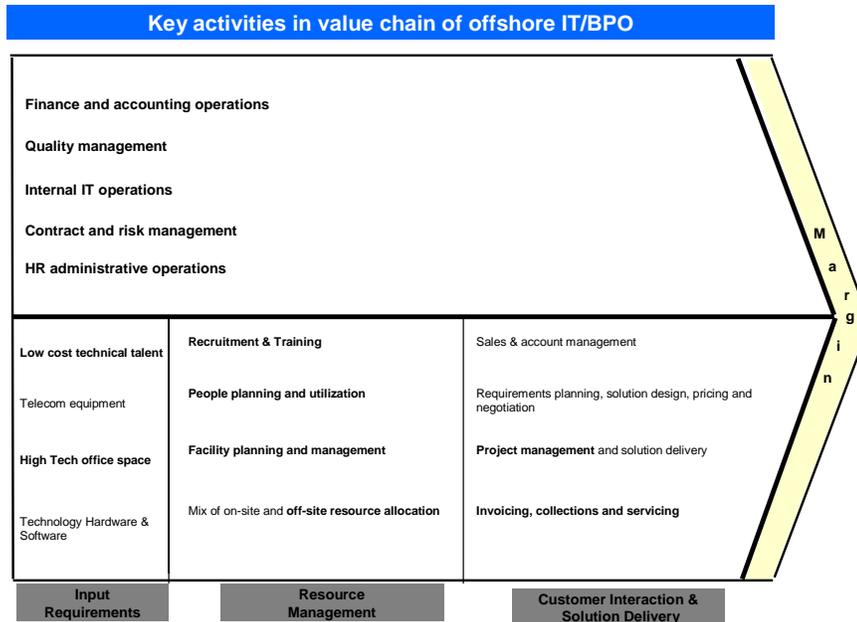
¹⁰ Interviews with early active investors in the Indian IT Sector – CVC International

¹¹ Jay Solomon article

¹² Tata Consultancy Services

CLUSTER VALUE CHAIN & FIRM ECONOMICS

The value chain activities of a Bangalore based offshore IT/BPO player have been laid out and the offshore locations activities which are performed in Bangalore (offshore location) are in bold. The key advantage offshore players have created is internal and external consistency in their value chain activities to build a low cost global delivery model.



Comparing the profitability of leading Indian firms (headquartered / strong base in Bangalore) with leading global firms establishes the fact that a global delivery model with the right activities in the offshore location is a necessity for players.

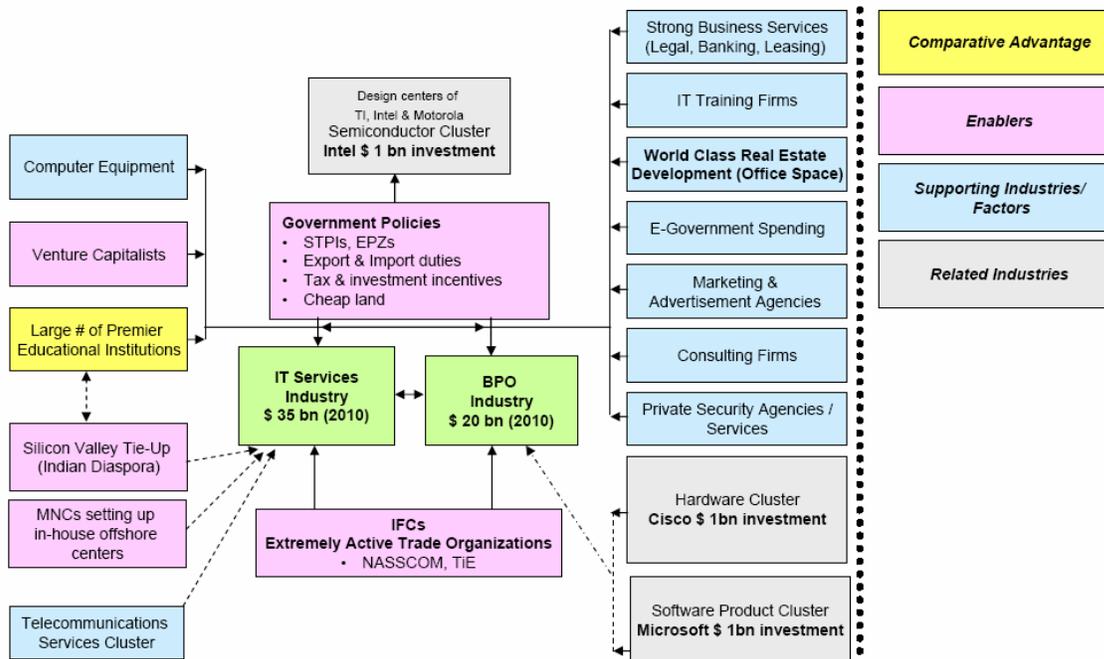


Source: Everest Research Institute, Bernstein Research

Typical cluster firms and their activities: **Infosys (IT services)**, is the leading Indian IT services company with activities spanning the entire value chain from application development, package implementation to customized IT solutions. **Accenture (IT services)** currently has more than 5000 programmers in India and is an integral part of its network of 20 global Development Centers. It conducts various activities including software development and other technology innovation. **Genpact (BPO)**, is one of the first movers and the largest BPO firms in India focusing on call center, mortgage and insurance claims processing and bill payment. **Convergys (BPO)**, the US outsourcing giant, has built a call center business in India to provide integrated billing and customer care solutions to primarily wireless service providers in the US. **Honeywell (R&D)** has a 400 person offshore development center focused on developing avionics and industrial control software. **Samsung (R&D)** set up a development center in India with 200 engineers to work on software applications around network management, computer telephony and network printing solutions

CLUSTER MAP & DIAMOND ANALYSIS

After examining cluster development history, it is important to evaluate the cluster strengths and weaknesses as of today, its future potential, challenges, and policy recommendations for various participants. The key characteristics that emerge are (1) Strong factor condition in human talent, (2) Strong Context for Firm Strategy & Rivalry, (3) Emerging Related & Supporting industries to help cluster improvement, (4) Weak domestic demand. Each of these diamond forces have been explored in detail below.



Factor Conditions – Strengths & Challenges

Quality, abundance and cost of talent: Karnataka has abundant talent supply compared to other low-cost locations for off shore IT and BPO. India has 28%¹³ of global skilled talent with Karnataka having approximately 25-30% of India's skilled talent for offshore work. Also, Nasscom research suggests that more than 25% of engineers in Karnataka have the basic skill for offshore IT jobs, compared to 10% each in China and Russia. A *key concern* over the last couple of years has been the steep increases in wages, with 12%+CAGR for last 3 years (Nasscom). If this trend continues, without corresponding increase in productivity, then India's advantage gap will close with other offshore locations. Bangalore has a presence of **advanced scientific institutions**, due to post-independence government policy of locating research work in Bangalore, which help in providing talent for high end research work. There is a strong **Indian diaspora** in the software, technology and research industries as well as in the management industry. A significant portion of the diaspora is originally from South India, including state of Karnataka. This has created informal

¹³ Nasscom 2005

networks between Indians in the USA and in India. A few data points¹⁴ demonstrate the diaspora’s strength: approximately 36% of NASA scientists, 34% of Microsoft employees, 28% of IBM employees, 17% of Intel scientists, and 13% of Xerox employees etc.

Physical infrastructure: Karnataka still has weak basic and business infrastructure, and hence the firms themselves had to find solutions for these problems. Historically, it did not matter much, as India had first mover advantage. But, with multiple clusters emerging across the globe, it is imperative to have adequate basic infrastructure to attract business investments from both Indian and MNC firms.

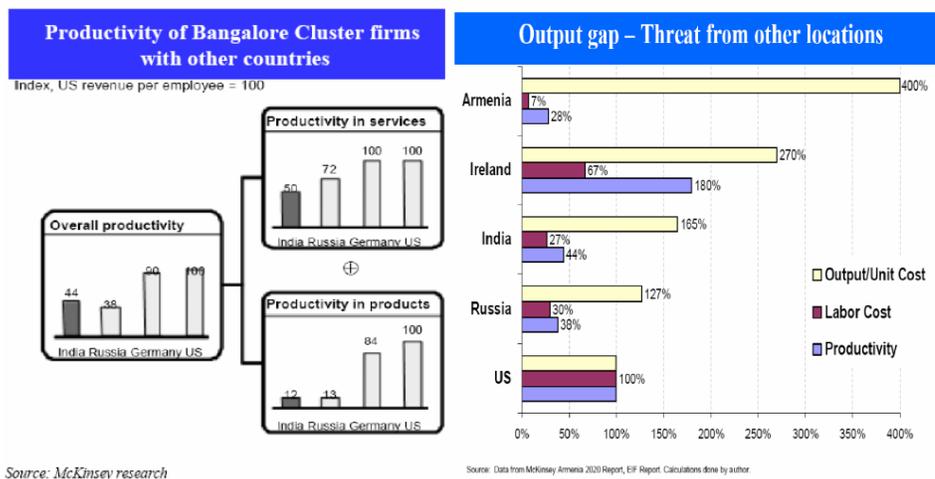
Summary of Key Factor Conditions		
	Strengths	Weaknesses & Challenges
Talent (Human Resources)	<ul style="list-style-type: none"> Currently, advantage due to history of English & technical education Adequate supply of relevant talent for the next 2-3 years Presence of scientific research institutions (IITs, IISc, DRDO, ISRO) 	<ul style="list-style-type: none"> Rising wages Low penetration of relevant skills in the existing educated workforce University “curriculum” needs modification & up gradation Lack of “innovation” orientation in Indian educational system, except very few institutes (result of McCaulay educational system) Shortfall expected as per current supply conditions, if India aspires to maintain market share
Basic Infrastructure	<ul style="list-style-type: none"> Private firms demonstrated ability to build captive infrastructure in the past 	<ul style="list-style-type: none"> Weak relevant basic infrastructure – didn’t matter in past due to first mover advantage, but will matter in future
Location Attractiveness	<ul style="list-style-type: none"> 24 * 7 model for U.S. market given time zone difference (for non-real time work) 	<ul style="list-style-type: none"> Lower ability to hire / retain talent in night shifts (for real-time work) due to competing opportunities in other sectors
Cultural Compatibility	<ul style="list-style-type: none"> High with USA, UK given English language, movies etc. 	<ul style="list-style-type: none"> Low with Japan, Europe, which are rapidly expanding offshore markets
Indian Diaspora	<ul style="list-style-type: none"> Strong diaspora in the USA 	<ul style="list-style-type: none"> Willingness to move back to India due to poor infrastructure

Context for Firm Strategy & Rivalry – Strengths & Challenges

Intense competition: Because of government policy for 100% FDI under automatic route, and no restrictions for local firms, competition among firms from Bangalore is intense. Currently, there are more than 200+ software development firms (Indian and MNCs) in the city of Bangalore alone, and such intensity of competition and proximity of firms, helped build lot of strengths in the cluster – such as: informal networks across firms and a pool of managerial and technical talent.

¹⁴ www.vepachedu.org/manasanskriti

High software quality standards: The multiple forces of the diamond working in a synchronous fashion in the India cluster had an impact on the competitiveness of the location. A key assessment of competitiveness is high quality at low cost. Bangalore cluster scores high on this parameter as it is evident through the fact that more than 70 of the World's 117 SEI CMM¹⁵ Level-5 companies are based in Bangalore. However, a key concern is extremely low productivity in software products - if Bangalore intends to move up the value chain, then this issue must be addressed. In addition, other offshore locations are taking advantage of low costs and are increasing their productivity to close the gap with India.



Presence of leading MNCs in India: The big 5 consulting firms and multiple other global software firms have established their Indian offshore delivery centers. The presence of such firms builds best practices in the cluster, as managerial talent moves around and informal networks are formed.

Venture capital activity: Due to government regulations and active capital markets (for exits), India has been able to developed strong activity in the venture capital industry. This has played an important role in fostering entrepreneurship and innovation. For example, many successful IT firms have raised money from venture capitalists in the early phases of their expansion (examples include: I-Flex, Rediff, Polaris, Satyam).

¹⁵ A global index, indicative of process quality in software industry

Role of Central Government: India’s central government has shown commitment to the growth of this cluster. From 2001 onwards, the annual government budget has contained financial and investment incentives to support these industries. In the last budget, the announcement of the Special Economic Zone (SEZ) policy is aimed at boosting economic growth in IT and BPO, among other clusters.

Role State Government – Focused IT policy: Karnataka government has played a proactive role in creating favorable state level cluster specific policies.

Software Technology Parks of India (STPIs): Karnataka state (working with central government) was the first Indian state to set up a STPI unit in 1991. The creation of Software Technology Parks enabled focused deregulation and incentives – such as tax incentives, plug-and-play infrastructure, streamlined approvals, and exemption from restrictive foreign exchange and excise provisions. STPIs provide high-speed data communication services, incubation facilities, financial incentives, concessions, and procedural waivers.

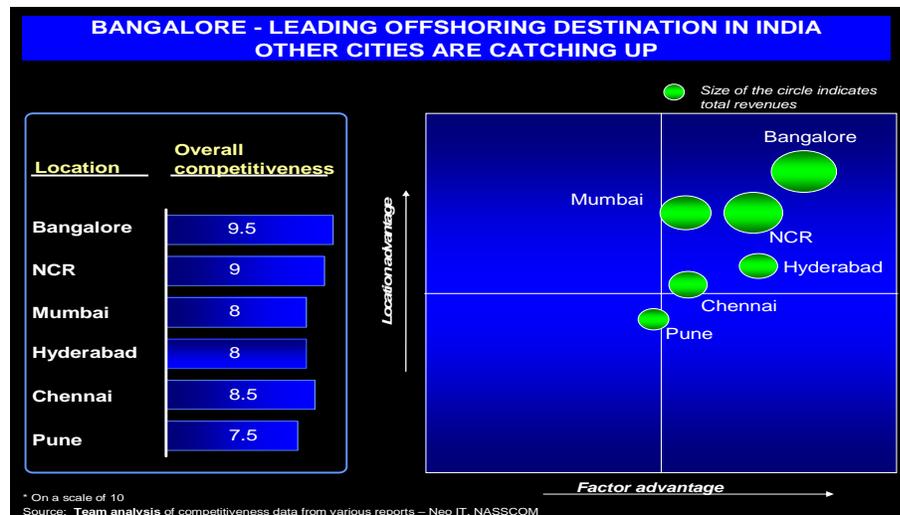
Land allocation: Since land is a state level subject, the government has come up with innovative policies and incentives to attract investment from firms. **Labor Laws:** Labor laws have been amended to allow 24/7 operations and labor-related procedures have been simplified, e.g. exemptions to maintain specific registers.

IP protection: Karnataka government took steps to strengthen intellectual property protection and as part of IT policy, it is laying out data protection and privacy laws.

Summary of Key CFS&R		
	Strengths	Weaknesses & Challenges
Investment & Financial Incentives	<ul style="list-style-type: none"> • 100% FDI on automatic route • Tax exemption until 2009; Steep tariff reduction; Excise exemption in hardware imports; Limited exchange rate restrictions 	<ul style="list-style-type: none"> • Loss of fiscal revenue for government
Government Policies	<ul style="list-style-type: none"> • STPIs - cluster specific export processing zone • Liberalizing overseas investments by Indian firms • One-stop contact point for foreign investors • Labor laws modification, specific to cluster 	<ul style="list-style-type: none"> • Weak IP protection laws and enforcement (though improving) • Information Security concerns
Competition Climate	<ul style="list-style-type: none"> • Removal of License Raj in 1991 fostering intense competition • Venture capital availability to foster small firm growth • Presence of captive centers of Fortune 1000, bringing best practices 	<ul style="list-style-type: none"> • Productivity gap closing with other offshore cluster locations • Low “innovative” capacity of Indian cluster • “Undifferentiated” business models of Indian firms
Business Environment	<ul style="list-style-type: none"> • Currently, well positioned compared to other locations 	<ul style="list-style-type: none"> • Lags behind Ireland; other locations upgrading fast

Comparing Bangalore with other Indian Cities

Bangalore has the first mover advantage and is currently India's leading offshore city. The project team analyzed multiple Indian locations using competitiveness data from various sources and concluded that Bangalore has been losing incremental market share to these cities and it is challenge for Karnataka to retain its lead other. It is because other states/cities are designing policies to attract investments.



Related & Supporting Industries – Strengths & Challenges

Telecommunications infrastructure: Bandwidth requirement and telecommunication costs are critical for this cluster. The central government's deregulation of the sector has really helped Indian IT/BPO cluster. Due to intensive competition in the telecommunication sector, India's submarine cable capacity has grown from 31 Gbps in 2001 to 541Gbps by the end of 2004 – a 17 fold increase in three years.

Business infrastructure: The IT/BPO cluster needs customized *Hi-Tech office space* and it needs to meet the requirement of Fortune 500 firms in terms of security, accessibility and quality standards. Bangalore has a well developed network of specialized real estate development firms, which are able to erect high-tech office space with a fast turnaround. However, with 1 million new direct jobs expected in the state of Karnataka over the next few years, and 100 sq ft / person, the state would need 100 million sq ft of hi-tech office space in the next 4-5 years. With the current capacity around 25-30 million sq ft, considerable State government

support is needed in terms of land reforms to meet this urgent need. **Hardware requirements:** Bangalore has sales offices of global hardware and software product vendors like Sun Microsystems, Oracle, Microsoft, etc. to help the cluster firms meet the key input requirements with state of the art equipment. **Business services:** This cluster needs a set of specific services, which are briefly described below:

Training firms: Since, the Indian university curriculum does not directly train for this cluster, it is important for the cluster to give industry-specific training. The Indian cluster has developed multiple successful training firms like NIIT, Aptech computer and many others. **Travel services:** Given India's non-existent and poor public transport infrastructure, local taxi service providers have developed customized solutions for the cluster. **Private security:** Given the low level of security reliance on local police, ex-Army officials have taken government approvals to set private security agencies for cluster offices and other activities. **Management consultants:** Key consulting firms such as McKinsey have played a main role in assisting India-centric firms on strategy of global knowledge about Fortune 1000 firms. **Others:** Other specific cluster specific service providers include legal consultants, marketing agencies and international foreign exchange and travel services.

Summary of Cluster R&SI		
	Strengths	Weaknesses & Challenges
Telecommunication Services	<ul style="list-style-type: none"> Telecom sector deregulation helped in competitive telecommunication costs 	<ul style="list-style-type: none"> Further reforms needed
Business Infrastructure	<ul style="list-style-type: none"> Rapid addition of customized commercial office space Presence of cluster specific experienced commercial real-estate developers 	<ul style="list-style-type: none"> Significant & integrated Greenfield development needed, if India has to achieved projected growth rates Land reforms needed, as it is a state level subject
Business Services	<ul style="list-style-type: none"> Presence of cluster specific training firms, private security, travel & foreign exchange services; management & off shoring consultants; legal services; marketing agencies; 	<ul style="list-style-type: none"> Increased sophistication needed from all service provides, if India has to move up the value-chain
Leading Technology Firms	<ul style="list-style-type: none"> Semiconductor - Intel's \$1bn investment commitment Software Products - Microsoft \$1bn investment commitment Hardware - Cisco's \$1bn investment commitment 	<ul style="list-style-type: none"> Very small percentage of global high-tech work done out of India Lack of Indian role model firms

Demand Conditions – Strengths & Challenges

Over the last three years, the average local demand has been 15-20% of exports. Demand for IT related services from government, corporations and consumers is currently low but growing rapidly. In the long run, having sophisticated local demand is key for cluster improvement and enabling firms to move up the value chain.

Summary of Cluster Demand Conditions		
	Strengths	Weaknesses & Challenges
Demand	<ul style="list-style-type: none"> • Growing local demand • First mover advantage in building close relationships with Fortune 1000+ firms 	<ul style="list-style-type: none"> • Very small size local demand • Lack of sophistication in local demand • Need to further strengthen & broaden Fortune 1000 relationships (to identify “lead” demand)

Institute(s) for Collaboration

NASSCOM – the leading apex body: NASSCOM is India's National Association of Software and Service Companies, the premier trade body and the chamber of commerce of the IT software and services industry in India. NASSCOM is a global trade body with over 950 members, of which over 150 are global companies from the US, UK, EU, Japan and China. NASSCOM is a great example of a successful IFC, which has played an anchor role in developing all the four corners of the diamond model. The efforts were always integrated to impact the entire diamond and had a very high level of involvement from business leaders.

Exemplary leadership: Late Dewang Mehta was an exemplary leader at NASSCOM. He demonstrated unmatched resilience and energy to explore every possible democratic process to find his way around bottlenecks. A key challenge is whether the new leadership at NASSCOM can replicate Dewang Mehta’s leadership and live up to the high standard set by him. Other IFCs are playing a key role as well. Another prominent one is TiE (The Indus Entrepreneurs), which focuses on entrepreneurship and strengthens ties with Silicon Valley diaspora.

CLUSTER GOALS

Short-term Goals: To maintain and increase market shares in offshore IT/BPO business lines vis-à-vis other offshore locations. **Long-term Vision:** To upgrade in terms of innovation capacity and higher value added activity, by increasing productivity.

CLUSTER CHALLENGES & RECOMMENDATIONS

Through primary interviews with industry leaders, it is apparent that Bangalore is a well established offshore center but is seeing threats from other offshore locations within India and from other countries, especially in the 2-4 year timeframe. Key recommendations to counter the competitive threat and achieve the goals by upgrading the diamond are outlined below

Factor Inputs

Increase supply and quality of cluster specific human talent: **Private sector** needs to set up more 1-2 year training programs for high school students (for BPO) and engineering students (for IT) to increase the supply in the medium term to tackle the pressure on wage increases. The focus should be to increase the penetration of engineers having relevant cluster specific talent from 25% to upwards of 35%. Also, these institutes should add training programs for higher-end job content, like embedded software, software product and hardware design. This would help in strengthening the higher-end of the value chain activities, increasing the productivity and thus giving Bangalore-based firms and opportunity to move up the value chain. The **government** needs to add supply at middle and high school levels and encourage students in tier II-III cities to pursue education until high school. In addition, more engineering colleges need to be added and a key bottleneck is **faculty**. Government should increase the salaries for faculty to attract talent towards the educational field. Innovation orientation should be increased by asking the private sector to give projects as part of the curriculum (in higher education institutions around Bangalore). **Basic infrastructure in specific cities:** *Power, land, and civic amenities* is a state level subject and the Karnataka government should

privatize the state owned enterprises, especially in the top 3-5 cities in Karnataka, to provide reliable supply to offices and to improve the physical infrastructure. Also, funding should be secured for road and airport connectivity and projects bid out to the private sector for fast execution. ***Integrated township development plans (residential, retail, office, hospitality) in sub-urban areas*** that are well connected to Bangalore. This would enable Karnataka to attract talent from across the country to work in better infrastructural conditions.

Demand Conditions

Increase local demand: The Karnataka government should increase ***e-government spending***, provide all government specific services on the internet and encourage citizens to use it. This way a culture of high technology adoption will take off and it will have a ***multiplier effect*** on increasing demand at the government, corporate and consumer levels. It can be achieved by firms offering ***attractive financing schemes on computers*** to increase penetration. In addition, IFCs should have a program to market and explain to ***SMEs*** the return on equity benefit of technology implementation. This would increase the demand from local corporations. Also, the Bangalore cluster has first-mover advantage to access the Fortune 2000 CIO office. Cluster firms should invest in ***onsite presence*** to continue having access to this sophisticated demand.

Context for Firm Strategy and Rivalry

Undifferentiated Business Models - India's IT cluster currently focuses on custom applications and application outsourcing. According to the IDC, there are multiple IT business lines in which India currently has low market share. The firms will need to start ***differentiating*** the business models, as already seen in some of the major Indian outsourcing companies. Infosys has decided to stay focused on its IT services provided through the global delivery model and to find ways of applying this model to talent from new places like China. Cognizant differentiates itself via superior understanding of Western clients facilitating faster growth than its peers. This requires more onsite professionals with business experience and consultative skills. This is reflected in Cognizant's economics in the fact the company has the highest

average billing rate for onsite employees (\$71.00 per hour versus \$68.08 for Infosys and \$66.11 for Wipro). Wipro has chosen a broader set of services and unlike Infosys, it has gone to higher-end R&D services and also more aggressively included BPO. Its IT Services and Products constitute 74% of sales and it provides IT consulting, custom applications development, re-engineering and maintenance, systems integration, research and development services and business process outsourcing. By having an end-to-end services offering, Wipro is able to offer a one-stop shop for its customer's needs and cross-sell products and services. **Differentiation** can come in the form of innovation, superior customer access and understanding of needs or scale. Cluster firms need to make relevant trade-offs and move from a pure execution based business model to one with strategic trade-offs among various parameters. **IP Protection:** Government (Central/ State) has to improve enforcement of IP laws and continuously upgrade laws in line with international standards. It is an imperative for the growth of the software product and hardware cluster. **Productivity enhancement and moving up the value chain:** These can happen in tandem but firms need to invest a higher portion in R&D as a percentage of sales, that their current proportion.

Related and Supporting Industries

More telecommunication reforms: The few cluster-specific reforms needed are allowing "Closer User Group" interconnection on leased lines between companies operating in India; permit encryption on international links, seamless switching between GSM/CDMA and WLAN networks within an IT campus. **Real Estate reforms and 100% FDI with restrictions:** Enable private developers to build 100 million square feet of office space at a rapid pace, since it is a critical need for cluster to scale its business. **Fostering Diaspora connections:** IFCs should play a role to attract the diaspora back to the Bangalore cluster to enable firms to have access to best-in-class talent and experience. This will help the firms to move up the value chain.

REFERENCES

Secondary Research

- Srinivasan, T.N. (2001). “India’s reform of external sector policies”
- Porter, M., E. (1998). *On Competition*. Boston: Harvard Business School Press.
- India Brand Equity Foundation (2005), Karnataka: economy and business
- World Bank, Improving Investment Climate in India
- Economist Intelligence Unit
- Virmani, Arvind (2004), Sources of India’s economic growth: Trends in TFP
- Bhide, Shashanka (2000), Growth in India’s state economies before and with reforms
- Reserve Bank of India, www.rbi.org.in
- Nasscom Strategic Review, 2005
- Enam (2006), India IT services, Q3FY06, results preview
- Gartner, IT Channel Dynamics
- Credit Suisse (2006), India IT services: signs of accelerating growth
- Gartner, India’s ICT industry: scope, size and client issues
- neoIT (2005), mapping offshore markets update
- neoIT (2005), India: comparison of locations
- neoIT(2006), Global IT and BPO trends

Primary Research

Telephone Interviews with,

- Ex Sr. Mgt. team member of Cognizant Technology Solutions
- Management Committee member of Mindtree Solutions (ex Management Committee member – Wipro)
- Offshoring Advisory Manager – PWC
- Senior Manager at Infosys
- Sr. Manager at McKinsey, India with offshore IT/BPO consulting experience
- CFO Satyam Computer Services
- Senior Consultant at Offshoring consulting Firm – Everest Group
- Offshoring Manager at IBM