

Thoughts on scientific development in Pakistan

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Your Excellency, Dear Afzal,

Once again, I apologize for not having been able to meet with you on Monday. I will therefore summarize in this letter some of the thoughts I wanted to share with you.

The two documents in which you are interested in, LAMS-364 and LAMS-1117, belong to a subject on which I have done some work in the past twenty years. I even think that the first one of them could be somewhere in my archives. However, since these two documents are formally “unclassified” I wanted to inquire why you had difficulties getting them, either from Los Alamos, NTIS, or elsewhere. I therefore sent the enclosed e-mail to the Los Alamos library and got a negative answer as you can see. This is surprising since that kind of documents were freely distributed in the past, and because there must be numerous copies of them in many libraries around the world. There are even places like the British Library which since at least fifty years maintain full collections of all published unclassified documents such as U.S. and other countries’ technical reports.

Well, it may be that while these documents are unclassified they are now considered as “sensitive.” One very troubling innovation of the Reagan era was the notion of controlling information outside of the classification system. *Unclassified but sensitive* or *classified by association* (meaning putting two unclassified data in the same document made them both classified) were policies that developed at that time. This idea extends government control of information essentially without limit.

Consequently, I have the strong impression that trying nowadays to get such a document (by official or un-official channels) is essentially the same as trying to get a “classified” one. Therefore, I think that it would be unwise for me to help you in such a process.

This leads me to tell you the afterthought I had concerning the promise I made to you when we met after my very interesting and stimulating visit to Pakistan, i.e., to write a report on what your country should do in order to strengthen its independent scientific and technological basis: The afterthought was that it would be unwise for me to write such a report!

Nevertheless, there are a few things I can say, especially since I have addressed them already in conversations with Prof. Riazuddin and Dr. Ishafq Ahmad during my visit to Islamabad. As you will see, these things directly relate to the question I have just discussed.

As you know, I have the strong philosophical and political conviction that the survival of mankind depends on the coexistence of several human cultures which should be sufficiently diverse to allow for a pluralistic approach to the solution of human problems. In particular, I claim that different cultures should develop their own science and technology, which in all human societies are at the root of economical welfare and national security. This does not mean that science and technology should develop in different cultures in isolation from one another. It means that each culture should develop its own core of knowledge and knowhow, and be proud of its achievements, independently of the successes et failures (which are always relative) in this or other cultures. To substantiate this thesis, let me develop a few point:

1. A fundamental lesson from the history of mankind is that knowledge is permanently created and destroyed. Just like in natural selection processes, there is “progress” only because there is slightly more creation than destruction of knowledge. One very good example is the disappearance of Moon landing technology: I am appending the first page of a recent paper in *Contemporary physics* that discusses the consequences of that. There are also numerous examples from history showing that very high levels of technology were achieved in many places of the world, and that such technology got lost for a reason or another. For example, during my visit of Taxila, I was amazed by the technology used to build walls that were able to resist earthquakes for more than 1’500 years! A contemporary example is the continuing decay of nuclear power and plasma physics technology and knowhow.
2. The world-wide rise and decay of the scientific and technological basis of plasma physics explains why reports like LAMS-364 and LAMS-1117 could be declassified in the 1950s or 1960s, while the same reports have become “sensitive” nowadays. This is because in the 1950s and 1960s sufficient numbers of people world-wide, even in countries such as Pakistan

or India, had the necessary and sufficient basic scientific training for very easily reinventing the content of these documents so that their classification was meaningless. Today, the young scientists have their head full with an enormous diversity of details and very few of them have the kind of sound mathematical and scientific basis that characterized the scientists of thirty to sixty years ago. Moreover, for obvious reasons, some fields such as plasma physics have never made themselves into regular academic disciplines: there was never any comprehensive plasma physics “text book” you could buy and learn from. Professional level plasma physics was learned on the spot and what was required of beginners was a solid basic scientific training. This is why, of course, countries which want to keep advanced plasma physics knowledge and knowhow alive have to rely on expensive “simulation” programs; and why it may make sense to “reclassify” some documents as “sensitive”.

3. Concerning plasma physics and the importance of an indigenous and truly independent scientific basis, it is interesting to compare what happened in China and in France. China was very successful in moving quickly from the A-bomb to the H-bomb. On the other hand, France had very big structural, political, and human resources problems in trying to do the same. (There are many papers and books addressing the question of the French “H-bomb problem.” A recent article on the topic, based on a doctoral dissertation in history by A. Bendjebbar, has been published in *L’Histoire*, No.257, septembre 2001, pp.64–69. This article is also citing an interesting paper by former minister of Defense Pierre Messmer, who stated that “from 1958 to 1973, most French scientists, with the exception of a very small number which does not exceed the number of fingers in one hand, systematically refused to participate in any research on, and in any test of, French nuclear weapons.” This shows that not only in the U.S., but also in France, the vast majority of scientists have always been against nuclear weapons in general, and the H-bomb in particular.)
4. But the most important reason for developing an indigenous scientific basis is not national defense: economical and social welfare are even more important. In this respect, it is paramount that while international exchanges and trade are essential in science as well as in business, international contacts should not become Trojan horses for impeaching any really significant national development. Many examples can be found in various areas of economy and industry. However, since I am a physicist, I will just recall the example I gave to Prof. Riazuddin: that of CERN. This institution has not just a scientific role, its political function might even be more important than

its scientific one! I just heard that the construction of the next accelerator (LHC) would cost \$300 millions more than previously estimated. If CERN had no political functions (for example, to attract bright young scientists from all around the world, e.g., see *CERN Courier*, October 2001), I doubt very much that Europe and the U.S. would find so much money for something that (just like the previous big accelerator LEP) will most probably add very little to our understanding of fundamental forces. In other fields of science and technology, there are also organization which aside from their main purpose have similar functions. The consequences are the well known “brain-drain,” the subsequent loss of pride in indigenous developments, and the increased dependence on foreign resources.

In conclusion, I reiterate what I said to Prof. Riazuddin and Dr. Ishafq Ahmad. The *National Center of Physics* could become a seed for creating a strong indigenous expertise in all areas of science and technology that are important to your country — and by the same token to the rest of the world because it is essential that plurality and democracy remain effective realities. As I explained, in order to attract young talent and initiate the return of expatriates, the *National Center of Physics* should be as ambitious as Princeton’s *Institute of Advanced Studies*. Moreover, the staff should be international (i.e., universal just like in the word *university*) to demonstrate that interesting and significant work can be done in Pakistan.

Documents:

- Copy of e-mail exchange of 26/29 October 2001.
- Page 319 of *Contemporary physics*, 42, 2001.
- Page 10 of *CERN Courier*, October 2001.