1 *Vent for growth*

Outside-the-box thinking

India has, seemingly and finally, embarked on her late, late industrial revolution. This has occurred more than two centuries after Britain launched hers, and a century after Japan commenced the industrialization process. She is several decades behind Japan, South Korea, and China, three other important Asian economies, in this industrializing and economic growth catch-up process. But it is better to have commenced the process now than never to have commenced it at all. In every decade, an ideal business and economic model is proclaimed and held up as exemplary. Thus, the central planning model of Soviet industrialization and the American New Deal in the 1930s, the indicative planning model of the French variety in the 1960s, the German co-determination model in the 1970s, and the Japanese *kanban* system of the 1980s were given approbation.[1] South Korea's late industrialization model was the exemplar of the 1990s, and the Chinese model of the 2000s was to be the workshop of the world. Can India's model of a late, late industrial revolution define the contours of business and economic discourse in the 2010s and beyond?

The answer to this question depends very much on India's entrepreneurs. In this respect, my niece Dr. Aindri Raychaudhuri, popularly known as Mikku, who is a very successful young infertility specialist in Calcutta, described an interesting entrepreneurship case to me. Now renamed Kolkata, it was once Rudyard Kipling's "city of dreadful night." For many now, Calcutta is the city of joy. It was then, and it still is now, one of India's largest and most vibrant cities. It has also emerged as the medical hub for eastern India. Mikku runs one of Calcutta's thriving in-vitro fertilization (IVF) clinics. An IVF baby is a test-tube baby, and an IVF therapy program is used for couples who have not been able to conceive naturally. In Western societies, many couples engaged in same-sex relationships or marriages also use IVF to

start a family of their own, since the natural processes of human biological reproduction are denied to them. The Calcutta IVF market may be somewhat socially different from that of the West at this point.

While the first test-tube baby was born in Calcutta in October 1978, just three months after the world's first test-tube baby was born in Britain, IVF therapy has only recently taken off in India.[2] In-vitro fertilization is not cheap. A rise in discretionary incomes, that has accompanied India's burgeoning economic growth, has made available the large sums of money that couples may require for IVF therapy if their natural attempts to have a family have failed.[3] While past business growth in the IVF sector may have lagged behind the technology of assisted reproduction, today the IVF sector displays boom symptoms. Such booms are accompanied by numerous individual entrepreneurial experiments and bets on ideas, to solve problems that may exist for consumers and in the market, in the context of a growing awareness of opportunities.[4] India's IVF sector is no exception.[5] The term manufacturing may apply, in a broad sense, and also in a polemic philosophical way, to the IVF sector. Yet, the IVF saga may reflect the emergent entrepreneurial contours of India's late, late twenty-first century industrial revolution.

The details recounted so far are standard. They apply to the formal element of India's IVF sector. Much of the elements of the formal IVF sector mimic those of formal sectors in other countries. But the real story is not the formal sector story. As with other sectors of the Indian economy, there is a large informal component in the IVF sector of India. The informal sector co-exists with the formal sector in a mutual symbiosis. This informal sector displays ingenuity and enterprise in equal or greater measure than that of the formal sector. This aspect of the IVF story provides the backdrop for the evocative tale of India's new entrepreneurial revolution.

Mikku shared with me several details of how a typical IVF center works. Mikku's center, and other IVF centers, are reliant on the supply of eggs and sperm from donors. These donors' eggs and sperm are stored for future use. These are the raw material resources required for an IVF center to operate successfully. The supply chain of an IVF center is based on the procurement of egg and sperm supplies from donors.[6] In the case of Calcutta women, a monthly egg donation, for those willing to do so, enables them to currently earn ₹30,000 on each occasion. In the case of men, many monthly donations are

feasible. Every donation nets Calcutta's male donors ₹1,000 per operational visit.

One of Mikku's most reliable egg suppliers is an enterprising woman from the urban working class of Calcutta, named Sumangala.[7] Originally from Purnea, in Bihar, a backward district of India, she is married, in her early thirties, and has a small child. Sumangala has had some school education, but no college education. She came as a donor to Mikku's clinic some years ago and, thereafter, consistently donated month after month. Of late, she has stopped donating her eggs because she wishes to conceive again. Her claim to fame has been her ingenuity in altering the contours of Mikku's resource supply chain for donor eggs. Sumangala has organized several women, at last count numbering over 15, to become egg donors. She directs them to Mikku's center where they donate eggs. These are women mostly in their early to mid twenties; some are in their early thirties. They are in the prime of biological life, and good donors. These women are from the urban working class or the urban lower middle class of Calcutta. Many have had severely impoverished rural backgrounds. Some have been disenfranchised Calcutta slum dwellers, who have typically provided the grist for Western movie-makers to make films depicting India's poverty.

These donor women would never have heard of the egg donation possibilities at Calcutta's IVF centers were it not for Sumangala. They are a part of Sumangala's informal egg donation network. For every donation that they make Sumangala receives ₹5,000 as her fee. The women then receive ₹25,000 each. In Calcutta, wages are relatively much lower than in Bombay or Delhi. These women may have been earning about ₹8,000 to 10,000 a month, at most. They have been able to supplement their monthly incomes by a large magnitude without major risk to their well-being. In the process, their donations may bring eventual joy to a childless couple. What of Sumangala? In addition to her existing income from her full-time day job elsewhere, in a good month when she is herself a donor, and say 15 of her current women also donate, she earns over ₹100,000 a month. That is the salary of a professor at Calcutta or Jadavpur University or the Indian Institute of Technology or of a very senior civil servant. Her ingenuity has enabled Sumangala to reach an income level compatible with a very comfortable middle-class lifestyle in one of India's largest cities.

Sumangala has since expanded her supply chain operations to supply several other IVF clinics in Calcutta. Her informal network of

potential donor women is growing every day and not only keeps Mikku's IVF center in eggs, but several other IVF centers in Calcutta are now assured of a steady and reliable supply of a key resource for their therapeutic needs. For the IVF clinics, a random process of egg availability has been replaced by a certain continuity of flow. This is important in the management of their business model. For the relatively impoverished women who supply this resource flow, Sumangala has enabled them to improve their economic lot in life. Sumangala's activities reflect the burgeoning informal entrepreneurship that co-exists, with its own ecology and structure, side by side with formal sector industrial businesses in India. Though she lacks a formal college education, Sumangala's informal segment entrepreneurial activities have changed the supply chain contours for an IVF center's key resources. Such entrepreneurship, of which there are many examples, is an important element of India's late, late industrial revolution.

The story is incomplete. Another of Mikku's suppliers, this time of sperm, is a young man named Onkar Mahalingam.[8] Popularly known as OM to his friends and colleagues, he is single and in his late twenties. He is a flight attendant, based out of Calcutta, for one of India's new private airlines. OM is originally from Golmalpur, in Karnataka state; a search for better opportunities brought him to Calcutta as a student over a decade ago. In his free time, of which he has large chunks, since his schedule of flying permits him to accumulate these holiday blocks, OM is a sperm donor. When in Calcutta, his first daily task is to visit Mikku's center to make a sperm donation. After the event, he pockets ₹1,000 for his exertions. If OM has a free month, and is not flying, his earnings from daily sperm donations amount to over ₹25,000. This sum is almost as much as his monthly flight attendant's salary from the airline. OM's combined monthly income of over ₹50,000 is a sum he never believed, as a teenager in Golmalpur, was within his reach. Given OM's seminal contribution to the resource base of Mikku's IVF center in Calcutta, he may well account for the paternal genes of a large number of babies conceived, albeit in a Petri dish, in twenty-first century Calcutta. He may be a latter-day Genghis Khan. It is outside-the-box thinking by OM that has enabled him to turn a liquidity contingency into a financial opportunity.

In addition to the large sums being invested by companies and private investors, many non-traditional persons have turned to entrepreneurship. Because there have have been no precedents, given sector novelty, they have generated, whether by accident or design, new business models. Similarly, it is the informal sector organizational ability, displayed by the likes of Sumangala in subtly altering the IVF raw material supply chain, which epitomizes contemporary autonomous Indian entrepreneurial activity, with important spillovers into the social sector. By weaving other women closely into the fabric of her informal social network, Sumangala has also enabled once-disenfranchised women to engage in commercial activities within India's economy in a way they would never have thought possible. The rewards for these women are considerable, for what is relatively low risk. Such financial rewards can enable them to make considerable enhancements in the various parameters of daily living and impact the qualities of their lives. Such financial outcomes function to enhance both personal autonomy and national economic growth.

Enterprising ventures are also the norm in the large corporate sector. Over the space of a few days, in the second week of February 2011, four announcements relating to Indian businesses were made. The first dealt with a multinational company, manufacturing consumer products, investing in India. The giant Japanese electronics corporation, Panasonic, was to start production from a newly established manufacturing facility at Jhajjar in Haryana in three months' time. The company had originally set a target to go on-stream in 2012. The economic boom in India persuaded it to advance the launch date for the manufacturing of home appliances, such as refrigerators, air conditioners, and washing machines. Simultaneously, it was to double its Indian workforce to 20,000 by 2012, and to make a total investment of ₹1,000 crores to set up Indian research and development and manufacturing facilities.[9]

Second, India's oil and gas giant, Indian Oil Corporation, a state-owned firm, commenced production from a naphtha cracker plant at Panipat in Haryana that had been established for ₹14,000 crores. This cracker unit became the largest industrial complex in the state of Haryana, and it would produce feed for downstream polymer units. This was a case of a state-owned enterprise investing in very large-scale industrial facilities.[10] Third, in a role reversal, the Anglo-Dutch oil and gas giant, Royal Dutch Shell, sold its Stanlow refinery in Britain, and the entire inventory of crude

oil and refined products located there, to an Indian oil and gas firm, Essar Energy, for US$1.3 billion. This was a case of a recently started Indian private oil and gas company, already possessing substantial resources, acquiring significant assets and businesses abroad.[11] Fourth, an Indian pharmaceutical company, Venus Remedies, set up 20 years ago by a former practicing chartered accountant, announced plans to enter the specialty oncology segment. It created a new dedicated business unit, with a product basket of 21 products in injection form, for fighting various types of cancer. The goal of the business unit was to offer affordable medicines to the mass market of India.[12] Collectively, the examples given, just the tip of the iceberg since numerous similar episodes exist, highlight contemporary autonomous entrepreneurial activity.

India's unique industrial revolution

An industrial revolution implies major quantitative performance transitions, as well as qualitative transitions in undertaking economic activity. An increase in the production of goods and services is accompanied by an upsurge in the consumption of items, and a production revolution is also accompanied by a consumption revolution.[13] The data on India's industrial production suggest that a major quantitative wealth creation process is in progress. These data provide a general overview of the transition. In the last 30 years, between 1980 and 2010, the overall index of industrial production has risen from 100, for the base year 1980–81, to over 720 by 2009–10. Figure 1.1 graphically displays the annual growth in the index of industrial production from 1980 onwards. In the three decades, of the 1980s, 1990s and 2000s, the index of industrial production has grown at 7.5 percent, 6.4 percent and 7.5 respectively. In the latest year for which data are available, 2009–10, the index has risen at 11 percent over the previous year. The annual growth rates are presented in Table A1.

Additional details support the thesis. When the index of industrial production is decomposed into its constituent parts, the trends are even more evocative of a late, late industrial revolution. The index comprises separate components for basic goods, capital goods, intermediate goods, consumer durables, and consumer non-durables. The two important enhancements of industrial production have been in the capital goods and consumer durables segments. These trends are clear from figure 1.2. In the capital goods segment,[14] between 1980

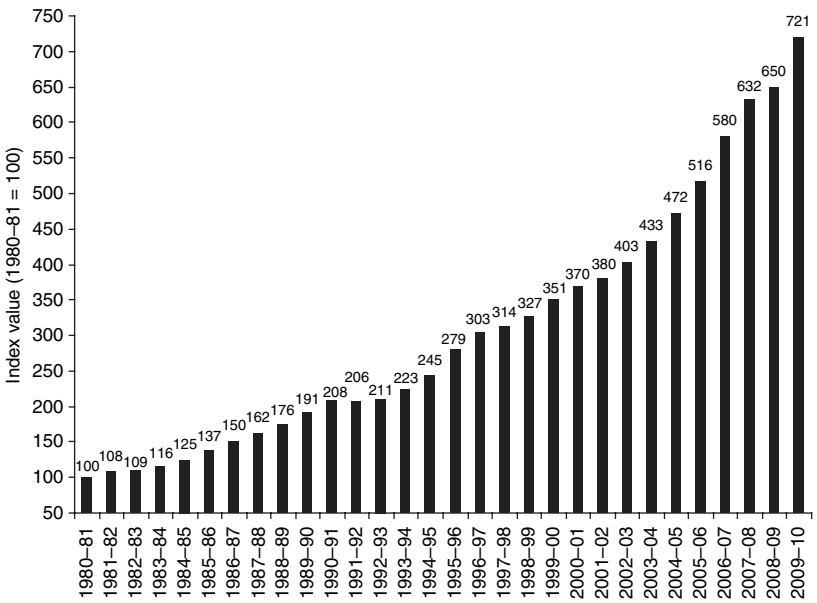

Figure 1.1. Index of industrial production in India: 1980–81 to 2009–10.

Source: Derived from Table 28 of the Reserve Bank of India Database on the Indian Economy.

and 2010 the index of industrial production has risen from 100, for the base year of 1980–81, to 1,339 by 2009–10. Growth of production in the capital goods segment indicates the long-term investment intentions of the business community. The index of production for the consumer durables segment has risen from 100, for the base year 1980–81, to 1,941 by 2009–10. This is an important segment to gauge consumer sentiments. Typically, the population of a country enjoying economic progress would invest in consumer durables as discretionary items. Such expenditures would be incurred after other important needs were met. The growth in the output of this particular segment reflects the economic growth of India as a whole, after economic liberalization has led to the increased production of goods and services available for consumption.[15] A consumer revolution is in progress. A consumer revolution reflects changes in the experiences of India's population, just as the industrial revolution in Britain, as an epochal event in the lives of her population, changed the patterns of consumption

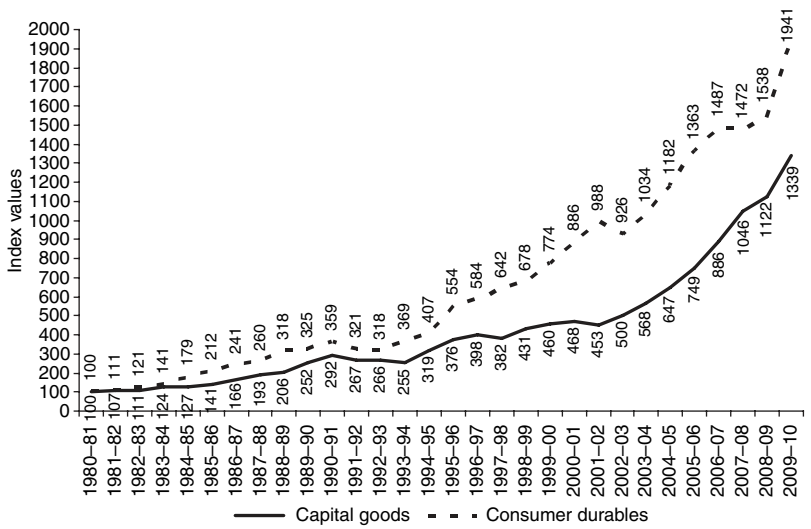

Figure 1.2. Indices for the production of capital goods and consumer durables: 1980–81 to 2009–10.

Source: Derived from Table 28 of the Reserve Bank of India Database on the Indian Economy.

and habits as rising disposable incomes and a growing supply of inexpensive goods and equity permitted less fortunate people to consume what the elites had been consuming.[16]

In the producer and consumer goods segments, there have been 13-fold and 19-fold increases in output in the course of the last three decades. These segments of Indian industry reflect important producer and consumer sentiments respectively. By any standards, these are substantial growth rates. When coupled with a median age of India's population of 24 years, compared to 34 years for China, 37 years for the United States and 40 years for Europe, the consumption experiences of participants in India's economy can dominate the logic of world markets. India's youth population will be the largest in the world. Given a lack of purchasing power relative to the West, the Indian market can provide the inducements, and economies of scale necessary for tailored innovation and product development of low-cost items to be sold cheaply around the world. The development of Tata's Nano car, to be sold at about $2,000,

heralds this phenomenon.[17] The other segments constituting industrial output in India have not lagged behind in displaying growth. The basic goods segment index has grown from 100, for the base year 1980–81, to 622 by 2009–10. The intermediates goods segment index has grown from 100, for the base year 1980–81, to 556 by 2009–10, while the basic consumer non-durables segment index has grown from 100, for the base year 1980–81, to 488 by 2009–10. While the broad growth trend for capital goods and consumer durables is brought out in figure 1.2, Table 1.1 provides details of the growth trends by decade.

Allied to major institutional changes, there has been a change in the entrepreneurial culture of India. There are little local difficulties;[18] nevertheless, entrepreneurs have propelled significant investments into agricultural, manufacturing, service, and knowledge sector activities. These have interacted to boost India's economic growth, and this economic growth performance has been substantially driven by the performance of India's manufacturing and service industries. Such growth is unsurprising. Indians have been an enterprising people for over 4,500 years. Research on the economic prehistory of India, on the Indus Valley Civilization, shows a pattern of trade, domestic and global, entrepreneurship and organization, at that time second to none. Till the British arrival on India's governance scene, in 1757, India was a dominant economy. India was not only the world's leading manufacturing country, but there was a large commercial sector, with a sophisticated structure of markets and credit, manned by a skilful commercial class supported by a competent class of service-providers.[19]

In relation to the industrial revolution, which started in the mid eighteenth century, in 1750 India's share of world manufacturing was over 25 percent.[20] At that time, the share of China in world manufacturing was 33 percent, that of the United Kingdom 2 percent, and that of the United States a tenth of a percent! Then, the first industrial revolution occurred. India did not participate. She was a mute bystander to the world's most fundamental economic transformation. Her relative share of total world manufacturing shrank rapidly, simply because the West's output was rising more swiftly. By 1860, India's share of world manufacturing was down to 8.6 percent, while that of the United Kingdom was 20 percent and that of the United States almost 15 percent. By 1900, India's share of world

Table 1.1. *Annual percentage growth in the constituent components of the index of industrial production*

	Overall index of industrial production	Basic goods index	Capital goods index	Intermediate goods index	Consumer durables index	Consumer non-durables index
Annual percentage growth in the 1980s	7.46	7.99	10.96	6.05	14.23	5.43
Annual percentage growth in the 1990s	6.36	6.17	6.74	6.68	9.65	4.18
Annual percentage growth in the 2000s	7.50	5.58	11.50	5.77	9.98	7.46
Annual percentage growth in 2009–10	10.92	7.18	19.34	13.64	26.23	1.32

Source: Reserve Bank of India Database on the Indian Economy, Table 30, and author's calculations; computations expressed in percentages based on data at factor cost and in constant rupees.