

VIEWS ON INNOVATION AND ENTREPRENEURSHIP

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Innovation implies industry
risk taking and its impact
on economic growth."
- Dado*

WHY INNOVATION AND ENTREPRENEURSHIP?

My talk today on innovation and entrepreneurship, is the result of many meetings and discussions I've had among stakeholders from academe, industry, government, private organizations and experts thinking about the need for innovation and entrepreneurship as the new foundation for economic development.

These discussions presented the opportunity and privilege to us to take on the mission of thinking about our country and its future from the possibilities that innovation and entrepreneurship open up.

Innovation creates the path to what is new and necessary to become better integrated into a world of accelerated changes that is complex, competitive and globalized.

Our thoughts and views took into account the trends evolving from throughout the world, because sooner or later these tend to impose themselves everywhere as major disruptions.

We were aware of certain dynamics that may radically change our lives, particularly, an expanding globalization, population growth, and our growing demand for greater productivity and quality of life.

We asked ourselves why we are concerned with

innovation today, how it occurs, and how it becomes part of our daily lives.

Is it just science and technology? What is the role of creativity? How much depends on culture, history or attitudes of various individuals and groups or countries? Are there places that are more favorable to the emergence of innovation?

Like this conference today, we discussed methodologies and models of how we usually think of innovation and entrepreneurship. It took us a while to finally bring this discussion to this level. We persevered, because our country deserves the commitment of taking responsibility to what is essential to our future, and that it should be done at an appropriate pace, and not limited by short term issues, and instead inspired by broad foundational principles.

INNOVATION AND ENTREPRENEURSHIP: TOOLS & DRIVERS FOR ECONOMIC DEVELOPMENT

In this context, no developing country's future is assured. The successful ones will be those able to derive methodologies and models from successful developed countries, humble and realistic about its current status and able to rally the collective strength of its government, academe, industry and population to deal with the transformation that innovation and entrepreneurship bring.

From the beginning, we observed that in spite of all our effort in exposing the need through examples from developed countries, innovation continues to be absent from the major discussions and planning about our country's future. For many Filipinos, it still appears to be the distant discourse of the political and economic elite, and not a response to their urgent needs.

Once and for all, we need to deal with this indifference.

This is why we must expand our comprehension of the innovation and entrepreneurship phenomenon, spanning both the human and social, and of course, the scientific-technological and economic-entrepreneurial space.

Also, and as important, we concluded that innovation and entrepreneurship are inseparable from an economic growth point of view.

We moved away from the classic view of innovation as “SCIENCE + TECHNOLOGY + CREATIVITY = INNOVATION”. Innovation is not a mere equation. Innovation is not invention. Innovation implies industry risk taking and its impact on economic growth.

Innovation is creating an idea, a product or service that has never been done before. We believe in the definition of innovation in the context of entrepreneurship as the “union of technology and market needs resulting in the creation of high value add products and services”.

Entrepreneurship is generally understood as the creation of enterprises from the ground up and in many cases, when successful, entrepreneurial equity accomplishes its role as the fastest diffusion of wealth to the population. How does this happen?

It happens when it is defined as: “entrepreneurial equity is the proportionate and fair distribution of ownership of the enterprise to all employees and investors”. It is one of the best known drivers for corporate and individual wealth.

Therefore innovation and entrepreneurship are tools and drivers for economic development.

In this practice of entrepreneurial equity, there is no better example than Silicon Valley.

Innovation and entrepreneurship, therefore, is such a powerful union enabled by leveraging the technical capability of human capital in all its form of knowledge and expertise in technology development, product creation and wealth creation. It is therefore the best tool for inclusive innovation where technical knowledge and creativity is valued more than money.

THE CHALLENGES OF GETTING THERE

As we confront the challenges of transformation, our cohesiveness, creativity, and more importantly our policies, energy and forcefulness in the implementation of models and methodologies will have direct impact in the success or failure of these transformations.

There are many aspects to this transformation that we are to achieve. In my own opinion, the toughest one we must deal with in this change is cultural.

We will be challenged by existing attitudes and prac-

tices around risk taking.

We need to learn new methodologies and practices in strategic long range planning, and in the face of uncertainty, always believing that innovation and entrepreneurship must be the foundation of our country’s sustainable economic growth to full development.

As we begin to face these challenges, our ability to continuously challenge ourselves, our actions and beliefs, fulfilling commitments, our trust in each other, and above all our imagination and creativity in innovating under competitive pressures and constant changes will play significant roles.

The saying “innovate or die” becomes a rallying point.

And if we aim to achieve a better quality of life and growth based on the creation of new wealth, if we wish to move beyond the exploitation of natural resources, combining intellectual work with scientific and technological training, it is necessary, not sufficient, and quite essential to build a faster and shorter path to economic development, a path that requires commitment and ability to improve our conversations and transformations based on innovation and entrepreneurship. Nothing else ever has.

To achieve these lofty goals, we need to define a few institutional roles – Government, Industry, Higher Education, Engineers, and Design.

FACTORS FOR ENABLING RAPID AND SUSTAINABLE ECONOMIC GROWTH IN THE COUNTRY

In recent years, we have seen constant GDP growth in the Philippines of 6% and above. We have also seen influx of foreign direct investments and a country achieving investment grade status.

Research has shown that in any economy, sustained high growth happens due to a number of common attributes such as: a functioning market system, high levels of saving, public and private sector investment, resource mobility, innovation, and political leadership and its ability to deploy the right infrastructure and business policies.

Successful cases of leadership and effective government share a further characteristic, and that is: an increasingly capable, credible and effective government.

It requires a strong commitment pursued with patience, perseverance, hard work and pragmatism.

While this present government has some work left to

do, they have shown their ability to lead and implement the basic foundation of economic growth. Clearly, we have seen some initial results. We can only hope that the next set of government leaders will follow the same path paved by the present leaders.

However, government is not necessarily the cause of growth. That role falls to the private sector and its ability to innovate, invest, and entrepreneurship responding not only to local but more importantly, global market needs.

It is assumed that “the need for innovation and entrepreneurship is to enable rapid and sustainable economic growth in the country”.

We take the view that economic growth is a necessity, if not sufficient, condition for broader

development, enlarging the ability of individuals to be productive and creative.

While growth is not an end by itself, it makes it possible to achieve other important objectives of individuals and societies. It can spare an entire population from poverty and drudgery. It also creates resources to support education, health care, infrastructure building and overall quality of life.

Additionally, the infrastructure for innovation in science and technology, assumes an educational system in primary and secondary levels that promotes a science and math culture. At higher education levels – a globally competitive practice of research and development focused on society’s needs.

With these as the foundation, it has been shown that in the long run, it is the resources of the global economy that stand out as the driving forces in sustaining high growth in a developing economy and these come in three parts: global market demand, innovation based on technology, and foreign direct investments.

GLOBAL MARKET DEMAND

In the case of global market demand, it is important to note that in a relatively poor developing economy, the global economy is huge in comparison, and at the right costs and prices for products and services, global market demand is, for practical purposes, unlimited.

It is not only possible now but more importantly easier to enter the global market because the world economy is open and integrated.

To quote the report from the commission on growth,

“once the challenge of identifying industries in which the country can invest in acquiring a comparative advantage is met, growth in exports will not be constrained by demand, and growth in the economy can occur at a rate determined by savings and investment rates.

Much of that investment in the early stages will go into the export sector which can grow at rates high enough to pull the economy along.

As we saw in many developed countries, the growth of exports can set in motion a process of sustained growth which is transmitted to the whole economy and could not be achieved by relying on domestic demand alone.

These policy foundations of sustained high growth create an environment for high levels of investment, job creation, competition, resource mobility, social protections, equity, and inclusiveness.

TECHNOLOGY AND INNOVATION

The second resource of the global economy to sustain high growth is technology and innovation.

They range from engineering, production, and services technology. Technology transfer may be used but only if there is a level of expertise locally to sustain and potentially surpass state-of-the-art. Otherwise it is not sustainable and is yet another form of capital loss.

Compared to developed countries, we are severely lagging in technology. The country finds itself not competitive in high value add products and services.

FOREIGN DIRECT INVESTMENTS

The third resource of the global market for sustained high growth is foreign direct investments or investments beyond the capacity of local economy to save.

FDI is especially important in that it brings in more technology, market knowledge and access to global markets.

In short, Foreign Direct Investments is the conduit for growing economies to import ideas, technologies, and market know-how.

Unfortunately, one major impediment in attracting foreign investments is the 60/40 ownership require-

ment law.

FOREIGN EDUCATION

Another conduit is foreign education, which often creates lasting international networks. Since learning is often faster than inventing, fast learners can rapidly gain ground on leading economies.

The Philippines, at this time, provides huge opportunities in infrastructure development. This ranges from agriculture, transportation, ICT, and others.

One of the most dynamic and technically demanding but with huge global impact is information, computing and communication technology. While there is a basic computing infrastructure built, the Philippines' communication infrastructure still has to be built to levels that can support high growth. The country's communication industry must respond to this need.

Unfortunately, the Philippines still has a great disparity between the rich and the poor. Using information and communication technologies for the purpose of economic development offers great promise in bridging this gap through its focus on connecting human capacity with computing and informational content.

It is well known that internet access has the capacity of fostering development and growth by enabling access to information, education, and opportunities that lead to inclusive innovation. I believe that it is through innovation and entrepreneurship that the gap between the rich and the poor can be substantially closed.

THE ROLE OF HIGHER EDUCATION IN ECONOMIC GROWTH.

Studies conducted by independent research commissions funded by governments and foundations revealed the positive impact of higher level education on a country's economic development. Estimates on the real rate of return on investing in university funding are in the order of 14% to 15% growth in GDP. Research also highlights the potential increase in living standards as a result of gains in knowledge depth of the labor force and productivity of workers. Of any one sector in the economy, investment in higher education has the biggest pay-off because in the long run an economy's prosperity depends upon the skills of its people.

The Philippines by all economic metrics is a developing country. Its economy is mostly supported by local

market demand, remittances and export of products and services that are of low value-add. One can comfortably conclude that its economy is not taking advantage of global demand. Economic growth is limited.

There is minimal research and development infrastructure where scientists and engineers can collaborate and develop competitive technologies necessary for innovation. The problem lies in an inadequate number of properly trained scientists and engineers due to under-funding by both public and private universities.

While industry must contribute its own share in funding scholarships and research, they depend on the educational system to provide globally competitive scientists and engineers. World standard in science and engineering education and research budget is at 3% of GDP.

Therefore, public and private educational institutions must break this vicious cycle.

In cooperation with academe and industry, the government must define national priorities and requirements addressing the needs of society. These requirements will be the basis of directed research and development in higher education.

To provide proper focus and organized execution outside of industry, an infrastructure composed of graduate level university education, university research institutes and government national laboratories must be created.

Trained scientists and engineers are then triple tracked to go back into academe, independent research and industry. Inherent in this is the assumption of an excellence level that is globally competitive.

In parallel to all these training, a culture and ecosystem of risk takers must be created. This consists of entrepreneurs, venture capitalists, service providers and management trained in building technology based companies.

Clearly, the Philippines is in a catch up mode.

The government must create sustainable poverty reducing economic growth policies and at the top of all is investment in higher education.

However, since learning is much faster than investing, partnerships with proven global excellence must be established. Propagating mediocrity is not an option.

One example of global partnership is the establish-

ment of joint research institutes that match the Philippine government's goal of mobilizing knowledge for greater productivity and economic growth in the two key technology areas identified as the focus for the development of industry in the Philippines: information and communications technology, health and biotechnology.

To create true intellectual capital at global levels, partnerships with other institutions must be established and premised on realistic relationships that provide mutual benefit to both sides. Philippine universities will derive expertise from top-tier participants representing unique depth and breadth in ICT, translational medicine, and healthcare. Additionally, visiting university scholars from the Philippines will gain exposure to the most advanced facilities and research on the participating campuses.

In the context of national aspirations, the institutes will become a pivotal vehicle for achieving the Philippines' vision for science and technology as a catalyst for poverty reduction and sustainable economic development.

THE ROLE DESIGN IN ENGINEERING EDUCATION

To take advantage of this research knowledge, the role of design in engineering education must be intensified.

Within the last few years in the US and other countries, there has been a movement in transforming engineering education beyond theoretical skills to include experiential design. It is no longer enough to provide our future engineering leaders with technical skills. They must also learn to work in multidisciplinary teams, how to iterate designs rapidly, how to manufacture sustainably, and how to address global market needs.

Engineering students must be able to solve problems characterized by volatility, uncertainty, complexity, and ambiguity. They need new toolkits that allow them to frame and then reframe the problem they are trying to solve.

Infusing design culture in faculty and students will re-invent existing programs that are overly focused on analysis and into design, to correct shortcomings in the skills needed to operate in the concrete realm of making things and to offer students experiential learning alongside theory.

Students are transformed into being better designers and not just developers. For example, there is a huge difference between programming and coding or hacking.

The design process itself induces critical thinking, which is the most important asset in designing successful products. Industry benefits tremendously through productivity and efficiency in the design process even for new college graduates.

In the context of rapidly changing technology and increased customer demands, design offers an approach and a set of tools that guides the process of framing and reframing problems.

The design process iterates between analysis and synthesis work and between working in the concrete world and in the abstract world. It starts in the concrete world with observation or immersing oneself in the context of the problem to be solved, and learning from both quantitative and qualitative data about the situation.

It then moves into the abstract space to extract insights from the messy data of the observation phase exposing questions such as – “what’s important?” “What’s new?” The insights and imperatives identified are then carried into the ideas phase on the “how?” Side of the model where teams learn how to separate the act of diverging from that of converging, and how to imagine a variety of alternative ideas.

Finally the model returns to the concrete space with actual prototyping of solutions and experimentation to get feedback and learn more insights into the proposed solution before exploring alternatives.

The model as described, divergence to convergence, or iteration of alternative ideas, is far from linear. The prototyping itself is linear and is considered a short loop, but the iterative process as a whole is long loop.

Within the long loop, teams must pay attention to where they are in the cycle, to step back from solutions, and ask what problem they are solving, to ensure connection to objectives, and to be willing to put something unfinished in front of others to learn.

It goes without saying that design and innovation is not undertaken by individuals working on their own.

Product development in industry is always undertaken by a cross functional team representing research and development, product marketing, and minor participation from operations, and sales and sometimes management. In Silicon Valley, for example, during the design process, inserted in the schedule are milestone design reviews where the team invites top designers

and specific technical experts within the company to critique specific approaches to the design, the design itself, and the resulting viability and efficiency of the design. Valuable inputs are fed back to the design process.

This design process, properly proportioned in scope, could be a model for the multidisciplinary approach to design at the university level.

The innovation process that mostly happen at the graduate level, research institutes, and industry can be dramatically accelerated by infusing design as a discipline at the undergraduate level.

In the end, industry benefits through a much faster introduction of products to the market and at much reduced cost simply through productivity gains derived from the student knowledge of design earlier in the learning cycle.

In looking at the big picture of innovation, good design practice is a necessity in the same way that innovation is a necessity for entrepreneurship.

ROLE OF ENGINEERS IN THE CREATION OF FUTURE INDUSTRIES

Roles, in general, may be uniquely defined based on needs. This is similar in idea with defining products where markets are researched and analyzed, needs are exposed leading to a series of requirements that become product definitions.

In this analogy, the market is the global economy. The need could be sustained economic growth. Requirements are to define and build the infrastructures for this to happen. The customer is society in general, and the local population in particular.

Most economic research point to the idea that a major contributor to economic development is the creation of technology based industries. It is in this need that the role of engineers is uniquely defined.

Since this need is varied in nature and constantly changing due to society's requirements, engineering expertise must evolve in the same way. Science continues to present ideas to scientists and engineers and together they innovate to create technologies.

These technologies become the foundation of high value add products and services which can then address the needs of the local population.

Assuming that in defining these needs, the

global market was included in the research and analysis process, these products can be sold to a much larger global market enabling high growth in the local economy. This is a compelling idea because the world economy is open and integrated.

The consequence of this is that the engineer's role must take into account global requirements for products and services.

Secondarily, the focus is to create industries that will lead to a sustained high rate of economic growth in the country.

Clearly, this is multi faceted role. That role may be one of many possibilities, such as, research and development, teaching, design, investment banking, entrepreneurship, operations, marketing, corporate management, and others.

In all of these possibilities, i believe and suggest that the roles of most value for economic development are innovation and entrepreneurship. This is largely true whether the country is already developed or still in the developing stage.

It is important to note that economic growth resulting in wealth creation without entrepreneurship has been known to widen the gap between the rich and the poor. This situation happens since most of the investments are financial in nature. The creation of value through creativity and innovation is insignificant to none. Hence the rich get richer and the poor are still poor.

IN SUMMARY

For the engineer to be successful in the creation of industries of the future, expertise in innovation and entrepreneurship must be learned and practiced to meet the requirements of a sustainable high growth economy.

The government, academe, and industry must provide the necessary policies, infrastructures, funding for globally competitive education in science and engineering, investments in research and development, and venture investments that provide fair entrepreneurial equity.

This is Dado's speech during the 2015 International Conference on Innovations in Engineering, Science & Technology held at Batangas State University last November 18 - 20, 2015.