intellectual property infrastructure buildup, patenting and licensing activities at the universities of these nations have flourished.

Korea, Taiwan and Malaysia have implemented legislation that is similar to the Bayh-Dole Act and have well defined policies for intellectual property ownership. However, they are yet to fully succeed in technology commercialization. The major barriers to technology commercialization in these countries are conflicting organizational objectives and lack of awareness of commercial potential. To encourage transfer and commercialization of university knowledge, governments and university leaders need to provide more incentives and support for academic entrepreneurs. More long-term and joint capability development of university-industry partnerships would be beneficial for Korea, Taiwan and Malaysia.

Thailand, Vietnam and Indonesia need governmental support for academic-industry research projects. Government can establish technology transfer offices in university, provide models of ownership and frame of benefit sharing mechanism for university and other public research organizations. Possible mechanisms for technology transfer of research may be consultancy service, outright sale of technology, licensing of technology, joint-venture and start-up ventures. Stimulating collaborations between universities and industry, transfer and commercialisation of university-born inventions would be the key steps for the economic development of these countries.

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Technological Growth in the Emerging Markets: Lessons from the Case of India

Dr. Vipin Gupta

What's the standard prescription on the drivers of technological growth of an emerging economy? The recipe for success, it seems, involves the importing of foreign technology, reengineering and adapting it, and incrementally changing and applying it.

Success stories of several nations suggest the viability of this prescription. In Japan, South Korea and China, the governments encouraged large domestic firms to import electronics technology from various multinational corporations (MNCs), then incrementally assimilate it, and develop capacity to perform complex innovations.

We identify several counter hypotheses suggesting limitations of this model.

First, socio-technical systems hypothesis predicts that the technologies are linked to the social institutions. Research has demonstrated difficulties in transferring mass production technology from the US to Europe, and lean production technology from Japan to US and Europe. The so-called advanced technologies from overseas cultures did not succeed until local solutions that selectively built on the know-how emerged.

Secondly, absorptive capacity hypothesis predicts that without a strong related prior technological base, it may not be even feasible for the private sector to absorb and assimilate foreign technology, and if the government coerces this through subsidies, then the absorption initiatives would occur but at a very high cost.

Third, property rights hypothesis predicts that the MNCs have constrained incentives to nurture foreign capacity building, because their property rights in foreign nations - particularly those who are keen to learn from their know-how and develop local base - are incomplete. MNCs are concerned with the intellectual property rights piracy in the emerging markets, and withhold transfer of their key technologies.

So, what might be an alternative model for the emerging markets? Let's look at the story of India, and the role different technological drivers played over the course of the history.

We identify 1951-80 as Phase I of development. During the 1950s, massive public sector funds were invested in the basic and heavy sector. The private sector investment was under licensing controls, supported through concession

finance. Several domains were reserved for the small scale sector. Foreign aid and technology was mobilized for basic industries, agriculture, and technical education.

To reengineer this know-how internally, a network of publicly funded R&D labs was created, along with technology and engineering colleges. These efforts yielded mixed results - the nation became 90% self sufficient in capital goods by late 1970s, but there were substantial consumer goods supply constraints, along with economic stagnation, inflation, educated unemployment, and growing poverty, despite the *garibi hatao* or eradicate poverty campaign. Also, the cost of capital goods was high, e.g. the computers had limited applications, and were costlier than better foreign options.

This Phase I suggests that the public sector controls may be excessively oriented towards basic infrastructure and capital goods industries. They may take an expedient approach to fulfill social goals, which may be cost-escalating and dysfunctional.

Phase II is the period between 1981 and 1995. The government introduced liberal policies for electronics, including computers, telecom, and software. In the 1980s, public sector railroads and banks were computerized, and the work was assigned to private professionals to help enhance their capabilities, resources, & confidence.

A focus was put on Bangalore as an IT regional cluster. Bangalore had several large public sector electronics, telecom and aeronautics firms, several government R&D labs, and several technical colleges. A body shopping link in Bangalore was facilitated, for instance, between GE and Infosys. This had a positive demonstration effect on many US MNCs, who set up software development centers in Bangalore.

At the time, smaller firms began importing and assembling Korean and Taiwanese computer kits. Many larger firms, unable to compete on cost, moved to software, by hiring away from the firms who had participated in the public sector computerization, and began focusing on the MNC clients. The firms began doing low-end work onsite in the US, but as their alliances strengthened, shifted higher end work offshore to India. The offshore work focused on the maintenance of various legacy systems, by leveraging on the skills in India of working with several foreign platforms. The onsite work was largely body shopping, with low skill programming and short term client relations.

The Phase II suggests that the rise of professional controls may need incubational institutional support in developing capabilities, resources, and confidence. The professional controls can be very effective in making a business case to the MNCs, and in building relationships that allow value added work to be done in the emerging markets.

Phase III is the period between 1996 and 2005. After the mid-1990s, numerous MNCs entered seeking to compete with local family businesses and professional firms, often offering attractive consumer credit, and hiring away experienced local employees at high compensation. Many Japanese firms that sought to use older technology quickly failed. Korean firms, who adapted Indian methods, and offered their latest technology products, were successful. As the foreign competition intensified, the private sector firms showed amazing capacity to produce quality goods and services at ridiculously low prices: $20 air flights, 2 cents-a-minute cell-phone service, $2,200 cars, and low-cost medical procedures and medicines. This capacity allowed many Indian firms to become successful MNCs, and some pushed ahead by acquiring even the premium-end assets.

Phase III suggests that the learning of the local techniques were critical for the successful tech based competition of the MNCs. The creative deepening of the local technical know-how enabled the local firms to withstand that competition.

We can identify the Post 2005 period as Phase IV. We are seeing a sharpened focus on the bottom of the pyramid and the grassroots. Intensified efforts are on, supported by several Non-Government Organizations (NGOs), public sector institutions, and the community cooperatives, to scout and encourage the grassroots knowledge. The efforts are on connect the grassroots innovators with the local, national, and global markets, with the involvement of various family businesses, other private professional firms, and the MNCs. Many MNCs are also recognizing the benefits of collaborating with the Indian firms to penetrate the rural market. 60% of India's population lives in 650,000 villages, which are clustered into 600 districts. They are also recognizing the benefits of including other invisible groups, notably the women. Many American MNCs, in particular, have instituted diversity heads and policies in India, with aggressive goals.

In summary, the Indian development model began by emphasizing the role of foreign technology and public sector organizations for the basic and heavy industry sector, presence of a few large family business groups in select niches of capital and consumer goods, and a number of small scale enterprises in several reserved areas. The model was supported with subsidized public finances. Inefficiencies, escalating costs, restricted outputs, limited variety, and gaps in technologies, limited the efficacy of the model.

The model then shifted to enabling the family business groups and professional enterprises to serve the foreign multinationals, and refocusing the small enterprises on new products based on imported and domestic inputs. Through this exchange, the capabilities of the Indian firms strengthened in areas that were comparatively weak for the foreign firms. But a macro-economic crisis ensued, because the rupee denominated public finances could not support the demand for dollar denominated import fund needs.

Next, on the basis of the strengthened private sector, the international finances and MNC investments were attracted. This allowed the private sector to further strengthen its global competitiveness, and to broaden the domain of areas to compete.

Inclusion of the groups, previously excluded from the national and global market, is the new mantra. These groups have human capital, purchasing power, as well as unexplored technological endowments. In a recent article, the Wall Street Journal (Wonacott, 2009), noted how India has defied global slump, powered by growth in poor rural states, "Growth has slowed in the new India of technology outsourcing, property development and securities trade. But old India -- the rural sector that is home to 700 million of the country's billion-plus people -- shows signs it can pick up the slack. The rural awakening helps explain why India continues to grow."

To conclude, the public controls have shifted their role from being the nation's primary financier and generator of knowledge and technology, to a secondary supporter of innovations by well managed private sector enterprises, and now to a tertiary governance and organization of the distributed knowledge in diverse communities.

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Valuing Intangibles in a Complex, Competitive World

Sujana Hari
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In an increasingly flat world defined by globalization and fast technology driven markets, most of the talk across seminars, conferences, workshops and some boardrooms today revolves around creating value out of intangibles. Intangibles, especially Intellectual Property (IP), are recognized as one of the most valuable asset of an enterprise. A well-identified, managed IP in an enterprise can help it in attracting new investment, in new research and product development, in hiring the best and brilliant minds, and in expanding across geographies, while surpassing competition.

Success is no longer just dependent on ownership and management of tangible assets.

If one were to look at the recent events in the banking system of developed economies, a key reason for the banking system to be so close to a complete meltdown could be attributed to the poor understanding amongst key stakeholders of the complex financial instruments. In a similar vein, intangibles running an entire global market would require identifying, understanding, managing, nurturing and leveraging such intangible assets before it is too late.

When we take an historical view, over the past three decades many enterprises have attained leadership position through effective IP management. During this period, intangibles have started occupying a higher proportion of many corporate balance sheets than ever before. In this context, it becomes extremely important to identify ways to exploit the IP, assess the risks and rewards associated with it, and decide the best strategy to manage it. To determine these, the holder needs to assess the current and the potential value of the IP under each scenario.

If one were to look at India, over the past decade, India has been on the forefront of putting IP frameworks in place, with a number of inspiring legislations in place to protect and promote IP management. The increase in awareness of IP amongst scientists and enterprises is also seen in the increased filings for patents and trademarks at the Indian Patent Office (IPO). By 2010, filings for patents are expected to touch 100,000 per year, while trademark filings would increase to about 150,000 per year.. As India moves towards a knowledge and increasingly IP-based economy and is emerging as a globally sought-after IP destination, this article aims to be a primer that touches upon some of the