

# Road to Technology Revisited

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*"It was the best of times, it was the worst of times, it was the age of wisdom, it was the age of foolishness, it was the epoch of belief, it was the epoch of incredulity, it was the season of Light, it was the season of Darkness, it was the spring of hope, it was the winter of despair, we had every thing before us, we had nothing before us, we were all going direct to Heaven, we were all going direct the other way." Charles Dickens - A Tale of Two Cities.*

There cannot be a better description of the state of affairs in Pakistan than the above. We are on the threshold of the 21st century but the majority of our population lives in middle ages and antiquity. We have achieved outstanding successes in the fields of nuclear, science and space technologies; at the same time we are totally dependent on imported technologies in the fields of science, industry and medicine. In the past there was only one university and it fostered two nobel prize winners in the persons of Prof. Abdus Salam and Har Gobind Khorana; now there are dozens of universities, national institutes and centers of excellence but no outstanding scientist or man of letters is in sight. The country is under very heavy foreign debt yet it is more dependent on the import of some of the basic necessities of life. We live in momentous times and the world scene is changing fast. If proper cognisance of the realities and the effective measures there of are not taken, we will be left out on a limb in poverty, ignorance and open to exploitation. According to the world economic report the country is ever more on downhill slide to poverty and the present industrialization has made no dent in the fortunes of the down trodden.

There are 46 countries of the Organization of Islamic Countries and they have a standing committee of Science and Technology. They all make tall claims of past achievements in humanities and sciences and aspire to be in the forefront in science and technology, whereas they are totally and absolutely dependent on the import of every piece of scientific equipment and laboratory supplies however simple or sophisticated. At the same time the universities and national institutes of science and technology have rapidly proliferated and multiplied over the last four decades but they have made no contribution to the scientific and industrial development of the country. Our science is barren because it is purely analytical and theoretical with no effort for and stress on applied and productive aspects.

In fact we have come to depend on ready made imported solutions to our problems and have developed a strong inferiority complex. Even the traffic of Lahore has to be managed by Australian experts. The will and inclination for the creative effort have been lost.

The country is endowed with burgeoning population and heavy foreign debt. The unemployment is rampant especially in the educated and professionally qualified sections of the population. Thousands of science graduates, engineers and doctors are jobless inspite of the overemployment in all sectors of available jobs. The technical and professional jobs are highly circumscribed and most of these are in governmental institutions or public sector. There are few opportunities for the expansion and training for these jobs for the following reasons:

1. The scientific and technical education in the country is academic and theoretical with no orientation for applied aspects and opportunities for apprenticeship.
2. The industry depends totally on imported turnkey technology, with little room for indigenous enterprise. There are no provisions for its further development and research.
3. The basic industries such as chemical, mineral and synthetic are non-existent to supply jobs and challenges to scientists and technical personnel.
4. There is no scientific instrumentation industry; even the simplest scientific equipment and appliances are imported.
5. There has been a long period when the technical training and higher education abroad was neglected and the scholarships offered by foreign

governments allowed to go unutilized and lapse so that the scientific institutions and universities stagnated in the absence of infusion of fresh knowledge and scientific technology.

6. This is the age of specialization especially when it is the very foundation of high technology. The transplantation of high technology is possible only on the existing technology without which it will wither. Most of the costly training and specialization abroad of our students could not take root in the absence of a prepared and fertile soil.
7. Brain drain is a world wide phenomenon especially afflicting the third world. Part of it occurs due to frustration and lack of opportunities.

Biotechnology is one of the foremost technologies of this century and ranks at par with nuclear, space and the computer technologies in terms of scientific achievements, applications, investment of resources and business enterprises. Its importance in the form of drugs and diagnostics is known to every body without exception. It has enabled the scientists to dig deep into biomolecules to study and manipulate them. Genetic engineering can change the very nature of an organism or biologically synthesize molecules which otherwise cannot be synthesized in the laboratory such as human growth hormone and insulin. It has opened new vistas of amelioration of human health and well being. Growth hormone is used not only in the treatment of short statured and under developed children but has recently been reported to counter some effects of aging improving the quality of life and physical appearance in the aged.

In spite of the very heavy burden of foreign debt Pakistan imports drugs and diagnostic aids worth billions of dollars a year. Although there is a government policy of deletion in the case of import of drugs, it is openly flouted by the drug manufacturers. In the case of diagnostic kits there is free import and that also duty free and with no policy of deletion. The market is flooded with diagnostic kits and their agents hover like vultures over a dead body. In the case of drugs the packaging constitutes a small part of the cost where as in the case of diagnostic kits 90 percent and above is the cost of weighing, dissolving and packaging which can be done within the country at great savings of cost and foreign exchange with the added advantage of acquisition of technology, creation of technical jobs and

laying foundation for scientific research work in biotechnology.

Most of the advances in medical knowledge and technology emanate from the United States and Western Europe. Rapid advances in biomedical knowledge and technology will continue in these countries. Chemical mechanical and electronic technologies available for prevention and treatment will become more complex, powerful and effective and dangerous. Unless a scientific base of biotechnology is created in Pakistan we may not be able to avail of these or pay for these. Total dependence on import of biomedical technology without establishing an indigenous base is economically unsound, practically unfeasible, morally unjustifiable and policywise irresponsible. This process has already been allowed to go on too long. The practical training of our medical graduates belongs to pre world War II era. We have lost the imagination and will for the creative effort and our mental faculties and practical skills have atrophied. We have become agents of foreign products from the importers, civil servants, academicians, scientists, middlemen down to users. Consequently the idea of preparing diagnostic kits locally in the laboratories when first presented produced surprise and disbelief in the authorities and consternation and resistance in the circles of vested interests. When conclusive data were presented to show that the imported reagent kits could be exactly reproduced in the laboratory after necessary experimentation and testing it was disallowed by an executive prerogative. However, by the interest of the new Chairman of the Hospital Prof. Mahmood Ahmed Chaudhary and on an appeal to the Chair Person of the Shaikh Zayed Bin Alnayhan Trust, Senior Minister, Begum Bhutto, I was allowed to undertake the preparation and trial of the locally prepared biochemical reagent kits in the laboratory. Below is the progress report of the work.

It must be borne in mind that the market of any article is determined by its demand. As our medical institutions and universities have become dependent on imported reagent kits, most of the basic reagents are no longer available in the local market and had to be imported which took some time. The hospital was originally planned to prepare its own diagnostic reagents and it already had a stock of some basic reagents. Initially those reagent kits were prepared and tested, whose reagents were available either in the hospital or with the local suppliers. Until now the following 23 kits have been prepared, tested and are in use in the hospital laboratories as shown in the Table 1.

**Table 1: List of diagnostic reagent kit's prepared in Shaikh Zayed Postgraduate Medical Institute, Lahore.**

Sr. No.	Name of Diagnostic reagent Kit	Cost of Imported kit (Rs.)	Cost of Imported Reagents used in the Kit(Rs.)
1.	Albumin	1700	25
2.	Acid Phosphatase	890	102
3.	Alkaline Phosphatase	435	100
4.	Amylase	1900	50
5.	Bilirubin	420	60
6.	Calcium	580	40
7.	Cal I for I on selective Analyser	85015	15
8.	Cal II for I on selective Analyser	85015	16
9.	Chloride	510	30
10.	Creatinine	350	31
11.	Flush solution for Ion selective Analyser	400	14
12.	Combined acid buffer for Chloride analyser	1200	50
13.	Electrode Activater	1800	20
14.	Glucose	650	100
15.	HDL - Lipoprotein	590	15
16.	Lactic Dhydrogenase	400	50
17.	Lipid Total	630	60
18.	Phosphate (Phosphorous)	690	60
19.	Proteins	900	140
20.	SGPT	1896	125
21.	SGOT	1711	55
22.	Urea	375	45
23.	Urine Diluent	1370	21
	<b>Totall</b>	<b>21097</b>	<b>1224</b>

As shown in the Table the average cost of reagents in the reagent kits is 5.8 percent of the cost of imported kits themselves. Because of the very keen competition, the middle man's profit can be about 20 to 30 percent and the remaining more than 70% of the cost is in foreign exchange. The numbers of individual kits used per month as well as their individual costs vary greatly but a rough estimate of savings to the hospital is rupees lac and a half per month. This is for one small hospital of 365 beds and for the very limited number of kits. However at the national level these savings both in local currency as well as in foreign exchange can run into billions a year. Further work is in progress.