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# Keynote Address

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Mr Prime Minister, Excellences, Ladies and Gentlemen,

Mr Prime Minister, you had approved on March 3, 2005, the objectives of Medium-term Development Framework (MTDF), which was to develop a technology-driven knowledge economy for rapid and sustainable growth for Pakistan to become an industrialised nation in 25 years. We have a world now which is full of challenges. Over the next 50 years we will have a population which will be close to 10 billion, fossil fuel reserves are fast depleting. There are environmental pressures. Children being born today, think they are going to live hundred years and there will be increased urbanisation and so world is changing rapidly and the only constant is change. We are going to be inflicted by various pressures and science and technology and knowledge has become the great divider. The rich are becoming richer and the poor-poorer. Best investments, nations can make is in science and technology and in higher education. In the countries where this vision is missing they are in trouble. However, there is light at the end of the tunnel and education, science and technology can come to the rescue because they have opened up vast new horizons for nations to progress rapidly and there are various fields, like genome, areas of information technology, material sciences, biotechnology and molecular medicines. For instance, biotechnology medicines' market presently 30 percent of current medicines marketed are made through biotechnology means and by 2020, 50 percent of all medicines will be made through biotechnological means like fermentation process. For the areas of crop, the yield can be increased. Genetically modified crops are grown on increased area. In many countries, like China are rapidly moving towards biotechnology. The Twenty-first Century is characterised by two ideas:

(1) Manufacturing can be done anywhere, and
(2) Designing can be done anywhere.

So we have seen the death of physical distance. It does not matter if you are sitting next door or in Stanford. These are opportunities and the key to progress is

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innovations, the ability of nations to innovate and incorporate the process of innovation into their national policies. I just mention what one institution can do. Like students and faculty at MIT, have formed some 4000 companies employing 1.1 million people with annual sales of $232 billion which is 10 times higher than exports of many countries. This is the kind of area we want to move into. The vision that nations must incorporate in their policies is that process of socio-economic development is no longer dependent on natural resources. It depends on quality of human resources. For example, Japan has virtually no natural resources and yet 120 universities in Tokyo alone and about 1000 universities in Japan and GDP is four times higher than GDP of entire Islamic world which had ¼ of world population and 70 percent of world's energy resources. So the challenge for Pakistan is to invest in quality of human capital empowered with latest technologies and dynamic innovation policies so we can march ahead. We can move in to new global knowledge economy. We need to have research programmes also which are for new needs. One example is 1400 medicines which have come into market in last 25 years, only 14 of them are related to poor man's diseases. The rest are all for rich man's diseases. So we need to gear ourselves to what we need. Let me mention the example of one or two countries. Like China started with sending about 100,000 bright young men and women abroad annually about 20 years ago. Impact we see today is that China is the fastest growing economy in the world. So the critical factor has been the human resource development. So the pillar of China's progress is the human resources. The key has been high priority given to promotion of science and technology, and to promotion of high tech industry. High tech is the fastest growing areas in the industrial sector. Value-added agriculture, not just agriculture alone and self reliance on defense manufacturing play a key role. These are the key components. Look at South Korea, 40 years ago 50 percent of the exports were agriculture and now the share of agriculture has declined to 5 percent only and more than 50 percent are engineering goods.

Cabinet entrusted, me about two years ago, to prepare a strategy for socio-economic development. How do use knowledge/how do we use science and technology (some books are in front of Mr Prime Minister and Deputy Chairman Planning Commission) for socio-economic development of the country? We worked closely with Pakistan Institute of Development Economics (PIDE). About 2000 persons were consulted in the entire country including a large number of economists and subject experts in various fields, e.g., agriculture, biotechnology and in engineering, the sector that are going to make a difference. So what needs to be done, who will do it, implementation time frame, human resource requirements, cost of project and impact on national economy. These are the key questions. It is a technology foresight exercise. For which there has been no tradition in this part of the world. India has done it. Other countries in this part of the world do not really know what technology foresight is. It identifies niche opportunities which are

present and how to use them. It also identifies resource gaps, technology gaps and the policy gaps. Take the example of milk in agriculture sector. Pakistan produces about 1500 liters per cycle per animal/cow as compared to Europe which produces 8500 liters per cycle per cow and Israel produces 11000 liters per cycle per cow. Similarly in the engineering goods, home appliances are the largest component. Pakistan has a very small share in total world production of engineering goods. The annual sales of TV sets, mobile phones, and modems is growing at a very fast rate in the World and in Pakistan also. Looking at mobile phones alone current sales is 7 million annually at an average cost of Rs 3000 per phone. This means that about Rs 20 billion are spent on mobile phones alone and the demand is growing. A lot of public money is going in it which implies presence of an opportunity that can be exploited. Similarly opportunities are present in the chemicals and pharmaceutical industries. In order to exploit the opportunities in these sectors, there is an urgent need to set up Neptha Cracker plant so that we can make basic raw materials that are needed for the pharmaceutical, for variety of synthetic fiber, plastics and other materials.

In the last few years under the leadership of President Pervez Musharraf and earlier Finance Minister and current Prime Minister Mr Shaukat Aziz, we have exciting economic growth. The growth rate has gone up from 1.3 percent to 8.4 percent in the last year. It is providing much bigger fiscal space and investment in human capital. I would like to congratulate Mr Prime Minister for leading this ship so well, especially in the time period when the economy was on the verge of collapse and as a result there is a decision recently to increase allocation for education from 2.4 percent to 4 percent of Gross Domestic Product (GDP) which will happen in next few years. If we look at how Pakistan compares with other economies, we are the second fastest growing economy after China. This year may be a little less because of earthquake, but the fast economic growth has set the pace resulting in decline in Debt/GDP ratio. We have to move forward quickly.

We are facing problems in higher education. First is the issue of access. Currently, only 3 percent of children in the age group 17-23 years have access to higher education as compared to 68 percent in Korea. We have about 100 million in the age group of less than 25 years. This is huge resource which should be provided opportunity otherwise it can be a huge burden. We have taken some initiatives:

(1) Dramatic change in salary structure of professional and technical staff of universities and research centres. This decision was taken when Mr Shaukat Aziz was Finance Minister.
(2) Tenure track system where salary structure is linked to performance evaluation. The salary of a professional can be 4-times higher then the salary of a minister, i.e., about Rs 175,000 per month.

(3) Research productivity allowance to bright young men and women publishing at international level. They should have higher take away home then non-performing older persons.
(4) Massive scholarship programme worth $ 150 million with USAID for 5 years to send bright young men and women to universities in USA in different disciplines particularly for post doctoral fellowships. More interestingly we have to think how to use technology to leap-frog and catch up.
(5) Linking up of universities.
(6) More then 50 universities are fiber linked, some have radio links and some have satellite link and these links are largely for educational purpose. Similarly two educational channels are opened on Television. Provision of video conference facilities is expected to help students and faculty from lectures from professors of reputed international universities like Cambridge, Oxford and others.
(7) In order to benefit from modern technology virtual universities are opened. Two more universities are planned in next few years.

The technology has led elimination of distance and provided new opportunities to work. If we look at educational path of Pakistan, we see a significant change over time and linking of education with research centres.

Another important aspect is library. Earlier, hardly 3 or 4 journals were available in the libraries. Today, probably Pakistan is the only country where students have access to 17,000 international journals and 80 percent of these are available to universities free of charge. Government is paying for these journals. These journals are available in various fields, not just science and technology. The availability of these journals is vital for conducting research.

However, far more needs to be done. We need to have a national innovation policy. Innovation must be imbedded in all our programmes. The challenge is not just transfer of knowledge. We should be able to create new knowledge and link knowledge with socio-economic development, with development of industry and agriculture. So ideas must be transformed into products and processes. Instrumental to transfer these ideas into implementation and access to venture capital, access to clusters, technology and industrial incubators. All these must be put in place.

In order to create knowledge economy, we must create few niches where we can be leaders. For example, Finland a country with 4 million people decided to focus on telecommunications. Their sale of mobile phone was of about $ 35 billion last year. We also need to focus on few key areas. Therefore, we recommend the following:

(1) We must have in place our National Innovation Policy embedded in government infrastructure.

(2) Establish an organisation for technology assessment, for regular technology foresight exercise.
(3) Invest in standard laboratories for testing and certification. Without testing and certification process in place, our export cannot expand. People want to see quality certification as far as the product is concerned.
(4) We have to establish world class Engineering Universities. We are setting up five world class Engineering Universities with the help of Germany, France, Sweden, Korea and Austria. Project will be starting soon. Total quality assurance is the key. This is an exciting programme and it will change the landscape of the country.
(5) Industrial Technology Institute and vocational institutions are extremely important. Government is doing a lot to reorganise the technical skill development sector. Emphasis should be on quality. That is the key.
(6) Private sector should be involved. Private sector involvement in research and development is essential. Matching grants and other steps can help.
(7) Change in the service structure of scientists is crucial. We can hire every one on contract. They receive reward upon delivery. I am advisor on Science and Technology. I recommend a massive clean up. Get rid of the dead wood. Make permanent only those who deliver and establish their worth. This will save a lot of money and it will work better then the golden handshake.
(8) Creation of technology development fund for promotion of private sector and promotion of technical and vocational institutions.

I will conclude by saying that our real worth is our children. It is the quality of education we can give them and our ability to empower them with the skills which they need in this modern day and age. That is the challenge we face. We do not lack credibility. Our children are second to none. If you walk in HEJ, which won the award of best centre in Islamic World last year, in Karachi you will find people working at 12:00 o'clock at night because they have realised that learning is fun, acquisition of knowledge is not just something you study for your examinations there could be greater joy to learn and to use technology. This is what I would like to see happening in Pakistan.