

GINed for Innovation, Technological up- gradation and capability building Case of a Truly Global, Innovative and Networked Firm

**An FP7 research project on
Impact of Networks, Globalisation, and their INTERaction with EU Strategies**



On WP6

- WP6 aims to research the link between GINs on the one hand and warm bodies and the skills and competences they encompass on the other.
- The tale emanating from WP6 will be one of (Northern) MNCs that embody certain capabilities while at the same time looking for new ones, and of education and training systems (in the South) that are an essential element of the very absorptive capacities that ENGINEUS conceptualizes as a local or national building block of GINs.
- In simple terms, we would expect that the extent to which GINs manifest themselves depends on the availability of knowledge workers in the South. To be sure, their existence is a necessary but not sufficient condition for GINs to emerge.

WP6:THE ROLE OF COMPETENCE BUILDING IN FIRMS IN THE EMERGENCE AND EVOLUTION OF GINs

- In other words, if you don't have knowledge workers, you can't have GINs.
- But knowledge workers are by themselves no guarantee that you get GINned. Further, since training systems differ from country to country, we expect different manifestations of GINs as well.
- WP6 focuses on the two-way relationship between FDI and local human capital in Brazil, India, China, and South Africa (BICS). By two-way, we refer to the attraction educational achievements hold for inward direct investment and to the influence MNCs exert over education and training systems post-entry both directly and because they increase competition which in turn accelerates skill-biased technological change.

Higher Education system in India and China

- Historically, China's education system had a strong feudal colour where in only the upper caste had the right to be educated
- Since the formation of People's Republic of China (PRC) in 1949, the structure of China's education system underwent major change such that equal opportunities were ensured for all to get educated.
- In the 1949, the enrollment ratio of school aged children was only about 20% and about 80% of the Chinese population remained illiterate.
- As a result of the various initiatives by the state, the net enrollment ratio of school aged children increased to 99.5% in 2007.
- Equally remarkable has been Chinas achievements in the sphere of higher education.

Higher Education system in India and China

- China has 1867 HEIs, of which 1591 are state-owned and 276 are private
- HEIs in natural sciences & technology accounted for more than 40% of all, while the HEIs in social sciences accounted for less than 20%.
- In 2007, the total number of HEI students was 25.29 million (23.66 million and 1.63 million in governmental and private HEIs respectively) with a gross enrollment rate of higher education at 23%.
- The scale of higher education in China is now among the biggest in the world.
- Besides regular HEIs, research institutes is another force providing post-graduate programs in China, and Chinese Academy of Sciences (CAS) is a typical one.

Higher Education system in India and China

- Indian experience has been comparable to that of China.
- In 1947 illiteracy rate as high as 85 per cent. Hence the imperative of skilled manpower to achieve the desired economic transformation with prime role for science and technology the planners adopted a strategy where in both primary education and higher education were promoted with an equal vigor.
- Nonetheless greater importance has been for primary and secondary education and it accounted for over 88 per cent of the total outlay for education.
- Various initiatives resulted in a remarkable increase in GER at the elementary level from 32 per cent in 1950-51 to nearly 95 per cent in 2005-06.
- However in 2005-06 the GER at secondary and senior secondary level is at a much lower level of 52.2 per cent and 48.5 per cent respectively (GOI Ministry of Human Resource Development 2008)

Higher Education system in India and China

- The Science Policy Resolution (GoI 1958), which perhaps laid the foundation of India's national system of innovation, noted that India's enormous resource - manpower- becomes an asset in the modern world only when trained and educated.
- Hence substantial investment was made in establishment of an elaborate system of higher education to address the growing demand for highly skilled manpower for a growing economy.
- The higher education system is basically a three tier one with each level producing different levels of output.
- The first includes the premier institutions; The second level of higher education institutions come under the university education systems that consists of over 350 universities.

Higher Education system in India and China

- The growth of higher education in India has been phenomenal.
- In 1950-51 India had only 27 universities, 370 colleges for general education and 208 colleges for professional education (eg engineering, medicine).
- By 2005-06, the number of colleges for general education increased to over 11 thousand, professional colleges to 5284 and that of universities/ deemed universities and institutes of national importance of 350.
- The level of enrolment increased from 0.15 million in 1947 to nearly five million by 1980 indicating an annual growth rate of 7.5 per cent sustained over 35 years.
- The stock of persons with third level education rose from 0.5 per cent of the population (25+ age) in 1951 to 2.5 percent in 1981 wherein the total number was 7 million in comparison with 1.5 million in 1950.
- By 2005 the total number of students enrolled in the universities and colleges crossed 11.7 million

Higher Education system in India and China

- Growth in professional colleges recently years has been much higher. To illustrate, during the first 40 years (1950-90) the number of professional colleges increased by a little over four fold
- whereas during the last 15 years their number increased by six times.
- In case of the number of colleges for general education the trend appeared to be different; during the first forty years, their number increased more than 13 fold where as during the last 15 years increased by 2.5 times.
- Despite the remarkable increase in student enrolment in higher education, the GER in higher education remains at very low level of 11.5 per cent in India with significant inter-regional and inter cast variation. To illustrate, when it comes to backward castes like Scheduled castes and scheduled tribes the ratio is still lower at 8.3 per cent 6.6 per cent respectively.

Barro Lee Index

- In terms of Barro-Lee index on educational attainment of India during the period 2005-2010 the education attainment in general and tertiary education in particular is at a very low level.
- The proportion of population without no schooling above the age of 25 marginally declined from 46.8% in 2005 to 42.2% in 2010.
- The population completed tertiary education above 25 years of age increased marginally from 3.4% in 2005 to 3.8% in 2010.
- Similarly, the increase in average years of schooling for the population above 25 years of age was also minimal from 3.97% in 2005 to 4.4% in 2010.
- India has to travel a long distance to reach the destination of a country with large proportion of population with highly skilled manpower.

The Case of firm1

- Firm1 was founded by a small group of computer scientists from Stanford University.
- It produced the first router in 1986, making different types of network connect with each other reliably and thus contributing significantly to communications revolution.
- Over the years firm1 has emerged as the worldwide leader in networking
- Thus viewed, in the current context of heightened competition, the product and process innovations by firm1 enable its customers to harness ICT for increasing their productivity and efficiency.
- At present firm1 is present in 165 countries with 550 offices and around 30 manufacturing sites.

Growth in sales & Employment

Year	Sales US \$ Billion	Sales growth (%)	Employment added
2004	22.0		
2005	24.8	12.7	
2006	28.5	15	11500
2007	34.9	23	11600
2008	39.5	13	4500
2009	36.1	-9.0	6600
2010	40	11	
Total employment in 2010			72,600

Firm1 in India & China

- Firm1's Innovation centre in Banagalore - the head quarter for the east-established as part of a total investment in India with US\$1.16 billion;
- headcount is 7000+, including R&D (1/3), sales and business support staff – second largest outside the US
- The campus in Banglore is ISO 14001 certified, which is the internationally accepted standard for environmental management systems. The initiatives at the campus include solar lighting and daylight harvesting, rainwater and treated sewage water harvesting for irrigation and fertilization, network-controlled lighting and a ubiquitous security system.
- Firm1 entered the Chinese market in 1994, and currently has more than 3,400 employees in China, engaged in the fields such as sales, customer support and service, research and development, business process and IT outsourcing, and manufacturing. It has set up 13 offices

Firm1 in India & China

- On 1 November 2007, Firm1's board chairman and chief executive officer John Chambers visited China, announcing that innovation and sustainable development would become the strategic focus of Firm1's development in China, and committed to make an investment of 16 billion US dollars in China in the next five years, including a significant increase in local procurement, education, financing lease, R&D, as well as sales and service.
- On 16 April 2008, John Chambers made his second visit to China, and announced the company's developing strategy and blueprint in the next stage. As an important step of "innovation and sustainable development", Firm1 will strengthen its cooperation with Chinese government and industries, and try to match with all-level goals of economics, society and environment in China.

Innovation Strategy of Firm1

- As a company operating in a high tech industry with relatively shorter product cycle and fierce competition, Firm1 has been providing top priority for innovation

“In our opinion, the key to long-term success in the high-technology industry is ongoing strategic investment and innovation,....Our innovation strategy requires a unique combination of internal development, partnerships, and acquisitions. In our opinion, for companies to lead in the technology industry they must be able to do all three”

High R&D Intensity

Year	R&D Expenditure \$ billion	R&D intensity (%)
2005	3.3	13.31
2006	4	14.04
2007	4.5	12.89
2008	5.2	13.16
2009	5.2	14.40
2010		

Beyond R&D: Partnership with local Govts

- Innovation in Firm1 is not perceived as technological innovation alone but also as business innovation (capturing the current transitions at societal level and create cooperation with partners and competitors)
- Firm1, for example, is involved in the creation of smart cities (in particular in emerging markets like China, India, Mexico where the main societal transitions are going on, for example, for education or healthy issues).
- The smart cities are developed in cooperation with other companies for example Build International? (a huge developer company) What Firm1 provides is the communication infrastructure for those cities

- “For fiscal 2006, we reorganized our sales theaters and added the Emerging Markets theater in order to take advantage of the growth potential of these countries. We met with government leaders around the world in countries such as India, China, Saudi Arabia, and Russia. Our conversations centered around how Firm1 could help their countries develop a stronger economy through Internet access to education, healthcare, and business opportunities. As these countries begin to deploy Internet solutions, they look to Firm1 as a partner and resource vital to their success. As a result, product revenue in Firm1’s Emerging Markets theater grew 38 percent on a year-over-year basis—the highest growth percentage of all five theaters” (annual Report 2006).

MoU with Karnataka Gvt to evolve an intelligent, sustainable city

- On February 12, 2009 Firm1 announced a pilot program to assist the government of Karnataka in developing a road map for an intelligent and sustainable Bengaluru city.
- As part of the pilot program, Firm1 will work with K S R T C and the K police to improve public safety and security around one of the major bus terminals in Bengaluru.
- The project will help enable public safety and security at strategic points within the terminal, offering remote monitoring capabilities with real time information.

Innovation Strategy: Role of Internal and Global Networks

- ***Strong internal network***
- Firm1 is a typical case of open innovation within a global network.
- Apart from being highly R&D intensive, Firm1's innovation strategy is reflected in the strong internal network between the head quarter and 550 offices, 30 manufacturing sites spread across 165 countries. \
- The R&D labs are mainly located in the two HQs in Silicon Valley and in Bangalore but other smaller labs have been established in other locations as well (for example in China).
- The fact there are around 30 R&D establishments across the world indicates the firm's intension to be close to the markets and harness the feedback from its customers and suppliers as in inputs for innovation.

Strategic Alliances

- Apart from the strong internal network for generating ideas and technologies Firm1 is very actively networked with other firms including competitors.
- In the United States Firm1 has partnerships/collaboration with Firm2 - one of the strong competitors in some areas.
- Firm2 is also a valuable customer of Firm1 for network equipments.
- Even in India it has forged firm collaboration with the largest IT Company in India which is a competitor of Firm1 in certain areas.

Acquisition of firms

- Apart from alliances the firm also actively pursued since late 1980s a strategy of acquiring new companies with competence in niche areas from both developed and developing countries
- At the beginning when the company started this strategy, acquisitions were mainly the US based companies but later the company started to spread these strategies worldwide. So far Firm1 has acquired 140 companies of which 14 of them were since 2008

Linkages with Knowledge generating organizations - Universities

- Being a truly innovative, global and networked firm, the strategy of building and sustaining technological competence by Firm1 involves networking not only within the firm and other firms, suppliers and customers but also the other knowledge generating organizations like universities around the world.
- Firm1 collaborates with universities worldwide both for educational purpose (e.g. special graduated programmes) and also for innovation purpose.
- Special mention may be made of Global Talent Acceleration Programme (GTAP) globally established by Firm1 in different countries. Networking Academy aims to provide a consistently enriching learning experience by partnering with public and private institutions such as schools, universities, businesses, nonprofits, and government organizations to develop and deliver innovative ICT courses and to education and career opportunities, and help ensure that students and instructors have the resources they need to accomplish their goals.

Linkages with Knowledge generating organizations - Universities

- Though Firm1 has its own R&D center in Shanghai, it pays more attention to cooperation with local universities for a lot of R&D programs
- It established the “Green Science and Technology Joint Laboratory” with Tsinghua University in April 2009, which focuses on developing wireless sensor networks and intelligent technology solutions to urbanization.
- In December 2009, it set up the “Next Generation Broadcast (NGB) Joint Laboratory” with the State Administration of Radio Film and Television.
- In February 2010, it set up the “Chongqing University of Posts and Telecommunications with Chongqing University of Posts and Telecommunications.

Linkages with Knowledge generating organizations - Universities

- Firm1 is participating in some important programs in China, such as next generation Internet, mobile TV programs, collaborating with the Research Institute of State Administration of Radio Film and Television, as well as the development of TD-SCDMA.

Coordination

- The strategy of coordination is one wherein each single employee of the group can participate in the innovation process (practice of prize for new ideas).
- The innovation is then filtered through boards and councils composed by executives located in different sites.
- Communication among the group (in different locations) is done mainly at virtual level (tele-conferences with advanced techniques allow the transfer of knowledge and meeting among people located geographically in different sites).
- Employees use shared ICT platforms for common work sections and communications (use of internal you tube, blogs etc).

Concluding observations