

R.B.R. Kale Memorial Lecture

Innovation Economy: The Indian Challenge and Opportunity

by

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It is a great privilege to deliver this prestigious R.B.R. Kale Memorial Lecture. I am truly honoured to be amongst you today in Gokhale Institute of Politics and Economics, a world class institution, which is not only pride of Pune but pride of India. This institute has not only been a centre of excellence in education and research but it has been a great thought leader right from its inception. Its founders will have every reason to be very proud to see its momentous journey so far.

I feel particularly humble when I see that this memorial lecture series, which was started in 1937, has had people of great eminence ranging from Babasaheb Ambedkar to C.D. Deshmukh, from Dr. Man Mohan Singh to Jagdish Bhagwati give this prestigious lecture.

I also feel specially honoured because I appear to be the only other scientist – besides my friend Vasant Gowariker - to speak in this lecture series over the past seventy five years.

I have been doing science and leading science in India. I firmly believe that science must ultimately make economic sense. It is rather a coincidence that yesterday I had the honour of giving the evening lecture in the Annual General meeting of Indian National Science Academy, primarily to a gathering of leading scientists. The title of my talk was 'Whither Science Led Innovation?'. It is a coincidence that within 24 hours, I am speaking to a gathering of eminent economists on the subject of 'Economics of Innovation.'

I remember giving the Dr. C.D. Deshmukh Memorial Lecture on 14th January 1999 in India International

Centre in New Delhi. It was titled as "Economics of Knowledge". Research converts money into knowledge. But it is innovation that converts knowledge into money. Today's lecture, which deals with economics of innovation at Gokhale Institute is, therefore, a most logical sequel to my Dr. C.D. Deshmukh Memorial Lecture delivered 13 years ago.

Innovation Led Economic Growth

Joseph Schumpeter with his classic 1942 book *Capitalism, Socialism and Democracy* laid down the fundamentals of innovation economics. Subsequently Solow's (1957) seminal work that brought to us the discovery of the importance of the 'residual' in aggregate productivity growth and Nelson' (1959) and Arrow's (1962) influential papers on the economics of knowledge creation brought further insights.

It is well accepted today that innovation leads to economic growth and development. Added economic value gets created when through the process of innovation, new products are introduced into the market, production processes and organizational practices are redesigned, and so on. Competitive advantage is created by firms and nations through innovation. Creating, diffusing and sustaining innovation is playing an increasingly strategic role in national strategies now.

There is an empirical evidence worldwide to show a positive link between technological innovation and economic performance. U.S. has gained a disproportionate share of the world's wealth through their aggressive pursuit of technological change, demonstrating

that technological innovation is a central catalyst of their steady economic performance.

Conventional Economics & Innovation Economics

Let us get some fundamentals right first. Innovation economics reformulates the conventional economics theory so that knowledge, technology, entrepreneurship, and innovation are at the center rather than at the periphery. Previously, they were being looked at as independent forces that were largely unaffected by policy. Not any more so. Innovation economists look at the central goal of economic policy to be able to spur higher productivity through greater innovation. This also means that markets relying on input resources and price signals alone will not always be as effective in higher economic growth, which is fuelled by higher productivity. This is in sharp contrast to the two other conventional economic doctrines, neoclassical economics and Keynesian economics.

The focus in neoclassical economics on studying how societies use scarce resources to produce valuable commodities and distribute them among different people. On the other hand, the focus in innovation economics is on the study of how societies create new forms of production, products, and business models to expand wealth and quality of life.

Neoclassical economics is focused on getting the price signals right to maximize the efficient allocation of scarce resources. On the other hand, innovation economics is focused on spurring economic actors – from the

individual, to the firm, to cities, and even an entire nation – to be more productive and innovative.

Global Challenge: Inequality of Access

The “Base of the Pyramid” comprises 2.6 billion people worldwide – a majority of whom live in Asia and Africa - subsisting on less than US \$ 2 a day (PPP). People need access to essential services, be they education, health, financial services, communication and so on. Then only can they achieve the basic level of human empowerment. Then only can they participate in economic development productively. Presently BoP members are not just excluded from the *benefits* of economic growth, but also from the *ability to contribute* to it.

A well-designed inclusive growth agenda must address both well-being and human empowerment. Perceived injustices breed social upheaval, as in evident from the recent developments in the Middle East, Thailand, and lower-level disruptions all across the globe.

As emerging economies continue to design special policies and programs that focus directly on the needs of the economically excluded, they cannot simply wait for a “rising tide to lift all boats” while addressing income inequality exclusively through standard policy levers like tax and transfer mechanisms, subsidies, welfare and entitlements, and standard economic development practices focused on competitiveness. Those initiatives are unquestionably important. But an agenda which also facilitates the

provision of access to essential goods and services at affordable prices and increases the purchasing power of the BoP will better enable this segment to participate economically, and will reduce the challenge of income inequality by making the daily experience of those with lower incomes more like that of the well-to-do.

How can we achieve these three objectives simultaneously and rapidly. First, improves access to essential services. Second, increase the purchasing power. And third, also reduce the income inequality. There is a magic answer to this. Create access equality despite the income inequality. And how? By using inclusive innovation.

It must be emphasized that inclusive innovation forces us to measure opportunity by the *ends* of innovation—what people actually get to enjoy—as opposed to just an *increase in their means*. In important ways, this rationale invokes a return to the traditional case for innovation—its ability to produce break-through improvements in the quality of life—alongside the usual objective of competitiveness.

Inclusive Innovation Strategy

Let us understand the concept of inclusive innovation clearly.

Inclusive innovation is any innovation that leads to affordable access of quality goods and services creating livelihood opportunities for the excluded population, primarily at the base of the pyramid, and on a long term sustainable basis with a significant outreach

First, the term 'any innovation'. The innovation can be technology led or it could be non-technological, or it can be a combination of both.

A typical example of technology led innovation is the lowest cost refrigerator (\$69) ChhotuKool, which does away with the use of conventional technology involving a compressor and uses a cooling chip and a fan similar to that used in computers. This is a clear case of using 'disruptive' rather than using an 'incremental' technology innovation. As we will see later, for shifting the price performance envelope radically, it is often times the 'disruptive' rather than 'incremental' innovation that one needs to resort to.

The examples of non-technological innovations include business process innovation (e.g. low cost telecom service providers) or workflow innovation, (such as in low cost cataract surgery or low cost heart surgery

It could be a combination of technological and non-technical innovation. The Indian telecom revolution of low cost mobile services, came about due to a business process innovation done by the Indian telecom service providers. However, it was the technological innovation producing handsets at the price point of \$ 20 - \$ 30 by the leading telecom companies (such as Nokia, for instance) that led to an 'affordable access' to a handset. In, other words, in this case, the 'affordable access' to a handset was provided through a 'technological innovation' and 'affordable access' to low cost telephone calls was provided through a 'non-technological' business process innovation. One without the other would

not have worked for the consumer, but the combination worked.

Key Characteristics of Inclusive Innovation

There are five key characteristics of inclusive innovation.

The first characteristic is that of 'affordable access'. The affordability will depend upon where exactly the individuals are placed in the economic pyramid. If 2.6 billion people in the world are earning less than \$2 a day, then one can imagine that the goods and services cannot be just 'low cost' but 'ultra low cost'.

Such inclusive innovation will have to be aimed at 'extreme reduction' in both the costs of production as well as the distribution. Here are some examples of 'extreme reduction'.

- Can we make a Hepatitis-B vaccine priced at US\$20 per dose available at a price that is 40 times less?
- Can we make an artificial foot priced at US\$10,000 available at a price that is 300 times less?
- Can we make a high quality cataract eye surgery available, not at US\$3,000, but a price that is 100 times less?
- Can we make an ECG machine available, not at US\$10,000 but a price that is 20 times lower?

Incredible as it may sound, all such 'extreme reduction' targets have been met.

The second characteristic is about the inclusive innovation working on a 'sustainable basis'. This means that in the long term, the 'affordable access' must not depend on the government subsidies or generous government procurement support systems but should work by retaining the market principles with which the private sector works comfortably.

The third characteristic has to do with 'quality goods and services and livelihood opportunities.

'Quality', because we have to recognize the basic rights of the people at the base of the pyramid, who should be enjoying the more or less the same level of quality of basic services as people at the top of the pyramid.

The objective of a truly inclusive type of innovation, therefore, would not be just to produce low performance, cheap knock-off versions of rich country technologies so that they can be marketed to poor people. That is getting 'less for less'. Inclusive innovation gets 'more from less'. This will mean that we will have to harness truly sophisticated science or technology or truly creative non-technological innovation to invent, design, produce and distribute reach price-performance envelope that leads to quality goods and services that are affordable for the majority of the people.

Coexistence of low price and high quality may appear as a contradiction in terms. But there are a number of examples of this being achieved. For example, India's Aravind Eyecare Hospital performs ultra-low cost cataract

surgeries with quality that measures up to international benchmarks by making more efficient use of scarce (and highly-paid) surgeons: rather than having a surgeon perform the entire surgery, each medical personnel performs a specific task during the operation. Similar workflow innovations have been applied to perform low-cost open-heart surgeries (at a cost of US\$3,000) at the Narayana Hrudayalaya Hospital in Bangalore with success rates that match their western counterparts.

The fourth characteristic is the access to the excluded population, primarily at the base of the pyramid. The excluded population could include the poor, the disabled, the migrants, the women, the elderly, certain ethnic group, and so on.

The fifth characteristics is 'significant outreach'. If the 'true inclusion' has to happen then the benefits of inclusive innovation should reach a large scale, i.e. a significant portion of population, and not just a small section of the population. (in many cases, the total target population may only be a few hundreds of thousands or a few million- and not necessarily hundreds of million- e.g. psoriasis patients or premature babies)

Advantage India in Inclusive Innovation

As the title of my lecture suggests, I am going to look at what special challenge and opportunity that we in India have in this space of innovation economics. Innovation that drives inclusion, and through that accelerated inclusive growth and economic development.

I and late C.K. Prahalad wrote a paper titled 'Innovation's Holy Grail' in Harvard Business Review in the July-August 2010 issue. Unfortunately, this turned out to be the last paper the legendary CK, as we fondly called him, wrote. There we discussed how the combination of scarcity and aspiration had helped India develop its own brand of innovation – getting more from less for more people – not just for more profit. This was called the MLM paradigm, i.e. 'More from Less for More'. This paper provoked world wide discussion and debate. In fact only six months later the paper was published in HBR, the World Economic Forum had a special session on 'More from Less for More' on 16 November 2010! And there have been many more since then.

In this paper, we had first analysed the contextual factors that had undoubtedly facilitated the growth of Indian inclusive innovation. Let us examine these in some detail.

First, the country's political leaders experimented with socialism for more than four decades, which kept out foreign capital and technologies, but spurred local innovation. Indian engineers, backed by government funding, developed some of the lowest cost nuclear weapons, rockets, imaging techniques, supercomputers by depending only on their own ingenuity.

Second, the Indian economy didn't start growing until the 1990s, so local companies were small. For example, in 2008, India's then largest pharmaceutical company, Ranbaxy, made \$800 million in revenues, which was 60 times less than the \$48 billion that Pfizer made and nine times less

than what the U.S. giant budgeted for research. Indian entrepreneurs, therefore, developed a penchant for undertaking small projects and using capital carefully. They've changed their approach to scale since 1991, but they maintain an unwavering focus on capital efficiency.

Third, local companies know that while India has both rich and poor people, catering only to the rich limits their market. Most target the aspiring middle class family, which lives on \$5,000 a year. As a result, they were forced to develop value-for-money products and services by changing the price-performance equation.

And fourth, the most important driver happens to be India's innovation mindset. Some Indian leaders had the audacity to question the conventional wisdom. With increasing frequency, these leaders were rejecting established ways of doing business in favour of new practices. The mix of miniscule research budgets, small size, low prices, and big ambitions had created the need to think and manage differently. Indeed it is fair to say that the combination of extreme scarcity and extreme aspiration ignited the Indian innovation.

The Challenge of MLM

A "more from less for more" strategy – more quantity and quality of goods and services, from less resources, for many people – often requires radical re-conceptions of existing business models, organizational structures, and product development, manufacturing and distribution processes. This strategy also requires similar boldness in rethinking complementary public

policy, organization and regulatory regimes. Slight changes to existing ways of doing business to serve the BoP rarely work—either the target is missed completely, or the end product is highly inferior in quality. To overcome that inertia requires initiative and investment, an acceptance of uncertainty, an appetite for risk—and considerably more experimentation and explanation to determine which pro-BoP business models work.

For example, lower cost inputs do not explain why Indian telcos were able to introduce mobile phone service in India at a cost orders of magnitude lower than in the USA. Rather, the telcos decided at the outset to adopt high-volume low-cost strategy. That strategy prompted radically different decisions on when to "make or buy" than adopted by their Western counterparts, who dispersed the risk of up-front investments amongst various players involved in mobile service provision. The end result was that service providers could charge rates far closer to the (ultra-low) marginal cost of adding a new user to a network, allowing cell phones to emerge as a powerful poverty-fighting and empowerment tool for the BoP, especially ruralites in India.

Towards an Inclusive Business

An "inclusive innovation strategy" promotes the sustainable production, dissemination, and absorption of inclusive innovations by connecting excluded populations to a nation's innovation ecosystem. Given the BoP's immense aggregate purchasing power, inclusive business can be a sustainable business for private firms.

As a strategy for inclusion, "Inclusive Innovation" complements disruptive methods of innovation gaining fast attention in the business world. Inclusive innovation describes a method of "responding to limitations in resources, whether financial, material or institutional, and turning these constraints into an advantage."

Inclusive business provides great opportunities. For instance, firms can benefit from seeking alternatives to high-cost and bloated traditional innovative processes. Second, they benefit from innovating over constraint-induced hurdles, rather than avoiding those challenges by lowering product quality or changing the target market. Finally, mindset matters: accomplishing those tasks requires a frugal and flexible attitude.

It is clear that inclusive innovation, anchored on the solid foundation of affordability and sustainability, will help us design a sustainable future for the mankind.

Leadership in Inclusive Business

For this we must have a fundamental shift in attitude. Leadership believed in doing well and doing good. That means one made a lot of profits, and then set aside a small fraction of it for some public good. No, we have to shift to another model. And that is 'doing well by doing good'. That means a fundamental commitment to 'doing inclusive business'.

If inclusive business innovation models have to thrive, and in turn drive accelerated inclusive growth, what kind of leadership qualities will be required?

First, inclusive business CEOs must develop a deep commitment to inclusive growth, which will force them to think of unserved customers, be they rural poor, who don't have access to telephones or urban poor, who don't get emergency medical services. Companies often start by asking: "Given that we need to cater to the unserved, what should our cost structure be?"

Second, inclusive business CEOs must have clear vision with a human dimension: for example, helping poor Indians travel safely and affordably with their families; using connectivity to improve people's work and lives; and enabling patients to buy cheap medicines.

Third, inclusive business CEOs must establish ambitious goals and clear time frames for achieving them. Companies should ask: "What is our on-the-moon project?" Or, as they do in India's boardrooms: "What is our Nano project?"

Fourth, inclusive business leaders must force project teams to work within self-imposed boundaries that stem from a deep understanding of consumers. That will result in novel, outside-in view of innovation. The language inside their organisations should be about consumers as people, suppliers as partners, and employees as innovators.

And finally, inclusive business CEOs must continuously ask "What if we change the way we operate to reduce costs and focus on return on capital employed, not just on operating margins? If we reduce prices enough and make our products available to the

poor, won't there be explosive growth as they quickly find uses for and buy our offerings?

Inclusive Innovation Led Economic Growth

A well-designed "inclusive innovation" strategy would address three dimensions of inequality and complement the growing policy arsenal that is generally aimed at improving incomes:

First, inclusive innovation will improve access to essential goods and services. Promoting inclusive innovation is important for achieving each government's goal of universal access to high quality basic services in an efficient and sustainable basis.

Inclusive innovation programs promote efforts that enhance human *capabilities* thereby enabling more people to participate in economic development. Innovations that have drastically lowered the cost of health care treatments (e.g. jaundice treatments, prosthetics, surgery sterilizations, cataract surgeries) and preventative services (e.g. vaccines, immunizations, diagnostics, clean water systems) can introduce millions more to the workforce and make them far more productive members of it. Similarly, ultra low-cost pre-fabricated shelters and diffusion of knowledge in home construction and improvement can bring affordable, more stable housing to people whose homes are vulnerable to natural disasters and even everyday weather. Breakthroughs in rural-area financial intermediation have increased access to credit, while mobile phones, radios, and literacy-toolkits (Computer Based Literacy

system so powerful that an investment of US\$1.5 billion could raise literacy rates in Southeast Asia to OECD levels) have increased access to markets, skills and information.

Second, through inclusive innovation it becomes possible to increase purchasing power and enhancing economic empowerment. Promoting inclusive innovation is important for addressing disparities in income and access to basic services. Income inequality, even if reduced, will likely be a persistent feature of even the most successful (and equitable) growth stories. Thus, any inclusive growth agenda must also directly address the quality of life affordable at very low income levels. Policymakers are rightly concerned about the purchasing power of the BoP, as evidenced by the uproar surrounding commodity and food price instability and inflation. But those issues present only limited opportunity for policy interventions because of their exogenous causes and the extremely large countervailing benefits of high growth and open markets.

Inclusive innovation programs, on the other hand, can credibly expand what even meager incomes can afford without altering or diluting pro-growth policies. What currently appears far from cost-effective for the private sector—and feats that seem impossible for the public sector given fiscal constraints—need not always be so. Applying current technology and know-how to targeted ends, and producing more of it for the precise purpose of lifting up the BoP, has already served millions across the globe. As we said earlier, these programs invoke a return to the traditional case for innovation—its

ability to produce break-through improvements in the quality of life—alongside its more recent place in development circles, where the primary focus has been enhancing national competitiveness and creating high income employment. Put simply, there must be a parallel track of development for the BoP that relies less on redistribution of gains, and more on the direct expansion of the bundle of goods and services against which we traditionally measure purchasing power—and at an ever-accelerating rate.

Consider for instance, the quality of life improvements that come with a highly affordable non-electric washing machine, a low-cost refrigerator, and non-essential but life-improving health care associated with “modern medicine.” Similarly, computer tablets, phones and radios provide entertainment, and allow excluded people to establish a more *connected* self-identity informed by participation in larger national culture previously less accessible to them. Ultra low-cost hygiene products can make tough living conditions more manageable (and reduce the spread of disease). These products do not only make life more comfortable; they *empower* people. They facilitate economic activity and entrepreneurship by freeing up time, making labor more productive and improving health, and they dull the currently sharp distinctions between low-income and high-income people by increasing access to products that promote dignity, self-worth and identification with broader society.

Third, inclusive innovation will eventually help us achieve the aroused goal of reducing the income inequality.

Nonetheless, inclusive innovation programs can also provide income-generating opportunities for BoP innovators. With the right policies in place, the needs-driven innovation and creativity inherent in the BoP way of life can be brought to market, to the benefit of the innovators and society at large. At the same time, diffusion of knowledge to (and adaptation of products for use by) the resource-poor can enhance productivity, again improving nominal earnings for BoP businesses (many of which are small, informal, and severely lag their productivity potential).

Global Spread of Inclusive Innovation Paradigm

Multinationals are beginning to take ideas developed in (and for) the emerging world and deploy them in the West. For instance, GE’s Vscan, a portable ultrasound device was developed in China. As against the standard ultrasound machine, costing around \$ 20,000, Vscan costs just \$ 1500! It is now a big hit in rich and poor countries alike. The same is true of what GE healthcare in Bangalore did for electrocardiogram (ECG) machines. Their team created a portable high quality ECG machine for just \$ 600, as against a \$ 10,000 machine. This has become a big hit too.

The worry among Western firms now is that this strategy will cannibalise the existing market for expensive technology. Why buy a \$10,000 device if the same firm makes a slightly simpler one for \$600? This worry is misplaced, because at lower costs, the customer base expands dramatically. GE opened up a new market among doctors for its cheap electrocardiogram machines;

whereas previously only hospitals could afford the things.

India's Mahindra & Mahindra sells lots of small tractors to American hobby farmers, filling John Deere with fear. China's Haier has undercut Western competitors in a wide range of products, from air conditioners and washing machines to wine coolers. Haier sold a wine cooler for half the price of the industry leader. Within two years, it had grabbed 60% of the American market.

In fact, Jeffrey Immelt, the CEO of General Electric looks at another driving force. He recently said 'If we do not come up with innovations in poor countries and take them global, new competitors from the developing world – the Mindray, Suzlon and Goldwind will. That is a bracing prospect.'

This trend will surely accelerate. As west moves from times of abundance to times of austerity, as the middle class is squeezed and governments curb spending, affordable access will become the norm rather than the exception. I sit on the Hindustan Unilever Ltd. Board. On the other day, I was told about the new phenomenon in the sale of sachets of shampoo. Originally cheap sachets were meant for the base of the pyramid. Now suddenly the western markets have opened up for sachets. One would not have imagined this to happen about 5 years ago!

There is another driving force. Globalisation is forcing western firms to provide more value for money. Logitech, an American firm, had to create a top-class wireless mouse for bottom-of-the-range prices when it took on Rapoo, a Chinese company, in China. John Deere

had to do the same with its small tractors when it took on Mahindra in India. At the same time, globalisation gives Western firms more tools. Some are building innovation centres in the emerging world. PepsiCo, for example, established one in India in 2010. Some Western firms routinely fish in a global brain pool. Renault-Nissan asked its engineers in France, India and Japan to compete to come up with ideas for cutting costs. The Indians won. The Tata Nano may not have changed the world, but the drive on inclusive innovation will.

Importantly, western governments should realize that they have a stake in this agenda as well. Though inclusive innovation focuses on addressing the needs of the "resource poor," it can also be useful for wealthier people in poor countries as well as people in developed countries. There is no reason that the US\$28 Jaipur Foot or the US\$25 Embrace Incubator cannot find demand in OECD countries—there is nothing inherently "poor" about these innovations. The key features of these innovations are that they are (i) very low cost, (ii) created or invented with an eye on the needs of the BoP, and (iii) have performance characteristics that are roughly equal to or greater than the performance of more expensive products initially designed and invented for wealthier customers. Nowhere else are the successes of inclusive innovation more relevant to these nations than in the area of health care: not only does lack of access to health care describe a form of first-world exclusion, but the soaring cost of that care has become the single most important fiscal challenge facing the United States today.

And Finally

The Indian Decade of Innovation (2010-2020) has been declared. It stems from the visionary declaration of our President and the passionate championing of our Prime Minister of this very concept of Decade of Innovation. Prime Minister's National Innovation Council has been formed. This council has taken 'inclusive innovation' as a major agenda. A billion dollar fund – India Inclusive Innovation Fund has been announced. Rs. 500 crore has been already pledged as a starter, with contribution by the Indian government and others. The fund is intended to be operational from January 2013. That augurs very well.

Indian march in inclusive innovation is changing the dictionary of innovation. Phrases that did not exist five years ago have suddenly emerged. These include: 'inclusive innovation', 'frugal innovation', 'Gandhian Engineering', 'Reverse Innovation', 'More from Less for More (MLM)' and so on. Inspired by Tata Nano car, there is a book titled as 'Nanovation' written by Freibergs, an American couple, that has appeared this year. All this shows the emerging strong imprint of Indian innovation.

What should we see at the end of this Indian decade of innovation? As a starter, it will be great to see India achieve a place amongst the top ten of the innovative nations in the world.

But it is not about getting into the top league alone. It is about a change in our culture, in our society.

It is about achieving innovation led inclusive development and growth.

It is about not 'some Indians' doing well, but 'India' doing well.

And it is also about innovative India rapidly moving, through the innovation route, to becoming a truly inclusive society.

It is about the Indian model of 'Inclusive Innovation Led Economic Growth' becoming a model for the rest of the world to follow.