Attaining Inclusive Growth through Science and Technology[1]

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First of all, my thanks for Dr. Gilbert Llanto, the lead convenor of the Philippine APEC Study Center Network and the President of the Philippine Institute for Development Studies for this kind invitation to participate Annual General Assembly and Symposium. I have no doubt that your discussions today on your symposium theme "Attaining Inclusive Growth through Science and Technology" will be meaningful and productive.

Global developments underscore the important role of science and technology: world trade has been liberalized, exerting pressure for innovation; economic activity has become knowledge-intensive, requiring competence in the emerging technologies; elaborately transformed manufactured products, developed through the individual countries' systems of innovation, have become the major items in world trade, making the capability to add value the basis for competitiveness.

In the rush towards free-market economies, we often ignore the fact that the majority of the world has little or no surplus capital to invest in innovation to make their needs or desires felt in the marketplace. Thus we are witness to various assaults, subtle or otherwise, that challenge the real productive competence of a nation.

Robert Solow was awarded the 1987 Nobel Prize in Economics for providing convincing evidence that the most important factor that accelerated the rate of development of the advanced countries was the use of superior technologies in improving productivity. It seems that this conclusion has been largely ignored by developing countries as their investments in science and technology continue to be very low.

The subtlety and ruthlessness of these technological assaults have weakened our positions in the world market especially our capability to join the mainstream of innovation. Taking advantage of developments and discoveries elsewhere needs trained people who are familiar with the frontiers of subjects and can help assess the potentials of new processes and technologies.

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Therefore, any effort for global competitiveness requires a strategy to acquire the basic elements of survival in a global market. This is contingent on a strong national capability to produce and market value added products.

OUR DEVELOPMENT AGENDA

Development could be redefined in terms of the capacity to generate, acquire, disseminate, and use knowledge, both modern and traditional.

It is in this light that I submit that without S and T capacity, no country will be able to formulate policies and strategies for achieving sustainable development; absorb, adapt, and improve imported technology; or expect to develop its production potential, even in those areas where it has competitive advantages.

Admittedly, the Philippines still has to reach a level of excellence in terms of scientific discoveries and innovation and wealth creation. Whatever it has of a national system for innovation is weak. It educational system, something to be proud of before, is showing signs of decline. There are examples of world-class companies, but also a long trail of mediocrity in industries that are demonstrably in terminal decline.

The journey is going to be tough. Although economic arguments linking R and D investment to wealth creation have largely been won, and even though science is higher on the government's list of priorities, government funding for R and D has been erratic and reversible coupled with the low rate of retention of highly trained faculty and staff in HEIs and research institutions

Furthermore, too little of the great power of modern science and technology has been directed at development. The attempted mobilization of scientists in developed countries to deal with problems found mainly in developing countries has not been very successful; and the S and T capabilities of developing countries are far too limited to deal adequately with the enormous problems of development because their capacity to generate, acquire, disseminate, and use knowledge is limited.

Any national effort towards poverty alleviation needs, among others, trained people who are familiar with the frontiers of technology and thus can help assess the potentials of new processes and technologies. Nations must retain the capacity to identify and absorb emerging technologies which are the most solid instruments for human development.

HIGH TECH AND POVERTY

The conventional short term, but politically attractive gains of poverty alleviation programs are indeed very tempting. They are useful approaches, but they have their limitations in that we are not liberated from the vicious cycle of squalor and want.

Human societies that have, by and large, found some solutions to liberate a major portion of their population from poverty have anchored their programs on productivity. And this is where modern science and technology can make a significant contribution.

Unfortunately, there are those who, even now, continue to believe that modern technology is not for the poor. It is this mindset that continues to undermine our efforts to get to the jugular; to replace the paradigm of regarding the poor as the "Cinderella of national development" to a paradigm that is more strategic, knowledge-based, scientific, and long-term.

Having said all these, let me underscore an oft repeated statement that the shortcut to development is never science and technology alone, but in development itself.

Agriculture and Rural Development

While it is clear to many that industry and services must be competitive, agriculture, because of the tedium and physical stress associated with it, is perceived as something that need not or cannot be competitive. This is a disservice to the farmer. On the contrary, agriculture is a knowledge-intensive activity. The earlier we disabuse our minds from this traditional view, the faster we can extricate ourselves from the notions that agriculture need not and cannot be competitive. This defeatist attitude has caused many farming operations to be inefficient, with the farmer feeling helpless and losing control of his operations. Government, on the other hand, fearful of social unrest, persists in providing short-term rescue measures that perpetuates the vicious cycle.

Agriculture deals with tradable items and is directly linked to the vagaries of the global market. Furthermore, agriculture, if closely examined, is as information-intensive as a manufacturing operation. It is high time we eliminate guesswork in our efforts to improve productivity, especially in agriculture, which, in fact, demands precision. Unfortunately, government is saddled by a number of constraints, such as outdated missions, its effectiveness and ability to innovate in governance is compromised by bureaucratic constraints, and the inability to attract the best scientific talent, the most experienced management, or acquire state-of-the-art equipment.

Another important issue is the effective management of the tense relationship between sustainability and productivity. The harmonious relationship between maintaining adequate levels of productivity and preserving the integrity of our environment can only be enhanced if we have an adequate understanding of the impact of human activity on how nature operates. This includes studies on the regenerative capacity of natural ecosystems and the earth's capacity to absorb waste. And at no other time in the history of science are more and more secrets of nature being unlocked than now. Thus the availability of the powerful tools of information technology should be exploited to serve the purposes of defining sustainable productivity, especially at the farm level. The emergence of precision farming provides hope for us to achieve the balance between productivity and sustainability.

TOWARDS A TECHNOLOGY-EXPLICIT DEVELOPMENT AGENDA

I would like to submit that our development agenda be made more technology explicit in order to be more inclusive. Science and technology can provide the methods and tools for our country to be productive by addressing the following:

1. **ECONOMIC EFFICIENCY**
2. **TRADE FACILITATION**
3. **INVESTMENT INCENTIVE**
4. **FOOD SECURITY**
5. **HUMAN RESOURCE DEVELOPMENT**
6. **ENVIRONMENTAL PROTECTION**
7. **DISASTER AND HAZARD RISK MANAGEMENT**

Science and technology competence provides the real base for innovation. It is scientific competence that is vital to keeping diseases out, in containing and eradicating incursions of diseases and in providing a sound basis for product standards development. As in any risk assessment, science and technology obviously have a key role in making sure that standards are appropriate, in making sure they are sound in theory and robust in practice. It is therefore quite important that decisions are based on the most rigorous scientific analysis and risk assessment. We need to develop a society that views science as a way of thinking that develops skills in objective thinking. That is questioning, observing, formulating and testing explanations—rather than emotively reacting to new and different ideas and developments. Thus, in a highly competitive, globalizing economy, scientist's work is more important than ever.

PROMOTING INNOVATION

Establishing a strategic enabling environment for innovation, and eventually competitiveness, especially in tech transfer and acquisition are both recognized as vital elements in coping with poverty and globalization.

We need to eliminate speculation and guesswork in our activities. The information to minimize uncertainty is derived from scientific work. Science underpins risk management decisions involving many aspects of national life. The containment and eradication of threats to human, animal and plant health; weather forecasting; and correct time information are some examples of minimizing uncertainty. It is also science and technology that provides the basis for preventing non-tariff trade barriers fostered by protectionist lobby, from strangling world trade. These technical barriers include unusual requirements to technical regulations covering packaging and labeling.

How do we translate this into solid, long lasting interventions?

1. **Niching**-
   We need to determine our niches in the global market. Science and technology can provide quality information to help us make choices.

2. **Enlightened government intervention in science and technology**

   Enlightened government intervention science and technology is necessary to:

   - ensure a strong base of fundamental science

   - provide a business environment that fosters innovation and investment

   - invest in research that is critical to the economic and social needs of the nation but cannot attract private sector support

   -ensure S and T security; maintaining a cadre of highly trained scientists and engineers to allow us to add value to new knowledge and technologies transferred

3. **Increased private sector participation**

   Science base depends ultimately on the private sector and the preparedness of industry to invest in S and T. Let us remember that while government is expected to establish the enabling environment for high performance, it is still the individual

company that has to compete. The ability to compete will be enhanced by its innovative capacity through R and D.

It is our science and technology competence that will enable us to manage knowledge. Scattered bodies of knowledge can be brought together so that people who use them can work faster and better. This will also enable us to establish structural intellectual assets, such as information systems, knowledge of market channels and customer relationships, and management focus; turn individual knowhow into a property of the group. Unraveling lines of authority and laying out new ones will be the main task of the new knowledge workers. Nowadays, we need to adopt the systems approach in order to overcome the hurdles that retard our efforts to achieve economic efficiency and high levels of productivity. In a report issued by the National Research Council of the United States entitled "Convergence: Facilitating Transdisciplinary Integration of Life Sciences, Physical Sciences, Engineering, and Beyond", the chair of the panel that authored the report, Prof. Joseph De Simone (2014) emphasized the importance of interdisciplinary and multidisciplinary approaches, including those that extend beyond our national boundaries:

> "Ultimately, I believe this will entail partnerships at the intersection not only of the life and medical sciences, physical sciences, computational sciences, and engineering, but also economic, social, and behavioral sciences, arts and humanities disciplines, and beyond, thereby amplifying the potential for innovations of incredible variety and magnitude."

These intellectual resources can be used to transform businesses and create new models for global competition. It is about change, and its future depends on the ability to accommodate dramatic, often unexpected change.

The experience of many countries shows that economic development is not achieved by increased infusion of labor and capital but by improving economic efficiency or productivity.

Finally, let me quote Prof. Abramovitz who wrote the following in 1986:

> "Technological backwardness is not usually a mere accident. Tenacious social characteristics normally account for a portion, perhaps a substantial portion, of a country's past failure to achieve as high a level of productivity as economically more advanced countries."

Crafting a technology-explicit development agenda to facilitate inclusiveness is now a choice that we must make. Now more than ever, we must work together as one for our country to be productive but also just and free.

Thank you.