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EDITORIAL

The Cost of a PhD Degree

The Philippines with its population of more than 101 million in 2015 is the second and the twelfth most populous country in the ASEAN and the world, respectively (Philippine Statistics Authority 2016; World Bank 2016). Fifty percent of Filipinos are 23.2 years of age or younger - an estimated median age that is six years lower than that of Indonesia and Vietnam (World By Map 2016).

In AY 2014-2015, the Philippine higher education system consisted of 1,935 higher education institutions (HEI's) accredited by the Commission on Higher Education (CHED) with more than 88% of them privately owned. The country produces an average of 1330 new lawyers and 1702 new accountants each year from 2000 to 2015. The average passing rate in the Philippine bar and certified public accountant board examinations is 22.3% and 31.4%, respectively. In the last three years ending 2016, an average of 2,875 new medical doctors are also licensed annually and the passing rate in the physician board examination is 81%. The numbers indicate that several thousands of business, law, and medical students are graduated in a given academic year.

The same education system is able to produce barely a hundred new PhD graduates a year in the basic, applied and social sciences, technology, engineering and mathematics (STEM) with the University of the Philippines Los Baños (54%) and the University of the Philippines Diliman (30%) accounting for more than 80% of the minuscule number (Saloma 2016). The low national PhD production rate could be traced to a number of factors.

Few research and graduate universities. Only PhD faculty members qualify to guide and direct the dissertation research of doctoral students. In AY 2014-2015 less than 13% of the faculty in the HEI's had PhD degrees and the number is increasing at paltry rate of 0.3% per annum since AY 2003-2004. Among the six major ASEAN economies, the Philippines has the lowest SCOPUS publication per capita and the lowest number of researchers per million of population in the group (Saloma 2016; UNESCO 2015).

More than 99% of HEI's are incapable of functioning as research and graduate universities with tenable PhD programs in STEM mainly due to the lack of qualified PhD faculty. The Science and Education Institute of the Department of Science and Technology (DOST) had concluded earlier that only nine HEI's had the wherewithal to participate as member institutions of the Advanced Science and Technology Human Resource Development Program (ASTHRD) or the Engineering Research and Development for Technology Program (ERDT). The DOST spearheaded the formation of the ERDT in 2007 and the ASTHRD in 2009 for the purpose of increasing the number of PhD and MS graduates produced each year through the provision of more PhD and MS scholarships, pooling of available faculty expertise and broadening of access to existing R&D facilities in different HEI's and research centers.

Low probability of success. The PhD degree is a research degree and its curriculum is typically designed for completion within a period of five years by a student with the essential undergraduate training. Graduation requires the passing of an academic course work and the acceptance of a doctoral dissertation by an examination panel of experts. A dissertation is deemed acceptable when it contains original, novel and significant scientific knowledge that is accepted for publication in a pertinent peer-reviewed journal. A PhD student works on his dissertation research under the expert tutelage of a faculty supervisor. The requirement to publish introduces a critical unknown in the completion timeline which is not experienced by his/her counterparts in the business, law or medical school.

The 835 graduates from 59 doctoral programs of UP Diliman in the last eleven years ending AY 2014-2015 needed an average of 7.9 years to finish (Saloma 2016). The completion time in the College of Engineering (with 85 graduates) and in the College of Science (with 167) was 5.51 years and 6.925 years, respectively.

So far the ASTHRD and the ERDT have only been met with mixed success. More PhD scholarships have become available to students from different parts of the archipelago but only 76% of the 324 ERDT PhD scholarship slots created from 2007 to 2015, have been filled due to the lack of qualified applicants. As of summer 2015, only about 20% (with 43) of ERDT and 10% (22) of ASTHRD PhD scholars were able to graduate. The prevailing situation calls for an in-depth review to improve the implementation of both programs.

Few available mentors. Finding a committed dissertation supervisor who is actively engaged in cutting-edge research is most crucial to a young PhD student. It is not an easy task for him to accomplish since dedicated mentors are highly sought by other students and are extremely busy with other academic duties and responsibilities. There are not many of them even in the HEI's that are participating in the ERDT and ASTHRD. The College of Science employs about 150 PhD faculty members in an academic year but it produces only about thirteen PhD graduates annually from 1990 to 2015. The College of Engineering with approximately 70 PhD faculty members, graduates about four PhD students.

There is no dearth of potential young talent to train and comprise the next generation of Filipino scientists and researchers. The highly selective Philippine Science High School System that is operated by the DOST produces about 1300 graduates a year from its thirteen campuses and they are expected to pursue undergraduate degrees in STEM. Several thousands more are graduated from science high schools that are funded by local government units, laboratory schools of SUC's, and select private schools that regularly send students to compete in the International Math Olympiad and the International Physics Olympiad.

Opportunity cost. The key to becoming a successful independent scientist is to get a PhD degree early by immediately proceeding to graduate school as a full time student. It is the best direction to take especially for those who like to establish a long and fruitful career in a graduate university or research institution where a PhD degree is a pre-requisite for permanent appointment, promotion and recognition. But doing so would mean foregoing to take a full-time job right after finishing college and allowing others in the same age bracket to have a head start which might prove critical in other workplaces that put premium on in-house longevity and experience.

The risk of not succeeding is markedly higher in a STEM PhD program than in business, law and medicine where dedicated students are likely to finish on schedule. To be able to publish his research findings a PhD student needs to work on an interesting scientific problem that has not been solved before. But dissertation-worthy topics are not easy to identify without the wisdom of an experienced supervisor since human understanding of natural phenomena has become far more precise and accurate now than it was during the time of Galileo and Newton and even Einstein.

Hard work, motivation and mastery of content knowledge in the discipline do not guarantee subsequent success in dissertation research. Even smart students can hit a wall when aiming for a better understanding of a worn-out topic that would require either a new revolutionary physical concept, the invention of a new sophisticated mathematical tool or the development of a profoundly novel measurement technique. Students are therefore ill-advised to engage in such problems due to inherent time and the material constraints.

An unsuccessful PhD study usually means closing the door towards a meaningful life in a research or graduate university as well as cutting future access to adequate research funding. It also means not being able to mentor future generations of scientists and researchers. Of greater adverse impact than on individual career is the economic and social cost of denying society of an opportunity to enhance its capability to formulate scientific solutions to its complex, far reaching and evolving challenges. Note that our country has not produced a single PhD Geology graduate since AY 1998-1999 - a strategic concern given the distinct geographic vulnerabilities of the Philippines to major natural disasters and extreme weather events.

From linear to nonlinear accounting. The lack of willing and capable mentors is the primary reason why the country could not increase its PhD graduate production rate. Concerned higher education officials and administrators in CHED and HEI's must lead in developing an enabling and nurturing environment that encourages more faculty to serve as dissertation supervisors thereby increasing the probability of more PhD students graduating in a timely manner. They can start by making the grant of tenure, faculty promotion and recognition in research and graduate universities strongly dependent on the product of research output and number of PhD graduates produced rather than on their sum which is the underlying formula used for years now. The shift from linear to nonlinear accounting is essential in truly incentivizing individual faculty members to excel simultaneously in both achievement measures.

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