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Knowledge for Growth:
Harnessing India's Demographic Dividend[**]

Gen. Krishna Rao, Dr. S. K. Rao, distinguished guests, ladies and gentlemen:

I am indeed honoured and privileged to deliver the Rajiv Gandhi Memorial Lecture. Rajiv Gandhi was a very special leader. In my heart, he does have a very special place. I met him in 1981 at Mrs. Indira Gandhi's house when I was invited to give a presentation on my views on telecom reforms. It was an evening meeting where she had invited her entire cabinet. She was late because of some other visitors. I met Rajiv Gandhi for about half an hour, along with some of his close colleagues, and we just clicked. It was an accident of faith. In his eyes, I saw a special spark. He understood what I was trying to say. And I realized immediately, in my first half an hour, that if I ever wanted to do anything in India, I had to hang on to him. Because he is the one who would ultimately provide the political will that would be required to launch a major programme in India. I came from a very poor family. I had no connections in Delhi, didn't know anybody. But I happened to be at the right place at the right time in my life, and I had this dream to do something.

I started a business in the US, made a little bit of money, and in 1980 came to Delhi. I tried to call my wife in the US and couldn't call. A little bit of arrogance and lot of ignorance in me said that I am going to fix this. If I had known everything I know about the Indian system today, I probably would have never tried it. But I think ignorance is a great asset. I started laying out a plan, tried to understand how India operates because I had left at a very early age, right after college. I had never been to Delhi so I did not know the difference between joint secretary, additional secretary, secretary and minister

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of state. I had to learn lots of things very quickly. Then someone said, "You must speak to Mrs. Gandhi if you really want to do something."

I got a 10-minute appointment, realized that it is not worth spending just 10 minutes. I told her office that if she's really interested, then she must give me one hour. Finally, after eight months, I got a call that she will give me one hour. That's when I met Rajiv Gandhi. At the meeting, I talked about access to telecom, as opposed to telephone density. I talked about indigenous development, as opposed to buying products from multinationals; young talent, Indian engineers, rural communications, as opposed to urban communications and digitization of the networks. I talked about specific things—36 months, 36 crores, 400 young engineers and the political will to do it. Between 1981 and '84, it took almost three years, I spent two weeks in Chicago, two weeks in Delhi, trying to lobby around the Department of Telecom, trying to meet everybody, understand India. Finally in August 1984, C-DOT, Centre for Development of Telematics, was announced. But before that, Rajiv and I both realized that we needed a bypass.

C-DOT was essentially a bypass to the Telecom Department. It was set up as an independent society outside of the government, funded by the government, working with the Telecom Department (DoT) but with responsibility assigned to the Department of Electronics. The bypass mechanism was critical to launching the new initiative. Later I learnt that the government we have is designed to preserve the status quo. It is very difficult to plant new seeds in the existing systems. If you really want to plant new seeds, you must have a bypass. Bypasses also tend to get clogged over a period of time. We launched C-DOT in Delhi in Akbar Hotel because we couldn't get air-conditioned offices in the capital. If we needed air conditioners in our office, we had to order the equipment in those days from abroad, which was going to take nine to ten months. That's close to 30 per cent of our schedule. So we started our work on beds, as opposed to desks and chairs. We also realized that we needed, along with young engineers, a new work culture, new work habits, new work norms, a new work environment; and egalitarian systems, as opposed to hierarchical ones.

All of this created special energy in our young, and they gave their best to us. We had 23–24-year-old kids who hardly slept. People used to live in the hotel, sleep at three, get up at six and start working. I remember once at eleven 0'clock at night, a couple came in and said, "Look, our son tells us that he works late at night. We also know that he works for the government, and we just don't believe it. Because most of the people who work for the

government come home at 5! So we are here to check him out." I took them to a little room where four, five kids were discussing some software problem at eleven 0'clock at night. The parents were absolutely puzzled that not only are these kids working, but they also seem to be enjoying what they are doing. They said, "This doesn't happen in the government too often."

We could create such an environment because we were backed by the political will that Rajiv provided. Total trust, unconditional support and real belief in what we were trying to do. In those days, we had 2 million telephones for 750 billion people. It used to take 15 years to get a telephone connection. In a short span of time, today we have 500 million, and we are adding 10 to 15 million every month, month after month. Pretty soon, we will have 800 million telephones. And in the process, we have created our own big multinational companies with tens of billions of dollars in market capitalization. We have trained thousands and thousands of talented human resource, we have gained international recognition, respect and, most important of all, lots of self-confidence that we can do it.

This is very critical to building the India of the future. C-DOT was just one little seed that we planted. In the process, besides design, we created an ancillary industry for components, for circuit boards, manufacturing, cabinets. We also started the process of privatization in telecom in 1985. Once STD public call offices (PCOs) were available all over the country, people realized that telecom is not just about fancy instruments for the urban elite—it is a basic necessity. I had this conviction based on my own experience in the United States that information and communication technology brings about openness, accessibility, connectivity, networking, democratization, decentralization and, as a result, social transformation. In my own life, I have seen my own transformation. It's true that I had never used a telephone in India before moving to the US. But I understood the power of communication and technology. I also understood early in life in the US that technology is a great social leveller, second only to death. I am a son of a carpenter. Nobody remembers that. Even I don't remember that. Because my education, my experience in technology has given me a whole new perspective.

Telecom is the infrastructure of infrastructure. In this modern world, you can build a nation only with telecom. It is not about agriculture, believe me it's not about energy, it is all about IT infrastructure. Partly, I am biased because these are the glasses I wear. I see so many interesting possibilities that others don't see because of information and communication technology.

Today, we have a huge amount of optical fibre in the country. The Railways have 65,000 km of fibre. ONGC and all our telephone companies also have lots of optical fibre that is not leased out. This capacity to move billions and billions of bits around gives us a whole new way of looking at the future. I can see how telecom will transform education, health services, the public distribution system, the National Rural Employment Guarantee Scheme, micro-finance, banking for the unbankable. We need to learn to leverage this existing infrastructure through innovation to really understand what can be done for the future.

It took us 25 years to build the base for telecom. In between, I had a heart attack, Rajiv Gandhi died, I ran out of money, my children were growing up, they needed to go to school in America, and I didn't have money to pay for their tuition. I decided to go back—I did not run away. In the process, I realized that I had no visa to go back to the US because I had given up my American nationality. So I went back as a tourist. But as a tourist, you couldn't work in the US. I had to re-start my life, my mother lived with me and I had altogether ignored my family responsibilities while I was in India. I used to leave my home at 6.30 in the morning, and I would come back at 11 pm. When I left the house, my children were sleeping, and when I returned, they were sleeping. I had to make up for a lot of this. So, I spent some time with them. They are now both grown up, and finally I started thinking about something big for the next 25 years.

In December 2004, I think, I asked for a meeting with the Prime Minister and gave him a presentation on knowledge. I said I am convinced that knowledge is the most important activity for the next 25 years. Mainly because there are three fundamental challenges, from my perspective, in India:

1. Disparity: between rich and poor, urban and rural, and educated and uneducated.
2. Demography: 550 million young below the age of 25. Twenty million new jobs to be created every year, year after year. How do we do this? What does it really mean to train them? And what do we train them in?
3. Development: Everything is happening in India, but not happening fast enough. We are building roads, not fast enough; we are building power plants, not fast enough.

The Prime Minister immediately said, "This is a good idea." And I said, "We need to focus on knowledge and not on education." There is a fundamental

difference between the two. Knowledge is a platform that is much broader; education is a vertical which is pretty narrow. As a result, Prime Minister Manmohan Singh decided to set up the National Knowledge Commission (NKC) in 2005. He also had the political will and a clear understanding as to what it could do for us; and he backed us completely. At the commission, we decided to look at five aspects of knowledge:

- Access to knowledge
- Knowledge concepts
- Knowledge creation
- Knowledge application
- Knowledge services

Let me quickly take you through these five pillars of knowledge. The key is to have access to knowledge. You can have access to knowledge only if you are literate. So, literacy is crucial. Translation is also an important aspect so that the best of the best literature is available to you. Libraries too have a major role to play: We have 54,000 libraries in the country, not counting school libraries. Our libraries are in a mess. How do we modernize our libraries? Who is going to do it? Why did we let it go down to this level? Broadband networks, hotels, reservations, quotas, affirmative action programmes—these are all the areas which ultimately enhance access. So, we looked at a total of 10 subjects on access.

In knowledge concepts, we looked at:

- Primary education
- Secondary education (basically school education)
- Vocational education
- Distance learning
- Open courseware
- University education
- Professional education
- Teachers' training
- How do we send more of our kids into maths and science
- How do we create more PhDs

Then we looked at creation of knowledge:

- Who creates knowledge?

- How is knowledge created?
- Innovations, entrepreneurships
- Patents, copyrights, trademarks, intellectual property

We also looked at the application of knowledge in five areas:

- Agriculture
- Health
- Small- and medium-scale industries
- Traditional knowledge
- Enhancing the quality of life

We have a large reservoir of traditional knowledge, which is dying and needs to be documented. I used to tell my mother that when you die, the entire pickle technology of the Pitroda family is going to die. She used to make some 80–90 kinds of pickles. And it did happen. No one learnt from her, nobody had the time, but they loved her pickles. All these kinds of things in our families and culture are so very critical. But we are beginning to lose a lot of these very quickly. We need to document as much as possible. Today, there is digital technology to document all of this.

Fifteen years ago, a young man called Darshan Shankar came to me and said, "We have 12,000 herbal medicinal plants which are unique only to India and nowhere else in the world. But we have no documentation." I had no idea; I didn't know anything about it. So I said, "Interesting. Let us set up a foundation to document these plants." The Rajiv Gandhi government was intact, and we set up a foundation within a few months. Then we lost the government, a new government came in, and nobody would fund this programme. Finally, I found US$ 4 million from the Danish government and set up the foundation in Bangalore. In 15 years, we have documented 10,000 of these plants, preserved the genetic pool. We have 150 scientists working there, all on a non-profit basis, with very little help from the government. This is the Indian heritage; this is our property. But I don't get too many people excited about it. In traditional knowledge, we have lots and lots of stuff to document—I can see next 25 years of work. I would like to document the design of the Taj Mahal, the Madurai Temple and all kinds of other Indian heritage. How did people do all these things hundreds of years ago?

In Orissa where I was born, within 12 miles of that place, there is a temple near Titlagarh. It was built 1,400 years ago out of bricks, no cement. Nobody goes there, literally nobody. I went there with my children 10–15 years ago. Within 5 miles, all you could see is one town, nothing. When you go and stand in front of this temple, it blows your mind. Next to it is a temple with 64 Tantrik *deviyaan* (goddesses). It's on a little mountain. I am sure there are many, many heritage sites like these that nobody pays attention to it. It would be great to spend the next 20 years to document a lot of it.

Finally, we looked at e-governance as part of the reason for using knowledge to improve governance at the federal level and at the state level. Sum total, as part of this knowledge platform, we have 30 different subjects. On each subject, we created a working group because we didn't have the expertise. For libraries, we got the best librarians in the country. Gave them six to nine months to debate, discuss and give us a white paper. That white paper was then debated at the Knowledge Commission. The output of NKC was normally a three-page letter from the Chairman on behalf of the Knowledge Commission to the Prime Minister, saying Dear Mr. Prime Minister, these are the 10 things we recommend on the subject of Libraries.

So far, we have submitted 300 recommendations on 27 subjects. All of this is available on the NKC website. You will see white papers, recommendations, names of the committees, working groups. In all, 1,000 people worked on all of this. Unfortunately, nobody reads. A country of billion people, we get only 7,000 hits a month. And you'll be surprised, 50 per cent of that comes from abroad. People outside ask me all the time, "How did you all think of the Knowledge Commission?" Because this is the only knowledge commission in the world. "Why did you look at a platform and not verticals", they ask. We have always had this great tradition of knowledge. Don't forget, we were the first ones to build universities—Nalanda and Takshashila.

I have personally visited Takshashila. It is fascinating to find out what people thought 2,700 years ago. Through the concept of the university, we have always promoted knowledge all over the world. Buddha and others spread Indian knowledge everywhere—Angkor Wat, Bali, China, Japan. India has been the real foundation for knowledge. Unfortunately, something happened in between and we lost a lot of it. For the last 400 years, it's basically the Western universities that have been promoting knowledge. And that model has been used by everybody. So today, when you think of good universities, you think of Harvard, MIT, Cambridge, Oxford, Yale, Stanford. I believe this model is not sustainable. Mainly because of the intervention of the web,

new search technologies and IT, the entire concept of education will have to change drastically in a very short period of time. Unfortunately, when we think of education today, we think of duster, blackboard, chalk, teacher, textbook, exams, grades, certificates. All these things have no meaning any more. You don't learn the way we learnt 50 years ago. All our teachers are trained to create content and deliver content. Today, you don't need to create content. Content is already available on the Net by the best of the best in the world. You can modify it a little bit. You don't need to deliver content. I can get it anywhere, anytime on all kinds of devices. As a result, the role of the teacher will change to that of a mentor. So the notion of student-teacher ratio, the ideas of what you teach, how you teach will have to change.

Western universities have this fundamental flaw in my vision of the university. That is, the output of Western universities only focus on solving the problems of the rich. I have always said that the best brains in the world are busy solving the problem of the rich, who really don't have problems to solve. As a result, the problems of the poor don't get the kind of attention they deserve. All the Western models are very expensive, not scaleable in a country like ours, not sustainable. But over a period of time, we have created this world which strives to copy the Western model. The American model of consumption is what everybody wants in the world. Today, we recognize that this model is not sustainable, not scaleable, not workable. It's unfortunate that when people in America shop on Christmas, everybody gets happy in China, Korea and India. That model needs to change. That model was designed after the Second World War with a very clear understanding at the World Bank, IMF, United Nations, WTO and WIPO.

In the process, in the last 50–60 years, three billion more people have come into the mainstream. One billion as a result of the decolonization efforts of Gandhi and others, one billion following the fall of the Berlin wall, and one billion out of the Chinese modernization programme. Access to information for these three billion, coupled with the growth in IT, has changed the aspirations of three billion more people. As a result, the world is being restructured. So when my American colleagues talk about pumping in more money to revive the economy, I tell them: It is not about going back to what it was. It is about recognizing that you cannot go back to what it was, and it is about creating a new world. And knowledge will be the next big thing to create the new world.

Everyone has knowledge today. Yet, so many different things need to be done. Today, most people have a nineteenth century mindset, are using

twentieth century processes and have twenty-first century needs. All our processes today were designed 100 years ago. And they are all obsolete. How do you apply for admission in school? How do you get a birth certificate? How do you make payments? How do you open a bank account? It's all completely out of tune with the reality of the day. As a result, we have 600 million people who do not have bank accounts. Because we are still using the old processes. If I had an option, I would re-design every process in India. I still remember as a young kid, a 13–14 year old, trying to change school from Vidyanagar to Baroda. Somebody said you need a true copy of all your certificates by a gazetted officer. I did not know what gazetted officer meant! I said, "Sir, what do you mean?" The fellow said, "Go get five copies." As a 13-year-old kid from Orissa studying in Gujarat, I didn't know any gazetted officer. But life gets very complicated. You spend one week trying to find somebody through influence who is going to put a dumb little stamp, initial it, and you will deliver these five copies. Does it make sense today?

 Yesterday, I addressed 125 officers of the Karnataka government—Chief Secretary, Principal Secretary, all secretaries, all joint secretaries, directors, vice chancellors, everybody. I was impressed that they all showed up to listen to me for an hour. There was a conversation on e-governance. I said, look, we are spending billions of dollars on e-governance, and I am a critic of our spending because I believe it is wasted. Mainly because we have not let go of the *nada-wali* (with a ribbon/string) file! Till the nada-wali file remains with you, you cannot implement e-governance. What it means is that you need to change your mindset. You can't have e-governance with that mindset. I know that the challenge in front of us is very complex. First, we need to change minds, then we need to change processes, we need to change the way we work. Our concept of work will have to change, our concept of family will change, our concept of how we interact will change. And I assure you, our concept of education will definitely change.

We are building a broadband network to connect 5,000 universities, research institutes and libraries through 10 gigabit bandwidth to start improving collaboration, coordination. This is the knowledge network that we are building. The knowledge society of tomorrow is all about changing the mindset. It's all about our new customer who is below 25. He or she learns very differently. Their needs are very different, their values are very different. They may not agree with us. But until we really focus on their future—and not our methods—their methods and their needs, we cannot build the kind of future we need to build for them. We need a completely new paradigm.

We need to focus on innovations, we need to build more universities. A country of billion people cannot have only 380 universities. So we need to expand, we need excellence. Leaving aside 5 per cent of the top universities, our education system is not good enough. Most of our graduates are not usable. When you say this, people react. And if they react, you know you are on the right track. We also have to ensure that the poorest of the poor can indeed get the best education possible in the country. Thus, expansion, excellence and equity are the need of the hour.

It is not about education—it is about knowledge. We need to simultaneously focus on all kinds of institutions and infrastructure to create the knowledge society of tomorrow. We have started the journey. The government has allocated $US 67 billion in the 11th Plan to education. We are building a broadband network; we are focused on innovations. But this journey will take at least 25 years. I always tell my friends that I was lucky to be alive to see the benefits of telecom. I don't think I'll be lucky to be alive to see the benefits of knowledge. But I think there is great fun in planting the right seeds. And today, the seeds that we are planting are knowledge, which are really the right seeds to plant. This is indeed a tribute to Rajiv Gandhi. Telecom was the beginning, but his work is not done. And we all need to continue to realize his dreams that he dreamt for India. I was lucky to have the opportunity to work with Gen. Krishna Rao. He and I were part of a sort of back-room boys team of Rajiv, which worked on many things. It was a very romantic period, and I will cherish that for all my life.

Thank you.