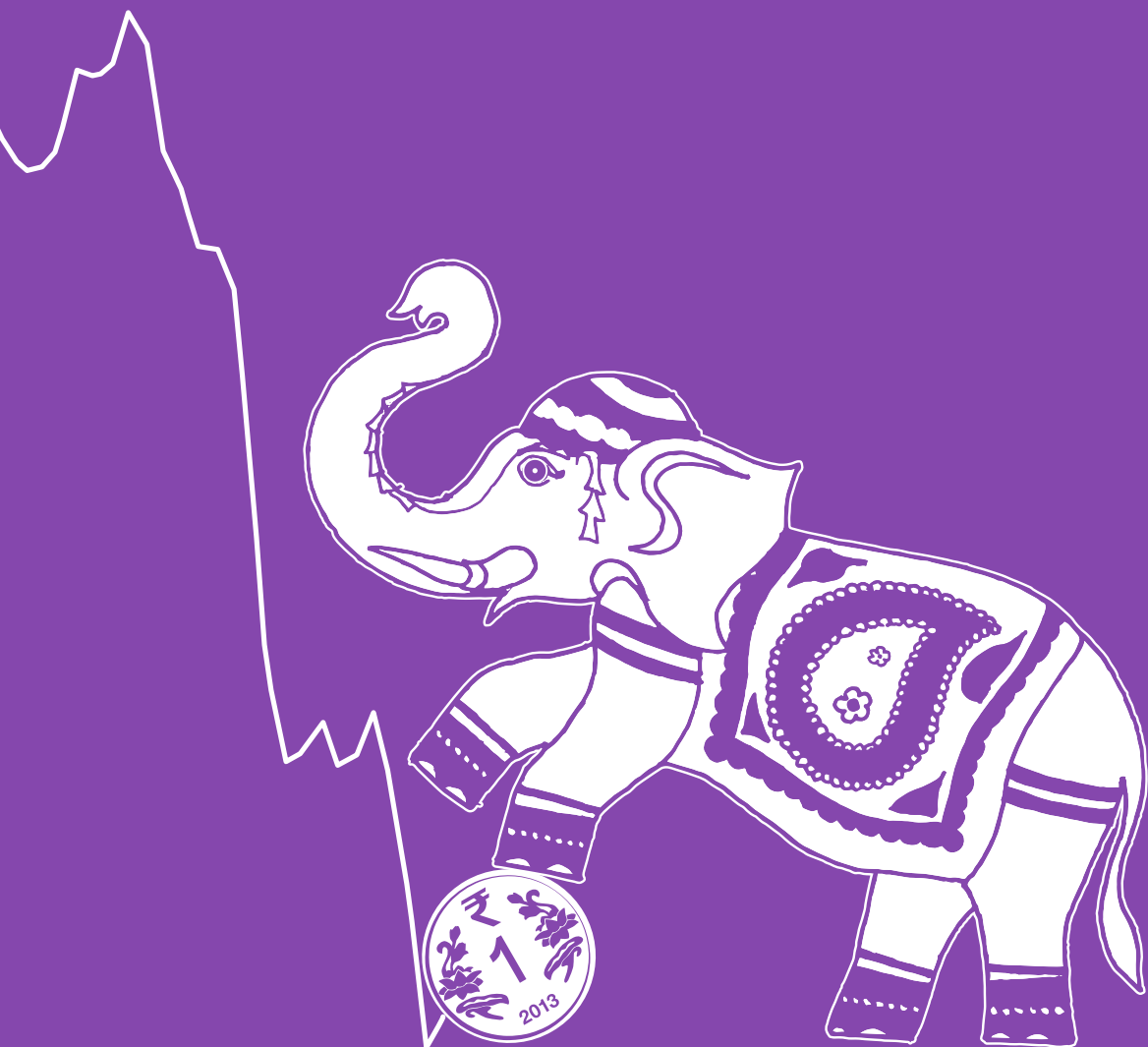
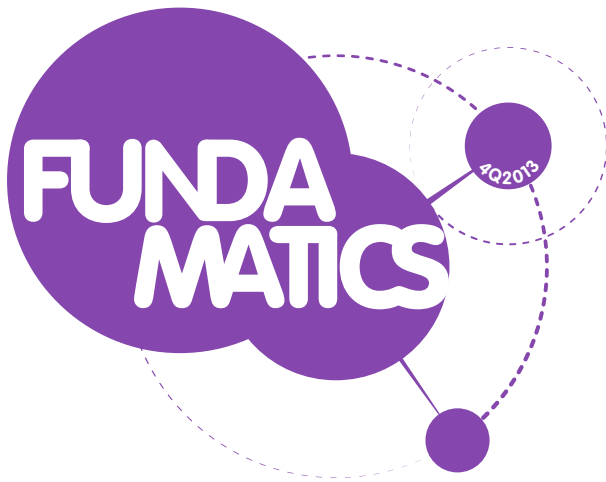


# FUNDAMATICS

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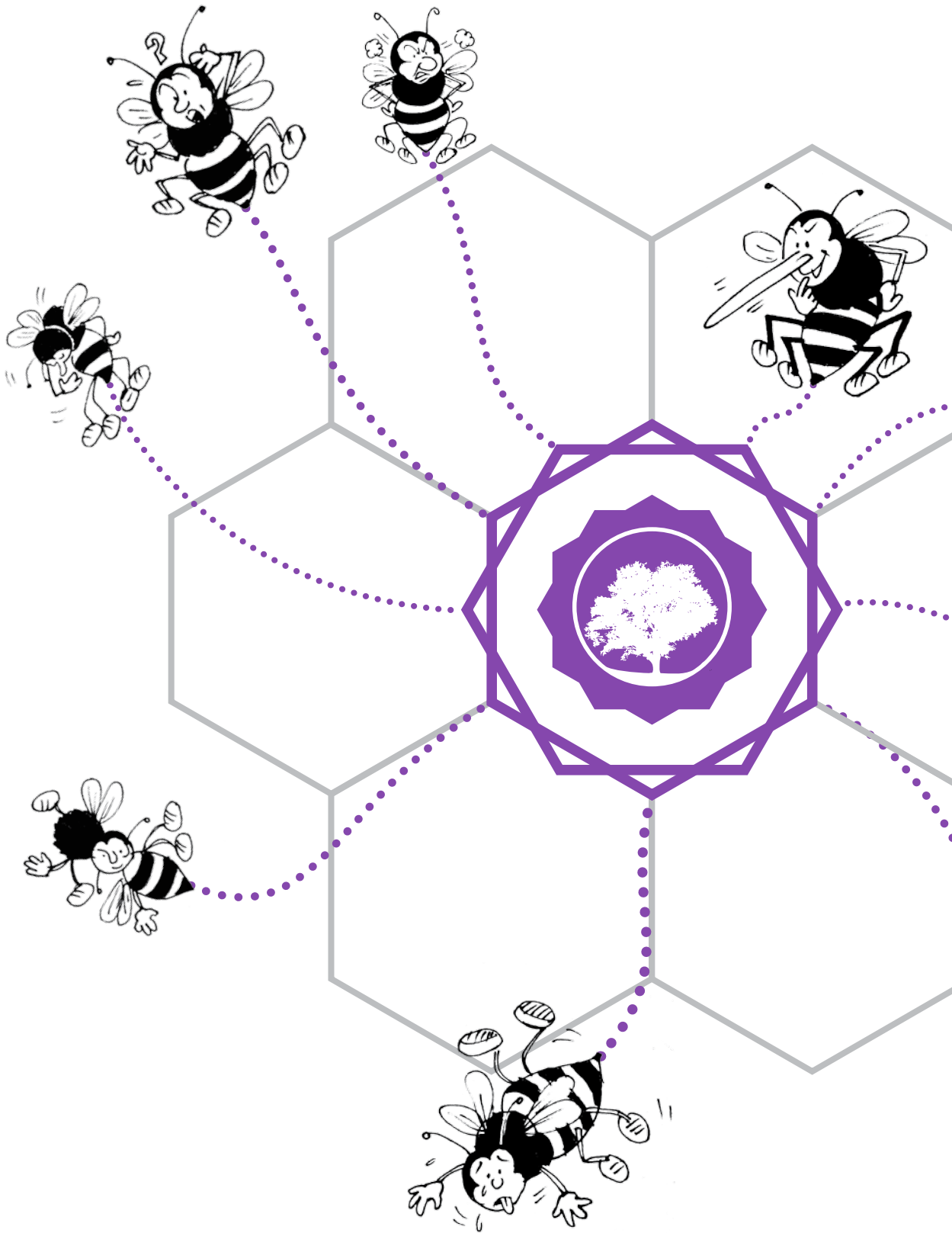
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# From the Beehive



## *Making the Elephant Dance*

In June while the beehive was abuzz closing the last issue of Fundamentals, the Rupee hit a new low. The growth rate was plummeting and foreign investment fled the Indian shores in speeds which can only be termed as the great escape.

Like the mainstream media which has been busy echoing and outdoing each other in gloom and doom predictions, we too decided to have the Indian economy as the theme for this issue. But instead of focusing on the immediate and the urgent (the threat of a looming fiscal and currency crisis), Fundamentals decided to do a 'Sancho Panza' and tip at the proverbial windmills by telescoping into the future. We asked two of our resident experts, Ajit Ranade and Ashish Chauhan to give us their views on India at 2061.

While it is true that our fiscal and current account deficit is large due to which the threat of a fiscal and currency crisis cannot be ruled out, but it is equally true that India still continues to perform better in terms of macro financial stability when compared to many other parts of the world. Our banks are stable and the stock market – the riskiest of places - has been stable from the point of view of systemic risks. We also strongly feel that a discussion of the Indian economy in terms of a narrow focus on growth rates and





GDP misses out key issues like how environmental degradations and income inequality are key deterrents to inclusive growth.

While populist policies in an election year like the Food Security Bill brings up the ire of people like 'The Capitalist Pig' whose 'Ranticle' is featured in this issue, we want to put the matter in perspective by pointing out that in the past 20-25 years, India's hand has been continually forced by the ever looming Foreign Exchange crisis and the need to continuously design policies and the need to attract funds from abroad to tackle its external debt. It has led us to a situation today where, as per RBI data, India will have to fork out \$170 billion (10% of our GDP) in debt servicing between now and March 2014. Compare this for a moment with the Food Security bill which will cost about 1.5 percent of our GDP. Rest assured the resident Socialist bee is sharpening her quill to give a fitting rejoinder to Capitalist Pig.

Our focus has not just been on the India of the future but also the India of here and now. So Apart from discussions on the economy and the Food Security Bill, look out for Ali Baba's take on the Asaram Bapu case and the murder of Narendra Dabholkar in the context of Scientific temper, Grumble Bee's latest rantings about MGPL – Madam G's Private Limited (no points for guessing which political party is the focus of his ire) and Shailesh Gandhi's investigative journalism on the revenue loss being incurred in the state of Maharashtra.

What is perhaps the overarching factor in all these issues is a feeling that somewhere all our debates on Indian Economy, Polity and Development have started bordering on the clichéd; where all theorizing is done in terms of binaries with the state and the private sector seen as the only two agents of change/development. It fails to account for a crucial

third front - the people themselves -- not seen as beneficiaries of state initiatives or as mere consumers of privatized services but as drivers of their own destiny empowered to self provision and govern from below.

To us, one of India's greatest achievements in the past decade has been from the people, through the consistent unleashing of an entrepreneurial movement like never before. Colleges and campuses across India are abuzz with this entrepreneurial spirit and many including IIT Bombay have their own incubators, Entrepreneurship cell and business plan competitions. This is a gigantic socio-cultural change that bodes well for our country. IITBAA too is doing its own bit by launching its own initiative I-ASCEND to support the nascent spirit of entrepreneurship.

We do not believe that the great Indian economic story is over. And we wish to focus on this crucial third front by choosing to select "Innovation and Entrepreneurship" as the theme for the next issue of Fundamatics.

We choose to cast our lot with the people who have decided to ignore the lure of cushy jobs with fat salaries and decided to dream of building something of their own. In the coming years many of them will build value, create jobs and most importantly, sustain hope.

If you agree with us and have inspiring stories of entrepreneurial ventures or collective wisdom to share, send in your articles to us at the earliest. We publish the next issue by December 29th and need your article latest by Nov end.

We do not know if the Indian Elephant will dance but this is our attempt to make it do so. Young India can surely lead and build the new India.

*Queenbee*





## Indian Economy: Telescoping into the Future

*The global economy is going through an upheaval and there are great uncertainties ahead. The global economic recession and crisis has, quite expectedly, impacted India too. It is a moot point today whether the Indian economy is affected more by the global economic ups and downs or by India's structural and political problems and economic management or mismanagement.*

*Things do look bleak in the short term. The Rupee is passing through one of its worst crisis in recent times. The fiscal deficit is rising and there has been a steady decrease in corporate investments with capital inflows to India receding, and appearing like the proverbial mirage in the desert. Some might even add that the institutional and structural weaknesses of our nation - bloated government, crony capitalism, corruption and other problems might mean that the sleeping giant who had only just awakened has been found to have feet of clay.*

*But the pessimism in the press about current growth trends in the economy notwithstanding, there are many reasons to feel optimistic about the future too.*

*We therefore decided to do a 'Sancho Panza' and tip at the proverbial windmills by telescoping into the future. We asked two of our resident experts, economist Ajit Ranade and BSE's Ashish Chauhan, to give us their views on India at 2061. While Ajit takes a*

*larger macroeconomic view on the Indian Economy in 2061, Ashish's gaze is more firmly fixed on capital markets.*

*Our attempt is in no way to suggest that there's a built-in determinism to our growth path. National economies have their own peculiar growth dynamics. We do not have a crystal ball and cannot predict if India does stand a chance of becoming a robust and resilient economy and polity capable of addressing the massive issues that this nation of 1.2 billion (projected to grow to 1.5 billion) people faces in the next few decades. It might seem that we as a nation are always muddling through. Often coming back from the brink. But let us not forget that from a historical perspective, the changes that the nation has seen in the last 60 years are truly transformational on many fronts. Let us as a nation feel less interested in global leadership positions and more on how to make all sections of India's population thrive.*

*Will the Indian elephant dance? Only time will tell.*

*Bumblebee*

# Indian Economy In 2061

*Ajit Ranade*

History is like Pac-Man, the eponymous hero of the video game. Just like he relentlessly gobbles up the dot-like pellets, History too is a voracious consumer of pellets, we call “events”. An event has but a momentary existence before it vanishes into the vast innards, and becomes part of History. The job of a futurologist is to gaze at, and describe all the pellets before they get gobbled up. Looking at India in 2061 is such an exercise. Of course, History is not a jealous hoarder of her treasures (the “events”). She reveals lessons from the past, only if you are willing to look. Often these lessons help us predict and anticipate the future, the part that has not yet been devoured by History Pac-Man. This is a process of linear extrapolation. It is also an implicit application of the maxim, that history does repeat itself.

In this essay, we will confine ourselves to extrapolating the economic aspects of India into the future. Perforce we will be silent on many other fascinating aspects of life of the nation, such as science, education, health and culture. Of course, some (if not many) economists believe that economic issues pervade all parts of our lives. These people are the champions of extreme economic determinism, who feel supremely confident on prognosticating on every aspect, purely based on economic analysis. We shall desist from such overreach.

## *1. Unity of India is Robust*

India in 2013 is already among the top ten economies, in sheer size. If size is measured in dollars, adjusted for changes in purchasing power across different countries, then India is the third largest economy in the world. When India was born as an independent nation in 1947, the world had around 120 other countries. Today, the United Nations membership has more than 240. So, India’s ascent in global ranking has more potency, simply because the class size is bigger! Of course, it is not as if the world discovered new landmass. It is just that in the past seven decades, old and new nations broke up into smaller parts. Even our twin, born in 1947 broke into two. Our erstwhile close friend, the Soviet Union broke into ten pieces. As late as 2013, a new nation was born out of Sudan. But India has remained intact, in one piece. Given its immense diversity on every conceivable dimension (race, religion, language, cuisine, culture), this indivisibility itself is a remarkable thing. Moreover it has remained united despite a political framework of multiparty democracy, which has inbuilt fissiparous forces. There is little prospect of civil war, or secession in the coming half century. In fact, there are many centralizing forces, which create national ties, making it less likely that India will break up. One such development is the creation of a common economic

market across the length and breadth of the country. The rollout of a nationwide goods and services tax (GST) system, which will overcome inter-state barriers of trade and commerce, will act as binding glue for economic unity. This consensus among all 35 states of India has taken a decade, but is to be celebrated as a landmark in India's federal setup. The GST consensus involved surrender of semi-sovereignty by the states, in exchange for larger welfare of the

The rollout of a nationwide goods and services tax (GST) system, which will overcome inter-state barriers of trade and commerce will act as binding glue for economic unity.



nation as a whole. That this consensus was obtained without coercion, in a democratic setup is remarkable. Such political achievements lend support to our assurance that breakup of India is an extremely remote possibility.

This is not to say that there may be proliferation of sub-national entities. As more power gets devolved to lower strata of governments, the administrative manageability becomes a constraint. Many states of India, if they were independent countries, would be among ten most populous countries. Uttar Pradesh would probably be fifth and Maharashtra seventh largest nation. Hence, it is quite likely that in the next five decades, larger states will break up into smaller ones. The birth of states like Chhattisgarh, Uttarakhand and Jharkhand is testimony to this tendency, and feasibility. It is possible that India will be made up of fifty states, and maybe eight hundred districts. The spirit of empowering lower

tiers, like village and town councils, will manifest in many tangible ways. Already much of government's welfare spending is getting routed through the lowest tier, i.e. the village panchayat. This phenomenon will only get stronger. It is quite likely that local governments will have a greater say in running schools, law and administration and building, upkeep and provision of local infrastructure. The national level constitutional mechanism of the Finance Commission will ensure that a greater share of tax revenue automatically devolves to lower tiers.

As for tighter national integration, there are several interlinked factors, which minimize the chance of the nation crumbling into smaller pieces. The India nationhood experiment is unique, because it has allowed citizens to maintain multiple identities. India has often been called a salad bowl, rather than the melting pot. The latter leads to eventual homogenous identity, but the former allows distinctions to be sustained.

One factor weaving the nation together is the movement of labour, which is also a decisive factor. India has one of the largest intra-country labour migration in the world. Large scale movement of labour, and their connection via the remittance economy, to their homelands, also weave uniting threads in the quilt of the nation. The free movement of labour is a remarkable feature guaranteed by the constitution. It has had a dynamic effect in the evolution of India. Despite being tested by occasional political turbulence caused by regional parties agitating against "outsiders", this right to free movement has had a robust existence in this vast nation.

## 2. Evolution of Economic Size

The prediction of the economic size of India

in 2061 is a relatively straightforward exercise. We know from the authoritative work of Angus Maddison, the renowned British economist, that India and China made up more than 50% of global GDP until the advent of the Industrial Revolution. India was the second largest economy even as late as 1870. The historic large share of India and China, commensurate to their population share, is expected to be restored in this century. More recently, the publication of

It is possible that India will be made up of fifty states, and maybe eight hundred districts.



the BRIC report by Goldman Sachs (and its technical revision by the IMF), as well as several other similar reports point to resurgence of India's economy. If we think of the economy as a machine in a black box which produces output called "GDP" and takes inputs called "labour" and "capital", it is easy to understand the logic of the BRIC report. India's labour force is expanding at around 2.5% per annum, and capital is expanding at a rate of about 3%. The latter is aided by India's high savings rate. Both these are structural features of the economy, unaffected by macroeconomic shocks, or political or business cycles. In addition to labour and capital stock, is the phenomenon of productivity. If one unit of labour combined with one unit of capital produces one unit of GDP, then in course of time, a productivity improvement means higher output per unit of inputs. Productivity improvement is a consequence of better education and innovation, which are essentially enhancement to human and physical capital. Together these three factors, labour, capital and productivity are sufficient to forecast the economy's trajectory. To

express the economic size in dollars, we need additional assumptions about how the exchange rates will evolve. (We also need to adjust for inflation.) Assuming a slightly appreciating bias of the rupee, the Indian economy will be roughly 60 to 70 trillion dollars, in today's prices. That's roughly four times the size of the present USA. It will be second or more likely the third largest economy, and the largest in terms of population.

Demographic projections are more reliable, since they are based on mortality tables, which have long-term stability. Human capital projections are harder, since they have to assume educational achievements, on top of demography. Even with these caveats, it can be asserted that India will be a very large economy by 2061. It may however be stuck in the "middle income" category. That is, the per capita income of Indians will remain in the middle quartile of the world. Very few economies in modern history have been able to make the transition from low income to very high (per capita) income in two or three generations. Japan and South Korea are outstanding examples. But there are many other economies like Brazil and South Africa, who for long periods saw their per capita incomes stagnating. This may be true for India and China as well, although Chinese per capita income may be considerably higher than India.

### 3. Some Demography Changes and Implications

The changes in India's demography, even though predictable, will lead to some radical changes. These are termed "radical" only because they produce a picture quite different from the current circumstances. The median age of India is currently 26. A large proportion of those below the age

of 26, are less than 15 years of age. But by 2061, the median age will move rapidly to 38 or 39. This acceleration is due to several factors. Life expectancy is constantly increasing, and will probably reach 80. The total fertility rate (TFR), i.e. the average number of children born to a woman of childbearing age will go down. The replacement TFR is 2.1. This TFR has already been achieved by states like Kerala, Tamil Nadu, Maharashtra, West Bengal and ten other states of India. India as a whole will reach 2.1 only by 2060. TFR reduction is aided by factors like rise in female literacy and female participation in the labour force (i.e. getting into paid work, as against unpaid work at home). TFR reduction has been unexpectedly fast in many states of India. This population stabilization is beneficial, because it then leads to rapid increase in per capita income and standards of living. Worryingly, the TFR for the country is stuck at 2.6 in 2011, and half the population live in states which have much higher TFR. This means that per capita income increase will be more rapid in the low TFR states. This will lead to increasing interstate, or inter regional inequality.

The phenomenon of ageing will also become more pronounced. India's population will go up only by 50% in the next 50 years, but the share of elderly will be up by 200%, reaching around 350 million by 2061. The elderly tend to be net consumers, since they are "living off" their savings. In India, unlike in the West, a larger proportion of the elderly are poor, so their dependence on the state is greater. In the West, the elderly are relatively more wealthy than the general population, and hence are often target of political canvassing. The rise of elderly population provides an opportunity for businesses that cater to their needs and lifestyle, but the size of the market will be

tempered because of large presence of low income people. Resultantly, the responsibility of their care on the state will be much greater.

#### 4. Public Finance

Most of the projections to 2061 rely on demography. For the government's treasury too, the demographic phenomenon portends good fortune. With the rollout of consumption-based taxation in the form

India has often been called a salad bowl, rather than the melting pot. The latter leads to eventual homogenous identity, but the former allows distinctions to be sustained...



of GST, there will be tax buoyancy. With greater integration of information technology and tax administration, more people will be in the tax net. India's tax to GDP ratio at 11% is quite low among its peers. This is sure to rise in the coming decades. If agriculture income becomes taxable, through a constitutional amendment, that too will add to the ratio. This will also mean that the government debt to GDP ratio will not rise alarmingly. It is likely to stay well below 90%. We will also see more devolution of taxing powers to lower tiers of government, especially city councils. Local infrastructure provision will become primary responsibility of local governments, who will depend on their tax base or their own debt financing capacity.

However, these beneficial trends are also offset by contrary factors. India is a fractious democracy with more than 1200 political parties. Democracies have an inherent bias to produce fiscal deficits.

This is because there is tremendous pressure from interest groups on spending, but there is no vested interest for higher tax collection. This feature is compounded in Indian context, since electoral victories are based on wafer-thin margins. Hence, there are often multiple (three or four) hopeful aspirants, with competing spending agenda. Since no national party can realistically hope for an absolute majority, it has to depend on allies to form governments. In

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But a glance back from the summit displays some astonishing panorama.

The world's second largest economy, a strong union after 114 years of Independence a large and vibrant middle class, a fractious and rambunctious democracy, a thriving industrial hub of low cost innovation, are but some of the descriptors of that panorama.



the age of coalitions, the impact on fiscal health is adverse. Even with greater transparency and accountability in our electoral systems and the functioning of the government, the tendency toward fiscal discipline will be weak.

The best antidote to weak fiscal discipline is to increase the share of spending on public goods. This includes conventional things like physical infrastructure: roads, bridges,

public transportation. It also includes spending on primary health and education, since these have spill over benefits for society at large.

### **5. Worry Points: Energy, Resource Sustainability, Urbanization**

India will have 21% of the world's population but only 2.4% of its landmass, and less than 2% of fresh water resources. In the coming decades, the per capita consumption of energy will rise at least as fast as GDP growth. This is much faster than most of the developed world. This will require energy sources like coal, oil and gas, and renewable sources like wind, solar, nuclear and biomass. India's current per capita consumption of electricity is below world average. This will need to rise faster than world rates. The world crossed an important landmark in 2010, when more than fifty percent of the world's population was located in cities. In India, the degree of urbanization is only 30% and will rise more rapidly than rest of the world. Urban dwellings have a much larger requirement of energy and resources. Hence, in the next 50 years, India will have to grapple these exponentially growing challenges. Aggressive pursuit of the Sustainability Agenda is called for. Water resources can be considerably enhanced with recycling. Cropping decisions have to be based not on maximizing production, but maximizing yield per unit of water. Similarly, industrialization too needs to focus on maximizing production per unit of electricity. Of course, maximizing employment (and hence focus on labour intensive industries) should remain a focus too. The management of energy and water probably are the greatest challenges in India's journey to 2061.

### **6. Concluding Thoughts**

History's Pac-Man will quickly gobble up events, and indeed all the years from 2013 to 2061 in a trice. India is a much older civilization than it is a nation. In the life of a civilization, fifty years is but a tiny dot, the "pellet" that the Pac-Man will devour. Change will happen, but will be overshadowed by continuity. Discontinuous change is unlikely. But seen from the perch of 2061, it will still be a dramatic progress. It is like the ascent of a mountain along its slowly rising contours. The climb is gradual, often imperceptible. But a glance back from the summit displays some astonishing panorama. The world's second largest economy, a strong union after 114 years of Independence, a large and vibrant middle class, a fractious and rambunctious democracy, a thriving industrial hub of low cost innovation, are but some of the descriptors of that panorama. For more details, we have to wait till 2061.



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# 2061 – A Capital Markets Odyssey

*Ashish Chauhan*

**A**s they say, the past was a different country. The future looks even more fascinating and full of possibilities.

In this article, an effort is being made to look at the history and the trend of developments in the world of capital markets and to make an attempt at extrapolating the results to arrive at a picture of how Indian markets would look like in the year 2061.

As per Investopedia, capital markets are “markets in which individuals and institutions trade financial securities. Organizations/institutions in the public and private sectors also often sell securities on the capital markets in order to raise funds. Thus, this type of market is composed of both the primary and secondary markets.”

Financial securities are essentially a way to connect the ‘present’ with the ‘future’ – using ‘trust’. Trust, in essence, is intangible and ephemeral. It is very fragile. To a large extent, it is also a function of the society we live in. The norms, mores, technical capabilities and institutions in a society all have a role to play in maintaining and enhancing this ‘trust’. Dysfunctional societies do not support vibrant financial markets.

Mankind has been making investments in capital markets for millennia in some way or another. The first set of organized lenders in Egypt and other places several millennia

Sub-millisecond response time is no longer aspirational but a reality. By 2061, we might be in picosecond response time.



back were large religious establishments. It is not surprising given the fact that, even thousands of years back, religious establishments were adept at dealing with connecting the present with the future (even beyond death and in next lives) and knew how uncertainty plays a role in human lives and how to make more money by connecting the present with the future.

A question arises as to whether by 2061, will the future become certain?

If the future becomes certain, will there be a need to differentiate between two investment opportunities? Since we will know with complete certainty the outcome of an investment event (default, repayment, interest payments, yield curve across the duration, returns from competing instruments etc.), will there be a need for capital markets? Since the entire future will be known for everyone and for the smallest to the longest duration of time, there will be no uncertainty and hence no need to invest.

However, it will perhaps be a boring life.

Hope, by 2061, uncertainty will still persist especially about the future. Perhaps, even beyond.

Capital markets therefore will still exist in 2061, perhaps even beyond.

An investor investing in a financial security is expecting the money to come back with returns in the future. This is called 'risk free return' in investment parlance. Usually investments in sovereign securities within the same country are considered risk free in nature. Modern 'fiat money' allows only the sovereign to print money. Hence, theoretically the sovereign can always print money and give the same to the lender. However if 'printing of money' creates hyperinflation, then society may not find it acceptable. Any other investment – in debt, equity, derivatives – therefore has a finite risk associated with it. Risk, in some sense, is a function of time. The longer the maturity of the investment (when the original money is supposed to be returned by the borrower), the more the risk. Methods to identify, measure and manage these different types of risks have evolved over a period resulting in very sophisticated models. By 2061, even more fancy models may be developed. However the unknown unknowns and known unknowns in Donald Rumsfeld's world would not have been captured even by then. Models would be even more accurate than what they are today. However the incremental value addition from here to 2061 in the model creation industry for risk management may still keep out a large delta that will continue to provide employment opportunities for many IIM graduates even in 2061.

There are 3 important features of a capital market that we can discuss here:

### *1. Transaction processing and price signaling*

Transaction processing is what makes a market look like a market. However the prime function of a market surprisingly is not transaction processing, but is price signaling. Squeaky clean price (not manipulated) is what one expects from a well-functioning market – indeed it is the obligation of a market to provide one. Transaction processing is a means to achieve that end. If a market has a great way to process

In last 3 years, BSE response time has reduced from 300 milliseconds to 10 milliseconds and number of orders has gone up from 75 lakh per day to 11 crore per day.



transactions but does not worry about the manipulations, then that market might not survive for long.

Over the last 20 years, Indian markets have seen a great move towards automating transaction processing. From floor-based markets in 1994, we have screen-based markets now. We have set up even risk management and settlement guarantee organizations called Clearing Corporations, and depository institutions which keep stocks in dematerialized format like banks keep money in bits and bytes for you. Connectivity to banks has improved and surveillance mechanisms have become real time. Mobile trading, web trading, algorithmic trading, etc. have become commonplace. Sub-millisecond response time is no longer aspirational but a reality. By 2061, we might be in picosecond response time. We might be using algorithms which take into account each and every part of economic and social data to predict the

future and still might fail.

Cost of transactions and post-transaction activities in the Indian market have come down by 99% in the last 20 years. However volumes in the market have gone up by 1000 times or even more.

By 2061, transaction cost may come down by a further 99% or more but transaction volumes will increase manifold. Market participants will also figure out new ways

By 2061, microsecond might be too slow. However, for people who invest for the long term, the pursuit of speed may not be very important. They may want to worry about identifying the right companies and business ideas to invest in, like today.



of making money. We will witness many innovative business models. We will witness a transformation in the way business is conducted in this sector.

In last 3 years, BSE response time has reduced from 300 milliseconds to 10 milliseconds and number of orders has gone up from 75 lakh per day to 11 crore per day. In Indian capital markets, the current working day lasts 6 hours and 15 minutes. BSE plans to change in the near future to a system that will have a response time of 100 microseconds and can take 3 crore orders in a minute. The trading day might last practically 24 hours by 2061 which is currently the case in many other countries. In Indian commodities markets, trading takes place daily till 11pm or beyond.

By 2061, microsecond might be too slow. However for people who invest for the long term, the pursuit of speed may not be very important. They may want to worry about identifying the right companies and business ideas to invest in, like today.

Capital formation will continue to remain the key touchstone of the effectiveness of capital markets and not necessarily at what speed the markets are able to transact. For that reason alone, corporate governance becomes an important aspect to discuss even in 2061.

In India, today only 1.5% of the people invest in capital markets. The returns derived from the non-regulated, non-matured asset classes have far outperformed the capital market returns in last few years. A similar trend, on a comparatively smaller scale, was witnessed in all developed markets as well. Sooner or later, as those alternative asset classes mature, or undergo correction, or generally reach peak prices, investors will once again turn to the capital markets for capital formation and capital appreciation.

With the investor awareness programs and other initiatives undertaken by SEBI, BSE, etc., the market size in terms of number of market participants has been growing at a steady pace and is expected to accelerate once the high returns currently offered by alternate asset classes dry up. Government initiatives like the recently launched Rajiv Gandhi Equity Savings Scheme will help attract new investors. By 2061, we can expect a large part of the population to be actively trading and investing in capital markets as financial literacy and awareness increases across the country across classes.

Due to the lower cost of creating faster and better technology, many more exchanges might come up. Many more transaction

processing platforms may come up. They need to be interconnected in a variety of ways with existing systems and systems that are expected to come up. Regulators will have their hands full in coping with newer technologies, newer instruments and newer challenges of corporate governance. The pace of change in regulations that has seen tremendous acceleration in last 5 years will accelerate even further. Many more regulators may come up time and again and perhaps, may get merged in each other again and again. USA, UK and several other countries are going through this creation and destruction process of regulators over last decade.

Markets will become safer. Already we see a trend where regulators and markets across the world are moving towards a centrally cleared model. Central Counter Parties (CCPs), with their collateral-based trading limits model and client collateral segregation, will make the capital markets virtually immune or less sensitive to the risks of defaults, market volatility and other similar risk factors. We can expect this trend to continue to its logical conclusion and by 2061, all products and assets will work on a centrally cleared model. The banking and payment system will evolve to cater to the need of real-time 24x7 payment systems and gateways through mobiles. There will probably be full capital account convertibility making it possible for any investor in any part of the world to trade in a security in India at any time of the day on any day.

Automation of trading, clearing and banking systems has already happened. The small degree of manual intervention in these financial infrastructure units will also get completely automated by 2061. The main system will be automated, the near Disaster Recovery (DR) system will be automated

and the far DR system will be automated. We will probably even have DR systems which are situated in different continents on different continental and oceanic plates.

Connectivity across the globe has already been discussed. Economic activities might be even more tightly integrated looking at a time horizon of 50 years. Cooperation across countries in terms of money laundering, terrorist financing, financial misdemeanor, etc. may increase. It will ensure that

By 2061, we can expect a large part of the population to be actively trading and investing in capital markets as financial literacy and awareness increases across the country, across classes.



there is no safe haven for crooks to run away to.

At the same time perhaps, a Japanese housewife will be investing in a handicraft unit in Jaisalmer using BSE's Micro Stock Platform with complete confidence that her money is safe and is used for the purpose she is investing in.

## 2. Corporate governance

In capital markets, a person invests with the 'trust' that he is investing in the business as a partner or a lender. He may be willing to face the losses if his investment calculation goes wrong. However, he will feel cheated if his identification of the business idea is correct but the system allows promoters to not share the riches with other investors and only losses are shared with the other shareholders; or if the company does not return the money when the bond matures

despite the company having sufficient money.

Corporate governance, faster and fair legal system, etc. will continue to remain important for the capital markets as they are today. They will become perhaps more relevant. The performance of the Indian corporate sector is directly linked to the investor confidence in the corporate governance practices followed. Companies which take leadership in corporate governance

There will probably be full capital account convertibility making it possible for any investor in any part of the world to trade in a security in India at any time of the day on any day.



norms are richly rewarded by investors.

Companies were earlier required to give annual results which have now been made quarterly. In the future, it is possible that companies may be required to provide details at shorter durations, maybe even on a real-time basis or perhaps not – for strategic and competitive reasons.

### *3. Need for capital and new instruments*

Current Indian demographics and even future Indian demographics suggest that India will continue to be a large and fast-growing economy till 2061 and beyond.

Currently, more than 50% of the Indian population is aged below 25. On the other hand, less than 1.5% of the Indian population has invested in capital markets. Given the formation of nuclear families and rapid urbanization expected to take place, it is natural for this young workforce to

invest in financial instruments for their old age pension, children's education, health care, etc. Whether they invest in financial instruments by investing in stock markets directly or investing through intermediaries such as mutual funds, insurance companies, pension funds, etc. remains to be seen. A safe guess would be that they will continue to invest directly as well as indirectly. They will have, perhaps, many more choices of instruments and companies to invest in. Derivatives which were not available till 2001 in India have become a part of life in 2013 with index futures, index options, stock futures, stock options, currency futures, currency options, foreign index futures and options, etc. being available to and widely traded by investors. Many more sophisticated instruments might become available.

While trading will continue to be an integral part of capital markets, so will investing. Indian debt market, which has remained dormant for too long, can get a new wind and follow the success achieved by similar products worldwide. And it cannot be any sooner. As per current estimates, India needs to invest US \$1 trillion in infrastructure till 2020. If we estimate the total need for the capital till 2061, it could run into several tens of trillion US dollars. While part of this capital requirement will be funded by the Government, a major part will come from investors, both from within India as well as from abroad, in the form of investment in infrastructure debt or investment in equity of infrastructure-based companies or through project-based financing.

The role of the investor in creating institutions like Birla, Reliance, Tata or the younger institutions like Infosys and TCS cannot be overemphasized. The same inves-

tors will play a big role in developing the infrastructure in India to help make India into a global power and a services and manufacturing leader 50 years hence. ◆



*Ashish Chauhan*

*Ashish Chauhan has been the Managing Director and Chief Executive Officer*

*of BSE Ltd. since November 2, 2012. Prior to this, he served as Deputy Chief Executive Officer of BSE Ltd. from 2009 to November 2012. He has been the Chief Executive Officer of Mumbai Indians and President and Group Chief Information Officer of Reliance Industries Limited. He has also acted as the Chief Executive Officer and Managing Director of Reliance Infosolutions Private Limited and Internet ExchangeNext.com Private Limited. He was awarded for Best IT Usage by the Computer Society of India in 1997 for his pioneering work in using IT for financial transactions at NSE. Ashish holds a B. Tech. in Mechanical Engineering from IIT Bombay (1989).*

# Bunkum and Wish Wash

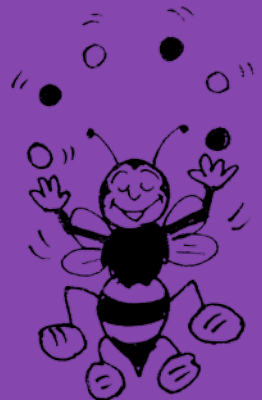
*He says his name is Bankim Biswas. He says he likes to speak Bunkum and Wishwash. We agree. Because it's totally bunkum that his name is Bankim Biswas. No such name exists in our alumni directory. Why then are we anointing this newbie i.e. Bunkumbee to be our new, and hopefully regular, columnist?*

*By Bunkumbee's claims, buttressed further by opinions from our readers, many of Fundamatics articles are good, but "heavy stuff". Discourses on education, research, philosophy, politics and now, Indian economy (and that too in 2061)-the main theme of this issue.....what else can it be, but heavy?*

*Bunkumbee is heavily into "light-shight" stuff and has threatened us that he will make light of the heaviest of themes. We dared him to try. So here we are, presenting this Bunkum/Shunkum to tear into the Indian economy and try to lighten the mood of those who have navigated till this page through heavy territory.*

*For the record, Bunkumbee is a heavyweight in the mid-region and a lightweight in the cranial area, by his own admission. So let us see him reduce the weight of Fundamatics and maybe make the shipping charges more manageable.*

*Ezbee*





# Who Moved My Tamarind

*Bunkumbee*



I am Bankim Biswas. What I write is a lot of bunkum and wishwash. Maybe, I should have been an economist. This economy shiconomy business can use my talent. I was born in 1960 and amongst the 17% of the human race that has lived through the sixties. Maybe it's not 17%. Who knows? Who knows through all this bunkum, wishwash, and economy?

In the sixties, we lived in India in houses that were built amidst open unkempt lands that sprouted boulders, tamarind trees, ditches and urchins from the neighbouring slum. We all lived in harmony and an equilibrium that told us that we all had two legs, one head and a passion for throwing stones at the tamarind tree to get some tamarinds to fall in our kitty. We shared tamarinds, gilli-danda, and bonhomie. This bonhomie did not recognise that some of us were fully clothed, some were half clothed, and the rest were non-clothed. Fortunately, we did not know about average incomes and per capita consumptions that were not yet invented by a future generation of guys who did know how to pass their time, by rascals who invented an OBC quota to fend for guys who were not in any class, much less a backward one.

Heck! Had they asked us, we could have told them that they would have had loads of fun chasing Bhalla aunty's car when her driver Krishna drove into the colony. It was

Back then in the sixties, it rained much like it rains now. Back then, water flowed through the open land and ditches and we sang and danced and made paper boats that we raced through puddles and streams and we dreamt that we had just crossed the English Channel. This was before the future inventors created a website that allowed you to print 16 pages. 15 were for instructions about how you can create a paper boat on the 16th sheet, complete with dotted lines, "fold here" instructions and all.



fun running alongside her car, waving her "tata" and throwing sand and stones at the car and scratching her fender with a wire. What joy we experienced when she stopped the car, got out to shout "Fool! Nonsense! Idiot!" at us. We all ran away, giggling with a fear that tickled us. For sure, there was poverty and hunger back then. Fortunately, we did not hear much of these words and

hence, we all smiled. And smiled equally. Equally loud and clear. Unlike Major Bhalla who stopped smiling and started frowning ever since he bought the car. Because he had to buy Mansion polish wax to keep it shiny and gleaming. He had to buy petrol at prices which were determined by an OPEC that we mercifully did not know about. He had to open the bonnet everyday and fill water in a radiator. He had to pull the starter every morning until the car choked, spluttered, and

Aha! These were enchanted times, these sixties. You went to Mehta uncle's photo studio, got yourself clicked on his Agfa Click-III and after endless fussing in dark rooms, negatives and paint strokes, you got your black and white mugshot painted by a camel hair brush into a painting that looked approximately like you.

Today, your kids...and even your servant's kids photograph you on a 12 megapixel cam in full colour glory and then Adobe you into a black and white that looks better than Mehta Uncle's colour and sepia.



shuddered to a start. And when it started and started running, we ran alongside it, threw sand and stones, and scratched its fender with a wire and ran away giggling with ticklish fear.

Today, we watch with smiles when we see Bhalla's grandson shouting "Fool! Nonsense! Idiot!" at taxi drivers and neo-rich middle

class aspirants who scratch his fender while driving alongside him with a brashness that spells economic liberalisation. Back then in the sixties, it rained much like it rains now. Back then, water flowed through the open land and ditches and we sang and danced and made paper boats that we raced through puddles and streams and we dreamt that we had just crossed the English Channel. This was before the future inventors created a website that allowed you to print 16 pages. 15 were for instructions about how you can create a paper boat on the 16th sheet, complete with dotted lines, "fold here" instructions and all. Now, you need to drive your car to find a stream that will let your paper boat float across 12 feet of water. You can drive in a car that has suffered excise duty to pay salaries for a breed of people known as economists. And you then have to pay for fuel, fuel surcharge, fuel subsidy, education cess, secondary education sub-cess, and all other things that were not necessary when paper was cheap, did not bleed forests and allowed you to smile. Origami is a dying art? No Sir, it is a dead art. (Please to note: We said Origami, not orgasm, though that is a dying art too when we last heard). Killed by something called GDP and indices. Just try racing your paper boat today in an endless stream. For starters, there is no endless stream. They all start and finish soon after they have started. And while you shout "C'mon Boat King! Beat that Bluebird and INS Vikrant", you'll get interrupted by a call on your mobile whose bad signal you'll cuss and swear at till you learn that the Gowri aunty you lusted for all these years still smiles because she knows not what a Nokia is.

Aha! These were enchanted times, these sixties. You went to Mehta uncle's photo studio, got yourself clicked on his Agfa Click-III and after endless fussing in dark rooms, negatives and paint strokes, you got

your black and white mugshot painted by a camel hair brush into a painting that looked approximately like you. Today, your kids... and even your servant's kids photograph you on a 12 megapixel cam in full colour glory and then Adobe you into a black and white that looks better than Mehta Uncle's colour and sepia.

Back then, we all breathed air that was rich in Oxygen amidst trees that were green and fertile and fruity and our smiles were robust and natural. Only thing we measured then was our height, Asha Parekh's "depth" and Marilyn Monroe's buoyancy. Today, we measure everything. Annual rainfall at Cherapunji. Carbon Monoxide in the air that Amethi constituency breathes. FDI, GDP, Prime lending rates, CPI, GPA, EMI, QSS world rankings, SENSEX, Shoaib Akhtar's bowling speed, number of hits on jungle.com, swings against Narendra Modi, TRP ratings of channels, HDI and now, even price of onions. We even measure a dollar that we laughed at in the sixties because Patel told us then that he bought a paper dosa in New York at 1 dollar. We measure quotients that make us weep. Ignorance was indeed bliss when we dealt with shopkeepers, tailors, mechanics, and camel ride merchants before the credit card merchants and internet gurus confused us about how to measure smiles and happiness. They now tell us that tamarinds have a nutritional value that cannot be measured by the stones that make them fall into our lap.

They tell us that fuel and electricity have a surcharge that can be exchanged with a promise of free power, provided there is no power cut caused by the self same powerless freebie. They tell us that if you earn Rs. 29 per day, you are as rich as you were in the sixties. You can gorge and pig and glutton at Rs. 10 per day that Raj Babbar's 10K plastic

surgery mouth delivered.

Blood flowed through our veins then. It now flows with BP and cholesterol that gave birth to insurance companies and the services sector. We called it hospital then and call it healthcare infrastructure now. Roads and buildings, they all built it. Ashoka the Great, Akbar the Great, and Chandrababu Naidu the Great. They also built rest houses and planted trees for the wayward traveller who would re-incarnate himself into a venture capitalist who would be advised by consultants and investors to listen to a mantra that Kabir sang with his signature "Kahat Kabir suno bhai sadho" tune. They all said the same thing... be a good human being, eat mangoes in summer and grapes in winter and above all, trim your moustache and be polite to your elders who masquerade themselves as economists. Be kind to them because they know not how tasty a tamarind chutney is. They look for VAT and Excise and income tax and cess and whirlpools in a joy that is but a stone throw away.

Voters of India! Unite! You have nothing to lose but your taxes and a fallen dynasty that did not learn economics at Harrow and Cambridge. You can still order an Onion Utthapam at a restaurant without surrendering your PAN card as a deposit. Salvation from an onion is just one tamarind away. We need a deluxe savior plan, not an economy plan. You demand and I will supply. One tamarind at a time.

Jai economy. ●

# Baba Black Sheep

*Ali Baba*

**A**sumal Harpalani and Narendra Dabholkar may seem an odd couple, but they represent the reality of India today. In case you are wondering, Asumal Harpalani is commonly known as Asaram Bapu. Narendra Dabholkar was the founder of Maharashtra Andhshraddha Nirmoolan Samiti (Maharashtra Committee for Eradication of Blind Faith). Dr. Dabholkar was shot down on 20th August 2013 while he was on his morning walk in Pune. There were spontaneous protests from members of the civil society and the Maharashtra government acted with alacrity and cleared the Anti-Superstition and Black Magic ordinance that they had failed to discuss for the past three years. Of course it's not as if 'all is well that ends well'. The ordinance needs approval of Parliament, so there is still room for procrastination. But the fact that political parties in Maharashtra that paid mere lip-service earlier, were forced to act is a positive sign.

Asaram Bapu was arrested on 1st September 2013, for sexual assault on a 16 year-old girl, but not before dodging the police for weeks. Here again, hundreds came out in protest, not against what he was accused of, sadly, but against his arrest. Fortunately, no political party came out in his support, though leaders of almost all major national parties had sought his blessings at one time or another. Asaram Bapu is not the first to have used young women in his spiritual experiments,

Like Socialism and Secularism, Scientific Temper was another ideal that the Nation had promised to give itself as it prepared for its tryst with destiny.



but the India of today is less forgiving of such abuses.

Between the contrasts represented by these two examples, is the case of Vikram Gandhi, alias, Kumaré. Vikram Gandhi played a fake guru, Kumaré, and filmed his journey of spreading his spiritual message in the West. Vikram Gandhi started with the purpose of exposing blind faith, but ended in greater doubt than he had bargained for. As a fake guru, he is certainly not unique, but he is a rare example of someone conducting a 'sting operation' to expose the prevalence of blind faith among Western followers of Indian spiritual gurus. However, there can be no doubt of the hold of blind faith among their followers in India, regardless of the faith these gurus and their followers profess.

Like Socialism and Secularism, Scientific Temper was another ideal that the Nation had promised to give itself as it prepared for its tryst with destiny. The first has been

discredited and the second sounds phony today, but Scientific Temper (one of the fundamental duties of every citizen under Article 51A(h)) is yet to find many adherents even in our scientific institutions. During early mornings at traffic signals in Mumbai, one sees 'vegetable' vendors who specialize in selling lemons and chillies ready to be suspended below the chassis of trucks, a kind of divine insurance for the day. Private cars rarely buy this device, because they already

The flamboyant promoter of one of our grounded airlines could not pay salaries to the staff for months but felt it necessary to offer three kilos of gold to his guardian deity.



have a better and more lasting talisman keeping watch behind the windscreen. Depending on the particular faith of the owner of the vehicle, it could be a portly Ganesha or a Chunri or a Kalama or a Cross. The owner will try to buy the cheapest third party insurance, and that too only because it is mandated by law, but divine security cover is a must, even if the seatbelt is considered a nuisance. The flamboyant promoter of one of our grounded airlines could not pay salaries to the staff for months but felt it necessary to offer three kilos of gold to his guardian deity.

A recent post by one of our professors on a news item about the chief of the Indian Space Research Organization carrying a miniature model of one of their launch vehicles to be blessed at a prominent place of worship before the launch, invited an avalanche of responses. The reactions were quite revealing. While a few were indeed concerned that this promoted superstition, and was contrary to the scientific temper that ISRO was expected

"...AND I JOIN ALL OF YOU IN  
PRAYING TO THE ALMIGHTY  
FOR THE SOUL OF THE GREAT  
RATIONALIST TO REST IN PEACE"



Image Credit Prof Arun Inamdar, IIT Bombay

to display, many saw nothing amiss. One person was more concerned to find out whether the ISRO chief had violated any government rule by taking his security guards with him for this purpose. Obviously, our educational institutions are no exception, and would rather hedge their bets when dealing with divinity. The power of prayer, as another colleague pointed out, was to calm one's own mind rather than try to influence God's. This insight is not widely accepted, it seems, even in portals of reason.

Regardless, the notes of the shehnai or nadaswaram from a temple or the azan from a mosque at dawn cannot fail to move the most ardent rationalist. Music and poetry move us in mysterious ways. The words of Khusro and Kabir affect us deeply, there is a little bit of the sufi and the sant in each of us. There is a yearning that is not easily explained. While we now understand fairly well where we came from (apes), we would like to know why we are here in the first

## TUKTUK

by Shreyas Navare



Sir, why does our country produce so many godmen but very few good men?

Image Courtesy : Shreyas Navare, Hindustan Times



Prof. Aliasgar  
Qutub  
Contractor

Prof. Aliasgar  
Qutub Contrac-  
tor, former HoD  
of Chemistry

Department, and former Dean Alumni and Corporate Relations, is an alumnus from C'73. Endowed with a rare gift of narrating "serious" and "heavy" matters with a tongue held firmly in cheek, his incisive and informed views on IIT Bombay and alumni relations are in evidence in his column *Sim Sim khul ja*. He is currently 40 thieves short of his target.

there is a little bit of the sufi and  
the sant in each of us.



place though we may have some apprehension about where we are going. As a race, we are searching for motives. Even Einstein chose to describe himself as an agnostic rather than atheist. As ordinary individuals our concerns may be more mundane such as the bottom line of the company balance sheet or a dear one's medical report but if something or someone can help, we are prepared to pay the price. But sometimes the price is more than one has bargained for. ●

# Carrier Ethernet Switch Routers:

## *From Concepts to Products, to Sales, and Beyond*

*Prof. Ashwin Gumaste*

**T**owards the end of 2005, there was a large and conscious effort by the research community to understand the implications of Internet design. The Internet was designed almost 30 years ago primarily for best-effort data-services. However, contemporary revenue bearing services indicate that non-data-services such as video, leased circuits, virtualization, voice, and enterprise connectivity, etc. dominate earnings. The NSF in the US, the NICT in Japan, and the EC in Europe began programs aimed at wiping off the non-service oriented architecture and replacing it with a clean-slate Internet design. The fundamental business problem with this approach was that there already existed several hundred billion dollars of telecommunication and networking equipment in the Internet. From a technical perspective, the Internet was wired to support TCP/IP, Ethernet, SONET/SDH and WDM as a suite of protocols. Any new design had to be cognizant of the existing infrastructure, and be backward compatible with the history of protocols that existed.

In this regard, we proposed the framework of Omnipresent Ethernet (OE for short), in 2009. The conceptual idea behind OE was to collapse multiple networking layers into a single layer, be backward compatible with existing technologies, make a strong impact on CAPEX and OPEX, and be able to support carrier-class services that generate

revenue (essentially be deterministic). In OE, we took advantage of existing patterns in the Internet connection graph and manipulated such interconnection to meet our goal of end-to-end carrier-class services on a single layer. We observed that irrespective of the physical topology, a network within the Internet could be abstracted to a tree shaped structure. Using this interconnection hierarchy, along with the well-known concept of binary routing and source routing, we were able to convert any network to a binary tree or graph by adding “dummy” nodes. This conversion to a graph that supported all nodes to be binary nodes was done by a centralized network management system that then accorded routes to services based on binary routing. Further, we showed that we could assign addresses to nodes in a way such that if the destination address (in a binary format) was available, then the source node could compute the journey to the destination. This kind of addressing and subsequent routing is called source routing. The advantages of source and binary routing are immense – preventing large lookup tables leading to low-latency – this meant low energy consumption thereby reducing the overall total cost of ownership. The concept was simple: by making the packet wait at a node for a shorter duration, we would be more deterministic in terms of end-to-end delay and reduce the power consumption at



the node.

While source routing and binary routing have been around for a while, the next question was how to adapt these to the present Internet hierarchy. Here, we proposed the use of Carrier Ethernet advances. Ethernet, which has been around for over 4 decades and is ubiquitously used for communication by PCs, handhelds, and servers, is widely accepted as a popular LAN technology. However, since 2000, there has been a move to make Ethernet work as a service in Wide Area Networks or WAN (with the adoption of the Gigabit Ethernet, GE, and the 10 Gigabit Ethernet 10GE standards by the IEEE). In WAN, Ethernet is made service oriented as opposed to its earlier role of being Ethernet as an infrastructure. In this migration of Ethernet to Carrier Ethernet, the frame-format has changed to accommodate a series of user defined Virtual LAN or VLAN Tags sometimes also denoted as labels in the Multi-Protocol Label Switching (MPLS) nomenclature. Traditional features in Ethernet like spanning tree protocol and MAC learning are switched OFF. Taking advantage of this new frame-format, we insert the binary addresses and routes that are calculated using binary routing and source routing over a binary tree or binary graph by defining new tags/labels. This means that when a packet enters a node, there is no need for an exhaustive look up, and all that the node examines are  $2\log_2 N$  bits relevant to the  $N \times N$  node interfaces. This speeds up the routing process through the node leading to energy efficiency. With this innovation, we are able to perform switching, routing, and transmission in a fiber, all at the Ethernet layer. In this manner, the concept of Omnipresent Ethernet was able to produce all the different functions of the Internet stack at layer 2. We also published an article in OFC 2010 on Optical Bit-Switching (OBiS) that

facilitated implementing OE like functions at layer 1 – a more futuristic paradigm.

To prove that OE worked, we published a post-deadline paper at OFC 2009, showcasing an OE experiment in the lab. This paper was very well accepted by academia and industry. The technology was first displayed in parts to the international audience through journal and conference articles that were used to vet the theoretical framework. Subsequently, prototypes were built using off-the-shelf equipment to demonstrate the working of the technology. These were primarily coded by engineers at IIT Bombay. On successful demonstration of the prototypes, an effort was made to build our own PCB that could lead to a series of commercial products. Three teams were formed that focused on the hardware, software, and the PCB. The hardware team was responsible for the RTL and ASICs, the software team for the network management system, and the PCB team for the PCBs, the testing, and mechanicals of the board. 5 versions of the hardware code exist – the final version, which has now become the backbone of the commercial router manufactured by ECIL, is close to 100,000 lines of RTL code. The network management software was given as a challenge contest between two groups in the lab – one focusing on a Java variant and another on a C# variant. The Java variant (64,000 lines of code) formed the commercial control system, while the C# variant would be the backbone of training programs on the router. PCBs between 14 and 22 layers were designed and included high-speed traces for up to 11.1 Gbps line-rates. Signal integrity at such speeds was a challenge, and we were lucky to get it right in the first go itself! In addition to the code, our boxes had between 800 and 1500 components. Inventory management and ensuring that when the technology became a product we had to



*Launch of MTNL's Carrier Ethernet Network: PSA Dr. R. Chidambaram with CMD MTNL, AK Garg, CMD ECIL P. Sudbakar and Prof. Ashwin Gumaste*

create a sustainable supply chain were some non-technical challenges. Independent testing and quality assurance was conducted by a team from BARC.

We built three products – a small box for your home/office environment that has 8 Ethernet copper ports a 2 Gigabit Ethernet Fiber/Copper ports with scalability built in, and a metropolitan network aggregator with 10x1 Gigabit Ethernet ports and 2x10-Gigabit Ethernet ports. The aggregators' cornerstone was the 1-microsecond port-to-port interconnection latency and for its size of being a 60Gbps duplex cross-connect, consuming only 28Watts of power. The third box was a core router which in its basic configuration supported 4x10Gbps core ports and 8x1Gbps edge ports. The ports in this box supported a technology called OTN or optical transport network that facilitated wavelength division multiplexing of channels and reach up to 1000 km without signal regeneration. This box also had a low latency of 3-5 microseconds and an energy consumption of about 65 Watts. The network management system was designed in compliance with the concepts of software defined networks or SDNs, whereby a user

could softly configure network parameters to his taste and set up services that were configured to meet his requirement. Services could be set up based on IPv4, IPv6, port, TAG, VLAN, MAC or any other customizable identifiers. The routers being compliant with Carrier Ethernet v2.0, could set up services for ELINE, ELAN and ETREE.

**User Acceptance by a Tier-1 Service Provider:**  
In 2010, the incumbent service provider in Mumbai, MTNL ([www.mtnlmumbai.in](http://www.mtnlmumbai.in)) approached IIT Bombay and my group and asked for the creation of a data-center. MTNL through a series of meetings and evaluations decided to use our CESR. This was perhaps the first example of a product developed in the academia being deployed in a tier-1 service provider network. The highlight of this data-center using our CESR was its clocking of a mere 1 microsecond port-to-port latency across 3 layers of the networking stack. The two data-centers in Worli and Belapur work on 56 of our CESRs since May 2011.

**Technology Sell-out to ECIL:** As a result of the success in deploying the CESR product and our continued interaction with BARC,



we were approached by DAE's Electronic Corporation of India Ltd (ECIL), who were interested in purchasing the technology. After intense negotiations, we sold the entire CESR technology as a nationwide manufacturing licence to ECIL. ECIL would now manufacture and sell routers (CESRs) to the domestic market. ([http://www.ecil.co.in/news/MOU\\_Press\\_Release.pdf](http://www.ecil.co.in/news/MOU_Press_Release.pdf) and <http://www.thehindubusinessline.com/industry-and-economy/info-tech/article2373134.ece>)

The products were launched in April 2012: <http://www.efytimes.com/e1/full-news.asp?edid=81749> and are now being deployed in various networks across the country. For example, recently MTNL announced that they will deploy the CESRs in their network: [http://www.thehindubusinessline.com/industry-and-economy/info-tech/mtnl-to-deploy-telecom-tech-developed-by-iitb-across-city/article4591550.ece?ref=wl\\_industry-and-economy](http://www.thehindubusinessline.com/industry-and-economy/info-tech/mtnl-to-deploy-telecom-tech-developed-by-iitb-across-city/article4591550.ece?ref=wl_industry-and-economy)

The highlight of this technology sale was that this was the largest ever technology sale (from a monetary perspective) between IIT Bombay and the industry.

Epilogue: From the onset we knew that our work is going to be different from the regular bread-and-butter research that

happens in academia. There was tremendous support from our current Director, Prof. Khakhar who made things work for us. Key support came from Prof. Rangan Banerjee, Prof. Mujumdar and Prof. Kaliappan – successive Deans and Associate Dean R&D. Product development can be a very frustrating exercise; there are days when the team and I were down, that is when a pat on the back went a long way! Prof. Subhasis Chaudhuri and Prof. Juzer Vasi have been instrumental in keeping us motivated. Successive department heads helped us with space and other requests – some of which were perhaps beyond my fair share of departmental produce! The faith that the administration reposed in us was and will also in the future be crucial for this productization to succeed.

We did face criticism from various quarters as well for such product development – there were stray comments about the novelty of this work, about the correctness of some of our published work, and even about the risk IITB is taking in selling to ECIL. Whenever there was criticism, there was support, whenever there were problems, we found solutions, innovation happened everyday across the product cycle. Most of us in the lab worked 15-18 hour days, 6-7 days a week for more than two years. But with a small team, a key

idea and a good plan, we knew we would succeed it was just a question of time.

Today, we feel good that a technology developed in India is passed on to an Indian PSU – who may have its own limitations in terms of marketing, but whose integrity is Everest like! We have deployed our boxes for NKN, BARC, and MTNL and several strategic networks are undergoing tests. The road ahead to selling this concept – which is a paradigmatic shift from what exists out there –, is a difficult one. We have a new roadmap of products, primarily moving back into our core business of being in the optical networking/very high-speed telecom space – a new reconfigurable optical add drop multiplexer with coherent optics is under development. This should expand our capacity to about 30Tbps per box – more than the entire installed capacity of bandwidth in the country! I strongly believe that product development is not an industry forte – it is something we have to undertake – products are the culmination of theoretical research, and products are always backed up by key papers and patents that are peer reviewed! Accepting new technology has always been a tough challenge. We have to persevere, and we have to convince others through results. I am sure that this product development cycle will be part of many more success stories from the IIT system in the years to come! ECIL has its hands full with selling this product, and we have our next target in our minds and heart! ●

*Chair Assistant Professor. He was a Visiting Scholar with the Massachusetts Institute of Technology (MIT), in the Research Laboratory for Electronics. He was previously with Fujitsu Laboratories (USA) Inc in the Photonics Networking Laboratory. He has also worked in Fujitsu Network Communications R&D and prior to that with Cisco Systems in the Optical Networking Group (ONG). His work on light-trails has been widely referred, deployed and recognized by both industry and academia. His recent work on Omnipresent Ethernet has been adopted by tier-1 service providers and also resulted in the largest ever acquisition between any IIT and the industry. Ashwin has 20 granted US patents, has published about 150 papers and also authored three books in broadband networks. Ashwin was awarded the Government of India's DAE-SRC Outstanding Research Investigator Award in 2010, the Indian National Academy of Engineering's (INAE) Young Engineer Award (2010). He was the recipient of the Vikram Sarabhai Research Award (2012) and IBM Faculty Award for the year 2012 as well as PK Patwardhan Award 2013. Ashwin is a guest editor for 'IEEE Network' and the Chair of the IEEE Communication Society's Technical Committee on High Speed Networks (TCHSN) 2011-2013. He has been with IIT Bombay since 2005 where he convenes the Gigabit Networking Laboratory (GNL): [www.cse.iitb.ac.in/gnl](http://www.cse.iitb.ac.in/gnl).*



**Ashwin Gumaste**

*the Department of  
Computer Science  
and Engineering.*

*From 2008-2012 he was also the J. R. Isaac*

# Wake the Lake, Float the Boat

Anukriti Chaudhari, Manoj Reddy, Shiva Kumar,  
Sidharth Prasad, Vardhman Kumar

*Have you ever prided yourself on having a lake in the campus - an oasis of serenity set amidst the chaos of the city - only to have that bubble burst at the sudden realization of the lake's deteriorating condition? Ever wished to take long walks around a beautiful Powai Lake instead of one around today's ugly and sickening green version? How about a functional boathouse in the campus again? Despair not, for it seems all these wishes may soon turn to reality. But what led to the boathouse being shut down in the first place? Why do we find the Powai Lake the way it is right now? What are the authorities doing to improve the status quo?*

Stumblebee

Not too long ago, there existed a boathouse that indeed housed boats and quenched the thirst of boating enthusiasts in the institute. There also thrived an active boating club, catering to the ardor of boating lovers, helping them prepare for various boating competitions and organizing boating activities. However, this was only till the early nineties or so, after which all activity was suddenly terminated.

The reasons were numerous. Many reported the presence of a crocodile in the waters, including SAC incharge Mr. Appaji. "I once encountered the crocodile from close quarters and was shocked. Luckily, I managed to get out of the lake safely," he exclaims. However,

a more serious, technical obstacle had been, and continues to be, the rapid increase in the construction work in Hiranandani during these two decades. Runaway waters from these sites that merge into the lake carry enough mud with them to form a thick layer of sediment at the bottom. Portions of the lake, especially the ones adjacent to our campus, have grown significantly shallower with time. They are, in fact, shallow enough in places to have made it possible for boats to hit the lake bed, thereby turning boating into a risky task. While the ongoing sedimentation had been threatening termination of the boathouse for a long time, a fatal accident - in which two people who had gone boating drowned into the lake - prompted the administration to close the boathouse immediately.

"Risks due to crocodile and fatal accidents can be taken care of with high levels of precautionary measures. After all, a boathouse is functional on the other side of the lake. But the real issue is that of the large amount of silt which hinders boating," opines Prof. Asolekar of CESE department.

Hindrance to boating is just one of the many problems caused by sedimentation; there have been other grave consequences as well. For instance, the unclean status of the lake is chiefly attributed to the sediment lurking in its murky waters. "The silt has nutrients that support the growth of water hyacinth,





whose overgrowth in turn shrinks the lake. Also, hyacinth or weed growth on the surface of the lake prevents sunrays to directly fall on the lake thereby making life difficult for marine creatures,” explains Prof. Asolekar.

Reacting to the repeated complaints from Powai community, Municipal Corporation of Greater Mumbai (MCGM) authorities finally took up the job of cleaning Powai Lake with many long term and short term goals. It is also reported that a committee has been formed under the name of Powai Lake Rejuvenation Project, for which Additional Municipal Commissioner (Project) Mr. Rajiv Jalota (IAS) is the chairman, and Prof. Shyam Asolekar has been appointed as the Convener. Prof. Asolekar of CESE department, IIT-B, has been a part of many committees which have successfully planned the cleaning of lakes across the country.

“We are missing out on a beautiful ecological spot which can be home to a variety of life forms if maintained properly. It is a centre of attraction in Mumbai city and holds great historical importance. It is our moral responsibility to contribute our part to the beautification of the lake,” said Prof. Asolekar.

It is understood that the project has three

primary steps. It will begin by digging out the accumulated sediment from the water-bed and using the same to form elevated spots in the lake, which, if planted with proper vegetation, can serve to attract a host of birds. This step is already in its advanced stage, with tenders being floated for desilting. It usually takes somewhere between six months and a year for completion.

Once desilting is finished, the process of re-establishment of the boathouse can be spurred into action by the concerned student representatives, and the DoSA is quite interested to see it happen. “While I was a student here, students enjoyed boating in the Powai waters. I would love to see the boathouse running with life again if the cited risks are cleared,” said Prof. Yajnik, DoSA.

Secondly, the project plans to hold various interception and diversion works which shall ensure that water from sewages and constructions is treated well before being emptied into the lake, so as to prevent problems from surfacing and sediments from settling again.

Finally, community awareness programs have been planned to educate people around the lake about the importance of maintaining its



cleanliness and beauty. “Ideally these 3 steps should ensure that in the long run, we will be able to drink water directly from Powai lake. However that takes quite a long time - around 25 years or so”, predicted Anand, a Ph.D student who is working on the same project.

Prof. Asolekar is very confident about the success of this project, having been a part of several such projects over the years. “I honestly do not find any hindrance that could possibly stall the project permanently. Government officials have been very proactive in their responses to the requirements. BMC authorities are ready to procure the necessary funds. Four experienced engineers have already been appointed to support the project. However, it should be accepted that the work is progressing at a slower pace now.”

Assuming that the project goes according to plan, we can expect to see a new, transformed Powai Lake - one with a more diverse ecosystem, a fully functional boathouse and cleaner water. Something to be really proud of, don't you think? ●



# The Food Security Bill

*Capitalist Pig*

**Y**et another right, with no responsibility attached. While there is a move afoot to invest in agricultural efficiency, yield, supply, storage and distribution to drive prices down, the UPA government finds it convenient to fund another populist idea targeted to serve 67% of India's population. Give me a break! 67% of Indians go hungry? Really?

The Food Security Bill (FSB) will provide 5kg of cheap grain every month to nearly 800 million poor people. The Bill proposes to provide 5kg of grains per month at subsidized prices (₹ 3/kg for rice, ₹ 2/kg for wheat and ₹ 1/kg for millet). 800 million people! That's 67% of the population, who will kiss the UPA's you know what for this manna promised to them, provided they get it. Corruption will siphon off a significant portion enriching babus, politicians and middle men. But wait ... there's more, children aged six months to 14 years will get take home ration of hot food! Have more kids, no problem, Sarkar will feed one and feed them all! The moment they are weaned off their mother's breast milk, they will start suckling on the UPA's largesse. And to make sure the child is breast fed, mothers will be given ₹ 6,000. The total estimated cost of this "Pork" that was pushed through as an Ordinance, with minimum debate in the Houses, is estimated to be ₹ 1.23 Trillion! ₹ 1,23,000 crore, that is 1.23 lakh crore. We don't even

After 66 years of Independence, the UPA has the temerity to say that 67% (~80 crore) of Indians need the right to food? This is an admission of utter failure having been in power for the majority of these years.



have a term for a lakh crore!

India ranks 2<sup>nd</sup> highest in the number of malnourished children behind Bangladesh and 47% of the children are malnourished which is nearly double that of sub-Saharan Africa as estimated by the World Bank. The HUNGAMA (Hunger and Malnutrition) report dwells into this issue in great detail. But wait, why is it that the people in sub-Saharan Africa are better off than these folks? Instead of focusing on kaibashing rampant corruption that has rocked the UPA and rather than pushing through economic reforms that will unleash the true potential of India Inc. to create jobs, the UPA wishes to introduce yet another Band Aid that will add to existing corrupt practices.

The appropriate fix to the problem is Jobs, Jobs, Jobs. No jobs, no hope. This is pouring money to solve a problem. Any fool can do it. If this were to be introduced as a stopgap

measure for a year and renewable for at most one more year, then it can be stomached (pardon the pun). But to continue to provide this largesse in the absence of economic growth and in the preponderance of corruption is unpalatable.

The International Food Policy Research Institute (IFPRI) in its Global Hunger Index (GHI) report, has indicated that of the 870 million people who go hungry, 25%, that is 210 million (21 crore), live in India.

Give each citizen a set amount of money per month (wait we will get to how much when we do the numbers) and get rid of subsidies for gas cylinders, petrol, diesel, rice, wheat, kerosene, etc. all together. That's right – let everyone apply, if they choose to (even Mukesh Ambani, his wife, his obese son, and other siblings), and let the people spend it on whatever they want – food, gas cylinder, petrol, liquor).



After 66 years of independence, the UPA has the temerity to say that 67% (~80 crore) of Indians need the right to food? This is an admission of utter failure having been in power for the majority of these years. What a shame. But wait! Malnutrition, not hunger, is the problem for the majority of this 67%. So giving them cheap staples will allow them to buy veggies and meat? As one activist shouted – no protein, no vitamins, no dairy, no pulses, none of the nutrients for a balanced diet. These people need nutritional security. Proponents of the scheme say that providing 5kg of rice & wheat at subsidized

prices will enable these families to purchase these supplements. Plus there are grants for expecting mothers and goodies for children.

This has been dubbed Vote Securing Bill by some. Besides vote bank politics, this is another notch on the right to corruption.

### *Capitalist Pig has a better idea:*

Give each citizen a set amount of money per month (wait we will get to how much when we do the numbers) and get rid of subsidies for gas cylinders, petrol, diesel, rice, wheat, kerosene, etc. all together. That's right – let everyone apply, if they choose to (even Mukesh Ambani, his wife, his obese son, and other siblings), and let the people spend it on whatever they want – food, gas cylinder, petrol, liquor.

Move to a market-based economy in one fell swoop. Use Aadhaar card to ensure UID and transfer money directly into the individual's account. Children's money can be given to their mother.

One caveat: families with more than two kids should have a sterilization certificate. If the family applies for another kid after faking a certificate, then the father should be apprehended and taken for nus bandhi!

### *Now let's do the numbers:*

The government claims that the current quantity through the Public Distribution System (PDS) is 60 million tons (6 crore). FSB will add just an additional 2 million tons. Currently 45% of the families covered get 35kg of grain per family. By giving 5Kg per person, 67% of the population will be covered. The current bill is ₹ 1.13 Lakh Crores, which will increase to ₹ 1.23 Lakh crores to meet the requirements of the FSB. The FSB adds just an additional ₹ 10K crores. So what is all the brouhaha about? Furthermore, since it is now a “right”, people

# TUKTUK by Shreyas Navare



*Mummy, after Right-to-Food, why doesn't our Parliament pass a Duty-to-Food Bill?*

*Image Courtesy : Shreyas Navare, Hindustan Times*

can demand their “right”. And since it is now cheap, there will be a huge sucking sound “whoosh” with people exercising their “right” which will reduce corruption.

The FSB will cost about ₹ 2 Lakh Crore according to some who believe the government is fudging the numbers. Some claim this is high, others say it is too low. There is another way to arrive at this number. The cost of low grade rice is about Rs. 25/kilo at the retail store which includes the seller's profit margin. This constitutes the entire cost from farm procurement to store. Let us take ₹ 20/kg for both wheat and rice.

India has a population of 122 crores. 67% is about 80 crores. Each person has the “right” to receive 60kg per year. That makes 4,800 crore kg or 4.8 crore tons. The government estimate is 6.2 crore tons, which we can assume accounts spoilage and “leakage”. At ₹ 20,000 per ton, this will work out to be just short of ₹ 1 lakh crores. To this we can add cash grant to pregnant women and other

grants to arrive at the ₹ 1.23 lakh crores quoted by the government.

But that assumes everything works according to plan and there are no cost overruns, spoilage, leakage, corruption, etc.

Now if we were to take into consideration all the other subsidies people at all levels, not just people Below Poverty Line (BPL) are receiving, you, me and even Mukesh Ambani, his wife, obese son and siblings. we can assume that the total subsidy bill including FSB will exceed ₹ 2 lakh crores.

To keep it simple and the numbers rounded, this works out to be about ₹ 2,000 per person per year assuming 1 billion people, instead of 1.22 billion.

So ₹ 200 per citizen (including children) per month, even if it works out to be Rs. 2,400 per year, would mean significant savings because:

1. Get rid of the PDS system all together, big savings there!
2. Get rid of all subsidies.
3. No corruption if money is deposited directly to the verified receiver's account.

Maybe it could even be made ₹ 300 per citizen.

Just look at the savings incurred! Not to mention the look on the faces of the losers i.e. the corrupt.

If the numbers are right, Capitalist Pig should get the Nobel Prize. ●

# RTI Exposes a Revenue Loss of 30,000 crores in Maharashtra

*Shailesh Gandhi*

**W**ould you believe that Maharashtra loses over INR 30000 crores annually because of carelessness/corruption, and that this has not been exposed so far?

Are we really poor or are we thrust into poverty? The recent scams which have been unearthed give me a feeling that we may actually be quite well off, with enough resources. If the lakhs of crores of public resources being given away and snatched away by the few were to come to the public exchequer, we could be quite comfortable as a Nation. I have been pursuing one such scam in Maharashtra in which I believe that a few thousand crores of public money is being lost to benefit a few.

Maharashtra's debt is about INR 2.5 lakh crore, and we pay the interest for this. A State owns many resources on behalf of the citizens. One of these is land. Governments sell some of the lands and give some on lease. The idea behind giving certain lands on lease is to basically have an inflation-proof investment and, sometimes, to encourage certain activities. Hence it offers lands on lease. It wishes to retain the ownership of the land so that it may ensure that its revenue matches with the growth in inflation.

A lease is a legal contract which primarily lays down the area which is leased, purpose for which the land is to be used, period of

The Gout. has decided to offer the lands to the lessees at about 20 to 30% of the value! It has effectively offered a 75% discount sale-not on the market value, but a notional value. In Sharukh Khan's case the market value is estimated as 200 crores, which is being offered to him for 8 crores!



lease, lease rent and certain other conditions. When the lease expires, it may be renewed with the lessor increasing the lease rent as per the market price which broadly reflects the inflation in the intervening period, unless there is a condition dictating a renewal in a particular manner.

When any individual or Institution gives land or a property on lease and the lease expires, a fresh lease is drawn up at the prevailing market rates if the lessee wants to continue. This simple principle has not been followed in Mumbai and in the State of Maharashtra. I have been told that this may be true all over the country. Some leases are renewed, while some are allowed to continue occupying the land at the old rates. What are the reasons for such irrational actions? This may be due to carelessness or corruption.

Using RTI, I had discovered this in 2005 and drawn the attention of the Chief Secretary in a letter titled ‘Arbitrariness and huge loss of public money in Public lands given on lease’. I have now got the scanned copy of the file relating to this which has over 900 pages over the years, and has ended on a bizarre note. Let me share the route the Maharashtra Government has decided to adopt after 8 years of confabulations: The Govt. has decided to offer the lands to the lessees at about 20-30% of the value! I am shocked at this irrational action of the Government and think that it is about time that the citizens defend their revenue by telling the Government they will not accept this approach. It has effectively offered a 75% discount sale-not on the market value, but a notional value. In Sharukh Khan’s case the market value is estimated as INR 200 crores, which is being offered to him for INR 8 crores! A special category of citizens has been created who alone would be entitled to the 75% discount Sale. This violates Article 14 of the Constitution and also many Supreme Court

judgements which have dealt with such cases.

In the 2G judgement, the Supreme Court has said, “In conclusion, we hold that the State is the legal owner of the natural resources as a trustee of the people and, although it is empowered to distribute the same, the process of distribution must be guided by the constitutional principles, including the doctrine of equality and larger public good.” Many Supreme Court judgements have clearly enunciated the principle that the State must come to a market rate determination when giving resources such as land. The poorest man who may be starving is an equal and rightful owner of this land, and it is necessary that the appropriate revenue is obtained for him. I looked at the list of leases of lands given by the two Collectors of Mumbai (obtained in RTI) and decided to calculate the worth of the lands where lease deeds have expired and unauthorized occupiers are allowed to continue.

Some examples out of about 700 cases of Expired leases:

Period of Lease Years	Lease expired On	Name of holder	Annual Rent	Area in sq.mt.
21	1-12-1991	S.R. Poddar	74.39	3087.82
21	1-5-1971	D.R. Jaikar	35.31	9553.59
99	22-4-1983	Simplex Mills	48.61	7836.18
10	23-7-1969	Ramnath Dhobi	2335.5	2169.74
33	31-12-1985	Khushaldas Vallabhdas	342.5	16238.48
50	1-11-1985	Shree Shakti Mills	1873.81	25067.62
25	1-10-1982	Sterling Investment	8	1024.26
99	1-9-2002	Shapurji Pallanji Mistry	1644.54	25507.15
30	1980	Sharukh Khan	2325	2446.4

Some arguments have been advanced that there is no difference between a long term lease and ownership. I am offering reasons to prove how completely fallacious this argument is:

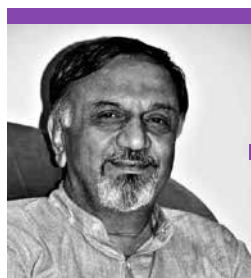
1. First and foremost, the leases given by the Public Authorities are of varying terms. It is worthwhile to ask why there are leases of terms ranging from 5 years to 99 years and also 999 years. Some have been given in perpetuity. Were these varying periods mere whims? A sensible investor or State may sell certain assets and also decide to give some on lease for varying terms and usage. This is to ensure particular development and to get increasing revenues after certain periods to counter inflation.
2. Sales of land were known and implemented even a century back. Hence to contend that a lease is the same as a sale is flawed. If the intention was to sell the land, it would have been so recorded, and a sale deed made. In this connection I would like to cite the clause of one lease deed which mentions that the lessee had purchased a part of the land, and taken a lease on the balance.
3. A lease deed specifies usage, rent and a period apart from certain other conditions. It is a matter of shame that our erstwhile British masters were more conscious and conscientious in thinking of the need for the State to have a long term revenue model, which would increase the revenues in the future to meet inflation, whereas our Public Servants are colluding in eroding the citizen's wealth.

My calculations show that there is a revenue loss of about INR 2750 crores each year in the leased lands of the two collectors of Mumbai, since no revision has been made in the lease rents where leases have expired. The

Revenue department proposes to give Occupancy II rights to those whose leases have expired for a one-time cost of about INR 4050 crores! This is a 75% discount Sale offer to a select few only. Alternately, they propose to charge about 5% of the market lease rent from the lessees.

Since Maharashtra is about 700 times the size of Mumbai, the revenue loss in the rest of the State, because of expired lessees being allowed to continue at old rates, is likely to be at least 10 times Mumbai i.e. about INR 27500 crores! Thus the total loss is likely to be over INR 30000 crores each year. Compared to this, the total central grants to the state are less than INR 15000 crores.

A lease is an inflation-proof revenue stream. This ensures that the State gets a revenue stream which copes with inflation and hence the State may have to collect lower taxes. The public loss is likely to be over INR 3 lac crores in the next decade, i.e. over 30000 Rupees for each person in Maharashtra. Citizens must safeguard their revenue from a revenue department which seeks to deprive them and the future generations.. ●



**Shailesh Gandhi**  
DA, DSA B. Tech.  
Civil, C'69

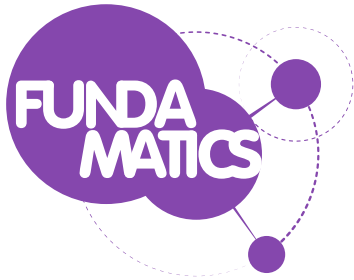
*Shailesh Gandhi DA, DSA B. Tech. Civil, C'69, was Chairman of the Board of IITBAA.*

*He was the CMD of Clear Plastics Ltd. He is a Right to Information (RTI) activist who has conducted over 500 workshops for citizens and government officers in slums, clubs, offices, schools and colleges, without any charges. A recipient of the Nani Palkhiwala Civil Liberties Award (2008), Shailesh, has been the Central Information Commissioner, Right to Information where he ran a file-less digital office.*









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# Cutting-Edge Technology for IIT

*Satish Hattiangadi*

Prof. Narashimva Rao felt good when he was chosen as the Director of a fledgling IIT. But that euphoria evaporated within a month, when the location of the Institute was revealed. He was to become the Director of IIT Nagaland! Goodness Gracious! What technology would anyone hope to learn in Nagaland? How does one get staff to come and live there, and how does one get students to join? Fortunately for Prof. Rao, the Heads of some of the departments had also been appointed, so he was not alone in his endeavour.

The Diro and his HOD team rented a bus and embarked on the four-hour drive to the site. Five hundred acres of fairly sylvan forest land, on the banks of a lake, more like a picnic spot than an Institute of Technology!

“I am sure this is what Bombay IIT must have looked like, when they were operating from SASMIRA and coming to Powai!” said Jaggu, the Head of Chemical Engineering. In his mind’s eye he could picture a Chemical Engineering Department coming up at the very end of a long corridor and shuddered at the thought of all that walking that would be necessary.

Prof. Nene smiled. He had spent a few years at the Lakeside Staff Hostel at Powai, while he was an Asst. Prof. of Nanotechnology. That was a few years ago, and now he was going to head the Department!

Everyone knew that Pajama had made a killing in the software technology bubble, though few recalled that the product he had sold, “Window Dressing”, was in fact a salad dressing



Diro Rao was despondent, though. “The similarity ends with the looks of the place. When IIT Bombay came up, there was a big demand for engineers. Now times have changed. And Powai in those days was not really that far from Bombay, as it was called then. Nagaland is a different story! We need something special to attract staff and students here. Some cutting-edge technology! Let us get some consultant to come and advise us about which technology would be best suited for Institute.” All the Heads nodded in assent (pun intended).

The team went back to Calcutta and searched for a suitable consultant. They were happy they landed with one of the best available well-wishers of IIT – Jamadagni Deshmukh – now known to one and all as Pajama Deshmukh. Everyone knew that Pajama had made a killing in the software technology bubble, though few recalled that the product he had sold, “Window Dressing”, was in



fact a salad dressing, even though a large and growing software house had purchased the rights and title for a phenomenal price.

So it transpired one afternoon a few months later that Diro Rao and his team of nodding Heads were ensconced in Arsalan Restaurant with Pajama Deshmukh, amid the wafting aromas of kababs and biryanis. Everyone was listening with rapt attention to the Angel Funding maestro talk of the appropriate

Our balance of payments  
position would get reversed,  
and a day might come when  
you get 60 US dollars for one  
Indian rupee!



technology for IIT Nagaland.

“India is still largely agricultural. So, to be relevant to our country, we should think of a technology that is associated with agriculture. Such a technology would have a great impact. Among the agricultural products that India exports, one of the more significant ones is coffee. And the best coffee being exported from India is a P-berry blend of Robusta and Arabica strains. The coffee beans are roasted to the right temperature to give the cup that delicious flavour.”

“But P-berry coffee is not the best or the most expensive. That label is attached to a brand called CPC. India could well be producing CPC coffee, because the CPC is made with the same beans as P-berry. But the process is different. Before roasting, the coffee beans are fed to civets. The digestive juices of the civet act on the beans, and when the beans are recovered from the civet poo, they can be washed and dried and roasted to give CPC coffee. In fact, that is what CPC stands for – it is an acronym for ‘civet poo coffee’.

If India switched from P-berry to CPC, our coffee exports would rise ten-thousand-fold in value, even if the same quantity of coffee beans were used. Our CPC coffee earnings would be higher than Saudi Arabia’s oil earnings!”

“Now take another example. The Panda is an endangered species. It survives on a diet exclusively of bamboo. But the funny thing is that pandas cannot, on their own, digest the cellulose. For digesting that, they have to depend upon certain bacteria in their digestive tract which can break up cellulose into sugars. Panda poo is being studied to identify those organisms. Cultivating those organisms gives a way of processing cellulose into energy. India could stop importing oil. Our balance of payments position would get reversed, and a day might come when you get 60 US dollars for one Indian rupee!”

“Just two examples are considered here. There are thousands of different animals, and the effects of their digestive tracts on thousands of edible products could be studied. You would get innumerable new products out of this study.”

“And you can add the effects of modified digestive effects. If the animal is suffering from diarrhoea or constipation, the digestive effects are going to be markedly different. IIT – N can, and should, start a Department of Poo-ology. You could have a veterinary section that took care of the animals, a culinary section that would taste the outputs to identify unique flavours, and a medicinal section to check out the use of Poo-ology in medicine.”

Diro Rao and his team of nodding Heads were in raptures about this wonderful cutting-edge technology.

“Yes!” beamed Prof. Jaggu, the Chemical Engineer. “We can define Poo-cleaning as a

unit process! It will be a new unit process after a very long time!” He could imagine the accolades coming his way. Maybe the new unit process could be named ‘The Jagdish Ramchandani process!’

“I am sure nano-technology would have a big role to play,” said Prof. Nene. “I can already see the need for a nano-camera that can see the particles go through the digestive system. I can also see the need for a

‘Research’ done at the Institute was primarily verification of papers already produced elsewhere, and the ensuing period had ensured that the ‘cutting-edge technology’ had lost the cutting edge



nano-spectrometer that could also follow the particle and trace the chemical history that the particle goes through!”

The decision was quickly taken to set up a Department of Poo-ology. A thousand acres of forest land was acquired to house the animals whose poo was to be studied, and a 50,000 sq.-ft. building constructed to house the department staff. Somehow IITs do manage to get funds for these things.

Then they scouted around for a Head of Department for Poo-ology. They checked at all the Ivy League schools, who were hearing of Poo-ology for the first time. But, since an IIT had enquired about it, they all set up their own departments, and in a matter of a few years, they had started producing doctorates in Poo-ology. But none of those were qualified enough to meet IIT’s norms.

So it was about twelve years after Pajama Deshmukh’s enlightening talk that the HOD

was finally located – someone that met IIT’s norms about academic qualifications as well as teaching experience. Then, finally, the cutting-edge technology took off at IIT – Nagaland. ‘Research’ done at the Institute was primarily verification of papers already produced elsewhere, and the ensuing period had ensured that the ‘cutting-edge technology’ had lost the cutting edge. ●



Satish Hattiangadi

B.tech 1971,  
Chem Engg., H5

Satish Hattiangadi did his Masters in Chemical Engineering from the

University of Massachusetts, Lowell (at that time Lowell Technological Institute). He did a Post Graduate Diploma in Software Technology from NCSDCT, and has worked extensively in software development. He is married to his classmate from IIT Bombay, Leja. Satish has all along been working alone, and tends to work 24/7 till the problem at hand is solved. He has retired from software development for the last eight years, and has been a regular participant in his Rotary Club and Rotary District activities. He is also member of the Executive Committee of the Mumbai Chapter of IITBAA.

# The Birth of 'Parshu'

*Raveesh Mohan*

2012, the Comic Con was coming to Bombay and I was totally kicked about being there! All my favourite characters under one roof, all those issues stacked up which I couldn't find on Flipkart or Amazon. I was ready to splurge!

There was a massive crowd around the venue. For a moment it felt like being back in the campus for MoodI, only this was bigger.

I managed to get inside after a long wait in a slow-moving line, but the sight inside was totally worth the wait! Loads of stalls selling comics, merchandise, character figures, massive colourful banners; a huge stage setup in the centre which was talking about new launches, announcing results and of course people everywhere. I was like a wide-eyed boy left in a chocolate factory full of different sorts of candies and not knowing which one to go for first.

I quickly started filling my bag up with my sought after issues, lest someone else happens to pick that very copy up, already having spent way beyond the threshold where my wife starts with a cold stare,

The crowd demographic was, as expected, mostly 15-35. People were wearing their favourite characters on their T shirts and buying their favourite characters' merchandise. But all these were pre-dominantly characters borrowed from the West. India did not



Parshu is a next generation Indian Superhero series, narrating the journey of a young warrior battling evils (like corruption, terrorism, violence against children and women) that pervade Indian society today

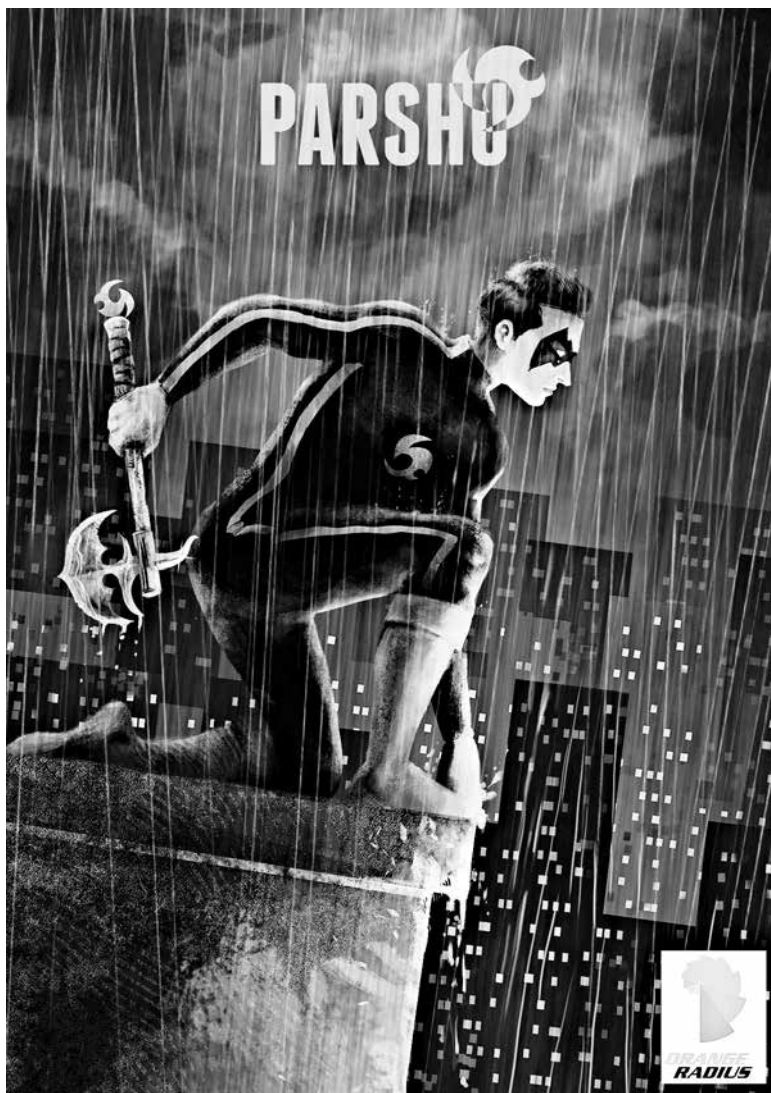


have a character that this generation could identify with. The limited Indian publisher stalls were mostly illustrating Indian mythological stories in their own style.

I did not know this then, but my study of the Indian comics market had started.

The seed had been sown. I had seen a huge market, albeit only in one city. I had seen what is NOT selling. I had seen an opportunity. This opportunity excited me.





That week on, I started my research of Indian comics and graphic novels. I bought whatever I could find on Flipkart. I read and re-read, I got down to the specifications of pages used, number of pages, etc., but the heart of any story is the story itself. If the story does not grip you, does not leave you with a feeling of having read something you would want to read again, then it needs improvement. There were very few such stories which

could keep me interested, but then I wasn't the target market. I needed to understand the market requirements. Delhi Comic Con was coming!

At the Delhi Comic Con I went with only one aim – to understand the market. Walking around, I selected small groups of 3-4 people and engaged them in a quick conversation about their favourite characters, what's miss-



ing in Indian comics, and what they would want to read.

This generation wanted to read but did not have much to lay hands on when it came to Indian characters. I started thinking of a story, a character that will fill the gap that was evident in the Indian comics industry. It was March.

I spent two months in coming up with a character – ‘Parshu’ – and a story around him. Parshu is a next generation Indian Superhero series, narrating the journey of a young warrior battling evils (like corruption, terrorism, violence against children and women) that pervade Indian society today. The first issue ‘Parshu: Origins’ is about a young boy leading a ‘regular’ life and how a series of events lead him to discovering his superhero streak. While writing the ‘Parshu’ series, I wanted to give the readers a believable character. Yes there is a mythological connect, yes Parshu has a special set of abilities, but is constrained by his set of vulnerabilities that will make the readers identify with him. Parshu is not your all-capable superhero, he doesn't fly nor dodge bullets, but he is someone who will hold on that extra bit in the face of extreme adversity when others would give up, fuelled by unwavering courage and grit, he is someone YOU can relate to. I wanted to create a character which should succeed not just in India, but reach out to an international audience as well. Bangalore Comic Con was here and it was time to test ‘Parshu’.

My friend Ankit was excited by this idea as well and decided to come to Bangalore Comic Con with me. We got a few sketches of Parshu illustrated by Rahul, a freelance artist from Kolkata (who I found on Behance). Bangalore Comic Con was huge, the crowd turnout was fantastic.

We went about talking to people, again in groups of 3-4, and showed them sketches of Parshu along with getting insights on what could be done better. People liked the character and the way it came out. By now I had decided that I was going to try and tap this unmet market need.

Work on the first issue of Parshu: Origins started in July. Rahul was on board for the first issue. I also went to IDC to look for talent, and talent I found – Ali (class of 2013)

If the story does not grip  
you, does not leave you  
with a feeling of having read  
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improvement



came on board full time. With a team of 2 illustrators, we started full steam with a deadline of launching the first issue ‘Origins’ at the September Hyderabad Comic Con.

The initial forming and storming stages of this team were quite eventful. There were a hundred ideas flowing back and forth and a thousand re-works on each panel. Having started early, these delays could be absorbed without compromising deadlines. The best part of the ideation was that we came out with the best in terms of the first issue. It looked gripping, the illustrations were crisp and the story moved at a brisk pace.

The company registration was moving at a brisk pace. The company name had been decided – Orange Radius.

The next challenge was to get a good printer. We were able to tie up with an excellent printer based out of Mumbai whose work was near perfect. We were now ready with our printed first edition and had to get the

A brutal tragedy triggers the transformation of a young boy into a warrior, a warrior he was always destined to be, given his lineage and ancestry.

Determined for vengeance and searching for answers behind the tragedy that befell him, he delves deeper into an abyss that will throw up more questions than reveal answers, he will need to dig deep into his reserves of willpower, strength and resolve to unearth and decimate the real face behind it all. In this journey he will fall only to rise stronger each time, establish alliances and start understanding the true potential of his gifted abilities.

Is he a superhero? No! He is you and me, only someone who held on that extra bit and decided never to give in even in the face of extreme adversity.

Divided into four expertly illustrated chapters, each brimming with excitement and mystery, we present the first edition in the Parshu series: The Origins



brand noticed before we hit the Hyderabad Comic Con. Social media helped immensely, we created quite a buzz before the Comic Con. It was now time for the Hyderabad Comic Con!

The first issue 'Parshu: Origins' was launched at the Hyderabad Comic Con with merchandise and posters ensuring that the Orange Radius stall stood out. Our slot on the centre stage set the stage on fire with an awesome launch video which left the crowd awestruck. Instead of the usual launch interview and a few words about the issue, we decided to conduct a small quiz to get the crowd involved and to drive home the Parshu brand from Orange Radius. We were able to sell all our merchandise and almost ran out of our comics stock. The Comic Con organisers later called to congratulate us on an excellent showing for our first Comic Con.

This is just the beginning. We have already

started work on another series which is scheduled for launching in January. The second issue of Parshu called 'Rise of the Warrior' is slated for early November release. Bombay Comic Con 2013 in December will see us launch our third issue in the Parshu series. We are also trying to tie up with digital comic hosting websites to take our brands to an international audience. Exciting times ahead as we are gearing up for the next set of challenges and opportunities that lie ahead of us. ●



Raveesh Mohan

Raveesh Mohan,  
batch of 2010  
SJMSOM IIT

Bombay, is the founder and director of Orange Radius Arts Private Limited. Raveesh, an Engineer from Pune University and an MBA from SJMSOM IIT Bombay, has about 7 years of work experience ranging from IT industry to the FMCG industry. An avid reader and a huge comics enthusiast, Raveesh writes short stories as a hobby and is now doing it as a profession with Orange Radius. Raveesh lives in Mumbai with his wife Karuna.

# Blithe Spirits:

## Wodehouse Corner at Dore's

PG Murthy

*Blithe Spirits, a fan club devoted to that inimitable humourist P.G. Wodehouse, used to hold monthly meetings at different venues. The invariably boisterous group had a nomadic existence piling up now at Baristas, then at Café Coffee Day, moving thereon to the Yacht Club and later to Kyani restaurant at Dhobi Talao. It was Giri Dore, a saviour, who invited the group to his home at Churchgate and this has been the happy permanent venue for Wodehouse Corner meetings on the last Sunday of every month for several years. Short of joining hands and dancing round, members have a jolly time recalling the subtle humour of the great author and of many others who excelled in their craft. Unfettered by formal agenda or protocol one sees a free play of jovial banter on any topic, be it the wind or the weather or the weary state of our economic scenario. Amidst the shifting lights and shadows of existence, Blithe Spirits is as rejuvenating as the elixir of life. Like-minded Wodehouseans may come over and see for themselves.*

Lazybee

September 2013 saw us once again assembled as a group stuck together 'like flies on flypaper'. The normal style is loud talk all at the same time on diverse topics ranging from the weather to walnuts, changing as the time passed to other branch lines of thought and argument. Now and then a wild laugh

like a howl explodes as if calling attention to the group that it's time to cast all care and concern aside and discuss serious issues – issues germane to life and living that evoke fun and only fun.

Since we last met a strange thing happened to our Dore. As he sat one morning he saw that every straight line was now crooked in the middle. He washed and cleaned his eyes but there it was persistent as ever. The straight line became a crooked companion. Dore who has lived a straight life was worried that this crooked line will take over his existence and rushed to the eye specialist for a miracle cure. He met one Dr. Nut who put him through tiresome tests and investigations before throwing up both his hands which also appeared crooked to Dore. The quack also gave him several medicines and asked him to come back after 8 weeks. In the meantime he strongly advocated that Dore remain friendly with the crooked straight line. Dore thanked him, paid his fees, washed his face with cologne, and left the hospital with his new companion. The crook (more like a delinquent) now walked silently by his side. The last we hear is that the new companion was trying to be as straight as possible.

And now for some good news from Our Man in Hyderabad: the film "Wodehouse in Exile" can be viewed on You Tube without the hassle of pen drives, CDs and ailments



like virus that they are prone to acquire and spread. The film is about the penultimate chapter of Plum's life when not only did he face some 13 months of detention in a German camp but the wily and cunning fashion in which he was innocently led by the Germans to give the infamous Berlin broadcasts. When released later he was in hot water with the British authorities who considered him as a traitor. It was pathetic to see this son of Righteousness, this innocent

When Ramana passed away Bapu created a life size sketch, an attribute that was displayed in his drawing room with a stunning caption: "You left me like a picture with no wall to hang..."



writer of humour lampooned by rogues from his own country. In England when sentiments were raging for his scalp it was George Orwell who wrote a long scathing article asking the Government not to be stupid and that a proper perspective was the need of the hour. All charges were then dropped against Wodehouse and he set sail for the US from where he never returned to the homeland. It is said that A.A.Milne was one of the writers who worked against Wodehouse but strangely enough Wodehouse and Milne later became friends.

Krishna Mohan (OMH) narrated his great fortune to have had a lasting friendship with two outstanding Wodehouseans in the South, Mr.Bapu a great skillful cartoonist and Mr. Ramana, a writer both legends in Telugu literature and who were active for over 35 years in the exciting world of cinema. The eminent cartoonist-writer duo, both

Wodehouseans to the core, have a collection of almost all the first editions. While in the US, Bapu visited Remsenberg, Long Island to pay tributes to the great humourist at his grave. Bapu loved KM's translations of some of the novels and lovingly referred to KM as "my own Wodehouse". When Ramana passed away Bapu created a life size sketch, an attribute that was displayed in his drawing room with a stunning caption: "You left me like a picture with no wall to hang..."

PG mentioned of an sms of a cartoon by Bapu showing Wodehouse as a cowboy with smoke emanating from his ears. A surprise gift to the Wodehouse Corner arrived from KM - a Xerox copy of Plum's book titled "The Parrot and Other Poems". A glance at some of the poems showed Wodehouse's skill in poetry heavily influenced by humour. Humour takes over as the poem proceeds. Dore conveyed our thanks to KM for the addition to our small collection.

Much time was spent on special snacks brought by Ranju and Raj. Now it is not easy to describe them or write about their taste. Like Mulliner all joined in saying, "It's good" followed by "It's exceedingly good". "It's tasty." "It's exceedingly tasty". Suffice it to say that united these two could be successful entrepreneurs in marketing unmatched snacks that transport people to moments of transcendental bliss, alas too few.

A member referred to the wretched subject of service tax on cooperative societies that was rumoured to be actively collected. One wonders what could be the logic in seeking service tax from a housing society that sends monthly bills as outgoings for money that is used, on a hand-to-mouth basis, to pay the salaries of the liftman, pump operator, sweepers and others who hang around the premises. Whether it is a beauty parlour or a courier service, a bill from the telephone company or

a credit card bill, the tax man with his hand outstretched is ever round the corner with his begging bowl. We live in an age that continually defies logic.

This reminds one of the thankless job of being on a cooperative society committee. In all such society meetings there are some common features:

Venue: In humble modest coop. societies: An old disused garage or room of some member. In affluent class of coop. society: Club house or Society Office.

Time: 9.30 PM or Sunday 10.00 AM.

Profile of members present:

- a. Couple of loud-mouthed, troublesome and cantankerous members, who squabble on every issue.
- b. Few of the constantly complaining type who do not do any work for the society.
- c. One meticulous paper and pen-oriented elderly man who likes to get all records straight and takes down notes as if he is in a classroom.
- d. Others yawning and waiting to get it over so as to return to their TV serials.
- e. Some who do not know what the hell is going; being present only on insistence by spouse to sit, observe, and vote if required.

Some have witnessed cooperative society meetings in the weaker section where proceedings resemble close to a street quarrel. Meeting scheduled at 9.00 pm. in open garage on ground floor. Participants turn up leisurely at 9.45 pm or later in striped pajamas (half), banians carrying their chairs and stools from their homes. Meeting called to order when a minor pandemonium is about to start. Hands are raised and Pandurang asks loudly for an explanation why A-Wing

gets water for 15 minutes more and when will B-Wing get justice. This was apparently discussed several times before without any answer except coming close to blows. Secretary pacifies him with some solution when another militant from A-Wing dares him to do anything which will reduce even a drop of water. Fight aborted and agenda shifts to accumulation of old shoe rack, broken ladder on staircase landing outside Kuppusamy's flat and tricycle (used by Godbole when he was

All neat and nice, laced with heat and ice. Some heat and conflicts rise to near-primitive expression but are hastily smothered to manageable dignified events – growling hearts behind smiling faces.



a brat of four years) which accompanied him from house to house, now lying outside his flat (Godbole now 65 years) near the lift for years and so on. Stubborn refusals and roaring arguments with shrill voices of women present amidst the barking of dogs that turn up to see the commotion. In better class of societies where there is systematic agenda circulated in a professional manner one sees quieter discussions taking place, being 'differences' instead of 'quarrels' in dignity and finesse -- the issues of contention being allotment of scarce parking space for cars, is there enough security for senior occupants from murderers ostensibly entering to hand over courier parcels, salesmen with dusters and detergents, the menace of motorcycles in the vicinity, the search for a revised quotation for lift maintenance contracts, and such other items of an exalted agenda. All neat and nice, laced with heat and ice. Some heat and conflicts rise to near-primitive expres-







sion but are hastily smothered to manageable dignified events – growling hearts behind smiling faces. Not cooperative living but living under compulsion, not even greeting the neighbour except when face to face at the annual society dinner served buffet through a hired contractor. A member pointed out that some cooperative housing societies have even started video-recording the proceedings of the meetings not for any aesthetic performance but to record unruly primitive play and display of emotions like tearing up the annual report, breaking the chairs and the door or hurling the mike and such other equally amiable gestures.

Anantha, in reply to a query, expatiated on the world of wines, from the growth of the vine to the final stage of that ambrosial elixir which, since time immemorial, has lifted mankind into the life transcendental. Anantha could easily qualify for a Doctorate on the subject displacing J.B.Attwater who, as we all know from Wodehouse, was licensed to sell ales, wines and spirits.

Members felt their energies liquidated and wound up the meeting. ●



PG Murthy

*The author of this report, P G Murthy, 75 years +, is a legal advisor specialised in employment laws, a B.Sc., LL.B., and a post-grad. from TISS. He is also a freelance writer. His articles have been published in Hindustan Times, Mumbai and in the SCOTLIT magazine of Glasgow University, Scotland.*

*This article has been forwarded by Ranju Bhat, BTech Chem 71 & H4. He is a devoted Wodehouse fan and member of PGW Fan Clubs including Mumbai Chapter of Blithe Spirits which meets on the last Sunday of every month in SoBo. Ranju was in regular correspondence with Sir P G Wodehouse till his demise in Feb 1975.*

## Hope and a Tin Can

*An impression that is almost cast in stone amongst the minds of alumni and the world at large that exists outside the gates of this Institute is that cutting edge technology at IIT Bombay extends to little beyond the 'cutting chai' served in its canteens.*

*Here we do not wish to speak about unique and interesting R & D projects that we periodically hear about or more foundational issues of what excellence in research means for IIT Bombay. Our lens is fixed on encouraging an ecosystem of research among the students of IIT Bombay. We believe that Research is not all about solving complicated math equations but nurturing a hobby in students. There are many passionate students at IIT Bombay who spend a lot of time in laboratories and being part of research group and working tirelessly at some 'cool' problems or in building and fabricating stuff with their limited resources. Be it the student Satellite project or Project Velocity (IIT Bombay's indigenous formula car racing team) or its most recent Team Shunya they continue to carry the IIT Bombay name in far corners of the globe.*

*But encouraging this spirit of research and engineering cannot be done with just hope and resources gathered in a tin can. Take the story of Team Shunya for instance, they took up the challenge to build a sustainable, cost-effective, solar-powered house for the*

*Indian middle class in urban areas. It is the first team from India to ever be selected as one of the 20 international teams selected for the prestigious Solar Decathlon Europe 2014 in France. Its previous participants include MIT, Purdue, Cornell, CMU and TU Darmstadt among others.*

*The team has estimated the total project cost to be INR 1.96 crore, comprising all of construction costs, cost of social awareness campaign and the costs sourced from participation in the competition, such as international air travel and shipping. Do note that 1.96 crore number is not the cost of the house, but of the entire project. The cost of the house that the team judges a consumer would have to pay for a fully-furnished, self-sustainable, solar-powered house has been estimated at around 35 lakhs.*

*The team has sought and received sponsorship in various forms from a number of companies from a range of industries, such as Jet Airways, ISHRAE and ONGC, and is currently looking for sponsors in other related areas. The team hopes to accumulate sufficient funding to complete the project and take the house to Paris, to compete against similar world-class houses made by university teams from around the world.*

*So the tin can is out as the students and faculty members are left scrambling for resources. That is the not-so-attractive truth behind the R & D journey of students at IIT Bombay. They lose out not because the students at MIT, Caltech or Purdue are better, but because compared to them what they have is hope and a tin can.*

*If you wish to help then do reach out to Team Shunya and Adwit Kashyap. Time is truly running out for them.*

*Humblebee*



## Team Shunya

*Adwit Kashyap*

With the number of urban middle class houses expected to increase from 22 million today to 91 million in 2030, there is a pressing need to design and build homes that are comfortable, cost-effective and sustainable. The energy requirement associated with this projected housing demand is one of the biggest challenges that India needs to face in order to maintain its growth rate.

This challenge has been taken up by Team Shunya, a collaboration of Rachana Sansad's Academy of Architecture and IIT Bombay, to build a sustainable, cost-effective, solar-powered house for the Indian middle class in urban areas.

Team Shunya is one of the 20 international teams selected for the prestigious Solar Decathlon Europe 2014 in France. The Solar Decathlon was started as a biennial event by the US Department of Energy in 2002 and has, since, expanded to Europe and China. College teams from across the world are invited to design, construct and demonstrate full scale houses powered entirely by solar energy, complete with all amenities from a dishwasher to a building automation system. The houses are judged on 10 extensive criteria:

1. Architecture
2. Engineering and construction
3. Energy efficiency

IIT Bombay's team Shunya is one of the 20 international teams selected for the prestigious Solar Decathlon Europe 2014 in France.



4. Electrical energy balance
5. Comfort conditions
6. House functioning
7. Communication and social awareness
8. Urban design, transportation and affordability
9. Sustainability
10. Innovation

In the 18 month long designing process, the teams interact with various industry leaders and conduct a multitude of events to raise awareness about renewable energy and energy efficiency. The teams will construct the houses on their own premises, disassemble them and transport them to France where the final phase of the competition, a two week exhibition typically with more than 300,000 visitors, will take place. The site for the SDE 2014 is on the grounds of the famous Palace of Versailles, featuring 41 universities from 16 nations.





..named Shunya to reiterate the goal of a zero-energy house, became the first team from India to ever be selected in the Solar Decathlon, whose previous participants include MIT, Purdue, Cornell, CMU and TU Darmstadt among others.



IIT Bombay and Academy of Architecture joined hands in November 2012 to form interdisciplinary teams of architects and engineers working hand-in-hand to find the perfect synergy for our house. The team, named Shunya to reiterate the goal of a zero-energy house, became the first team from India to ever be selected in the Solar Decathlon, whose previous participants include MIT, Purdue, Cornell, CMU and TU Darmstadt among others. Our team consists of over 70 students and has received constant

involvement and support from faculty and authorities of both institutes. The entire project is a largely student-driven initiative, with faculty members and institute authorities providing guidance in key matters.

Since its selection, the team has made significant progress in the design and engineering of the house. To be able to justify the decision to create a house for the Indian middle class, a large number of decisions were made to ensure that the house appeals to the sensibilities of the widest range of Indian home owners. This has also been balanced with the need for staying within the stringent rules and standards imposed by the competition. An active attempt has been made to provide as much functionality as possible at the lowest cost while staying within the competition limits.

The house has a 70 square meter floor area. In order to truly promote sustainable living at an affordable price, the team has provided



for 6 people to be accommodated in a relatively small area. This economy in space helps offset the fixed land and material costs per head. With the use of multi-functional spaces and modular furniture, the comfort and functionality the house provides to its residents has been maximized.

The house is based around a load bearing steel frame, with insulated wall panels that interlock easily to significantly reduce the construction time as compared to a conventional concrete house. The materials have been chosen to have the least energy and environmental impact, yet be affordable and acceptable in the Indian context. The overall aesthetics of the house creates a balance between elements of traditional Indian culture and modern themes that clearly depict the 'green'-ness of the home.

Passive solar architecture is another central design tenet. By reducing the requirement for artificial thermal and lighting control as far as possible, the cost can also be brought down. Scientific principles from Vastu Shastra have also been employed for arriving at the spatial arrangement of various rooms according to the time of the day.

The house has 5 kw solar PV panels, but is also connected to the grid. Using a PVT system, the hot water requirements of the house will also be met from the same panels. An innovative air-conditioning system

The construction of the house is expected to begin in October 2013. The final competition is scheduled in June-July 2014.



will control the temperature and air quality. Other innovations include the use of a durable light-weight steel frame, a novel solar powered oven and a smart home energy management system, all developed in-house. The home energy management system will also match the PV generation with grid peaks to minimize the peak load on the grid. It would also provide the owners the opportunity to control the appliances through a simple application run on their cell phones or tablet devices. These measures will work together to create a net-zero energy house, that supplies more to the grid than it draws.

The construction of the house is expected to begin in October 2013. The final competi-





tion is scheduled in June-July 2014. A site has already been allocated to the team on the IIT campus. The house will be shipped to the final competition in the month of April. A contingent of 30 students and faculty from the two institutes will spend a month in France during the final phase of the competition, showcasing the house to the local population and various members of the industry and media.

Apart from the construction of the house, the team is also engaging in awareness activities to promote sustainable construction in India. These include a website, social media platforms, lectures, workshops, and active participation in various conferences. The

team is looking to academia and industry to provide assistance to successfully accomplish its mission. ●



## Tearing up Nonsense

*Grumblebee*

*Readers of past issues of Fundamatics may remember Grumblebee's rantings about MGPL – Madam G's Private Limited – a private estate where the dramatis personae are all assigned a task in which they have to bungle. And when they bungle – which they do with unfailing regularity – they are all promoted and given other jobs which they can bungle up all over again. In past issues, Grumblebee has reported on bungling around the JEE Huzoor scam, by Uphill Cymbal, Coalgate scam and the Vadra-danti scam by Raabert. P Chillum Humdrum, Shudder Jowar, Pepsodent Prefab Musterjee, Uphill Cymbal, Jari Rummage, A Roger, S Calorie-Muddy, Menace Tawry, Salmon Cursed-it and a few more are the bunglers led by a blue-turbaned, remote-controlled, head nodding CoE – Chief of Estate. In this episode narrated by Grumblebee, we see how Madam G continues her tryst with environmental issues in an effort to save the estate from a hostile takeover by a saffron T-shirt, khakhi short wearing Marauder Moody.*

*Fundabees*

All the estate employees of MGPL – collectively known as the Cabaret – had assembled at 10, Warpath, official residence of Madam G.

"Gentlemen!" Madam G started. "By the way, I am the only person in the world who

Dig-my-grave Singh keeps opening his mouth every two minutes to change his feet. Our very own CoE has made files disappear and has brought the focus back on Coalgate over Echo Vadra-danti. Our farm manager Shudder Jowar has made onions disappear. CFO P Chillum Humdrum has started a "race for 100" between an onion, petrol and dollar.



still calls you gentlemen. I have called you all to make an important announcement."

The cabaret listened silently in anticipation.

"Firstly, I must compliment all of you."

Madam G continued. "You all are top-class bunglers and have indulged in some top-class bungling. Sawan Kumar Dunce-al bungled with the estate's trains. Lawyer Sushwini-kumaar bungled while correcting some typos in the CBI report. Dig-my-grave Singh keeps opening his mouth every two minutes to change his feet. Our very own CoE has made files disappear and has brought the focus back on Coalgate over Echo Vadra-danti. Our farm manager Shudder Jowar has made

onions disappear. CFO P Chillum Humdrum has started a “race for 100” between an onion, petrol and dollar. But alas....!”

“Alas what madam?” telephone operator Uphill Cymbal questioned.

“Think! Think!” Madam G continued with what sounded like a cruel instruction – asking the cabaret to actually think. “Have you gentlemen (argh, I did it again!) ever thought why Fundamatics has stopped

Just pass a bill. A law, for heaven's sake. Just pass a law that all crooks will get a gold medal from now onwards. That way, you'll all get gold medals, see?



featuring us? They featured us last when we launched the herbal toothpaste Vadradanti. After that, despite a series of top class bunglings, the bees have not approached us. Not even for ads or subscriptions, leave alone a lead story. That's because they like to focus on stories that have an ecological angle. The beehive is full of environmentalists.”

“Ma'am, you're right!” TV repairman Menace Tawry piped in. “I called them to tell them that when I speak, I generate a lot of biogas that can fill their pages. But they somehow find my gas to be toxic.”

“But Ma'am,” CFO P Chillum Humdrum chimed in. “I heard that the next issue of Fundamatics is focused on economy. And I have bungled the estate's economy big time with my race-for-100. So why don't they feature me?”

“Chillum, you're too educated to understand some rustic wisdom,” Madam G answered. “Economy is out. Ecology is in. But worry not gent.....er.....men. I have a plan. A fool-

proof plan. No, I don't mean a cabaret-proof plan. Foolproof does not refer to us this one time. My plan is to first change the CoE. Present CoE nods well, but he's getting old, his nod is getting slow and the batteries on my remote are wearing out. I cannot recharge the batteries because there is no power. There is no power because we gave it away free and we do not have gas or coal to generate more power.”

“So here's my plan” she continued. “I want to appoint Rollback Aandhi as the next CoE. I already appointed Rollback as our Vice President as you all know.”

“Ma'am”, Uphill Cymbal interjected. “We had one wise man and he's already the President. Do we have another wise man who will become the wise president?”

Madam G was aghast. “I said vice president, not wise president. Rollback will preside over all our vices. Present CoE is a goody goody man who just knows how to nod.” CoE, blue turban and all, started nodding as Madam G pressed the remote.

“But what does Rollback have to do with ecology?” Jerry Rummage asked. “After all, he's not world-class faculty at IITB...”

Madam G's icy stare froze Jerry in his tracks. “Here's the plan,” she thundered. “You all have to pass a bill in the Shok Sabha.”

“But Madam!” Shudder Jowar spoke. “We are not used to paying any bills. I do not even pay for cricket match tickets that my constituency people watch. In fact....”

Madam G turned on the ice again. “I am not asking you to pay bills. Just pass a bill. A law, for heaven's sake. Just pass a law that all crooks will get a gold medal from now onwards. That way, you'll all get gold medals, see?”

“What has that got to do with Rollback

and ecology and Fundamatics? We all have enough gold stashed away in the bank neighbouring yours in Switzerland.” CFO P Chillum Humdrum countered.

“Listen to the whole plan,” Madam G answered icy countenance and all. “You all call me the ice maiden but Fundamatics walked away with its maiden ICE awards. They are ecologists, whatever that means. They say that by printing emails, we are wasting paper and a forest. A jungle. No

He will tear up all the papers  
that you junglees will print. He  
will say “nonsense” and “tear  
the paper” with lot of aplomb  
while hiding in a beard that’s  
eco friendly. Get it?



wonder one of their own founded junglees.com. So, in order to make an ecological statement, we should tear up papers. First, you all pass a bill and print the bill on lots of papers. If you cannot pass the bill, pass an ordinary-sense and print the ordinary-sense on lots of papers. And then.....”

“Then what?” the entire cabaret rose up to ask while dancing a bhangra.

“Then....” Madam G continued with a sinister smile. “Then, Rollback will walk into a press conference that Ajay Makhan will convene. Rollback will convert an ordinary-sense to nonsense. He will tear up all the papers that you junglees will print. He will say “nonsense” and “tear the paper” with lot of aplomb while hiding in a beard that’s eco friendly. Get it? By the way, I’ve printed these instructions on lots of paper that you’ve all been given. I forbid you to tear up this.”

“But what happens to our dear CoE and his head nodding?” This question was from

CFO P Chillum Humdrum who dreamt of being CoE.

Madam G broke into a raucous laughter. “I am sending him away across 7 seas to meet a Sharif Badmaash in Oh-mama land and nod away while Rollback tears papers and CoE’s future into a dynastic submission. I own a football team that scores self-goals. See, how I created 2 regions within my own estate. Regions named Naach-gaana and Seema Bhindra? Rollback will roll back anything the CoE says. Not that CoE says or speaks. I have programmed him to just nod.”

The cabaret broke into a cabaret dance and sang,

G-ya (G=madam G) tu, ab to aaja

Cola pee le, aag bujha jaa.

(Sonika, oh my darling, Sonika, oh my darling)

Tan ki jwaala thandi ho jaaye, aise gale laga jaa

Dil bhi kala, coal bhi kala, India buja ja, buja ja, buja ja..

Nonsense Zindabad. ●

# **The Billionaire's Apprentice:** *The Rise of the Indian-American Elite and the Fall of the Galleon Hedge Fund*

**Author, Anita Raghavan,**

**Book Review by Pradeep Anand**



I knew that the book would not have a surprise ending. I knew that Raj Rajaratnam and Rajat Gupta would be found guilty and be sentenced to jail terms. Yet, I had to read the book. And when I embarked on this reading journey,

Anita Raghavan's writing was so compelling, brisk and riveting that I couldn't put the book down.

There were also many personal hurdles that could have prevented me from reading and finishing the book. Firstly, I wasn't pleased that an Indian icon's reputation was being dragged through the muck and destroyed. Additionally, Gupta and I had common friends, and our families had met a few times, until fifteen years ago.

Also, I knew many other members of the book's cast of characters, especially those who received their undergraduate degrees, like me, from an Indian Institute of Technology (IIT). I wasn't pleased that one of them had copped a plea.

Yet, *The Billionaire's Apprentice: The Rise of The Indian-American Elite and The Fall of The Galleon Hedge Fund* by Anita

Raghavan (512 pages) kept my attention and interest throughout the reading expedition. Ms. Raghavan has an eye for details that I enjoyed. She also avoided dime store psychology to provide "insights" into the players—she just laid out the meticulous minutiae in a "just-the-facts-ma'am" manner. The reader be the judge and the jury. The book documented a business tragedy in a journalistic way. However, a reader, who chose to delve, could conjure images, parallels and lessons, even a screenplay.

First and foremost the book has drama.

At the center is a bright but boorish seducer of Sri Lankan birth, who has an aura of financial success that makes him larger than life. His success was due in part to his Wharton/Silicon Valley/South Asian network that he "played" for insider information at publicly traded companies.

On the sidelines is a persevering star, who propels himself out of humble and orphaned beginnings, and shines and sparkles as he crosses oceans and continents, only to fall ignominiously. While reading the book, Greek and Shakespearean tragic images can be invoked. The Great Gatsby may also come to mind.

However, this reader recalled The Mahabharat. Central to that epic is Yudhishtira, the eldest of the Pandava clan, who was also

known as Dharmaraj—loosely translated into the “Righteous King” or “King of Dharma”. Yudhishtira, the novice, is drawn into a game of dice by Shakuni, the expert. Dharmaraj gambles away and loses his entire kingdom in a single game. In addition, he, his brothers and family are forced to a thirteen year exile. (They do return and are victorious after a battle at Kurukshetra; but, in this context, that sequel has to come.)

The book has minor characters who are very intelligent but possess a common flaw—these bright people believe that they should be richer, their net worth larger, comparable to the wealth of people of equal acumen. It was a flaw that any modern Shakuni could exploit.

Add to this brew of frail human traits more ingredients: ego, greed and frayed integrity. Spark it with rising market tides and you have a dramatic crucible for schemes that go splendidly for a while, and then abruptly and explosively go awry, when the tide recedes. The persistent good guys from the SEC and the US Attorney's office come in to clean up after the party is over. And then there is the role of chance and diligence. A pull at what seems to be a weak thread that, when pursued diligently, unravels a ball of chicanery, tied to insider information. These Modern Untouchables were dogged and meticulous in their pursuit, seeking those decisive informational pearls in a vast ocean of data.

The drama ends in a courtroom battle, followed by sentencing, and the accompanying shocked agony of family and friends.

There are other tugs at emotional strings: destroying the sanctity and joy of every future Diwali (similar to Christmas) celebration, which would be remembered as the day of arrest; the deep sense of responsibility that

the oldest son of an orphaned family has for his younger siblings; the empathy and sympathy for the emotionally distraught families; the immigrant's pain in being rejected in corporate America; the humiliation of being found guilty, with the family in the gallery; the irony of Preet Bharara (US Attorney, Southern District of New York) visiting Harvard Business School to lecture on white-collar crime, with one of Gupta's daughters in the class; and many more.

Besides the human drama, this tragedy is another lesson in how much successful executives, caught in the euphoria of triumphs in the market, underestimate the role of uncontrollable factors in their achievements. Two uncontrollable factors affected Galleon, its principals and partners.

The first was growth trends in the technology sector in the 1990s. As is the nature of trends, this growth was accompanied by two abrupt decelerations—one, with the bursting of the dotcom bubble, and, two, due to the stock market meltdown that began in 2007 and persisted until 2009. Bubbles create blindness to alternate scenarios, especially to markets regressing to the mean.

The second uncontrollable factor was government regulation. In 2000, the SEC passed a rule called Regulation FD. This rule required publicly traded companies to disclose material information publicly to everyone. Before Regulation FD, large investors, like hedge funds, got a competitive edge because companies could provide information to select investors and analysts.

But, after Regulation FD was passed, that edge disappeared. Hedge funds—about eight thousand exist today—had a hard time in creating market-beating strategies that could be protected from competitors and not replicated. Unsurprisingly, these funds, as a group,



have underperformed the market for nine out of the past ten years.

When uncontrollable factors overpower an industry, there is some backlash of illegal activities to maintain performance standards. Ponzi schemes are well known examples of such fraud—Bernie Madoff, Alan Stanford and many others have succumbed to them. Add “seeking insider information” and Rajaratnam to that list. Gupta was caught in the net of an elaborate trap set by the SEC, meant for this bigger fish named Rajaratnam.

The book drove home another lesson. This one goes back to a key tenet from McKinsey’s own Waterman and Peters, *In Search of Excellence: Stick to your Knitting*. In this case, many players moved out of their comfort zones, crossed legal lines of integrity, and were judged by precedence in their new environment. As Federal Judge Jed S. Rakoff said, “The annals of white-collar crime in this district are filled with people who wanted to make themselves respected, powerful members of society by giving to charity.” In a similar situation, on familiar turfs, where “giving to charity” was not viewed with such suspicion, Gupta’s global altruism, perhaps, would have permitted more character witnesses.

Finally, the majority of the pursuers and the pursued are of “South Asian” descent. Therefore, the book has substantial “South Asian” content. To a majority of American readers, South Asia is a generic name for the sub-Himalayan region that includes Bangladesh, Bhutan, India, Maldives Nepal and Sri Lanka. For students of South Asia and the Indian Diaspora, Ms. Raghavan sprinkles ethnic and cultural insights throughout the book. For example, she highlights the appreciation of quality of education these fine people received at the best of schools and colleges in India and the US. IIT and IITians

feature prominently in the book.

After I was done with the book, I was left with the question: Why do people cross that fine line that separates ethical and unethical pursuit of money and wealth?

I found an insight in recent research done by Francesca Gino of Harvard Business School and Adam D. Galinsky of Northwestern University’s Kellogg School. They concluded that when people feel psychologically close to someone who behaves selfishly, they are more likely to consider the behavior to be less shame-worthy and less unethical.

Like parents often warn their children: Be careful about the company you keep. ●



*Pradeep Anand*

*Pradeep Anand is president of Seeta Resources, [www.seeta.com](http://www.seeta.com), a consulting firm that helps business leaders accelerate their firms’ growth. He is the author of *An Indian in Cowboy Country: Stories from an Immigrant’s Life*.*

# Mission & Vision Of IIT Bombay:

## A Commentary

**Authors: Alankar Jain, Anudeep S, Chirag Chadha, MS  
Krishna Deepak, Ramya Polineni, Vishal Singh**

*A good way to regularly feature student insights into the IIT Bombay community is to peep into InslghT.*

*InslghT is the student's media body of IIT Bombay. Established in 1997, InslghT in its 16th year continues to report, write and provoke thought on the issues relevant to the student community here. To reach campus news, visit [www.insightiitb.org](http://www.insightiitb.org) or follow us on [www.facebook.com/insight.iitbombay](http://www.facebook.com/insight.iitbombay)*

*For suggestions or subscription, you may write to the Chief Editors at [insight@iitb.ac.in](mailto:insight@iitb.ac.in)*

*Hope you enjoy reading!*

*Anubhav Mangal, Suman Rao*

The official Mission & Vision (M&V) statement of IIT Bombay states: “The Vision of IIT Bombay is to be the fountainhead of new ideas and of innovators in technology and science. Its Mission is to create an ambience in which new ideas and creativity flourish and from which research and scholarship and leaders and innovators of tomorrow emerge.” The problems that face IIT Bombay in the realization of this M&V, such as infrastructure hassles and slow policy making, are being tackled in a number of articles in the current print issue and will be the subject matter of some future InslghT articles. In this commentary, we shall discuss how the institute has sought to fulfill its M&V over

Providing world-class education to Indian students can itself be looked upon as national service and is something that makes IITs institutes of national importance.



the course of its long and turbulent history, despite the changing trajectory of the institute right from its inception, not taking into account the various challenges that have and continue to face our institute.

### *How was IIT Bombay set up?*

Even before India attained independence, a high-power committee of the Govt. of India instituted in 1946 recommended the establishment of four higher institutes of technology, to be named the “Indian Institutes Of Technology” or IITs, of the level of their counterparts in Europe and United States in order to set the direction for the development of technical education in the country. These institutes were designed to provide the necessary dynamism and flexibility of organization in the light of expanding knowledge and changing socio-economic requirements of modern society. It was envisioned that graduates from the IITs shall help to inculcate



scientific temper and inquisitiveness in the minds of the then, largely illiterate masses. It was felt that an urgent requirement of quality engineers and technologists was to take up activities of nation building. Planning for the Institute at Bombay began in 1957 and the first batch of 100 students was admitted in 1958. In 1961, by an act of Parliament, the Institute was declared an “institute of national importance” and was accorded the status of a university with the power to award its own degrees and diplomas. IIT Bombay was established with the cooperation and participation of the UNESCO, utilizing the contribution of the Govt. of USSR.

### *Brand IIT and the middle class Indian dream*

IIT Alumni get great respect from their peers, academia and industry. The “IIT brand” was reaffirmed when the United States House of Representatives passed a resolution honouring Indian Americans and especially graduates of IIT for their contributions to American society. The post 1990s era has seen the trend of brain drain get reversed with hundreds of IIT graduates, who have pursued further studies in the USA, returning to India.

With the formation of 8 new IITs, increase in number of UG seats and change in pattern of the Joint Entrance Examination (JEE) from subjective to purely objective (keeping in mind the increased number of applicants), there has been din about dilution of the brand created by its illustrious alumni which has really taken IITs global. We feel it would be premature to say that and we should wait for the coming 20-30 years to see what the current batch of alumni does. Times have changed today and so have the needs of the country. There are a number of engineering colleges in the country today and very few IIT undergraduates (UGs) devote themselves to “nation building” in the way that was envisaged at the time of establishment of IITs. So, how do we interpret “institute of national importance” in the modern context? An Institute of National Importance is defined as one which serves as a pivotal player in developing highly skilled personnel within the specified region of the country/state. Going by the definition of the term, providing world-class education to Indian students can itself be looked upon as national service and is something that makes IITs institutes of national importance. With the number

and variety of opportunities in the institute, IIT Bombay continues to provide its students exposure to hone their skills in many fields, preparing them for diverse career opportunities. The Director, IIT Bombay feels that students should take up careers in areas that challenge and interest them. They should use their Education to take on bigger problems and contribute to the society in a meaningful way.

### *The Future*

Of late, there have been increasing efforts from the IIT Council to move IITs towards the US university model.

### *Diversity of Education*

Today, older IITs have a number of departments, schools and centers which offer degrees in disciplines other than pure sciences and engineering. For IIT Bombay, those include Department of Humanities and Social Sciences (HSS), Industrial Design Center (IDC) and Shailesh J Mehta School of Management (SJM SOM). We have been informed by the Director, IIT Bombay that work on introducing undergraduate programs by IDC and Dept. of HSS is at an advanced stage. When asked about slow growth in work on this front, the Director described our model of growth as an organic one, starting from existing faculty strengths. This is in contrast to other institutions where a new school may be started by attracting a number of senior established persons, usually by offering generous terms.

### *Focus on research*

There has been a marked increase in the intake of postgraduate (PG) students over these years. Starting off as a solely UG institute, today we have an equal number of UG and PG students. With number of citations per Professor being an important parameter

in determining world rankings of universities, there has been greater focus on research and development activities in the institute. That is reflective of and also sets the trend in the country as a whole.

### *Recent developments*

The council of the Indian Institutes of Technology (IITs) has decided to focus on branding and marketing IITs in India and abroad, and engage with global ranking agencies to improve the standing of the schools. IITs have agreed to be accredited by the National Accreditation Board (NAB), albeit in their own different way. NAB accreditation is essential for India to be part of the Washington Accord that allows smooth student mobility from Indian engineering institutes to foreign institutes and vice-versa. It also makes Indian engineering degrees equivalent to foreign ones, helps institutes foster better ties in research, curricula and sharing of resources, and also improves a country's image in the higher education league table.

### *Conclusion*

It is clear that IITs are moving towards the more holistic US university model. While that would be a natural extension and the most appropriate next step in India's journey of Higher Education, we feel that we need to do more as a nation. A national dialogue to assess the needs of the country as a whole is the need of the hour, so that we can tweak our programs accordingly and don't end up imitating the West blindly. ●

# Heart of a Teenager

*Arun Kaul*

A few days ago, my wife said to me, “You are a teenager at heart.”

I could not decide whether to feel insulted or complimented.

What do we think when we think of teenagers?

They are careless and irresponsible. They are self-centred, focussed entirely on themselves. They cannot think beyond today. They want everything, now. They will not respect others but want their own opinions to be taken absolutely seriously, whenever they care to give them. They are ignorant about the facts of life and ways of the world, but are convinced that they know everything. They are moody, untidy, and loud. The list can go on and on.

On the other hand, teenagers are enthusiastic about whatever they are engaged in. They are curious. They are ready to accept anything new that they come across. In fact, they expect and want change all the time and would be bored if it did not happen. They are always experimenting with new clothes and new gadgets, with new friends and relationships. Give a teenager a new mobile phone and see. He will immediately get absorbed in it and by the same evening, he will know everything about its features, its applications, its merits and demerits, and everything else that can be known about it. He will have

read its manual, talked to his friends about it and looked it up on the internet. Your typical teenager, in short, is a person who lives fully in this world and is ready to take it on with all its capriciousness.

I decided, therefore, that on the whole, I should take that remark about having the heart of a teenager as a compliment.

This incident set me thinking, however. Youth, per se, is a highly sought after state. Everybody is trying to figure out the secret of eternal youth. There’s a gazillions of rupees worth of industry out there selling the dream of an ever young body to whoever will buy it. But what about a young mind? Apart from general advice to seniors to maintain an interest in something, try to cultivate a hobby, solve the Sunday crossword or Sudoku, not much is on offer. A youthful appearance is ephemeral, but a youthful mentality can live forever if we will it. It’s that mentality – of innocence, of enthusiasm, of creativity – that fosters happiness. And who doesn’t want to be happy!

So, out of all the attributes of a young mind (agility of thought processes, eagerness to learn, high degree of enthusiasm, a relative disregard of dangers leading to fearlessness, readiness to enjoy everything new) which aspect is the most significant? I feel that, without doubt, the top place goes to

their ready acceptance of change in this ever changing world; and again, without doubt, all the other qualities of youth enumerated above contribute to this. This aspect makes them absolutely comfortable in most situations they might find themselves in; and this is why they feel confident of being able to master any new gadget or trend in clothing or music and art.

Contrast that with our typical middle-aged manager in a large corporation or a typical housewife who have grown comfortable in their respective places in the world. They will take a sort of a pride in saying, “Oh! I can’t be bothered about these new-fangled ways of working with computers and internet and software and hardware. Give me the solid old system of ledgers and account-books. Let us have the good old attendance register and personal reports. Anyway, I can’t be expected to learn such things at my age. If you want me to make use of computers in my work, give me a computer operator also.”

Now, think coolly. Which would you rather be?

An ignorant, moody, selfish, shallow teenager with a brilliant flair for mastering the technology of today, with a heart full of enthusiasm and hope for tomorrow; or a worldly-wise, mature, well-informed man, a pillar of society but one who is constantly under threat of being replaced by a younger person, at home with the modern ways of communication.

How about a combination of the two?!

A wise, mature, well-informed person, as comfortable with his ledgers as with his computer. A guy on the go, with grey hair and an iPhone in his hand.

Is that possible?

Let us see.

What is the basic difference between a young man and an older one?

It’s age, of course.

Obvious, isn’t it?

No! It is not! It is the attitude.

A young person is young because he takes his youth for granted. He never thinks of his age as he takes on the world. Any change in life, whether social or technological or political is

‘Youth’ today does not symbolise breaking away from the ties of tradition, it rather stands for breaking down the barriers of several traditions, it symbolises reaching out, reaching beyond.



just another challenge and he knows that he must either surmount it or adapt himself to it. An old man, on the other hand, is too set in his ways. He knows what he knows and no one can tell him otherwise. He gives his age as an excuse for burying his head in sand or flaunts his age to end an argument.

Generation after generation the ‘youth’ has been seen as a group that is synonymous with change and revolution that must perhaps be resisted.

Yet, times have changed and so has the connotation of this word.

‘Youth’ today does not symbolise breaking away from the ties of tradition, it rather stands for breaking down the barriers of several traditions, it symbolises reaching out, reaching beyond. ‘Youth’ stands for a departure from prejudices of religion, caste and creed; it stands for knowledge, tolerance,



and, perhaps most importantly, freedom. Yet all said and done, is 'youth' only about a certain generation? Only about an age bracket? No, it is not so today. It has moved beyond this to become an attitude ... A state of mind.

Reflect.

What is the Secret of Eternal Youth?

The secret of youth is keeping a youthful attitude.

If the history of the planet is calculated as a 24-hour clock, Homo Sapiens emerged as the dominant species on our world barely a minute ago. After sluggish technical progress during eons of agrarian societies, the industrial revolution began, just a few seconds ago. According to this geologic clock, the Internet emerged less than a micro-second ago.



And the key to a youthful attitude is an easy acceptance of change.

Let us now see what change we are talking about.

As time passes, every life undergoes certain changes, some predictable and some unpredictable. But all need to be dealt with. What is more, everybody deals with them eventually, some do it cheerfully and others grudgingly.

You undergo change in your physical appearance. Gain some weight and wrinkles, lose some hair and elasticity of the skin.

Your social position changes. From being somebody's son or daughter, you change into husbands or wives to parents to grandparents as you grow older.

Your intellectual condition changes. From being ignorant to well-informed to learned.

Your financial position changes. From being dependants to self-sufficient to providers.

Your attitude changes. From eager to hopeful to satisfied or resigned.

Now you cannot control the change in your physical or chronological aspects, but all the other changes can be controlled if you resist the change in your attitude. With a youthful attitude you can positively enjoy all the other changes.

As long as you don't get stuck in a routine as you get older or pigeon hole yourself as a certain type of person, you are young. When you try new things, you'll be surprised to find that activities you were dreading, are actually fun. You can discover the surprising benefits of not acting your age.

Youthful people never lose their curiosity, joy or hope about life. They awaken with new determination on a regular basis with new vigor and a desire to live a good life. In essence, they keep the basic character of a child

If the history of the planet is calculated as a 24-hour clock, Homo Sapiens emerged as the dominant species on our world barely a minute ago. After sluggish technical progress during eons of agrarian societies, the industrial revolution began, just a few seconds ago. According to this geologic clock, the Internet emerged less than a micro-second ago. With so much changing so fast, no wonder so many of us suffer from future shock. No wonder we are so bewildered by the rapid changes all around us that we go into denial

and reject all change.

In today's world, people are in a desperate race with life trying to catch up with the rapidly changing reality. Most of them give up the race after pursuing it for a few years being content to step to the side of the track and join the spectators. Others refuse to acknowledge the race and go into their shells, giving up not only the challenges but also the fun of life. A few others, however, remain in the race right up to the end, enjoying it to the full.

Those with the "heart of a teenager".

On the whole, I am quite certain that what I received was definitely a compliment, not an insult.

*"Watch with glittering eyes the whole world around you because the greatest secrets are always hidden in the most unlikely places. Those who don't believe in magic will never find it."* - Roald Dahl ●



Arun Kaul

*Arun Kaul had to wait for his degree as an Aeronautical Engineer till '79, though he finished his engineering studies in '76, thanks to the dreaded Organic Chemistry course which he managed to clear only after three years of hard non-work. He could not convince the Institute that he need not know Organic Chemistry in order to make aeroplanes. He owns a 200 member strong Steel consultancy company with a client base from all over the world. Arun is remembered more for riding a horse to the lectures and parking it in the cycle shed. Many of his exploits are chronicled in the Madhouse book.*

# 40 years of “Innovation” in India

*Harshwardhan Gupta*

*This is a concluding part of an essay ( first part in 3Q2013 ) in which Harshwardhan Gupta takes a historical perspective on engineering innovation in India from his vantage point of being a consulting engineer-designer-innovator for the last 31 years. He points out that despite myriad tranquillising signs of industrial progress that we see today we are utterly and completely dependent on foreign companies, their technologies, machines and designs. Virtually nothing of their technologies, machines and their engineering designs are percolating fast enough into our own indigenous domain, as we simply haven't evolved mechanisms to do so. He deconstructs some of the existing myths, - that India is fast catching up with the world technologically; that India has given many inventions to the world, latest being jugaad. Or it is expensive to do R&D, that's why people copy. Even, India is too big for anyone to bring about any significant change rapidly to name a few. This is the concluding part of his essay*

*So why have we remained so technologically backward?*

After exploding some popular myths, let me list some little-known or ignored facts:

1. Most serious fact of all is the steady, widespread and invisible deskilling of our workforce. Today industry cannot find trained industrial workers, as most educated

*Socially we still look down upon a highly skilled engineering worker and look up at a graduate engineer working as a virtual clerk in a bank*



young people are not willing to work with machines. Simultaneously, the not-so-educated ones are also not willing to do the work of machines any more – like sweeping roads or washing utensils or recycling garbage or filling products off a running conveyor belt into shipping boxes. When people are made to do a menial task that is better done by a machine, they are obviously far less efficient than a machine, and by corollary de-motivated too.

2. Across the board, we stubbornly refuse to look at innovative automation until our house is on fire – I have the front-row seat on these scenes of despair! On one hand, capable engineering designers are far too few in India; and on the other hand, those who really need their contribution either really can't afford the costs of development any more, or (the majority) are way too cagey to risk their money (which they otherwise routinely pour into advertising and self-aggrandisement). Most don't have the stomach to persevere through the normal failure-punctuated devel-

opment cycle. It is an appalling situation, my individual success notwithstanding.

In the words of the great Dr. Raghunath Mashelkar (former DG, CSIR), “The ‘I’ in India does not stand for Innovation; it stands for Inhibition and Imitation!” How very true!

3. Thousands upon thousands of ordinary items, which we were (or still are) manufacturing in inefficient manual ways with increasingly lower quality, obsolete technology and designs (because of our obsession with cheapness), we are now importing them by container-loads from China and other eastern countries. Examples: Diwali diyas, rakhi components, bathroom tiles and fittings, sewing needles, small air compressors, all sorts of fasteners, small and large machine tools, telecom switches, household appliances, CFL light-bulbs, door latches, even paper-clips! The scale and extent of such imports is draining the remaining life out of indigenous manufacturers. The widespread kneejerk Indian response is to cut costs (and quality) even more brutally, akin to a losing athlete starving himself in hope of quickly shedding weight to be able to run faster.

4. Compared to other industrialised and industrialising nations, we remain extremely inefficient in terms of per-capita productivity. Our relative efficiency averages between 1/3 and 1/5 of the developed world’s average, and this is not improving. China exceeds the developed world’s average productivity – and this has been achieved by rapidly mechanising and automating thousands of manual tasks and skills.

Many multinational brands, which have edged out Indian brands in various sectors, now get their manufacturing done wholly or partly in China. Many Indian brands are also getting lot of their manufacturing done

in China. China is low-cost because it is efficient!

5. We still primarily export raw materials and raw agro-produce, and regularly import high technology and machinery by millions of containers a year. This scenario has hardly changed in the last 65 years. Our Asian neighbours like Japan, South Korea, Taiwan, China, Malaysia, etc. have managed to reverse this scenario completely!

Our frenzied media and obstructing politicians still have no clue as to how China has brought about its present-day Great Leap Forward so quickly!



6. The policy stagnation and a born-again licence-permit Raj, through callously increasing layers of permissions and procedures, are again hindering all attempts at rapid technological advances via the private sector. Power, defence, transport, agriculture, infrastructure are all major sufferers.

Since our Governments cannot enforce laws effectively, they habitually counter this by creating more and more laws and rules. This is severely hindering any rapid technological development and making the entire industrial machinery even more inefficient.

7. In the developed world (including China), if an engineer needs to design and build a new kind of machine, he can design most of it with all sorts of bought-outs, go to a big departmental hardware store, fill his cart (or order stuff online and get it in 2-3 days), farm out the manufactured parts, get well-made parts in a few weeks without banging his head, put the machine together in a short time, and start testing and debugging his new



*Designed and made in China*

design!

In India, every such exercise everywhere in the country is an increasingly slower and uphill battle, to put it mildly. However innovative the designer is, he is hindered, delayed and short-changed at every step of this development cycle.

Two decades ago, you could buy good and increasingly better quality of all sorts of engineering bought-outs. Today you simply cannot find simple decent quality Made-in-India engineering items like plated fasteners, hand tools, hacksaw blades, circlips. This list is vast and growing. The foreign-brand invasion notwithstanding – we are actually becoming more and more backward industrially, transmogrifying from an independent to a dependent nation.

8. And lastly: Our frenzied media and obstructing politicians still have no clue as to how China has brought about its present-day Great Leap Forward so quickly!

Very unobtrusively, China has consistently sucked in thousands upon thousands of experts from all over the world (retired or otherwise) in each and every conceivable field right from microbiology to tyre design to rolling mill erection to glassblowing to rail track laying to servomotor design, to train its own highly motivated professionals despite



*Designed and made in India*

their severe language barrier!

Specifically, on one hand, China has zeroed in on retired / jobless experts in the declining industrialised countries of Europe and the Americas, and offered these experts very lucrative contracts with a pot of gold at the end of their tenure. Many Indians experts too are in China on similar assignments. On the other hand, China has sent its students out by the millions to every possible centre of technical learning in the west, academic or otherwise. These students invariably go back to China and join the Dragon.

Japan, South Korea and Taiwan did much the same thing earlier at a much smaller scale, and came out winners. We have already frittered away our chance of massively gaining technological prowess from the decline of the industrial nations.

Now, I proudly say here that a great many Indians count among world's most innovative doctors, surgeons, lawyers, businessmen, actors, artisans, soldiers, etc. However, the moment it comes to technological and machine-related innovation, we somehow drop to the bottom rung – so gross is our national disconnect with machinery and technology. We merely use the latest of global technologies and machines everywhere, but at 1/6 of the world population, we cannot



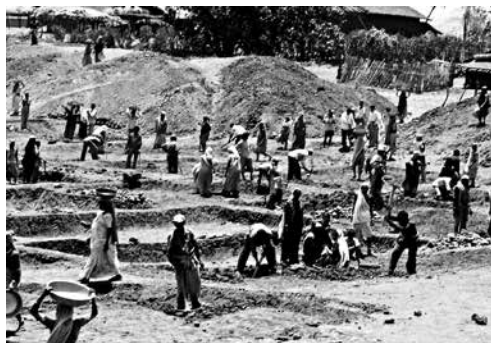
*Employment Generation in China*

create even a few of them.

I also proudly say that innovative changes for the better do happen everywhere in India in many spheres including technological. However, their scale always remains minuscule. Our real problem is that as a nation, we are collectively incapable of scaling up these betterments. If one municipality, school, industry, institution or an individual does something innovative, we repeatedly prove ourselves incapable of reproducing or scaling up that innovation. Betterment of any kind is now becoming slower and slower in India as the world around us progresses faster and faster.

Worse, we slowly let our gains go to seed. If something good of a large size makes its appearance on the Indian scene, it only takes a few short years before it all starts coming apart at the seams instead of getting even better with time. Look at the IRCTC, the private courier services, mass housing, urban infrastructure, BRTS, the Golden Quadrilateral, various Private-Public-Partnership projects, etc.

Nevertheless, we do scale up bad things extremely fast and efficiently: corruption, female foeticide, misuse of public utilities, stealing electricity, illegal mining, adulteration, dynasty politics, etc.



*Employment Generation in India*

It is sad that the vast majority of us, the people of India, remain perennially immersed in arguments, entertainment, ornamentation, media hype, self-aggrandisement, and remain completely immune to the vast amounts of filth, chaos, mediocrity and inefficiency. As one foreigner put it so graphically, “India is like an aircraft which is ready to take off, but never ever takes off.”

All of the above is already resulting in increasingly slower growth, and we are slowly becoming irrelevant in the world order. The editorial of *The Economist* of March 24th 2012 succinctly concludes, “A slower growing India will be more financially vulnerable, poorer, full of frustrated young people and taken less seriously by the rest of the world.”

### *What needs to be done?*

It is customary to end such a negative article with suggestions for change. So here are my suggestions for bringing about innovative, widespread and quick changes, knowing full well that innovative change in our country will always remain a case of way too little and way too late:

1. Learning to scale up good change quickly, by not procrastinating, not obstructing change for personal gains, ego or self-aggrandisement. Today, scaling up the change is



actually even more imperative than change itself.

2. Learning how to do something better and faster, rather than cheaper and more mediocre.

3. Working on education to make it shed irrelevant baggage and include various modern skills and civic sense (like garbage segregation, traffic civility, unambiguous communication). This lays the foundation of innovative minds flourishing in a healthy, clean, peaceful society.

4. Motivating and facilitating young people to learn about machinery and industrialisation, and to acquire skills to use, design and build advanced machines of all sorts.

5. Getting out of the jugaad mentality, as any jugaad solution can neither be scaled up, nor work reliably in the long run, nor make the practitioner (nor the society) any richer. For this, the entire nation's social mindset has to change.

6. Reducing our addiction to entertainment in various forms – Bollywood, TV, music, sports, social networking – as these have become habitual anaesthetics for our various pains.

7. Fixing our national habit of offering an instant argumentative explanation for every shortcoming or problem (big or small) as a necessary and sufficient response. Such defensive argumentativeness routinely pre-empts real solutions.

8. Stopping coining and playing with new words and phrases, and doing something real.

9. Bringing the media around to shift its interminable focus from politics, crime, sports and numbing entertainment, to skills, training, cleanliness, civic sense and promo-

tion of technology of the non-entertainment kind.

10. Having a re-look at our contagious optimism: this may sound cynical, but in reality, this has become poignantly true: From Satyamev Jayate (Truth always prevails), our de-facto national motto has become Sab theek ho jayega (Everything will be alright), implying that it will happen somehow and by itself. Unless we get seriously alarmed about our future being bleak, we will not change.

11. Lastly, learning to accept and comprehend criticism, and to quickly work on fixing the problem instead of instantly attacking the critic. In the land of Kabir, the latter has become our most predictable, all-pervasive national nature!

I rest my case. ●



Harshwardhan  
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# The Great Indian Soap Opera

*Gautam Saha*

How many of us Indians are not familiar with the sight of our wives raptly watching one of the numerous TV soap operas on offer in any of the Indian languages? Come dinner or supper time, the timing of our repast is carefully selected by the wife in order that her favourite TV soap opera will not be missed. Some housewives have even perfected the art of watching two or three favourite soap operas simultaneously by deft use of the remote, carefully skimming to some other channel when the ads are on.

Is this a picture of general contentment, when the lady of the house, after completing her mandatory chores, likes to relax and watch some TV just for distraction from the general ennui of life? Or is it true and pure entertainment? Just out of curiosity, I decided to also watch what my wife was watching with so much attention. Whatever be the language of broadcast, most of the soap operas fell into a general pattern.

Every soap opera has a wicked lady and an innocent childlike heroine, who is constantly harassed by the wicked lady. There is invariably a mother in law who overlooks all the virtues of the heroine (chaste bahu) and is blind to the machinations of the wicked lady. In the case of Rajasthani styled serials, very particularly, the matron lady calls the shots and hogs most of the dialogue. Various men are stationed across the tableau, like pieces of expensive furniture, who are just silent,

The serials drag on and on, well past their expiry dates, till the intelligent viewer is forced to switch over and out. The story goes round and about, since the producer and writer have no intention to cut it short and come quickly to the climax.



gaping spectators and have no role except to occasionally utter “yes of course, my dear”. Those of the men who have worked out diligently at the gym, wear tight shirts and very short sleeves so that the viewer is left in no doubt about the masculinity of the prize heroes. Most of them, though, well educated and endowed with many talents as per the script, are likewise caught flat footed when the bad guys call the shots. The serials drag on and on, well past their expiry dates, till the intelligent viewer is forced to switch over and out. The story goes round and about, since the producer and writer have no intention to cut it short and come quickly to the climax. Consequently, most of the highly popular soap operas have scores of climaxes, and scores of anticlimaxes, putting Robert Ludlum to shame, in the department of long haul stories, without proper beginnings, true middles, and authentic endings.

This brings us to another, perhaps more fundamental, question. What is it that makes the ladies watch and get hooked to the soap operas that much? Does it mean that ladies have the uncanny knack of seeing deep into the heart of the story, whereas men only see superficiality and get bored quickly? Does it mean that men lack the sensibilities and finesse to read into the artistic and altruistic content of what the storyteller has to say? Sadly, and unfortunately, no. The answer lies

Clever TV serial producers and *de rigueur* script writers know this very well. They know that it does not take much to 'better' the standards of the dull and boring husband. So why not give the bored womenfolk some celluloid tripe to take their minds off their highly depressing, dull and boring husbands?



closer to home and will be hurtful to some (husbands). Here goes...

Most men think that we are intelligent, charming, good conversationalists, well read, good story tellers, with excellent mannerisms and good breeding. Is it all true? Since women are more subtle than men, instead of actually calling us bores, dullards, boneheads, vain, deceitful, foolish, drunken bums and what have you, women, in their characteristic subtle way endowed by nature, just switch off from us, without actually being rude and calling us names. Instead, they turn on their make belief world of TV characters, however improbable or ridiculous those characters might be. Somebody's loss is someone else's gain.

Clever TV serial producers and *de rigueur* script writers know this very well. They know that it does not take much to 'better' the standards of the dull and boring husband. So why not give the bored womenfolk some celluloid tripe to take their minds off their highly depressing, dull and boring husbands? So that's it. The real reason lies closer to home.

Someone said, "no man is a hero to his wife". When a man tries to be a hero to his wife, he is aiming too high. He should probably contrive for the rest of his life not to appear dull witted or uninteresting to his wife, a truly daunting prospect of Herculean proportions. For, as they say, familiarity breeds contempt. As for TV serial producers, they are merrily making profit from the discomfiture of dull or awkward husbands, and laughing all the way to the bank. It is the husbands' customary dullness or lack of imaginative companionship that has spawned the great Indian soap opera industry. ●



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# Creative Bees at Fundamatics

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## eZine



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