

UPCOMING EVENT

Building the Innovation University

The IRIS Presidential Leadership Course

For University Presidents

WHERE: Amphitheatre, Ateneo Professional Schools
Rockwell Centre, Makati City

WHEN: August 23-24, 2018

ABOUT THE MAIDEN ISSUE



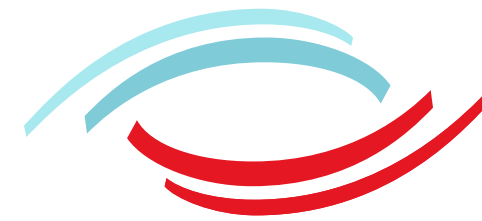
The IRIS Hub welcomes Academic Year 2018-2019 by highlighting the research productivity of Philippine universities in the field of Natural Sciences. In Ripples, we feature a free-wheeling conversation among six of the Philippines' scientists and researchers about their scientific and research careers and the road ahead for developing a culture of science and innovation in the country. May this maiden issue engage and encourage us all to join in what we envision as continuing and enlightening conversations that engender new ideas, move us into action, or propel us to explore new frontiers.

ABOUT THE IRIS

The Institutes for Research, Innovation, and Scholarship seeks to harness Philippine intellectual capital through solutions-driven platforms in research and innovation while advancing the national discourse on the value of quality and innovation-driven programs in scholarship and education. The IRIS is composed of notable senior advisory members as well as accomplished scientists, researchers, scholars, and esteemed leaders in the government, industry and academe. The IRIS aims to serve as the Philippines' one-stop shop for R&D talents and resources for optimal collaboration and integration.

ABOUT THE IRIS HUB

The IRIS Hub, published quarterly by AccessEdu, Inc., is the primary repository for news, think pieces, analyses and features pertaining to national and international trends in science, technology, and innovation; development of intellectual capital; higher education and academic leadership; research and scientific achievements; academe-industry collaborations; international higher education; global university rankings; research grant opportunities in science and technology as well as job and consulting opportunities for people in science, technology, research and the academe. We wish to invite you to this rarefied space to talk about matters of substance and intellect and let us create a community that engenders a culture of science, research and innovation.



The IRIS Hub

MAIDEN ISSUE

Excellence finds a Voice.

JULY 2018

REALIGNING WITH THE WORLD

THE CHALLENGING PATH TO BECOMING A RESEARCH UNIVERSITY

(See story on Page 2)



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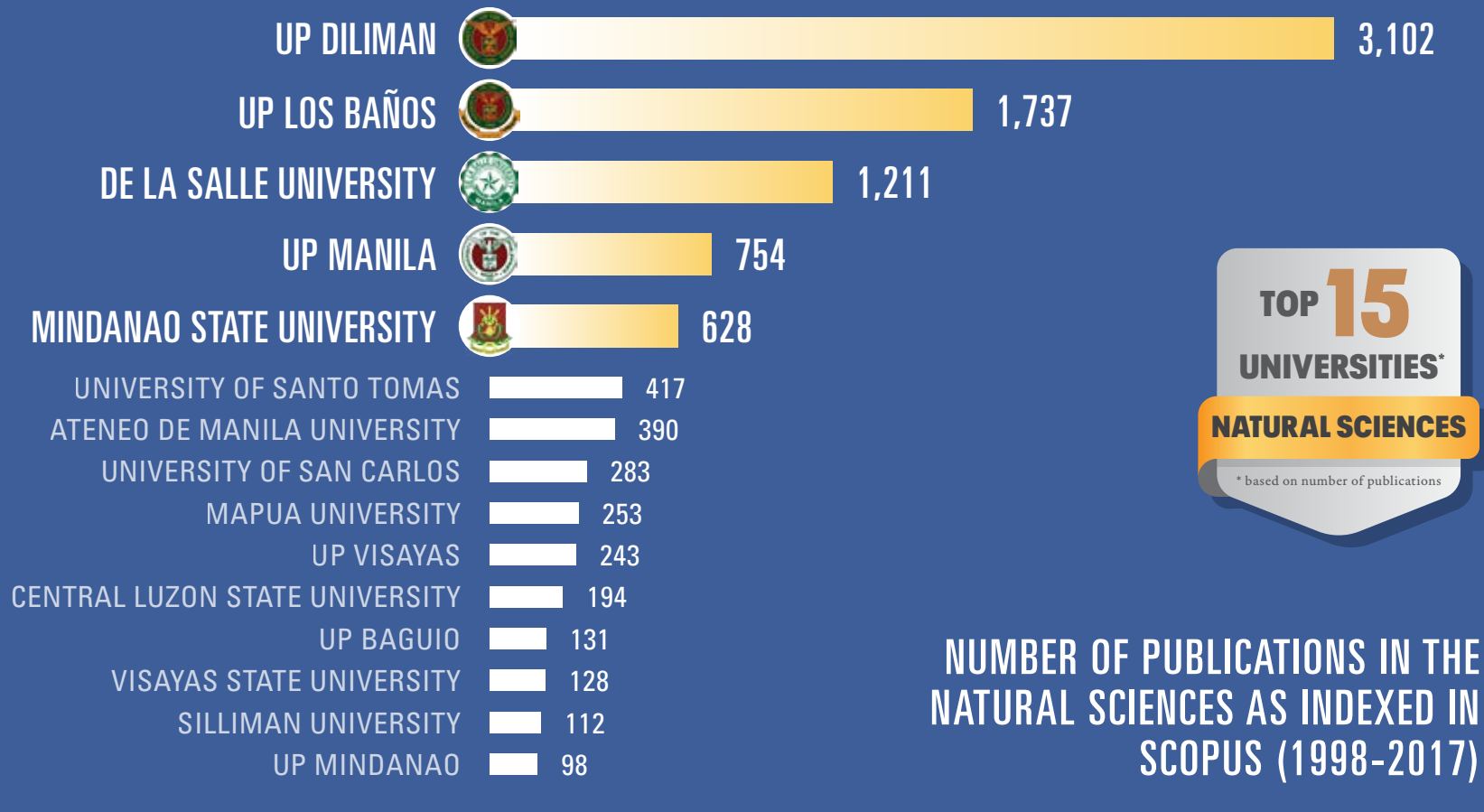
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TOP 15
UNIVERSITIES*
NATURAL SCIENCES
*based on number of publications

NUMBER OF PUBLICATIONS IN THE NATURAL SCIENCES AS INDEXED IN SCOPUS (1998-2017)



REALIGNING WITH THE WORLD

The Challenging Path to Becoming a Research University

As leading platforms for knowledge production, knowledge transfer and diffusion of innovations, universities are a natural ground for developing a country's human and intellectual capital. Four of the seven measures in the Global Innovation Index, wherein the Philippine ranks **73rd** out of 127 countries, can be derived, directly or indirectly, from contributions of universities such as:

- (a) Tertiary Efficiency (Total enrollment in higher education, regardless of age as percentage of post-secondary cohort; share of labor force with advanced level of education; annual new science and technology graduates as percentage of total tertiary graduates and as percentage of labor force);
- (b) Researcher Concentration (Professionals, including postgraduate PhD students, engaged in R&D per million population);
- (c) Patent Activity (Resident patent filings, total patent grants and patent in force, per million population; filings per \$100 billion GDP and total grants by country as a share of the world total); and
- (d) R&D Intensity (R&D expenditure as percentage of GDP).

Tertiary Education Enrollment Rate, 46th in Quality of the Education System, 76th in Quality of Math and Science Education, 62nd in Internet Access in Schools, and 43rd in Local Availability of Specialized Training Services. Under the Twelfth Pillar (Innovation), it ranks 45th in Capacity for Innovation, 75th in Quality of Scientific Research Institutions, 51st in Company Spending on R&D, 59th in University-Industry Collaboration in R&D, 91st in Government Procurement of Advanced Technology Products, 74th in Availability of Scientists and Engineers, and 83rd in PCT patents applications/million population.

There is a complex interplay of a myriad of factors that contributes to the county's level of global competitiveness. One recognized criterion of research excellence and productivity in universities or in the competitive environment of global higher education is the number of publications in peer-reviewed and indexed journals. It might be useful to take a closer look into how the country's universities are doing thus far using this particular measure.

Over the past 20 years (1998-2017), there appears to be an increasing improvement in research productivity as evidenced by the growth in publications from Philippine universities in the Natural Sciences in Scopus-indexed journals for the period 1998-2017.

Although the publication outputs are not normalized per capita and, therefore, the size of higher education institutions (HEIs) are not factored in, such metrics

already provides important insights on the transition of Philippine HEIs into Research Universities which are now viewed as institutions central to the global knowledge economy and provide the critical link between global science and scholarship and a nation's scientific and knowledge system.

Remarkably, in the last five years, the Philippines has increased its publications in Natural Science journals by an additional 265 publications each year. This is quite a shift compared to ten years ago when the country's publication outputs in the Natural Sciences had only grown an average of 32 papers each year. Furthermore, it is interesting to note that, in the past three years, the top HEIs have increased their publication outputs: the University of the Philippines, Diliman has averaged 358 per year, and De La Salle University has averaged 189 per year. As well, there are HEIs that have started to publish only recently but are now significantly contributing to the country's totals in the last three years such as the Technological University of the Philippines at No. 16, Central Mindanao University at No. 17, and Far Eastern University at No. 20.

If the Philippines is to compete globally, it must continue to critically and internally look at the performance of its universities and identify ways of strengthening all elements that contribute to quality and productivity.

In the next issue of **The IRIS Hub**, we will take a look at publication rankings of Philippine universities in Engineering and in the Medical Field.

In the 2017 Global Competitiveness Report published by the World Economic Forum, wherein the Philippines ranked **56th** out of 137 countries, tertiary/higher education is considered a critical factor. Under the Fifth Pillar (Higher Education and Training), the Philippines ranks 80th in Secondary Enrollment Rate, 77th in

The Road Ahead

Carving a Culture of Science in the Philippines

RIPPLES is a central feature of **THE IRIS HUB**. It is composed primarily of interviews, discussions and conversations with Filipino scientists and researchers as well as their global counterparts on a range of topics from science literacy, education, research and innovation to the impact of science and technology on society. For the first feature of **Ripples**, we gathered six Philippine scientists and researchers coming from diverse backgrounds for a free-wheeling conversation about their science careers and the challenges of building and sustaining a robust culture of science in the country. (*Nap Juanillo, Jr., Convenor, The IRIS Hub*)

ABOUT THE CONVENOR



NAPOLEON K. JUANILLO, JR.

(Ph.D. Agricultural Extension, Cornell University) is currently the Innovation and Entrepreneurship Advisor of the Department of Trade and Industry. He recently served as Director IV, Office of Planning,

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¹ International Labor Organization, International Monetary Fund, World Bank, Organization for Economic Cooperation and Development, and World Intellectual Property Organization
² Schwab, K. (Ed.), The Global Competitiveness Report 2017-2018.

IT'S GRATIFYING TO THINK THAT THE WORK IS BEING READ OR USED IN MANY PARTS OF THE WORLD. THAT'S MY SMALL CONTRIBUTION TO MAKING THE WORLD A BETTER PLACE.

— Raymond Tan



Let's begin with your journey as a scientist and a researcher.

How's the journey so far?

CP DAVID: It's been good. Lots of (professional) changes - from being a principal investigator to mentor, from researcher to administrator and back to researcher, from just writing about a scientific concept to putting such concepts to the test through start-ups.

JINKY BORNALES: It is an exciting and a challenging journey. It took me from undergraduate studies at Mindanao State University (MSU) in Marawi to international collaborations at the International Center for Theoretical Physics (ICTP) in Trieste, and most recently, to Germany, Japan, and Portugal. Topically, I started out with classical physics, then moved on to quantum physics and to the physics of macromolecules. Now, the various challenges of research management have begun to occupy a large part of my time as well.

LARRY ILAG: It's been full of twists and turns. I have learned that you have to love the journey, including the long ungodly hours, grant-writing, discouraging experimental results, etc. if you are going to stick with research. And one should try to do other stuff and have hobbies, or you'll burn out. To cut a long story short, I learned that research isn't what I'd like to do full time, and so I got into other things, like patent law and administration that still made use of my technical background. Now I am back in the Philippines, I am loving again the idea of doing science, but with a less intense approach and with a perspective that's been shaped by lessons learned.

GANI PADOLINA: I'm glad that my journey is still driven mostly by curiosity and not my ego. I realized quickly in my career that I need to collaborate and share to solve both small and big problems. It continues to fascinate me that concepts from one discipline can be applied to another. I also have become

more comfortable with being wrong and less celebratory with being right. Science does transcend our perspectives of being wrong or right but it has this wonderful way of bringing us closer to the truth, the known unknowns and the unknown unknowns. I am looking forward to discovering those pathways that I have not even imagined.

EVA CUTIONGCO-DE LA PAZ: I am an accidental researcher. I trained to be a pediatrician and envisioned myself to be busy seeing patients in clinics and making them well. However, my life took a detour when an opportunity came for me to have research fellowship training in molecular genetics. Suddenly, my perspective about the practice of medicine changed—it was not anymore just about clinics, I realized that researches involving different disciplines can enhance human health and well-being. I proceeded to take a new specialty in medicine at that time, Genetics, which further rocked my world



and transported me to the path of being a clinician scientist. I embarked on genetic studies in collaboration with other specialists that identify and understand the relationship between our genes and diseases. The information gathered from these genetic studies may allow doctors to improve their ability to predict a patient's susceptibility to disease or response to treatment. The challenge on how to translate research findings into medical practice and meaningful health outcomes for the Filipino people remains, but we need to start somewhere.

RAYMOND TAN: It's been an interesting journey, to say the least. I work in a sub-area of chemical engineering known as process systems engineering (PSE), also called computer-aided process engineering (CAPE). Much of my research focuses on developing algorithms and models to improve the sustainability of industrial processes. It's gratifying to think that the work is being read or used in many parts of the world. That's my small contribution to making the world a better place. I do enjoy the intellectual challenges I encounter, so I'm happy to squeeze it all in when I get downtime from my management work at DLSU.

We all know about the constraints, challenges and hurdles to productivity, excellence and competitiveness —

What do you think are other pathways (both in the transitional- and long-term) for Philippine scientists and scholars to achieve these, to show the world that we've got what it takes and be part of the global conversation?

J. BORNALES: We still need to address the lack of qualified manpower and competencies in the STEM fields. From my vantage point, there are a number of crucial determinants for success. First, STEM departments and colleges should continuously develop a research and teaching profile suitable for furthering the national goals. And this should not be too narrow. For example, Applied Informatics is surely a priority among the support sciences, but its development will be weak and of copy-cat quality at best if the foundations for "pure" informatics are not strengthened. Second, we need intelligent incentive systems to motivate up-to-date research and teaching. There are, by now, a good number of internationally accepted quality gauges in research and these should be applied. Moreover, there are intelligent incentives for teaching that we can look at, including very valuable upgrading tools. Third, international high-quality collaboration should be encouraged, and, of course, gauged ex-ante by the quality of the consortium, but ex-post by its productivity.

L. ILAG: Indeed, we need more international collaborations. And perhaps we should focus on fields where these challenges do not wield as much impact, like bioinformatics and apps/software development. We should also invest in private research

institutions, where scientists can pursue research without the usual hurdles encountered when dealing with public funds.

G. PADOLINA: We know what the problems are and, most of the time, we know how to fix them. What still amazes me though is our lack of urgency and inability to put together the necessary resources to catch-up! I do not mean to minimize the continued efforts of our well-meaning colleagues in the ecosystem to make things better, but there's no indication that we have the sense of urgency to leapfrog towards a) growing R&D talent at more 1 thousand per million population, and b) increasing R&D investment closer to 1% of GDP.

We have continued to push for R&D metrics in our SUCs and forced them to develop R&D programs yet not having the proper facilities and talent to support one. Our limited talent pool needs tools to accomplish the job but our R&D material supply chain system is antiquated and for some reason it has been acceptable to wait for 2-6 months or even more for reagents and equipment to arrive. We can go on and on about the vicious cycle of diminishing supply and resources and the continued lack of competent governance to get out of the vicious framework but if we don't do something about the situation that we are in, then we deserve it. We need a

massive, honest-to-goodness effort to solve our R&D talent and tools issues.

Talking about mindsets, a culture of scientific inquiry and innovation will improve the quality of our decision making at all levels. A culture of curiosity, collaboration, and interdisciplinary thinking will revolutionize the way we educate our people and prepare them for the challenges of the 21st century. If we don't have the culture to support our plans and strategies, we will always have false-starts and sustainable progress will not be in the horizon.

CP DAVID: I don't think the country's R&D budget is small in absolute terms - more than Php5 billion from DOST alone. If we are able to maximize its use, then the impact we produce should be worth more than this. One problem is that we're not getting the full value of R&D, but we're getting there. Metrics for productivity will help but certainly it will be that shift in mindset in our researchers that will do the job and finally show to everyone the role of R&D in nation building.

E. DE LA PAZ: Yes, we have to open new windows of opportunities and close those doors that clearly do not work. What, I believe, are most important for the Philippines at this time first, to create knowledge for public good - solve the problems of the country using evidence from research and translate research findings to a product, policy or practice; second, invest in infrastructure that is globally competitive; and third, value locally developed technology by improving regulations for adaptation.

R. TAN: The biggest challenge is to have a global outlook. While it's good to have "science for the nation," I think "science for humanity" is much better. Pinoy scientists should see themselves as contributing to the global arena. This sort of an outlook will force one to aspire for higher levels of rigor, quality and productivity. Research institutions should simply set up an environment that allows individuals and teams to do this. I understand, though, that that is a lot easier said than done.

What's another way of looking at a scientific and research career in the Philippines –

Can there be an “entrepreneurial” dimension as opposed to the conventional path?

CP DAVID: Definitely. It's not easy, but it can be done. I'm now on my 4th and 5th startup. The first two failed after a couple of years, the 3rd one is now financially stable. I'm eager to see if the next two will also work.

J. BORNALES: There can be in teaching by providing the tools for creativity and innovativeness, as well as motivation and orientation for the entrepreneurial perspective of students

There can be in research for those whose expertise can lead to product development. We repeat the warning that it would be detrimental to neglect the research or researchers who provide the necessary theoretical underpinning for entrepreneurial success. A balance between these two qualifications and academic offerings is of the essence.

L. ILAG: Yes, I think there can be an entrepreneurial dimension to a scientific career. In the United States, there is a paucity of open university research faculty positions, forcing scientists to seek career alternatives, like joining industry or starting their own companies. Here, I do not think there is such a problem, and the reverse is true, i.e., lack of qualified applicants. Nevertheless, not all scientists aspire to be university professors conducting research. And with the current interest nationally in tech transfer, we also need self-motivated individuals who have the initiative and determination and appetite for risk to invest in science and make something for the market.

G. PADOLINA: There's no way to go around the need for resources to generate knowledge. However, we can be

creative. We can divide our projects into smaller sizes and manage activities in such a way that they will integrate into the whole. So if you are thinking big renewable grants, then you will not thrive in this environment. But if you are open to sources that are unconventional and are sometimes smaller, then you will achieve some success. Resources can also come from private businesses, NGOs, and foreign aid agencies are playing a more active role in the R&D ecosystem. Once you get good data, you can take it further and spinoff by developing a “product” using venture capitalist funding. It is not cakewalk, but it is doable.

E. DE LA PAZ: I think we have experienced a “renaissance” in research in the country in the last decade. The government has invested heavily on researches; however, the development part can still be improved. Processes need to be in place to scale up and promote innovations.

R. TAN: I think there's a danger to trying to be too commercialization-oriented without proper scientific foundations. This leads to incremental/superficial innovations. A recent paper I read looked at the ratio of publications to patents—the latter being a proxy measure of innovation in BRICS, and the average figure was round about 50. If we zoom in on one specific scientific discovery, I can point to graphene which was first published in 2004. There are about a million papers and 20,000 patents worldwide, according to Google Scholar, which gives us a ratio of about 50. In the Philippines, we can't get deep innovation without scientific foundations. We keep looking at the Silicon Valley experience but forget that the scientific output in California alone is orders of magnitude greater than the entire Philippines, and with a far longer history as well. Trying to innovate from 2000+ scientific papers per year which is the Philippine total is not going to yield robust results.



I THINK THE PASSION TO BE CURIOUS IS TRANSFORMATIVE AND UNIFYING. IT IS WHAT ALLOWS US TO EMPHATIZE, ENTER INTO EACH OTHER'S WORLDS, AND HAVE AN ENJOYABLE TIME LEARNING FROM THESE NEW WORLDS. FUN JUST NEVER STOPS, IT'S A LIFELONG SYMPOSIUM.

— Nap Juanillo Jr.



OUR COUNTRY HAS TO BE DISCIPLINED ENOUGH THAT IF WE WANT THESE SCIENTISTS TO COME BACK (OR RECRUIT FOREIGN SCIENTISTS), OUR WELCOMING PACKAGE HAS TO BE GLOBALLY COMPETITIVE, IF NOT SUPERIOR.

— Gani Padolina

What would you advise young scientists and researchers to do?

CP DAVID: Think about their work and how it will make an impact to society. Learn from others who came before. Emulate researchers who see the practicality of scientific knowledge.

G. PADOLINA: Be curious and find questions that you want to answer. Everything else will follow.

L. ILAG: I would tell them to focus on a topic that interests them and try to be creative in thinking of strategies on how to answer their questions about that topic or organism or phenomenon. Do not be afraid to learn new things and ask

questions and seek help. Here in the Philippines, I think there is a preference for applied research. Do not be afraid to pursue basic research if that is your interest, just think big and think of the possibilities. Interest should be the beacon that guides your career.

J. BORNALES: Advanced studies abroad, international collaborations, and pursuing first-rate research are worthy personal and professional investments. They become national investments as well when we feel honor-bound to share these acquired riches with the country.

E. DE LA PAZ: Motivations for choosing a career in science include curiosity for the unknown and a penchant for discovery. Whatever the motivation may be, what is most important is creating an environment where the interests of young researchers and scientists can be nurtured, sustained and allowed to flourish.

R. TAN: Pursue excellence by global standards, and for the good of humanity.



ABOUT OUR GUESTS



CARLOS PRIMO (CP) C. DAVID
(Ph.D. Environmental Science and Geology, Stanford University), is a licensed geologist and professor of Geology and Environmental Science in UP Diliman. He concurrently served as the

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JINKY B. BORNALES
(Ph.D. Physics, University of the Philippines Diliman) is currently the Vice Chancellor for Research and Extension in MSU-Iligan Institute of Technology in Iligan City. She has produced a number of papers in international

journals and has actively pursued memberships in international consortiums with researchers in Germany, Japan and Portugal resulting to student and faculty exchanges in universities abroad. She is instrumental in the establishment of two new innovation facilities in the university, the Technology Business Incubator and FabLab.



LARRY I. ILAG
(Ph.D. Molecular Biophysics and Biochemistry, Yale University) is co-founder of LBiotech, Inc., a start-up company focused on streamlining protocols for manufacturing recombinant enzymes on a commercial

scale and former Deputy Chief-of-Party, USAID-STRIDE. Dr. Ilag also holds a JD degree from Harvard Law School and specializes in patent law and worked for several years as a patent attorney at the law firm of Finnegan Henderson in Washington with a practice focused on patent litigation in the biopharmaceutical arts.



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