

CLOSING REMARKS

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Dr. Dayrit, the president of the National Academy of Science and Technology, Dr. Juliano, Dr. Ramirez, distinguished men and women of science, guests, fellow workers of the science and technology community and the government, members of the academe, ladies and gentlemen.

I must thank Dr. Ramirez for her generous introduction. Many of these are accomplishments which I cannot claim as solely my own because I see many faces here who in one way or another I have had the privilege to work with. And without their cooperation, I don't think we would have accomplished any of the tasks that Dr. Ramirez read.

When I was informed that the President had made the announcement during a Cabinet meeting to make me an Acting Secretary, it came really as a pleasant surprise because I was home at that time, one of the few occasions when I was able to go home early. That was because I was not feeling well the day before, and I planned to just finish signing papers the following day and leave before lunch. But as usual, things got extended and I did not get to leave for home until 3:00 o'clock in the afternoon. So I just thought I would rest until I got a phone call from Dra. Fellizar, the wife of Science Asst. Secretary Jun Fellizar, who said that President Ramos had announced changes in the Cabinet, and that I had been named Acting Secretary of the Department of Science and Technology (DOST). It was of course a pleasant surprise, although there was already an indication that there would be some changes in the Cabinet. But we were not sure then when it would come and who would take the respective places in the Cabinet. This appointment makes me the third Los Banos member of the Cabinet, and I am a bit apprehensive about that because I think Los Banos might be blamed if there is anything that would go wrong since we hold some key positions in the government. Ciel Habito holds NEDA, Dr. Gloria is now holding DECS, and will influence the establishment of the Commission on Higher Education. And I hold a low profile, a relatively anonymous department called the Department of Science and Technology.

I hope that with these changes in the leadership of the different departments, as well as a positive confluence of events which I do not think we will ever have again in the history of the Philippines – Fr. Ben Nebres as the President of the Ateneo University, a mathematician; President Javier of the University of the Philippines who is a well-known scientist and science administrator; and Bro. Andrew Gonzalez who is now at the helm of De La Salle University and one of the foremost promoters of science and technology, and which during his previous term in De La Salle, was able to introduce an art of progress into their science and engineering programs. I think with these developments, we should have enough will, political and otherwise, to be able to move the Philippines into a stage of world competitiveness.

I must extend my regrets for not being able to join you yesterday in the awarding of your young scientists. I had to make a choice I must confess, in either coming here or attending an affair with the First Lady at DOST. I think you would not hesitate to make the same decision as I did, given the choice. I find myself really trying to make discards of decisions in my position now. But I was told that all your sessions had gone very well, and that listening to part of the reports in the different concerns covering environment, health, economics and statistics, agriculture and energy, I find that there is again a list of things which we will have to attend to in the very near future.

There is one observation though that I would like to share with you as I listened to some parts of the reports. And number one was the lack of element of competitiveness, the lack of that will to fight in this global economy which is fast encroaching and reaching our source. I hope that as we now translate this recommendation into something doable at all fronts not only in the academy but also within the science community, we shall have that will to be competitive to excel because it will eventually bring us to national well-being, and sustain what now appears to be a turnaround in our efforts to move toward national progress.

It is I think in this context that I would like to share with this group and some of you who may have already listened to me about this, the seven-point program which I hope will become a framework within which the science community could move, and within which the science establishments could lead in bringing us toward the goal of global competitiveness and people empowerment. I must state here that as a whole, this should bring us toward a higher level of national well-being. And while there is very clear participation of the scientists and engineers, and the inventors, talking about national well-being would always bring into the future the necessity of those who study human behavior and the human being itself. When we talk about well-being, we talk about people, we talk about environment, we talk about their activities and how they are able to transform nature and unlock the secrets of nature toward their own advantage.

Let me now share with you the seven-point S & T action agenda which I hope will start discussions. I am sure that there are many other views that you could input to refine these. I am also sure there will be other ways of bringing us toward that level of competitiveness which we all want be in. But I would like to offer this as starting point:

The first point, if I may suggest, is for us to refine the vision that we have articulated in the Science and Technology Master Plan (STMP) and Science and Technology Agenda for National Development or STAND Philippines 2000, into something clear and coherent with emphasis on identifying the next generation technological advances critical to Philippine competitiveness. We now have to start scanning technological advances in the global science and technology enterprise. The questions we should start to ask now is after biotechnology, what? After microelectronics, what? After all these advances in material science, what's next? There are now indications of an emerging wave of advances which if we do not get prepared will again push us back in our efforts.

Related to this vision which should be clear and coherent is the need to start using superior technologies. May I emphasize the word superior. This does not necessarily mean high-tech but technology that is more efficient than the one being used at present. In jest I always tell the food industry that it is no longer adequate that they test their products by smelling and tasting, "paamoy-amoy at patikim-tikim. Hindi tayo mananalo niyan, hindi na pupuwede iyan". We have to use modern methods of analysis, modern methods of monitoring whether we are reaching the standards because that is the name of the game, and that is the only way we will survive in the world market.

I hope you now feel that there are these developments coming and if we do not prepare for them, we will find ourselves at the losing end. **AFTA will be with us . . .* This is a massive reorganization of the region. GATT (the General Agreement on Trade and Tariffs), when it starts to be in effect as early as 1995 (because we expect Japan and the United States to ratify the agreements fast), offers new opportunities but it also offers threats. And I hope that we will try to understand this development within our own circles because in the end, it will be a matter of national survival. Even now if you go to supermarkets, you will find so many products coming from our neighboring ASEAN countries – simple things like cookies, candies – attaining certain levels of quality and at a very affordable price. This is an indication of how AFTA will look when it is fully implemented when tariff barriers are lowered and when there is now a borderless economy among the six, or potentially seven, eight or nine countries in the ASEAN region. That is why we need to really sit down and further refine our vision, make it clear and coherent, orient it to the future technologies that will come by our way. And for those which are already available, use them or make an effort to use them.

That brings me to the second point, which is to design a strategic research plan focused on these critical advances in knowledge, tools and technologies which will lead to fulfill the vision. We need to be focused on clearly identified problems and concerns. This is an exercise where we are relatively weak, because we have bleeding hearts and we have soft hearts. And whenever we try to prioritize, we end up with a longer list than what we had started with. I am afraid this kind of exercise will get us nowhere. And the earlier we focus on clearly identified development plans we must apply advances and participate in the generation of more knowledge in relevant areas. We can not just be transferring knowledge from other countries all the time. They become obsolete very fast. And by the time we get to use them, their value added may have already diminished considerably. We can only correct that if our own internal capacity to generate new knowledge is very strong.

In this strategic research plan, I propose that we undertake science and technology-based bottle-necking activities which are in effect problems in the establishment and operation of very vital industries such as agriculture, steel, petrochemicals, packaging industry, etc. What I am in effect saying here is that we must try now to marshal our resources and invest in big ticket items. We can not wait for the time when we shall have enough of this wealth to invest in these bottle-necking activities because surely, this delay will bring us to a point where we can no longer catch up.

Third, I suggest that we deliberately and try very hard to organize cross-disciplinary teams of scientists and engineers, that we adopt a team approach to bring together the best and the brightest regardless of institutional affiliation. We should bring together the scientists and the engineers, the scientists and the inventors, the engineers and the inventors. These creative forces will have to bond together if we are to achieve a critical mass to be able to address and solve the problems that we would like to. I always liken this task to something like addressing a mission tailored-fit for a battalion with just a platoon. With my two years experience at DOST, disturbing realities have emerged like the fact that our technical manpower pool is very thin and narrow. We have an \$85 million World Bank-OECF project where for five years we should be recruiting faculty members to be given scholarships for a masteral degree or a doctoral degree. And I am sorry to say that even after the second year of implementation, we have started to run out of qualified people. Isn't that disturbing? Because these are the people who will take charge of the next battlefield. And even now, we already see that there are not enough of them.

So that brings me to the fourth point, which is to really campaign for an educational program involving significant numbers of graduate and undergraduate students with research teams focused on technological systems with exposure to industrial views. This should consist of a refinement of our manpower development program. We can no longer content ourselves with just growth figures of how many engineers would you want, how many electrical engineers would we need in the future. Otherwise, we will always find people following the path of least resistance, and you find an imbalance of manpower in certain areas. This is, I think demonstrated very clearly by one institution that we are helping in Batangas.

Sitting in the middle of chemical industries – Shell, Caltex, Coccochemicals, – with a college of engineering but which does not offer any chemical or engineering degree, you will see how junk this system is. There are also schools which are starting to phase out programs, especially the expensive ones like chemistry programs and chemical engineering programs. And if we do not stem that tide, I am afraid again, the capacity to train will be severely affected. We have to address that, and we have to address that soon, because we have a Science and Technology Scholarship Act which would provide for the training of 3,500 students in undergraduate degrees in science and engineering every year. That is a law passed by congress which mandates the Department of Science and Technology now to undertake this program – two scholars per municipality roughly, and you can just imagine the pressure it will put on our academic institutions. If we do not plan that out, again I said the path of least resistance will follow and we will find some distortions into this program. On top of that, we should retain, expand and retool our brainpower. Whatever we have installed now in the country, we should try our best to retain through a package of compensation, benefits, coupled with a good research environment.

In addition to that, we should expand this brainpower pool, improve the throughput of institutions of higher learning in the field of science and technology. If your

throughput is only 10% and you graduate, on the whole, 30 chemist per year in the whole Philippines, I do not know how you can be globally competitive with that. But yet, you have a large enrolment in this program. The throughput is very poor, it's either we are making it too difficult for them to finish, or our facilities are so inadequate that it is going to take them snail's pace to go through the mill. I think this is a challenge for these institutions which process this brainpower. Because if we do not improve the internal efficiency of these institutions, we can not encourage more students to take up science and engineering. They would think that even if the curriculum was tailor-made for a four-year course, it is going to take them seven years because subjects are not available, the laboratories are not that well-equipped, or the curriculum is just so crowded you have to take 200 units to finish the course, an undergraduate degree. Everytime a new professor comes in, we institute a new subject and have it required for everybody. Before you know it, you already have 250 units for an undergraduate degree.

We should bring home expatriate scientists. We have revived the Balik-Scientist Program. Two weeks ago the first Balik-Scientist under the Ramos administration returned. We hope to process six more or even ten more within this year. But let me just give you the figures of the past Balik-Scientist Program within ten years. From 1975-1986, we brought home 250 people. Only 150 stayed and out of that 150, 10 left after sometime. Again, I do not think with 150 expatriate scientists here, we can be globally competitive. The magnitude of this kind of intervention is just so limited that we now have to look out for a package, a milieu of interventions that we hope will put one and one together, complement each other, and bring the quantity and quality we need to address our problems.

We do have TOKTEN. This is a Transfer of Knowledge to Expatriate Nationals but that does not bring us the numbers too. You probably get 5 or 6 a year. That will not make you globally competitive. And we now have the INTERNET in nine different nodes all over the Philippines which I think has opened up in an unprecedented way, access to information to three million computers abroad, involving 18 million users. If you want more information about that, I advise that you touch-base with PHILNET which is in the DOST.

And there are bilateral agreements which you also can use in our DAAD, Fullbright, etc. And we now intend at DOST to put all of those together, paint a coherent picture, use to our advantage what can best be offered under these programs. But I'd like to emphasize that we need the numbers, now.

Lastly on this brainpower, we must make an effort to retool. Those who are with us now should make an effort to learn new techniques, the emerging technologies through post doctorals, through industry fellowships, through retraining programs, and even through the INTERNET, because you can download a lot of information through the INTERNET.

Retooling is a very important component of this program. And you should give opportunities for our professors and our researchers to learn new techniques and to learn a science that would generate more precise information.

Because again, that will be the only way to bring us to a level of global competitiveness.

Fifth, I suggest that we involve the private sector in planning research and even in educational programs, to focus on short-term and long-term needs of industry, while at the same time involving the transfer of knowledge and technological advances to industry and other users. I would like to emphasize here that the earlier you make the private sector participate in this process, the better for all of us. Institutions which have entertained barriers to this participation or who have in a sense been quite conservative, must now open up and bend a little bit to accommodate private sector participation in many of their programs. This way, we will be able to assist in the identification of the needs of industry, many of which are not aware that they have problems because a lot of them have really reflected their efficiencies by manipulating their books and not their production floors.

Sixth, we need now to establish major and specialized, experimental capabilities supported by large-scale contemporary instrumentation and laboratory infrastructure. Our laboratories need to be modernized, to achieve world class status. This is a big ticket item. We need to establish analytical and testing service laboratories especially for food and health products. The trading system has become very sophisticated that a lot of non-tariff barriers have been set up. And they are improved at critical times and are working to the detriment of many developing countries, simply because they do not have the capability to provide information that will counter the claims of the importing countries. I think I do not need to brief you any further about this and just state the problem about aflatoxin in coconut which I am told has now been removed because American peanut mills could not meet the standards. So what is the game that we are really playing. My position is that, unless you get the kind of information that can counter that kind of a move, I think you will be in a losing position all the time.

Seventh, let us improve our research management system to optimize the use of financial, physical and human resources. We pledge to improve the internal efficiency of the science establishment which is represented here by the DOST, and the science community especially in the allocation of human, physical and financial resources. Our conservative estimates are that, just for the General Appropriations Act alone, government research institutions, DOST, state colleges and universities probably handle around P800 M worth of R & D money. When the public returns to you and asks you, what have you done with your P800 M, it is a little difficult to give an answer that will satisfy them. So, we have to improve these internal efficiencies so that we can work and solve the problems with the existing human, physical and financial resources. We have to improve procedures to reduce bureaucratic paralysis. The phenomenon of bureaucratic paralysis has occurred to me no more vividly than in the two years I have been at DOST. There is just a lot of this around, and you have to learn every new trick everyday to navigate these waters, including the skill of anticipation and forecasting so that you can prepare these papers way ahead and navigate your way through all these procedures before you get to it. It

may take sometime before we get the regulatory bodies of government to be development-oriented. They will of course need a cultural change. And I supposed that at this time, in order to cope with it, we just have to use all our scientific and technological skills to navigate through these bureaucratic waters.

In this regard, therefore, within the framework of the seven points, we would like to explore the following vanguard projects:

First, expand the use of the metals industry. There is no doubt that a mark of an industrializing and progressing country is its ability to harness, use, transform and produce metals, even single things like farm implements, processing equipment and machineries. We will try to campaign for an expanded use of these in even the smallest communities in our land. Which means that we have to train more design engineers, technicians who can weld, cut and even operate.

Second, it is about time that we put our efforts together to rehabilitate or start the rehabilitation of Laguna de Bay. Laguna de Bay continues to be a strategic source of water for Metro Manila and CALABARZON. And I think when our energy crisis would have been solved, it is the water crisis that will come in. And this is I think more difficult, less easy to bear than living without lights eight hours a day. This strategic source will need the combined undertaking of not only scientists and engineers but the communities around it as well.

We are lucky that Dr. Gloria is in DECS, and there are millions of school-children that he can marshal and mobilize through a memorandum that will be made available to this effect.

Third, we suggest also as soon as possible, the coconut industry to be revitalized. We keep on saying that this is a very important part of our economy, affecting 1/3 of our population and to which we have devoted 20% of our arable land, and yet we are not doing anything about it. The replanting program which was designed in 1975 has been implemented in trickles, in magnitudes disproportionate to the problems. You know that we need to replant 100 million trees. And you can not be replanting at the rate of 10,000 trees a year because by the time you finish replanting 100 million trees, you are back to square one. And this effort will have to be addressed because this is precisely the reason of coconut oil. In addition to this, coconut parts will have to be utilized fully. Research and development leading to high value products using coconut parts will have to be supported.

Fourth and the last, promotion of computer literacy. There is no doubt that the computer is going to be a very important part of our lives. Friends I know have become so helpless without it. And to the extent that it will not only assist in our daily domestic activities, whether it be in the office or in the home, but also provide an avenue by which learning experiences could be expanded and access to information could be facilitated, we would like computer literacy to be promoted as widely as possible.

The coming of the electronic classroom, I think is inevitable. Although it is hard to imagine how we could put this into a barangay high school, but we are in fact trying this in Catanduanes. We provided about 35 barangay high schools with televi-

sion sets. And with the receiving satellite disc, courtesy of Congressman Verceles, Jr., they are now accessing PTV-4 selected programs which they can use in their learning schemes.

There is indeed still much to be done. And this is just the starting point. My concern is to address the doables, get started and let the perfect plan, which we so religiously want, evolve through the process. Our problem is that we do not want to start unless everybody's satisfied with such a super perfect plan. And by the time we are ready to implement it, it becomes outdated. I think that lesson has to be learned.

And the nations which are moving faster than us are not going to wait, neither will you be able to request them to wait no matter how much goodwill you have. Neighbors are growing at faster rates than us. That is beginning to be a problem, not only in terms of our access to resources which are near us. As an example, the problem of accessing the 200 million hectare waters that we have around us. Water area that is available for us is 200 M hectares, which is seven times that of our land area, but which we can not exploit or which we are beaten to the draw because if you have a fishing boat with satellite discs that can tell you where the schools of fish are, that is no match to a poor fisherman's banca powered by a paddle which can go only so far. These are the kinds of events that are taking place. And as I said, we probably will have to get out of our complacent attitudes and do something about it. And we must put that element of competitiveness into our programs, not in the negative way. We do not compete to undermine it, but we compete successfully because we excel, because we are better, we can generate and use the information in a much better way.

Let me conclude by expressing my faith in the role of the National Academy of Science and Technology in helping this country attain global competitiveness, creating its own niches, and getting into heights of excellence.

Let us continue to make more aggressive efforts in sharing our knowledge and resources, to harness the full potential of our scientific and technological advances.

Thank you and good afternoon.