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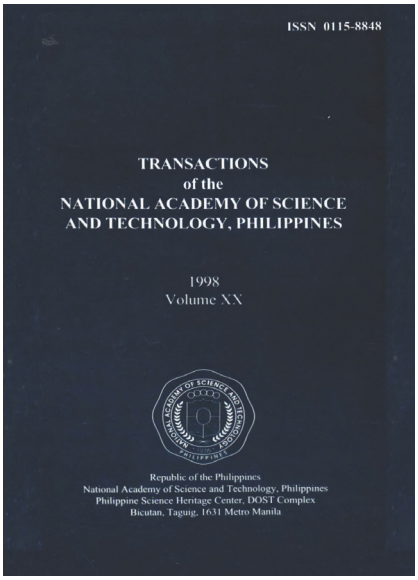

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SCIENCE AND TECHNOLOGY POLICY AND SOCIAL SCIENCES

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INTRODUCTION

Let me begin by complimenting the organizers of this year's annual scientific meeting of the Academy for the elaborate preparations as well as for the quality and breadth of participation in the plenary sessions, in the simultaneous scientific paper presentations as well as in the poster presentations and exhibits.

Worthy of very special commendation were the three Pre-Congresses organized in preparation for this regular congress. I had the privilege of attending some of the sessions and I was very pleased and very much encouraged to note the coming together of the disciplines (and their practitioners) in discussing many important issues of national concern whose effective resolution would be possible only with multidisciplinary complementation.

If the only outcome of this year's congress is the realization by our scientists of the desirable outcomes of meeting more often with colleagues from other disciplines – to educate one another, to explore and share new horizons and perspectives, to share techniques, methodologies in dealing with the challenges before us – the Academy and the PSSC would have achieved a great deal.

This morning Academician Bienvenido F. Nebres and I have been asked to initiate the discussion on science and technology policy and social sciences.

The first observation I will make is that Science and Technology (S&T) would profit immensely from the reflections and inputs of the social sciences. Because, after all, whether we recognize it or not, the formulation of policies that enhance or constrain scientific and technological activities in the country is *essentially a social process,* informed by political and economic imperatives. Unfortunately, very few social scientists have systematically examined this process to draw insights that can guide the scientific community in its advocacy efforts.

To date, the only serious work on the subject is still Olivia C. Caoili's thesis on the changing structures, processes, and directions of policy making for science and technology in the Philippines. Since the time it was written almost twenty years ago, no other social scientist has been sufficiently challenged to identify and address issues in S&T policy even at this juncture in our history when the nation's future hinges on the development of its people and technological capability.

My brief presentation this morning shares personal observations regarding the process of policy formulation for S&T. I hope these observations can serve as inputs to the theoretical reflections of social scientists on policy making in this area and challenge them to be more involved in shaping the direction of our country's S&T Policy.

PUBLIC POLICY FOR SCIENCE AND TECHNOLOGICAL ACTIVITIES

Public policy for science and technology is conventionally defined as what government does for three categories of scientific and technological activities, namely:

- experimental research and development,
- scientific and technological support services, and
- scientific and technological education and training.

The first category includes, among others, the creation and support for research institutes, provision of laboratories and experimental fields as well as incentives for researchers.

Under the second category are provisions for scientific libraries and information/communications systems; museums, geological surveys, meteorological and seismological observations, setting up of industrial and scientific tests and standards, issuance of patents; and other technical and laboratory support.

The third category covers support for scientific education and training at the tertiary level. In our system as well as in other countries basic science education and training is the purview of the Department of Education (or Ministry).

Thus, in assessing the state of scientific and technological development in a country, the indicators or parameters resolve around these three sets of activities: For example, in comparing ourselves with our Asian neighbors, we look into

- Where are our research laboratories?
  How well-equipped are they?

- What is the ratio of scientists and engineers, to the total population; what is the percentage of PhD holders among scientists and engineers?

- How many scientific papers are published in the science citation index?
- How many patents are issued?

And if the country is found wanting in these measures, as in our case, the explanation is sought in the lack of or inadequacy of the state's S&T policy.

But how are S&T policies made" Who makes them? How are they implemented?

Public policy on S&T are made at different levels by different actors. At the highest level is the constitution where invariably the statement is "that the state gives the higher priority to science and technology" or some noble elaboration to such effect.

At the next level is Congress which enacts or passes legislation to give flesh and meaning to the priority for S&T and allocates a budget or resources for their implementation.

At the next level is the executive branch, from the President himself, down to the members of his cabinet, more specifically, the secretary for Science and Technology, who spells out the administration's policies, priorities, programs, and resource allocation for S&T activities during its incumbency.

Thus in many forums, solutions are sought from or issues addressed to these sources of formal S&T policy.

While this is true, it is not as if we in the scientific community are completely helpless or voiceless in crafting or directing S&T policy. On the contrary, many effective policy choices for science and technology in the Philippines are in fact left largely to administrators, and scientists in research institutions and universities. This constitutes my second observation.

Consider the fact that a very significant part of experimental research and development and scientific higher education is conducted by UP and the bigger SUCs.

Given the academic autonomy of UP and the SUCs and the jealousy with which the faculty guards its academic prerogatives, and responsibilities, it will not be entirely wrong to claim that in fact much of S&T policy in the past as in the present have been decided within the halls of academe.

This realization has led the previous secretary of the Department of Budget and Management (DBM) to propose that the Department of Science and Technology be under the administration of UP to save on cost.

I have been President, Chancellor, Director of a research institute and practising scientist in the university. I know for a fact that most of the effective choices for R&D for scientific higher education are conducted by the professors and research directors/deans. Not by the President nor by the Chancellor! Not by DOST. Not by Congress.

An effective research director/dean will, from to time to time enlist the support of the President and Chancellor but the initiative, priorities, and strategies reside mainly with the faculty and academic leaders.

Contributions of social scientists to S&T Policy Formulation. At this point, it is appropriate to ask what have been the contributions of social scientists to the formal formulation of public policy on S&T activities. Here it is useful to make a distinction between the national science agency and other executive departments.

Unfortunately, there is little by way of record which reflects the unique contribution of social sciences in S&T formulation in the DOST.

More of the significant players in the national S&T scene in post-war years had been medical doctors, physicists, engineers, chemists, and agricultural scientists, with a few exceptions.

In the reorganization of the science community in 1982, for instance, the impetus for social innovations such as the organization of sectoral research councils; the regionalization of S&T activities; the recognition of science communities and later of S&T parks; the institution of the science career service; and the recognition of national centers for scientific excellence came largely from natural scientists and engineers.

In recent years, the elevation of the science agency to a formal department, the establishing of S&T parks, and the conceptualization of the ESEP project resulted from initiatives of natural scientists and engineers.

Nevertheless, it should be noted that PCARRD which served as the model for the sectoral council system recognized early on the central role of farmers -- the users and beneficiaries of information -- in the technology generation and utilization continues.

For this we must acknowledge the role of social scientists in UPLB and UP Diliman particularly Prof. Gelia T. Castillo and Prof. Manuel F. Bonifacio who very skilfully persuaded the agricultural technologists of the benefits of having social scientists as partners and collaborators in agricultural research.

SOCIAL SCIENTISTS AND TECHNOLOGY POLICY

But S&T policy is crafted not only by the national science agency (DOST). On the contrary, continuing strategic choices adopted by other cabinet departments (other than DOST) set the parameters of the nation's S&T activities, not the other way around.

The links between social scientists and S&T policy in the national science agency are tenuous at best but they do have a lot of voice in the technology choices adopted by the other line departments.

For example, the debate whether we should pursue a policy of food self-sufficiency or food security has raged for some time. However, the economists have carried the day; now the official policy as far as agriculture is concerned is *food security.*

I do not have time to elaborate on the profound differences between these policy options. Suffice to say that this policy option has far-reaching consequences for research priorities in agriculture. This public policy decision which was made outside of DOST will determine the direction, timing, and scale of efforts along the three clusters of S&T activities described.

A second significant example is the national policy on social forestry. After so many decades of forestry education and research on silviculture, logging, and forestry products engineering, the social scientists in Los Baños and their allies in the DENR, NGOs, and farmer groups succeeded in turning priorities around the needs of communities and the compatibility of forest management practices with their needs. So marked was the paradigm shift that the recent reorganization of the UPLB College of Forestry almost went overboard in renaming their college, the *College of Social Forestry.*

But one of the better-documented collaboration among social scientists, natural scientists and engineers in S&T-related policy occurred at the level of the National Irrigation Authority. Social science research from Ateneo de Manila's Institute of Philippine Culture, the International Rice Research Institute, the Asian Institute of Management, the Central Luzon State University, and UPLB succeeded in helping transform the official top-down paradign held by the National Irrigation Authority (NIA). In NIA's traditional approach, engineers designed, built, transferred, and rehabilitated irrigation systems without consulting end users. As an alternative, the researchers fleshed out a participatory framework, detailing procedures, processes, and policies which the farmers eventually found useful and adopted.

The links between the social sciences and S&T-related policies have not always been as fruitful. It may be useful to state some of the more obvious failures of public policy due to lack of social science input in their formulation but I will leave that up to you. We do have success stories where social scientists have made important contributions to S&T-related policies.

TECHNOLOGY POLICY REQUIRING SOCIAL SCIENCE SUPPORT

It is always good to have a sense of the past – a notion of how well we have done in some situations, and how poorly we have done in others. I look at history with a utilitarian purpose as a guide, a reminder, a call to arms to do better in the future.

In the next few minutes, I would like to dwell on prospective social science contributions to S&T policy.

With or without the intervention of social scientists S&T policy continues to be articulated, supported, and implemented at all levels of government.

The myriad and very complex problems and solutions that face the nation have technology implications:

- graft and corruption, lack of transparency, role of access to information and communication, information technology;
- problems of waste disposal and the appropriate mix of solutions – landfills, incinerators, and recycling;
- lack of energy resources and will to harness various energy sources – tidal waves, ocean thermal gradients, geothermal energy, fossil fuels, nuclear power, solar panels – and the need to make them socially acceptable;
- monstrous traffic jams, inadequate mass rail or highway transport, lack of discipline to hurdle such problems, and poor urban planning; lack of land use and zoning;
- the need for electoral reform and computerization;
  problems of population, nutrition, health, food science, genetic engineering, and transgenic plants;

The list can go on and on.

But invariably, these technology fixes will affect how people behave, think, and organize their lives. They have to be made aware of modern technologies that will address our collective problems. It is the task of the social scientists to process new technologies with future users who will either weave the notions and ideas behind the technology into their own cultures or press for the modification of the technology to suit their idiosyncracies and those of bigger social institutions.

For example, so many of the seemingly intractable problems of Philippine agriculture can be traced to the failure to recognize its essential duality -- as an industry and a way of life. I have had a running argument with some of my economist friends who keep harping on the weaknesses and limitations of the Philippine agriculture R&D system. I think they have got it all wrong. Philippine technical capability in agriculture is better than most developing countries. In fact, our indigenous technologies are being adopted elsewhere. Our scientists sit as advisers in international bodies and serve as consultants in many countries.

To my mind, the weak point in Philippine agriculture is not technology generation *per se* but its articulation with a broader economic, political, and social environment and with the farmers and end-users.

Against this backdrop, we may generalize that policies are likely to succeed when the natural and social sciences complement each other. The greatest strength of the natural sciences lies in their rigor and value-neutrality. But this strength turns into weakness when scientific recommendations fail to take into account the political context or social milieu of a particular course of action.

This is where we need each other. Many social scientists have borrowed the methods of the natural sciences to enhance the rigor of their disciplines. Lately, the natural sciences have returned the favor by paying more attention

to the social and ethical consequences of scientific discovery and technological development. This trend is exemplified by the growth of science and technology studies or STS that focus on the impact of S&T on society.

Thomas Kuhn, who originated the concept of a 'paradigm shift' is credited as the father of STS demystified the process of scientific discovery by explaining that

> The process of science is fundamentally human, that discoveries are the products not of some plodding rational process but of human ingenuity intermingled with politics and personality – that science is, in the end, a social process (Gladwell in Javaid, 1997).

This convergence between the natural and social sciences augurs well for the successful pursuit of S&T policy.

So as our country moves on to its second century, what are the challenges and opportunities in which social scientists can play a more crucial role?

How should the social sciences and social scientists organize and position themselves to make a difference?

If more social scientists would only stop to reflect on the answers to these questions, then I think the Pre-Congresses and this Annual Scientific Meeting would have achieved their purpose.

In summary, practically all the complex and difficult problems facing Philippine society today have science and technology underpinnings and implications. Fortunately, there is a growing convergence around the realization that the successful resolution of these challenges requires complementary, multidisciplinary approaches.

Such being the case, the articulation of public policy for scientific and technological activities ought to be the concern not only of the natural scientists and engineers alone but also of social scientists and humanists. The purposive crafting of S & T policies and their effective implementation is a worthy subject for social science research. Unfortunately it has not received much attention.

In the systematic study of S & T policy formulation and in enlisting the active role and participation of social scientists in the exercise, reiterating the following observations of the Philippine experience may be useful:

1. S & T policy formulation occurs at different levels. The constitution, congress, and the executive departments each have their roles. However, it is not as if the scientists and the research and higher education institutions are merely passive receivers of S&T policy.

As a matter of fact many effective policy choices in S&T activities are decided by scientists and research administrators themselves.

UP and the SUCs are major S&T players. Beyond the aggregate budget levels, the universities (meaning the faculty) pretty much decide what their priorities are.

2. Historically, social scientists have had relatively little role in S&T policy making in the national science agency (presently the DOST). However S&T policymaking is also being done in the other executive departments. The technology choices adopted by executive departments in many cases effectively determine the priorities directions, timing, and scale of S&T activities in DOST, in the SUCs, as well as in the private sector.

3. Technological choices are continuously being made at the national level. The national scientists and engineers need to carry out their assigned tasks of assessing, innovating, adopting these technologies to suit local physical and biological conditions. The social scientists ought to work hand-in-hand with their counterparts in assessing the social, economic, political, and cultural compatibility, acceptance and adaptability of these technologies.

4. Fortunately, there are increasing examples of technology-based strategic choices by executive departments when social scientists have made significant contributions. Let us build on this track record and get more involved. If we do, the problem of inadequate resources for the social sciences will resolve itself.