Technology Acquisition: Analysis of Different Models

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Epochs & Eras

Technology is the distinctive mark of the human species. In a rare disagreement with my favorite dictionary, I propose to define technology as *the means by which we (humans) have successfully dominated our environment*. If we leave out the claims of the prehistoric times, our common experience shows that humanity, no matter how "primitive" or remote, is always at the top of the food chain even in the menacing presence of apparently more able animals that may seem naturally endowed with the means to turn the tables. It is no surprise that our summary of the entire history of the world is a tribute to technology: We classify the eras into the Ice, Stone, Bronze and Iron Ages. When we add the succeeding "Industrial Revolution" and the "Information Age", it is clear that aside from the Ice age (which was devoid of human society), what seems to matter most is the prevailing technology of any particular period. "*The Stone Age was the earliest known period of human culture, characterized by the use of stone implements"* [1]. The technological paradigm of that era was essentially based on the implements or instruments made using stone or the ability to use stone to make implements. These were for the existential purposes of protection from the elements, from cantankerous neighbors or, offensively, for domination of weaker neighbours. This same is largely true for the other epochs; Bronze, Iron and even the Industrial Revolution to the present time.

Technology is not necessarily Science or Engineering. It is important we make this distinction clear in order to avoid mental clutter in our analysis. Humans are "*technological*" by instinct and also by natural endowment. The mango up in the tree may be desirable to us and several of our other neighbors. Who will get it? Of course, the birds will get there first because they can fly. The monkeys may follow, because they can climb. The giraffe and elephants may reach it because of the advantage in height and a "fifth" powerful "limb", The bear, though it can climb, may find the tree branch will not support its weight. It is the human that will most likely proffer a technological solution of "extending" the limbs by means of a tree branch to make the mango come to meet us without needing to expend too much resource in seeking it. Such "technological" instinct is in man, every man, no matter how primitive – and that is closely related to his ability to dominate the others. Of course, we follow that action by eventually planting the orchards which we guard and prevent others from using so we can get as many fruits as we want in season and out of season.

The naming of the periods, as we have seen, was largely based on the chief raw materials for the production of goods and services; war related paraphernalia etc. Let us not forget that technology, apart from making man dominant over other species, it is also what makes a people dominate other peoples. Kings pay tribute and homage to superior kings. This "superiority" is usually in the level of technological superiority that can be brought to bear if a fight were to break out – as it often does, over scarce resources.

The initial drive in each man is to survive. The technological instinct in man created implements that are used for:

- Survival, and then,
- Imposing their will on others (War Making), and then,
- Gaining Trade Superiority in Peace times, and then, where there are no imminent threats or dangers,
- Doing better in Sports and cultural advancement

History teaches us that each age creates Winners and Losers. The winners are those (Men, Nations and Peoples) who understand the metaphor of the age, apply it to advantage Reap great benefits. The losers are the bystanders who look on while these technological advances and changes are taking place!

It is therefore no surprise that the Europeans ruled the world in the 18th to 20th Centuries. In earlier centuries there had been greater civilizations from the Mongols of eastern Asia to the Ming Chinese or the Arabian Moors. The Europeans dominated the world by the mastery over the oceans, use of gunpowder, well established governmental systems, etc. It is also no surprise that Africans were (are?) their slaves. Our most important contact with the foreign cultures of Europe took place in the context of at the end of the Iron Age. The bitter truth to face is that our forebears were the losers in that technological Time Zone. Consequently, when they could not coax us with "gifts" such as gin or looking glass to capture and sell our brothers, they coerced us with their gunpowder to give up sovereignty over our land by signing one sided "protection" treaties, and then went on looting binges. The world map as we have it today is the result of the military victories and losses of recent centuries.

Why, for example, are the Chinese and Indians with their massive populations restricted to their homelands while the smaller European tribes alone rule over three additional continents of America, Australia, in addition to substantial influence elsewhere? The world map as we have it proves the adage that, in this world, *you don't get what you deserve, but what you negotiate!* Based on population, the Chinese and Indians ought to be awarded Canada and Australia to give a little "elbow room" to their large numbers. Not in this world. They were not the high and mighty when it came to sharing that!

Science, Engineering & Technology

These three overlap in several ways; it may therefore be useful to explain their different roles. Webster defines science as "*the state or fact of knowledge*" and "*systematised knowledge derived from observation, study, and experimentation carried on in order to determine the nature or principles of what is being studied*" This is the scientific method. It has greatly assisted man to have greater mastery of the knowledge database of the world and even himself. The knowledge we acquire can be used to create products for the benefit of man. It may even be used to create destructive things. Science has speeded up the advancement of technology. Yet, technologies are not always exclusively products of science, because technologies have to satisfy requirements such as utility, usability, safety and affordability.

Engineering relies largely on the scientific method to create technology, products and services. In its hard form, it is essentially the solution to physics (and possibly other science) problems of economic significance. In that sense, Engineering is a scientific art. This is largely so because while Science accounts for the predominant portion of engineering achievements, serendipity and trials and errors including things of nonscientific nature are also part of engineering and are used when they work! Science and Engineering have greatly accelerated technology but they are relatively younger arts in themselves when compared to technology which is, by definition as old as man's dominance over his environment. Continuum Theories of Mechanics, for example, are even somewhat contrary to what science knows, yet the built environment depends on its results. The more scientific microscopic theories fail because humans do not yet possess the ability to solve the problems of macroscopic aggregates in a way compatible with known results.

Engineering, as we know it today, is a child of the Industrial Revolution. "*Before that time, the economy was primarily agricultural, transportation was poor, and manufacturing was carried on in the labourers' homes. The invention of the spinning jenny (1763), the water-powered spinning machine (1771), and other mechanical devices gave rise to the factory system and created a need for mechanical power. … The new devices, in turn, required more efficient use of fuels, and more emphasis on factory planning; thus, mechanical engineering was established. Those civil engineers concerned with machines were called mechanical engineers, and as new sciences and skills developed, they became specialists in the new art*" [2].

In the foregoing, we can see that Engineering can be distinguished from Science because, while it is based on the Scientific Method, it is not restricted to it. Second, and even more important, is the economic factor. Science is able to pursue knowledge for its own sake and that as an end in itself. Engineering wants to use scientific knowledge to satisfy economic concerns. It does not require a lot of engineering to build a bridge if you have unlimited resources. To build one within economic constraints is a lot of Engineering. Whereas, Technology is as old as human society, Science and Engineering are, today, the chief driving forces for technological development. It is easily proven by extant facts that the nations with the best Science and Engineering are also the same that will create better technologies.

Effects of the Industrial Revolution

The Industrial revolution started the move into a new definition of technology and its applications. The technology that it made available created massive infrastructure such as railroads, telephony, the built environment, food mobility, better health and other conveniences that made city dwelling possible on the large scale we have it today. Power generation and utilization on a massive scale and several other factors created goods and services on an unprecedented scale. This led to a democratization of products to the extent that the comforts that were once the exclusive preserve of kings and the nobility came within the reaches of a much larger segment of society in countries that first adopted these technologies. At the close of the nineteenth century, the motor car was at the point of becoming the new paradigm for transportation. Europe and the United States led the world. It is instructive to ponder how recent this development is. The faces of these countries have become so altered that it may appear as if they never had the challenges we have to cope with!

"*Prior to the nineteenth century, cities were traversed almost exclusively on foot. Mounted riders in US cities were uncommon, and due to their expense, slow speeds, and jarring rides, private carriages were rare; in 1761, only eighteen families in the colony of Pennsylvania (population 250,000) owned one. The hackney cab, ancestor of the modern taxi, was priced far beyond the means of the ordinary citizen*." [3] Furthermore, "*IN 1898, delegates from across the globe gathered in New York City for the world's first international urban planning conference. One topic dominated the discussion. It was not housing, land use, economic development, or infrastructure. The delegates were driven to desperation by horse manure … American cities were drowning in horse manure as well as other unpleasant byproducts of the era's predominant mode of transportation: urine, flies, congestion, carcasses, and traffic accidents. Widespread cruelty to horses was a form of environmental degradation as well. The situation seemed dire. In 1894, the Times of London estimated that by 1950 every street in the city would be buried nine feet deep in horse manure. One New York prognosticator of the 1890s concluded that by 1930 the horse droppings would rise to Manhattan's third-story windows. A public health and sanitation crisis of almost unimaginable dimensions loomed." [3]*

The fact that these same western powers were the pioneers in the replacement for animal traction becomes reasonable once we factor in the difficulties they had with animal transportation. A combination of inventions with the availability of inexpensive power sources made it possible for the Internal Combustion Engine to topple the Horse as the main personal transporter within and between cities. That dominance was to lie there unchallenged for nearly 150 years.

The development of air travel in the same period led to a massive shrinking of the world and gave meaning to the epithet "Global Village". The European children of the Industrial Revolution dominated the world. They faced no serious challenges from anyone other than themselves – only themselves as the history of the wars of the last century bears testimony. . The older giants and powerful civilizations were literarily asleep! Napoleon Bonaparte had earlier quipped, "*China is a sleeping Giant, Let her sleep, only a madman will wake her up!*". The same could be said of most of Asia. These were, like us, losers in the technologies of the 17th

and 18th Centuries. Most suffered colonization and the usual one-sided “protection” treaties of the victorious Western Powers.

We can see that the advances in technology and shifts in paradigm has grave social and political consequencies. The 20th Century saw an attempt to redress this in Asia. And we shall examine three of them that, as latecomers to the technology challenge were able to shed the toga of Bystanders and Losers to take their proper place in the world.

Several Asian Nations started transforming from dependency of the West in the 20th century. The strategy and experience in which they, as latecomers to the technology age, were able to transit can be instructive to any serious Nation that desire to move away from poverty, hunger and disease. The examples here are by no means exhaustive. We have left out worthy nations such as Korea, Taiwan etc because the three examples (Japan, India and China) we have chosen are representative of the experience of the others.

Japan: Competition&War

A proud ancient people of a world regarding empire-building nation, the Japanese were latecomers into Automobile technology. It was the American Detroit-based auto giants that first saw in Japan a big market for the expansion of their trade. The Japanese as empire and a warrior imperialistic nation in its own right never had too much patience in being a sitting duck and a trading post for foreign concerns. The need to acquire the technology was in the Japanese mindset from the very beginning of the US automobile “Invasion”. The sense of purpose and clear focus in acquisition of automobile technology was the key in Japan’s success. 1914, Mitsubishi Zosen manufactured 22 Mitsubishi Model As, the first mass production cars in Japan. 1918, the Military Vehicle Subsidy Law was established. Under this law, the military granted subsidies to automobile manufacturers to produce vehicles (mostly trucks) to be used by civilians during peaceful times and converted to military use in times of war. This was in effect Japan's first automobile industry policy.

The recent disaster is not the first time the Japanese Islands have suffered setbacks due to a major earthquake. Around 1927 when the Japanese where grappling with the after effects of an earthquake similar to the recent one, foreign motor manufactures were breaking into the Japanese market. In February 1925 Ford established Ford Motors Japan in Yokohama Japan and began local assembly and sales (in June of that year) of Model Ts. GM followed suit; establishing GM Japan in January 1927 and commencing local assembly and sales of Chevrolets in April.

The occupation of Manchuria (northern China) by the Japanese military in 1931 exacerbated already difficult relations with the West. The basis for war grew steadily stronger, and in 1936 the Japanese Ministry of Commerce and Industry and the Ministry of War jointly supported the establishment of the Automobile Manufacturing Industries Act. The aim of this legislation was

ostensibly to stifle the monopolization of the automobile market by American manufacturers by fostering domestic mass production of motor vehicles to meet the needs of the public. An additional goal was to ensure the uninterrupted supply of vehicles for the military. Between 1925 and 1935, the General Motors, Ford and Chrysler produced a cumulative total of 208,967 units in Japan. In contrast, domestic production for the same period totaled 12,127 units, just 5.8% of what the American's had produced! After 20 years of effort, the Japanese could only get 5.8% of their own market due to overbearing foreign competition offering better products at lower prices: Cars, bikes, etc.

US Companies Pull-out

Sino Japanese war of 1937 – pressure on Japan domestic non-war spending. Foreign exchange was revised leading to the skyrocketing of import prices with the decline in the yen exchange rate. Feeling the mounting pressure, the Big Three finally discontinued production in 1939 and withdrew from Japan. The Automobile Manufacturing Industries Act of 1936 positioned the automobile industry in a key role in the war effort. The Ministry of War classified motor vehicle manufacturing as a munitions industry. As of 1938, automobile manufacturers had no choice but to focus on the production of trucks, rather than cars, and some were eventually required to produce other kinds of munitions as well

It was clear to Japan that its imperial ambitions in China and east Asia were closely related to the Automobile industry. It was therefore not acceptable to have such key sector in foreign hands. The several policies taken to create an independent Japanese auto industry made it possible to fight a war. The outcome of most wars is closely related to technology. A nation armed with bows and will bow to a few men equipped with sophisticated weapons. This was similar to what Japan faced at the close of the WW2 when they were expecting a street-to street fight with American Invaders who came in instead with a nuclear bomb!

Ministry of Commerce and Industry followed Ministry of War in viewing automobile manufacturing as a "comprehensive" industry, because of its interdependence with a whole range of related industries in the provision of parts. Premise that the development of the automobile industry could serve as a model for industrial expansion in other sectors as well. The electronics industry, communications and aircraft manufacture were moving concurrently with the automobile. Government granted the automobile industry a key position in the development of Japan's industrial infrastructure. Large-scale investments in plants and equipment, not only to cope with the increase in demand accompanying the steady growth of the Japanese economy, but also to prepare for imminent trade liberalization. Investments in equipment were focused on the introduction of special-purpose automatic transfer machines. Beginning in 1955, manufacturers concentrated on introducing these machines to certain critical processes and applied them especially in the machining of engine parts, such as cylinder

blocks and cylinder heads. These various measures helped bring about the rapid automation of Japan's automobile production system

During the War Japanese companies were allowed only to produce for the support of the war effort. this restricted them to the production to trucks and utility vehicles rather than luxury models. In the rehabilitation and reconstruction after the war, there was a new impetus for the development of passenger vehicles. Accordingly, construction of Toyota's Motomachi Plant started in 1958, and Nissan's Oppama Plant in 1961; Isuzu also built its Fujisawa Plant at this time. At this time, the Americans had had more than sixty years of unbroken experience in automobile technology. The factories were old. The new Japanese reconstructed factories used the newer technologies that were not available at the creation of the main US manufacturing base. They were therefore able to leapfrog the industrialized manufacturers of Europe and America

They continued with steady growth in the domestic and export markets, the implementation of new technologies to increase productivity became a top priority for manufacturers beginning in 1965. High-speed automation was introduced when the use of special-purpose transfer machines was extended to each stage of production. To optimize the integration of automation within the production process, new factories were built between 1965 and 1974 to accommodate the new technologies. These developments laid the groundwork for the subsequent introduction of robot technology and also boosted the ability of workers to perform multiple tasks. From about 1970, the use of digital technology for specific tasks was expanded when all these operations went on line, leading in a short while to computerization of the entire manufacturing process from the earliest stage of product development through final production, on-line management of the supply of parts and materials.

Furthermore, during the 1970s, the steady introduction of new robot technologies gradually eliminated the need for humans to perform dangerous work in manufacturing operations. A resource disadvantaged Japan was always conscious of efficient use of fuel and other raw materials. The United States, through their client regimes in the Oil-rich middle-eastern countries as well as high domestic production, operated with a different mindset until the Oil embargo of the 17973 Arab –Israeli conflict. All along, Japanese cars had to meet stringent conditions worldwide. Fuel efficiency and conservation was a new field to the Americans. Emissions-reduction technology already in the Japanese system long before it became the norm worldwide. In 1975, for example, the cost of exhaust emissions research amounted to 36% of that year's total R&D investment by the automobile industry. Investment into gasoline efficiency research also took a high toll on the R&D funds

Report Card

Japan dominated the Automobile Industry. It created the National Industrial Development which, as the designers expected led to success in other areas such as Electronics, Robotics, IT,

Rail, Civil Infrastructures etc. Other Asian Countries such as Korea, China, etc are waking up to just that same model in our time!

India Outsourcing & Collaboration

We have seen how that the new paradigm redefines society. It may not serve a very useful purpose to compare the developments in our nation to the industrialised countries of Europe and America. It is however instructive to look at some developing countries which only 30 years ago were either at the same level with us or worse off. Countries in the Pacific ream (the Asian Tigers) India, Thailand, China, etc. come to mind. Again, even in this category, Korea and Taiwan again are hard acts to follow. They have so developed their basic industrial infrastructure that to continue to classify them with developing countries in a historical hangover. Right now, Taiwan ranks next to the USA and Japan as the third largest producer of microprocessors in the world! Ahead of Germany, or any other European powers!.

The case of India is particularly interesting. A nation burdened with overpopulation whose land space has been continuously cultivated over several millennia and hardly has room to grow. A nation torn apart by constant internal strife and external challenges. Between 1980-1985, India was so poor that the greatest foreign exchange earner for the nation was the "Western Union" remittances of Indians in Diaspora. Per-capital Income of India was no more than half to one third of Nigeria's during the oil boom days! In education, it was common knowledge that the typical Indian graduate of the sixties and seventies could not be compared to, say a UI graduate.

IT Revolution

India's acquisition of IT came largely because of the cheap labor of its educated underemployed university graduates in science and technology. Many of these had attended the IITs developed in six locations by the first post-independence government as the engine for India's advance to the league of developed nations. Companies in Western Europe and the United States outsourced much of their IT work and services to India and the underemployed Indians used that as a stepping stone to become Masters in the same technology areas. In a short span of about fifteen years, India embraced the new Information Age paradigm. It has become a major force in the IT Industry: The statistics:

"*The Indian Information Technology industry accounts for a 5.19% of the country's GDP and export earnings as of 2009, while providing employment to a significant number of its tertiary sector workforce. More than 2.5 million people are employed in the sector either directly or indirectly, making it one of the biggest job creators in India and a mainstay of the national economy. In 2010-11, annual revenues from IT-BPO sector is estimated to have grown over US$76 billion compared to China with $35.76 billion and Philippines with $8.85 billion.[1] India's outsourcing industry is expected to increase to US$225 billion by 2020. The most prominent IT hub is IT capital Bangalore. Even though Bangalore is the leader it will slip to the second position by 2016 with Chennai leading. The other emerging destinations are Chennai, Hyderabad, Trichy, Coimbatore, Kolkata, Pune, Mumbai, NCR and Kochi. Technically*

proficient immigrants from India sought jobs in the western world from the 1950s onwards as India's education system produced more engineers than its industry could absorb. India's growing stature in the Information Age enabled it to form close ties with both the United States of America and the European Union. [2]"

The present state of affairs in Indian economic performance can be compared to the situation in the 1980s when its foreign exchange activities were dominated by the remittances from its Nationals in Diaspora. "*Last year, remittances to Asia amounted to $8.9 billion for Bangladesh, $27 bn for China, $30 bn for India, $6.5 bn for Indonesia, $2.2 billion for Nepal, $1.8 bn for Malaysia, $7 bn for Pakistan, $16.4 billion for the Philippines, $2.7 bn for Sri Lanka, $5.5 bn for Vietnam and $1.8 bn for Thailand, according to International Labour Organisation estimates.*" [9]

The gross revenue generated by the software industry in India has now more than overtaken remittances and now contributes more than 5% of the GDP in a well diversified economy. If Nigeria continues to pumps one million barrels of oil a day for a whole year. At a conservative rate of $100 dollars per day, 365 days in a year, we will make $70 billion dollars. India is projection 205 billion dollars from outsourcing by 2020!

That was just before the meltdown on NASDAQ and Dow Jones in 2000 which affected the Indian stock exchanges. After a debacle, the software industry market cap has resumed a bullish path and has reaching US$ 55 billion by end of June 2000![9]. In a year, the market capitalisation was over 2000 per cent! This level of confidence in the Indian Industry is quite phenomenal!

In the past, Indian professional would go begging, cap in hand to be allowed into Europe or North America. The tide has now turned. Some of these countries are now amending their laws to enable Indian software specialists to come in. They have seen that partnership with India gives them competitive advantage. Germany, in 2000, upon discovering that it is falling behind in the competition for the share of the software market is desperately wooing Indian professionals in its search for Indian partnership

The Maruti Story

Up till the Mid-80's, there was only one practical passenger car in India: The Hindustan Ambassador. With deep roots in Oxford England, production in India started in 1949 [4]. Governement policy was to promote local manufacturing of cars and discourage import. At a time when Nigerian students from the West brought the latest luxury models home, their Indian counterparts went home to ride motor bikes. It did not matter even if they had the money because Indian Government extracted punitive taxes each year from owners of foreign made vehicles that only the very rich could afford to own one. I painfully remember this example; After the home-going shopping of a Nigerians from Canada in 1984, one Indian fellow student remarked that if he had the same amount of money the Nigerian had spent on consumable items, the most reasonable thing for him to do was to go back home with a Textile Mill! That was the effect of Government policy on the Indian psyche!

The Indira-Ghandi Government also had laws to protect the Indian Machine Tools establishment which were faithfully adhered to until 1983 when India decided to open its doors to the fledgling Japanese Suzuki Corporation. Suzuki was chosen by India over larger players such as Toyota, Nissan or Mitsubishi and temporarily suspended some of its socialist emphasis and allowed the company the kind of breaks that got it up and going. The story today is that Maruti Suzuki is the largest Car maker in India and those poor students of the '80's are now in a position to export cars to Nigeria!

The relationship was not all smooth-sailing; an incident in this relationship is worth noting.

"*Initially R.C.Bhargava, was the managing director of the company since the inception of the joint venture. Till today he is regarded as instrumental for the success of Maruti Suzuki. Joining in 1982 he held several key positions in the company before heading the company as Managing Director. The Government nominated Mr. S.S.L.N. Bhaskarudu as the Managing Director on 27 August 1997. Mr. Bhaskarudu had joined Maruti Suzuki in 1983 after spending 21 years in the Public sector undertaking Bharat Heavy Electricals Limited as General Manager. Later in 1987 he was promoted as Chief General Manager, 1988 as Director, Productions and Projects, 1989 Director, Materials and in 1993 as Joint Managing Director.*

Suzuki Motor Corporation didn't attend the Annual General Meeting of the Board with the reason of it being called on a short notice. Later Suzuki Motor Corporation went on record to state that Mr. Bhaskarudu was "incompetent" and wanted someone else. However, the Ministry of Industries, Government of India refuted the charges. Media stated from the Maruti Suzuki sources that Bhaskarudu was interested to indigenise most of components for the models including gear boxes especially for Maruti 800. Suzuki also felt that Bhaskarudu was a proxy for the Government and would not let it increase its stake in the venture.If Maruti Suzuki would have been able to indigenise gear boxes then Maruti Suzuki would have been able to manufacture all the models without the technical assistance from Suzuki. Till today the issue of localization of gear boxes is highlighted in the press." [6]

Despite its success, the issues of nationalism remains. Each side needed to get the most from the relationship. It turned out the in India, Mr Bhaskarudu looks like a hero – someone who wanted more for his country in the partnership. Investigations into the Suzuki's charge of "incompetence" against Bhaskarudu was viewed by insiders in the company from this perspective:

"If the gear box is indigenised, Maruti could start producing all its cars without any technical assistance from the Japanese company, … Suzuki feared that Bhaskarudu would not only succeed in procuring the gear box technology from the Japanese collaborator, but it would also result in Suzuki giving away its last technological trump card in the joint venture." [7]

Indian auto industry is certainly a success story at this point in time. Other companies – notably Tata Corporation are also in the fray while the "old Amby" (The Hindustan Ambassador) trudges on

China: The Giant Wakes!

The MagLev Project

"*It may have been a historic coincidence that when China started its economic reform process, economic globalization was getting stronger. Unlike their forefathers 200 years ago, the Chinese did not reject the idea of*

opening up to the world in 1979—maybe because China had suffered too much humiliation and poverty from its isolation during the past 200 years." [10]

The story of the Chinese economic epiphany is a developing story. In 20 short years of a change in strategy, they have become the second largest economy in the world. That is sufficient testimonial to their successful rise from number 25. I watched a live event in 1984: An American company in the was shutting down a factory in the US because of change in technology made the manufacturing practice at that particular factory obsolete. They wanted to move from a labour-intensive method to a fully automated one. A Chinese concern decided to buy the obsolete factory including the expertise of the workers in the plant to completely dismantle the factory, carry it to China and set up the factory and make it work for some months in China! The video of the dismantling was shown live and not a few people took their turns to mock the underdevelopment of the Chinese. That was 1984! Who is laughing now?

The Chinese knew that the shut down factory was still okay for their level of development in 1984. They had a large population and need labour-intensive factories to keep them busy. They knew they could run that factory efficiently. They got all the help they needed and they succeeded. They did not need IMF or some Harvard-trained person to advise them. They were self regarding and world regarding. They knew their place in the world!

The same excellent strategy accompanied several other Chinese Technological acquisitions. Another example is the recent foray into Magnetic Levitation Rail system. The Chinese have the population to create the scale of use that can make the technology economical to operate. They bought the technology from the Germans who fully built the Maglev Cars that were airfreighted to China. Yet the Chinese negotiated to use local technology to design and build the super accurate infrastructure and tracks on which the train would run. In that kind of cooperative venture, the technology is more than 50% Chinese even at the beginning!

Treating Everybody Equally: A Chinese Lesson

" *... during and after China's WTO accession, we introduced a very important WTO principle called national treatment. Under this principle, one has to treat foreign and Chinese enterprises the same. So during the campaign to promote the WTO, we advocated the principle of national treatment. Yes, treating foreigners and the Chinese the same way is not a problem, but the principle of national treatment triggered a* ***very fundamental debate in China. People questioned that if foreign enterprises were to be treated the same as Chinese enterprises, then in China, all Chinese enterprises—private or public or state-owned—would have to be treated the same way.*** *In China, the private sector has been discriminated against in many areas, including access to markets, land, and financial support. So it is legitimate for people to say that if foreign and Chinese enterprises have to be treated the same way according to the WTO principle, then first and foremost the WTO principle should be applied to the Chinese private sector to enable them to compete with state-owned enterprises. That debate has greatly accelerated China's economic reform, and the private sector in China has grown very fast*.

"Another very important thing in China is that we have 90 million rural workers in the cities. In the past, these rural laborers faced a lot of discrimination in the cities. When we advocated national treatment, people said that the national treatment principle should also be applied to the rural workers working in the cities, which again is a fundamental issue in China. Now the rural laborers working in the cities are enjoying the same rights as their urban

counterparts. So, the introduction of a very important WTO principle triggered a debate on such issues fundamental to domestic reform.

"I can cite another example—that of transparency. Transparency was not a very acceptable principle in China. We had numerous so-called internal documents, which were accessible only to state-owned enterprises and not to private or foreign enterprises. So people raised this issue according to WTO's principle of transparency and demanded that we should have a transparent legal system. China does not have a tradition of transparency. In China there is an old saying that "if the water is too clean, there will be no fish." It means that it should not be too transparent in the business world. One has to fish in troubled waters. This has been a tradition in China for thousands of years. It's important to introduce this principle of transparency in China and make the business system transparent, stable, and predictable" [11]

Analysis

It is simplistic to separate the advances in Automobile technology that Japan had through the twentieth century from the development in other fields that went on concurrently. It just that same period, Japan became world leaders in electronics and home appliances, High speed trains and communication. Similarly, while the Indian achievement in IT has been quite prominent, other areas such as infrastructural development and industrial production, Motor vehicles and other transportation etc were moving in tandem. The case of China is even more significant in the sense that the development in the economy is attended by massive production of goods and services on a scale the akin to the fundamental change of paradigm brought about by the Industrial Revolution itself. A before and after assessment of the Chiese experience is best stated as follows:

*" … At that time, all the Chinese were **equal, but they were equally poor**. I would consider 1979 a historical turning point in modern China. That year Deng Xiaoping, the greatest man in contemporary China, decided to change this situation and launch a policy of reform and opening up to the world. Deng Xiaoping said, "Poverty is not socialism. We should make economic development the top priority of all priorities." And he advocated China's transformation from a planned to a market economy. With this transition, **1.3 billion people came to understand a very simple truth—that if they worked hard, they could have a better life.** It is this simple truth that has made the spirit of entrepreneurship come alive in China again."*

Yet these particular technology acquisitions areas give us measuring rod to see understand the basis for these achievements. There are a lot to learn.

1. **Late comers can become world beaters**. It took time, patience and perseverance for the Japanese Auto Industry to mature. Yet, mature it did and overtook not only the mass producers of cars in America, but also the niche producers of luxury cars in Europe. By their relative disadvantage in their natural resource base, they anticipated an energy hungry world, where efficiency would be play a dominant role, nearly three decades ahead of the Americans!
2. **Infrastructural development will pay off in the end.** China was not completely asleep all those years after all. They invested in rural infrastructure. They developed large-scale use of small hydropower and their communication and transportation network paved the way for

the achievements of today's economic miracle. It takes a lot of time to build roads, rail lines, power generation and other heavy infrastructure. Nations that postpone doing these are postponing the day their people will be delivered from hunger, poverty and disease. Even underdeveloped India had cheap transportation network in its rail system that made it possible for even the poor to travel through the country. They did this while heavily taxing the use of private vehicles until they were in a position to produce their own brands in quantity. Neglect of public infrastructure while allowing private interests to have ways of by passing the hardships in the country as a whole will further delay development.

3. **Gestation periods for technology acquisition can be long.** While one will not advocate a wait of another 50 years before hapless Nigerians have solutions to pressing problems, the easy solution of awarding contracts to foreigners since "Nigerians cant" - mentality has to end. The Japanese people had close to forty years to prove they can never beat Americans in Automobile production. Yet they persisted. Consequently, they were able to compete with and even fight wars with the US while their technology was yet inferior. The problem in Nigeria is not really that "Nigerians Cant". What happens here is that the governments bypass good Nigerians, give overvalued contracts to bad Nigerians – the best people to use when the goal is private benefits at public expense, and come back to vilify the entire populace for the poor performance of those people who simply do what they were expected to do. The blatant way in which mediocre solutions are adopted to well-known public problems is something that must end. As an example, General Obasanjo blamed everybody other than his government after his contracts to revive the Oil refineries failed! We habitually pay foreigners more money to build roads than we are ready to pay local contractors only to go back and praise the foreigners for building better roads!
4. **Value Addition must be Central**. The nations that have been successful technology acquisition have been those that have constantly encouraged Value Addition as a National Policy. Until Nigeria gets weaned from the self-immolating attitude of always opting for turn-key projects, we will find ourselves moving backwards. Forty years ago, virtually every major town in Nigeria had well maintained football fields in primary and secondary schools of the Missionary era. Suddenly, with bigger cities and bigger stadiums, Nigeria may be needing to import either artificial playing turfs otherwise, we not see green and well-maintained fields! And this is something that was not a problem to us forty years ago! We have people in high positions with poor sense of history so hungry that their sense of self worth cannot rise higher than to pocket a little more unearned income. There was a government agency that instead of equipping and challenging Nigerian tertiary institutions to take up the challenge to train personnel for the large sum it is paying a foreign upstart school to do, was well rewarded by getting a honorary degree overseas for using Nigerias money to keep them afloat!

We carry our "Turn-Key" mentality to ridiculous extremes and deny present and future youth the opportunity to live in a country where things can improve from year to year. Every nation and peoples must learn to become perfect in anything. Our expectation that Nigerians can only have a chance in their own country only when they can outperform more experienced foreigners will lead us nowhere. Julius Berger built a sports facility in Abuja that failed in a rainstorm. Yet they were allowed to continue operating in Nigeria! When are we going to be that patient with local people?

A professor once told me he was going to award a contract to renovate a facility under his care only to a foreign company! Such self-immolating attitudes are too deeply entrenched in our psyche! We will need to adopt value addition to every project foreign concerns handle. The percentage of the project that employs Nigerians and contribute to Nigerian acquisition of knowhow will have to supplant bribery and self serving intents of the people charged by Nigeria to award such contracts.

5. **Governments, Communities & Individuals**. A paradigm shift in the direction of technology acquisition requires action at every level. No one needs to wait for another. The Indian individual who expends extra cash at his disposal to purchase a textile mill when a Nigerian with the same amount of resources got himself luxury goods has contributed tremendously to the progress of his own people. The Japanese Parliament that classified motor vehicles as a weapon of war and therefore controlled the direction of research and development to the benefit of the nation as a whole when we can have lawmakers attempting to become the richest in the world, are part of the stalwarts in the economic, political and social advancement of their people. A government that understands that its tenure can be used to advance the cause of the people rather than enriching its members are going to be helpful in technology acquisition. Every hand, as they say, must be on the deck!
6. **Education, Proper Education, a Must**. The most technological advanced nations today are also the nations with the best educational systems. That the two are closely linked is a fact we ignore at our peril. That we can so impoverish the schools and the teachers that work there to the extent that people will prefer to be gatemen at embassies, toll collectors at the borders or virtually any other thing than to be involved in the educating of our young is the result of our self destructing attitudes. In any nation that will make progress technologically, investment in education will have to become a priority and we should not stop until a teacher's lot is sufficiently attractive that people who have other attractive options will choose to go to teach as happens in more technologically advanced countries.

   The Indian software industry is the result of getting things right at the educational front.

Technology Deployment: What's the Challenge?

The challenge of technology deployment is not technology transfer. Technology is existential. Nobody will dash it even to his brother! The challenge is not money. The purchase of

technology with money will not give you technology. Money is good when used appropriately. The challenge we face as a nation is to have a common purpose to acquire technology by insisting on value addition. This has a few facets:

1. Evaluating major contracts and ensuring the most competent Nigerian concerns provide the aspect we are capable of doing alongside any foreign concerns. Ensuring that the engagement of Nigerians is done to **Add Value** rather than **reward indolence or settle political IOUs**.
2. Understand the scope of economic activities that Nigeria can use to create a massive amount of productivity that will mop up the energies of its unemployed youth: Agriculture, Real Estate, Non-Crude Oil Energy production and infrastructural development. There should be Government policies that will ensure that these are all given the long range plans needed to germinate into an unstoppable march into prosperity. Prosperous nations can face challenges. It takes the kind of leadership that understands the challenges of the times to create such national consciousness and excel.
3. Understand where Nigeria is presently succeeding. Leveraging these to further success. Governments in Nigeria are adept at snatching defeat from the Jaws of Victory! Bad as things are, we have areas where technology has been successfully deployed. The Banks in Nigeria have IT. We can extend that by demanding other large organizations including Government services follow such examples. If I can get my cash from an ATM anywhere in the country, why can't I get government services the same way? Are they not the same Nigerians running those organizations? If they need money to do it, why can't we pay them as we pay for those same services at the Banks?
4. Open guidelines in Private Enterprises to partake in large Value Addition projects. The reason why Nigerian executives chose to award everything hook line and sinker to foreigners in Turn Key projects is that they have experience of not being able to overcome the socio political pressures to give things to incompetent organizations. The solution is to open everything up. Let the track record speak in an objective selection process that those qualified to select cannot all be pressured. Let there be adequate punishment for failure.
5. Let private and individual entities see how they too can be part of the success story of their fatherland.

Conclusion

The Japanese competed, got defeated and faced nuclear bombs. Yet, from the ashes, they came back to dominate the world of automobiles as they always wished. Even in the face of the latest earthquakes and Tsunamis their PM could say "*We Japanese people have overcome all kinds of hardships and were able to create a prosperous society. In the face of the earthquake*

and tsunami we should be able to overcome these hardships, we believe we can overcome this." The Chinese moved from a situation where everybody was **equal, and equally poor**, to a point when "*1.3 billion people came to understand a very simple truth—that if they worked hard, they could have a better life."* The Indians have a hero in *Bhaskarudu whom Suzuki feared "would not only succeed in procuring the gear box technology from the Japanese collaborator, but it would also result in Suzuki giving away its last technological trump card in the joint venture."* In the face of these many examples, what model will Nigeria adopt to save its teeming populace from the trio of Poverty, Ignorance and Disease? We have our challenges, yet they are not the reasons why we are not making progress.

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