

# The essential role of science in technological progress and economic development

For the first time in the records of the International Centre for Theoretical Physics (ICTP) and of the Third World Academy of Sciences (TWAS), 50 economists and scientists assembled in Trieste to discuss what Prof. Abdus Salam – Nobel Prize for Physics, Director of ICTP and President of TWAS – calls the “missing link between economists and scientists and between economics and science”.

The meeting was held from 22 - 24 April, 1992. It was convened by Prof. Abdus Salam and Dr. Luls Emmerij, Director of the OECD Development Centre in Paris. Augustin Papic, a former member of the South Commission, also contributed to the organisation of the meeting.

In the developing countries, the number of scientists is ten times smaller than in the industrialised nations. Science is often confused with technology and science and technology are not (or not sufficiently), included in the curriculum of the education system. As a result, the Third World lags far behind the North. Having stated his diagnosis, Dr. Abdus Salam asked “Who is the guilty party as far as science and technology are concerned, who keeps this activity back (we the developing countries). We have come to the conclusion that it must be our brother, the economist”.

In the two and half days of the

meeting, many aspects of the issues raised by Dr. Abdus Salam were discussed in depth, and in particular, the respective roles of economists – they work in the short-term and are concerned with costs and benefits – and of the scientists who work in the long-term. Fundamental science which is generally acknowledged as having a close linkage with development, cannot be easily introduced in economic theory and hence, into economic planning

fundamental science results may be patented in the future and may therefore no longer be available in the developing countries; developing countries need a new type of international initiative like the 20 centres for excellence for technology and environment proposed by Dr. Abdus Salam.

Dr. Luls Emmerij summarised the debate at the end of the meeting. He found that Prof. Abdus Salam’s opinion was too pessimistic. Not all economists

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practice.

On the other hand, many economists believe that fundamental science should not be justified in economic terms only. It also has a cultural value for the society and this implies an intervention of the State; science, applied science and technology have their specific characteristics and are all parts of a continuum leading eventually to industrial innovation; corporations and the State have distinct roles which vary considerably from countries to countries; there are fears that

should be blamed for the existing situation. To the contrary, many of them have made important contributions to the topics discussed in the present meeting. Some economists, however, are responsible for the emphasis in the eighties, on decreasing the role of the state in the economy of the states. Newly industrialized countries provide a model for other developing countries. The so-called late-comers, Indonesia and China, could perhaps be a better model than the other East Asian countries.

The question of getting hold of technology is complex. One can make it or buy it. Between the two, there is a continuum of possibilities. In all cases, an endogenous basis must be created and this entails a range of abilities from science and applied science, engineering and craftsmanship. Skill is essential for incremental technology. The relation between science and technology very much depends on the firms. But also here there is a

need for a science basis which implies an adequate education system. The 20 centres proposed by Dr. Abdus Salam would undoubtedly strengthen such a science basis.

Intellectual property rights could become a problem and it might be more and more difficult to keep access to the scientific information. Science drives technology and vice-versa. The science base must be part of culture and societies should be persuaded of this. There is also the question of the misuse of science

and that of brain drain. On these points the signals received from the society are not easy to interpret. Fundamental science has never gotten its fair share of financing and this becomes even more obvious when one considers that much of this funding goes to defence.

Science policy should be administered by scientists and not by bureaucrats and, in this regard, the role of towering individual scientists is extremely important. However, ideas have to be there otherwise funds will not come. Dr. Emmerij believes that some measure of tension between scientists and economists is inevitable because the former are involved in the long-term, while the daily bread of the latter is to look at cost-benefit evaluation of investment in all kind of sectors, including science. Both communities should learn from each other’s field and, in particular, economists should help scientists to articulate the link between science and the production process through technology.

The strategy for the future can be summarised in seven main points: (a) the role of technological progress in economic development studied in the sixties by Solow and Denyson should be updated. This is essential to convince decision-makers that R&D, education are a prerequisite for economic growth; (b) Developing

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countries must move from alignment policies — which were essential in the eighties — to long-term policy. This involves investments in technology, science, innovation; (c) Governments must commit themselves to these investments. The updating mentioned in (a) will help to produce a political will; (d) Balanced policies are required. Countries should decide where to place themselves, given their oriented uses; (e) Talents in the developing countries must be brought out: hence the role of education, centres of excellence and skill formation; (f) These countries must adopt a fair income distribution policy. There are explosive situations in many parts of the world. Technologies must be designed to face these situations; (g) Ten per cent of the world lives in the twenty-first cen-

tury, while 90 per cent lives in the fourteenth. This dualism must be taken into account when resources are allocated.

Keynote papers were read by C.H.G. Oldham (Science Policy Research Unit, Sussex University, U.K.); A. Kifky (Club of Rome, Paris, France), D. Bes (Argentinian National Commission for Atomic Energy, Buenos Aires), C.N.R. Rao, Indian Institute of Science, Bangalore), D. Bekoe, International Development Research Centre, Nairobi, Kenya) and L. Yaker (UNESCO). The sessions were chaired by L. Emmerlj, M. Qureshi (former Vice-President of the World Bank), A. Badran (Assistant Director General for Research and Higher Education, UNESCO) and M.H.A. Hassan (Executive Secretary, TWAS).