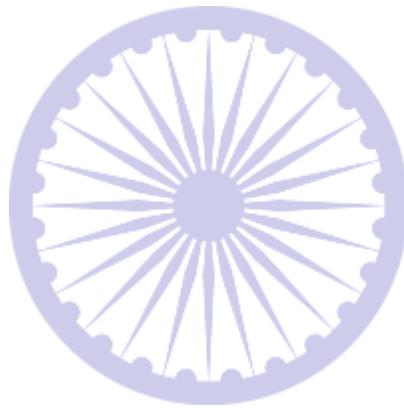


At the Crossroads

TECHNO-POLITICS IN THE INDIAN SUBCONTINENT



Navin Raj

STS2413, SVIEDRYS | FINAL PAPER

Table of Contents

Introduction.....2

Case Studies.....3

Farming.....3

Information Technology.....8

Conclusion.....10

End-Notes.....13

References.....14

Critical Bibliography.....16



Top: IT Corridor future housing development, Chennai, Tamil Nadu, India.



Right: Old Chennai near US Consulate, Anna Salai Rd, Chennai, Tamil Nadu, India.

Introduction

In the year 2000, India was more than just a different country; it was a completely different planet when compared to the quiet solitude of the United States in which I had been raised. As the child of Indian immigrants, I had grown up on stories of ox-drawn carts bringing fresh vegetables from the country-side, and idyllic summer nights spent at the local beaches—the stories of my parents. Upon arriving in my native city of Chennai, in the Indian state of Tamil Nadu, I was greeted by a much harsher reality.

The sound of screeching and honking cars polluted the air, mixing with the high levels of industrial and automotive pollution, to create a raucous symphony that dampened all the senses. The overcrowded and poorly maintained streets were filled with beggars and vagabonds. Sacred temples were desecrated by dog droppings and tobacco spit. Our residence, provided by our family members, was a small apartment with no working gas and a massive hole in the bathroom, which allowed both insects and intruders to enter. Water needed to be boiled to be used; however, without gas, and with electricity being rationed by the government, this was an impossible quest. This dizzying lifestyle was considered upper-middle class. No, this was not the India I had envisioned after years of my parents' stories. It was this acceptance of a lower standard of living that made me incredibly nervous upon my return 12 years later.

Unbeknownst to my immature eyes, India had begun a massive transformation process. During the 2000s, the country saw the growth of the economy by an average of 6.4 percent per year, and the sharp decrease of poverty from 50% to 20% by 2009^[1]. This transformation brought in new jobs, technology, and standards of living for the citizens. However, unlike most of the manufacturing hubs of Asia, the Indian economy took a different path. India has adopted

an approach of rapid high technology and high skill transfer, rather than the slow development of manufacturing. The focus has been on “services rather manufacturing as an engine of growth,” and has led to the growth of regional industry within the country^[2]. Indian technology transfer has fostered the skills of the citizenry to produce services for the world in the growing computer age.

Yet, with the Indian economy slowing down, the question arises as to whether the Indian method of economic growth has ignored the greater needs of the country typically addressed by technology transfer. Critics argue that by poorly utilizing the country’s population, the Indian government has caused the country’s growth to become stagnant^[3]. Growth requires not only fostering industry, but fostering the wide array of people within the country, particularly for a country with a population exceeding 1 billion people.

This paper shall exam how high technology transfer has shaped the Indian economy both for the better and the worse using two contrasting case studies: 1) the growth of local farmers, and 2) the growth of the Indian information technology (IT) sector. The juxtaposition of the two growth methods can shed light onto future path of the Indian economy. Since the year 2000, India has made great progress in growing its economy; however, it is the next decade of decisions that will decide whether the country will stay in the ring of competitive countries.

Case Studies

Farming

While the growth of the Indian economy has occurred mainly in the IT sector, the growth of the Indian people still requires addressing all aspects of the citizenry. For much of India, agriculture still remains a large part of the economy. To feed a population over 1 billion people,

revolutions in food production have been necessary. However, following the “green revolution,” when innovations in fertilizers were introduced, farming has become challenging for India due to deterioration of soil and water. According to Sita Ram Gupta, Executive Director of the Lupin Human Welfare and Research Foundation, farmers felt “in a helpless position because he could not decide the price of what he produced.^[4]” Gupta finds that the farmers have a wish to produce crop to support themselves. It is from the wish of the citizenry that technology is transferred successfully.

Recognizing the issues facing farmers, Gupta, a trained engineer, decided to bring innovations to rural farming that would put the power back into the hands of the individuals. Economic development begins with the poorest people, this is the notion of “bubble-up” economic development. By enriching the lowest, and often most populous groups, greater productivity can be achieved. This can lead to a more educated, ambitious, and ultimately advanced society. Technology transfer works best when it is used to enrich the drivers of economic development—the poor. Ram Gupta, the chief instigator for the farming project, decided to first bring the advent of technology to the rural villagers.

To solve their water concerns, Gupta brought in dam building technology that created a wall to trap monsoon water. He then commissioned a system of pipes to deliver this water to the fields. The reserved water allowed for crops to be grown year-round. The transfer of this advanced technology to the village was successful in fixing the first issue the rural farmers faced, but it was Gupta’s innovative method of delivery that fixed the greater issue.

Gupta’s further accelerated the growth of the rural farmers by encouraging them to be active in the development of the technology. While Gupta planned the wall and the pipes, it was local villagers who produced and constructed the technology. Villagers worked together, despite

being initially skeptical, to produce cement and build the wall using their own rocks. Where once they believed their rocky land was good-for-nothing, by encouraging the neediest group to work, Gupta was able to heighten productivity.

Finally, having taken a group of uneducated villagers and transforming them into motivated builders, Gupta's plan reorganized the economic structure of the farms. Gupta rented the land from the farmers, and employed them for a steady pay. He would profit off of the produce, and the farmers would be able to grow and earn enough to support their families. By the next famine, all of the villagers survived. Furthermore, his business has expanded to include, "income-generating activities for farmers such as beekeeping, poultry, dairy farming^[5]."

Gupta fed on the idea of local linkages, another important concept in technology transfer. Local linkages are key to spreading and ensuring the survivability of a new form of technology. When introducing a new technological process to an area, the success of the transfer is dependent on the community accepting the process. Establishing linkages involves finding existing processes and technologies that can be additive or supportive of the new technology. In the case of a new soda manufacturing process, an important linkage would be to go through a company with an existing distribution network to restaurants.

Gupta used the notion of linkages to both create and promote the new process of farming. First, he showed the farmers that their land was good enough to produce the raw materials needed for wall-building. This made the projects simpler and more practical during construction. Another local linkage involved the creation of pipes, and pipe businesses. Again, Gupta grounded the business within the community, and established another important support arm that could feed the larger goal of farming technology transfer. However, the most important local linkage for the growth of Gupta's method came in the form of communication.

	Humble beginning – 1988	Status Today - 2013
No. of states	(01) Rajasthan	(04) Rajasthan, Madhya Pradesh, Maharashtra and Uttarakhand
No. of districts	(02) Bharatpur and Alwar	(15) Bharatpur, Alwar, Dholpur, Dausa, Karauli, Sawai Madhopur Raisen, Vidhisha, Ratnagiri, Sindhudurg, Ratnagiri, Pune, Dhule, Aurangabad, Dehradun
Coverage	35 villages 35,000 population	2440 Villages 2.75 million population

Figure 1. Growth of LHWRF villages, 1988-2013^[6]

Figure 1 above shows the growth of the village program from 1988-2013. Starting from just 35 villages, the organization has grown to encompass 2440 villages in four Indian states. For a country with no national language, this level of organization can be considered miraculous. The spread of this system can be attributed through a local linkage of communication. The success of Gupta's model encouraged the adoption of the technology over a wide area. By encouraging the citizens to become active, and spread the word about the technology, the entire system grew. By yielding results, technology can be transferred without much hassle.

Like this, Ram Gupta was able to take a dying industry within India, in peril since the collapse of the "green revolution," and create a system that encouraged economic development through technology transfer in a broad sense. In the classical ten steps for technology transfer, Gupta's revolution in the villages would land at step 5, or the license of technology for local production^[7]. His method for wall production and irrigation was able to become adopted by many small villages throughout India. However, the greater implications of his technology go beyond the farm.

The greatest measure of technology transfer is not in how easy it is to implement, but in what it can produce. Economically, the transfer of farming technology at the local-level has made over 2000 farming villages profitable. As a program running since 1988, this can be considered a contributing factor to the immense growth of the Indian economy during this time. What is key from this transfer, though, is the social development brought on by sustained farming. Gupta's program created strong communities.

While these communities may not progress beyond locally producing parts for the agricultural process, the quality of life for the citizens has increased. New toilets and schools have been built in these villages, and Gupta has made teaching familial and sexual health a part of his development program. These programs are essential to increasing the education of the communities. By focusing on the health and welfare of the individuals, Gupta can encourage the villagers to become innovators, thus benefiting the economy in a grander sense.

Finally, Gupta's transfer of technology is remarkable in its ability to become widespread on the village level. As figure 1 shows, Gupta spread the program to four Indian states. Each state speaks its own distinct official language. Each state has its own, semi-autonomous government. And each state operates centrally from the cities. Thus, reaching villages from other villages in India is often an impossible task. Gupta's transfer of technology is remarkable in its ability to reach far into the often ignored Indian populace, and create a connection. It is a unifying force not often seen in a country marred by socio-political divisions.

The Gupta transfer of farming technology is a typical model of technology transfer. A crisis brings in new technology in the form of dams and pipes. The citizens have a wish to be able to produce their own crops. Eventually, the citizenry is trained in how to produce this, and this method spreads. The ultimate goal of technology transfer in the classical model is to reach

the global market and compete internationally. However, the benefits of the system change when the technology transfer begins at the international level, and works backwards.

Information Technology

The Indian IT sector was born from a global wish. This was the wish of the burgeoning U.S. computer industry to find labor. In the mid-1970s, the U.S. computer industry desperately needed programmers, and the Indian computer industry was happy to oblige with its large population of engineers. This system of sending engineers to fill the global gap for service ultimately led to the outsourcing and development of technology within India, itself. Much like manufacturers bringing their methods abroad for cheap labor, companies began seeking Indian technology services beginning in the 1990s. Ultimately, this transfer from servicing the global sector, to creating software within the domestic sector has created a backwards loop of technology transfer and development, which threatens the Indian economic growth. In a sharp contrast to the Gupta project, many economists are predicting the shrinking of the Indian IT sector.

The chief accelerator of this program was the Tata Corporation, an Indian multinational with ties to most major Indian industries. Tata developed a system known as “bodyshopping,” in which Indian programmers would travel to America to fulfill the needs of U.S. computer companies. By the mid-1980s, many companies entered the bodyshopping game to fulfill the nearly 346,000 U.S. programming jobs^[8]. India began to structure itself around a service-based economy, while much of the developing world was structuring itself around a manufacturing-based economy.

By the mid-1990s, and into the present day, companies found it more lucrative to develop within India itself. Thus, the major computer companies began flooding the Indian market. The major contributor to the growth of the Indian economy at this time can be contributed to the growth of the IT service industry. These companies required a massive, cheap labor force that was also highly-skilled. Thus, Indians began to focus their energies on IT education. By the year 2000, there were an estimated 660 private engineering colleges and 382,000 engineering graduates to service the growing industry^[9].

So then the question is, why would this growth be bad? The issue lies in the recent slow-down of the economic growth. As of 2013, India's growth had slowed to 4.4% per year, and their currency was in freefall^[10]. The growth alone is not the issue, but it is coupled with a slow-down of the IT industry, as many companies are choosing to leave India for lower wages in Singapore and Taiwan. As economist Arvind Subramanian explains, the years of economic growth have "caused wages to rise and have chipped away at India's competitive advantage^[11]." Thus, India finds itself at the whim of a changing market, with little plans to change course.

The issue lies in the development of the IT industry as a technology transfer. This development ignored the fundamental aspect of transfer in that it did not fulfill a wish of the recipients of the transfer. True, the Indian people were in search of jobs, but they did not have the desire to service another nation. This wish was imposed upon them, and did not allow for the economy to truly become innovative. As a result of this, it cannot be said that the transfer of IT technology to India truly produced anything innovative. Following the classical steps, there was no point that the Indian people claimed the IT technology as their own. Perhaps that point has not happened yet; however, the state of education in India does not seem to indicate this.

India has produced two Nobel Prize Winners— a typical gauge of the educational quality of a country— both in physics. The last was Subrahmanyan Chandrasekhar, winning in 1983 for a key finding in the evolutionary theory on stars. However, Dr. Chandrasekhar did not complete his research in India, but in the United States. The state of the Indian technological education system is in disarray. Amongst its many educational establishments created for the promotion of engineering and IT in the wake of the “IT revolution,” only the Indian Institute of Science (IIS) manages to make it into the Academic Ranking of World Universities Top 500^[12]. Indian education has not achieved the point of innovation, or perhaps it reached it and fell away.

Regardless, the IT revolution in India has resulted in a focus on service. This focus has created a system of workers focused only on learning skills, rather than on creating new technology. It has failed to enhance the education aspects of the country, choosing to profligate “for-profit” colleges and the exodus of genuine talent. As the economy slows, and the IT sector begins to move to countries who have developed their education system, the burn area will reveal the larger holes in the Indian social platform of the 2000s. The transfer was born out of the need for jobs; however, it failed to accomplish the duty of successful technology transfers and establish linkages within the country. The citizenry never had a strong tie to the IT industry. It was never their wish, nor has it brought the country closer together. In fact, the technology transfer of the IT industry has only revealed the greater issues facing the growth of India.

Conclusion

It begins with the growth of the people. The beauty of the farm technology transfer was that it hoped to foster the neediest of the people at its core. On the other hand, the IT technology transfer was created to serve the interests of both the Indian Tata Corporation, as well as the

American computer corporations. There was never the underlying belief in economic development through civic development that technology transfer thrives upon. To once again quote economist Arvind Subramanian, “growth has been skill intensive rather than intensive in the use of India’s abundant factor, labor^[13].” The IT transfer ignored the development of the community, while the farming transfer managed to unify the larger Indian community.

That is not to say that India must abandon the IT sector. Rather, it is an argument for a more populi-centric form of economic development. Technology transfer should exist to enhance the people. Between the two case studies, the farming technology succeeded in the long-run because it directly addressed the people. India has many social issues. The government is corrupt, and has a vested interest in seeing IT corporations succeed than their own people. IT corporations line their pockets, while the people are subject to government scandals involving telecommunications and media. This situation is only exacerbated by the social and geographic divisions of the country. No two Indian states speak the same language, and an archaic social-class system is still in place.

A country so disjointed can only be guided together by the hand of economic prosperity for all. Given the chance, people can improve their own situations, but if a system is not designed to work with them, and foster their own talents, then inefficiency arises. It is the tale of two economies: one economy has highly efficient workers, and only 20% of the population will feed into this. The other 80% will be completely inefficient. Without proper nurturing, there will never be an economy with 100% efficiency.

India is a land of contrasts. It has massive cities and tiny villages. It has a booming IT sector and a strong agrarian lifeblood. It has a corrupt government and a strong cult-of-personality. Last, it has a massive population that have little interaction with one another, yet it

stills calls itself a single country. Examining all of the juxtaposing elements, it is no surprise that the country is at a crossroads in economic development. Down one road lies the dangerous path of economic freefall and communism, an era my own family fought hard to escape. Down the other road is a free-market system that encourages education and health. It is not a system that will give everyone an equal chance; that system cannot be promised. Instead, this system can give everyone the basic necessities, through technology, to compete for a chance at success. This is the Indian economic miracle that must happen through the bubble-up economic process.

In 2012, I returned to India for the first time in a decade. I was nervous, for a moment, but upon landing, I found a changed country. Yes, the roads were still dirty. The smog problem may have been even worse. Yet, there were certain changes for the positive. Citizens seemed to care more for their city, taking care to throw trash away properly. Power cuts were few and between. Every citizen had a cell phone, and the mall was a common fixture. It was a changed country, it felt. However, there was another change. It was something greater, something just beneath the surface.

There was a tension going on in India; politically, socially, economically— something was bubbling up. Massive high rises were being built next to ancient city corridors. Engineering schools were as plentiful as Starbucks. Men and women walked around as equals, the patriarchy of the past showing few signs of existing. The country felt as though it were in the midst of a monsoon, and in the monsoon, the old was struggling to keep with the new. The city, my city, was changing. It was changing because of its people. It was changing because of its government. And it was changing because of necessity. What the city will be when the monsoon leaves, that is unclear. What is clear, though, is that the people most equipped to handle the storm, are those most in need.

End-Notes

[1] Subramanian, Arvind. “Why India’s Economy Is Stumbling.” 2013.

[2] Kumar, Ustav, and Arvind Subramanian. “India’s Growth in the 2000s: Four Facts.” 2011.

11-17

[3] Kumar, Ustav, and Arvind Subramanian. “India’s Growth in the 2000s: Four Facts.” 2011.

11-17

[4] Bhagat, Rasheeda. “From farms to ATM cards.” 2012.

[5] Bhagat, Rasheeda. “From farms to ATM cards.” 2012.

[6] REI Systems India Pvt. Ltd. *Sita Ram Gupta – Executive Director*. 2014.

[7] Sviedrys, Romualdas. “A conceptual framework for understanding technology transfer to the third world.” 1989. 185-200.

[8] Bhatnagar, Subhash. “India’s Software Industry.” 2006. 95-124.

[9] Bhatnagar, Subhash. “India’s Software Industry.” 2006. 95-124.

[10] Subramanian, Arvind. “Why India’s Economy Is Stumbling.” 2013.

[11] Subramanian, Arvind. “Why India’s Economy Is Stumbling.” 2013.

[12] S., Seethalakshmi. “IISc only Indian institution in top 500 global ranking.” 2013.

[13] Kumar, Ustav, and Arvind Subramanian. “India’s Growth in the 2000s: Four Facts.” 2011.

11-17

References

Bhagat, Rasheeda. "From farms to ATM cards." *The Hindu: Business Line*.

The Hindu Group, 5 Oct. 2012. Web. 11 May 2014.

<<http://www.thehindubusinessline.com/features/from-farms-to-atm-cards/article3969424.ece>>

Bhatnagar, Subhash. "India's Software Industry." *Technology, Adaptation, and Exports: How*

Some Developing Countries Got It Right, 2006: 95-124. Web. 12 May 2014.

<<http://www.iimahd.ernet.in/~subhash/pdfs/Indian%20software%20industry.pdf>>

REI Systems India Pvt. Ltd. *Sita Ram Gupta – Executive Director*.

Lupin Human Welfare and Research Foundation, 2014. Web. 10 May 2014.

<<http://www.lupinfoundation.in/node/103>>

Kumar, Ustav, and Arvind Subramanian. "India's Growth in the 2000s: Four Facts."

Peterson Institute for International Economics Working Paper Series WP (2011): 11-17.

Web. 10 May 2014.

<<http://www.piie.com/publications/wp/wp11-17.pdf>>

S., Seethalakshmi. "IISc only Indian institution in top 500 global ranking." *The Times of India*.

Bennett, Coleman & Co. Ltd., 16 Aug. 2013. Web. 11 May 2014.

<<http://timesofindia.indiatimes.com/home/education/news/IISc-only-Indian-institution-in-top-500-global-ranking/articleshow/21853062.cms>>

Subramanian, Arvind. "Why India's Economy Is Stumbling." *The New York Times*.

The New York Times Company, 30 Aug. 2013. Web. 11 May 2014.

<http://www.nytimes.com/2013/08/31/opinion/why-indias-economy-is-stumbling.html? r=0>

Sviedrys, Romualdas. "A conceptual framework for understanding technology transfer to the third world." *Technological Transformation* 5 (1989): 185-200. Print.

Critical Bibliography

Bhagat, Rasheeda. "From farms to ATM cards." *The Hindu: Business Line*.

The Hindu Group, 5 Oct. 2012. Web. 11 May 2014.

<http://www.thehindubusinessline.com/features/from-farms-to-atm-cards/article3969424.ece>

Taking from the premiere English-language, Indian newspaper, this article gives a modern take on the work of Ram Gupta first introduced in the video. This is an important article because it not only acts as an update of the numerous programs Ram Gupta has undertaken since the original program began, it also allows the success of the program to be examined in hindsight. The source is reliable, quoting from Gupta directly at times. Argumentatively, it does seem to be less substantive a piece than others. The article is highly complementary, and refrains from dealing heavily with the greater social issues facing the country. It does a fine job of explaining Mr. Gupta's role and motives

Bhatnagar, Subhash. "India's Software Industry." *Technology, Adaptation, and Exports: How*

Some Developing Countries Got It Right, 2006: 95-124. Web. 12 May 2014.

<http://www.iimahd.ernet.in/~subhash/pdfs/Indian%20software%20industry.pdf>

This essay published on the Indian IT industry provides an in-depth look at both the history of the industry, as well as the mentality of the members of the industry at its peak. It is a crucial resource in understanding the often murky history of the industry's development in India, and offered a surprising insight into the early years of IT. Its one limitation is the limited scope of the paper. Being published in 2006, it does not see the coming economic downturn, and views IT as a driving force. To this end, certain

opinions and conclusions from the essay do not apply to this paper, but it does not change the validity of the history being proposed. The essay is published in an anthology on IT growth, and is penned by the prestigious Indian Institute of Management, thus leading to its credibility.

REI Systems India Pvt. Ltd. *Sita Ram Gupta – Executive Director.*

Lupin Human Welfare and Research Foundation, 2014. Web. 10 May 2014.

<<http://www.lupinfoundation.in/node/103>>

This complimentary piece provides data on the growth of Ram Gupta's program. It is a biography on a foundation website. The key information on this site is the graph of the growth of the program into 2013. This information is important to view the growth of the program over time. It offers little more information really. Again, given that it is a personal site to the foundation, the data may be skewed for the most favorable outcome. For instance, population data is hard to accumulate in India, thus approximations may be made. That is mostly conjecture, though.

Kumar, Ustav, and Arvind Subramanian. "India's Growth in the 2000s: Four Facts."

Peterson Institute for International Economics Working Paper Series WP (2011): 11-17.

Web. 10 May 2014.

<<http://www.piie.com/publications/wp/wp11-17.pdf>>

This article is a modern breakdown and conclusion-piece on the economic future and history of modern India. While it is not a completed paper, it is from two reputable Indian economists. The paper summarizes the driving factors of the Indian economy very well;

however, it does tend to speak in platitudes. One issue with this is that it begins a conversation on Kerala that for some reason does not get further developed, possibly because the article is unfinished.

S., Seethalakshmi. "IISc only Indian institution in top 500 global ranking." *The Times of India*.

Bennett, Coleman & Co. Ltd., 16 Aug. 2013. Web. 11 May 2014.

<http://timesofindia.indiatimes.com/home/education/news/IISc-only-Indian-institution-in-top-500-global-ranking/articleshow/21853062.cms>

This article, again from a reputable Indian news source, announces the global college rankings. It is key for the Indian Institute of Science ranking. Interestingly enough to note is the positive spin the article puts on the ranking. Perhaps it is a positive thing for the IIS to be listed AT ALL on the global rankings, or perhaps it is a propagandist decision for a nationalistic cause. Unfortunately given the government control over media in India, it is often difficult to tell.

Subramanian, Arvind. "Why India's Economy Is Stumbling." *The New York Times*.

The New York Times Company, 30 Aug. 2013. Web. 11 May 2014.

http://www.nytimes.com/2013/08/31/opinion/why-indias-economy-is-stumbling.html?_r=0

This is an opinion piece summarizing the essay by economist Arvind Subramanian. The major for this article is the explanation of why the economy has turned downwards. This article provides the economists' (clearly biased) views on economic development in India. While the viewpoint of "pro-manufacturing" may seem controversial, it is a viewpoint that the writer backs up using examples and numbers.

Sviedrys, Romualdas. "A conceptual framework for understanding technology transfer to the third world." *Technological Transformation* 5 (1989): 185-200. Print.

This book lays the groundwork for the technology transfer process. Written by a known scholar on technology transfer, the process is laid out in ten steps. The steps cover the typical progression of technology through a country, and also speak to the resulting effects of the technology transfer. The book isn't necessarily quoted itself, but it is a strong guiding force for the entire paper.