16th Development Policy Research Month
Q&A

On DPRM

1) **What is the Development Policy Research Month about?**

   Pursuant to Presidential Proclamation 247 signed in September 2002, the Development Policy Research Month (DPRM) is celebrated every September to encourage Filipino leaders and the public at large to appreciate the role and importance of evidence-based research in program planning and policymaking. The DPRM seeks to encourage proper, systematic, and quality policy research in creating social and economic policies.

   Filipino translation:

   Ano ang Development Policy Research Month?

   Alinsunod sa Presidential Proclamation 247 *na nilagdaan noong Setyembre 2002, ang* Development Policy Research Month o DPRM *ay ipagdiriwang tuwing buwan ng Setyembre upang hikayatin ang mga pinuno ng ating bansa gayundin ang publiko na bigyang-pansin ang kahalagahan ng masusing pag-aaral at pagpaplano sa mga programa at polisiya ng bansa. Hangad ng DPRM ang pagkakaroon ng tama, maayos, at de-kalidad na mga pananaliksik o pag-aaral na magagamit sa pagbuo ng mga makabuluhang polisiya para sa ating lipunan/komunidad at ekonomiya.*

2) **What role does the Philippine Institute for Development Studies (PIDS) play in the celebration of the DPRM?**

   As the country's leading socioeconomic think tank, PIDS organizes various activities to demonstrate the importance of policy research and to engage the public to participate. During the month-long celebration, the PIDS, together with the members of the DPRM steering committee, organizes policy seminars and dialogues, press conferences, and roundtable discussions with institutions, fellow researchers, planning advisers, policymakers, and the media. The Annual Public Policy Conference (APPC) serves as the main and culminating activity of the DPRM. These events demonstrate an exercise in interagency cooperation to emphasize the importance of evidence-based policymaking.

   Filipino translation:

   Ano ang papel ng* Philippine Institute for Development Studies *o

PIDS *sa pagdiriwang ng* DPRM?

Bilang pangunahing socioeconomic think tank *ng bansa, nagsasagawa ang* PIDS *ng iba't ibang mga aktibidad upang maipakita ang kahalagahan ng masusing pananaliksik o pag-aaral ng mga polisiya at programa, at mahikayat ang publiko na makilahok at maging aktibo sa mga gawaing ito. Sa buong buwan ng Setyembre kung kailan ipinagdiriwang ang* DPRM*, ang* PIDS*, kabilang ang ibang miyembro ng* DPRM steering committee*, ay nagsasagawa ng* policy seminars *at* dialogues, press conferences, *at* roundtable discussions *kasama ang iba't ibang institusyon, mga* researcher, planning adviser, policymaker, *at pati ang* media*. Sa paraang ito naipapakita ang pagtutulungan at kooperasyon sa pagitan ng mga ahensiya ng gobyerno upang bigyang-diin ang kahalagahan ng masusing pananaliksik sa pagbuo ng mga patakaran o polisiya.*

3) Why is there a need to hold a DPRM?

Policy research is an important requirement for effective planning and policymaking. Policies should be evidence-based and the DPRM highlights this fact. It also aims to make people become more aware of the importance of research evidence in crafting programs and policies and to remind our policymakers that we have policy studies and other similar resources that are within their reach for their decision-making processes.

Filipino translation:

Bakit kailangang ipagdiwang ang DPRM?

Isang mahalagang bahagi ng epektibong pagpaplano at pagbuo ng polisiya ang masusing pag-aaral o pananaliksik at ito ang binibigyang-diin ng DPRM. Layunin din nito na mas mapalawak ang kaalaman at kamalayan ng publiko tungkol sa kahalagahan ng masusing pag-aaral pagdating sa pagbuo ng mga programa at polisiya. Ito rin ay nagsisilbing paalala sa ating mga pinuno at mambabatas na mayroon tayong mga pag-aaral na maaaring makatulong sa kanila pagdating sa pagpaplano ng mga programa at paggawa ng mga patakaran.

4) What is this year's DPRM theme?

This year's DPRM celebration carries the theme **"Harnessing the Fourth Industrial Revolution: Creating Our Future Today"** (Filipino translation: ***"Isulong ang Fourth Industrial Revolution Tungo sa Katuparan ng Ating Kinabukasan Ngayon"***). It aims to highlight the potential impacts of automation and other innovations in science and

technology and how we can harness these to the country's advantage, not only in terms of improving economic competitiveness but also in making progress both sustainable and inclusive. Through this month-long celebration, PIDS hopes to rouse the interest of policymakers about the FIRe and influence them to be proactive in planning and implementing evidence-based policies and programs that will help the country harness the opportunities and mitigate the risks emerging from the FIRe.

Filipino translation:

Ano tema ng DPRM sa taong ito?

Ang tema ng DPRM *sa taong ito ay* "**Isulong ang Fourth Industrial Revolution Tungo sa Katuparan ng Ating Kinabukasan Ngayon**". *Layunin nitong bigyang-diin ang maaaring maging epekto ng automation at iba pang pagbabago sa siyensya at teknolohiya sa Pilipinas at kung paano ito mapapakinabangan ng bansa, hindi lamang sa pagpapaunlad ng ekonomiya kundi maging kung paano ito magpapatuloy at makakatulong sa lahat. Sa pamamagitan ng pagdaraos ng* DPRM, *nais ng* PIDS *na pukawin ang interes ng ating mga mambabatas hinggil sa* FIRe *at hikayatin silang maging aktibo sa pagpapaplano at pagpapatupad ng mga polisiya at programang dumaan sa masusing pag-aaral, na siyang makakatulong sa Pilipinas upang magamit ang* FIRe *sa pagpapaunlad ng bansa at mabawasan ang problema o hinding magandang epekto na dulot nito.*

On the Fourth Industrial Revolution (FIRe)

5) **What is the Fourth Industrial Revolution?**

The term Fourth Industrial Revolution (FIRe), also known as Industry 4.0, became more popular when it was made the theme of the 2016 World Economic Forum (WEF) Annual Meeting. According to WEF, the FIRe is ushered in by developments in genetics, artificial intelligence, robotics, nanotechnology, 3D printing, biotechnology, among other things. These new and emerging technologies, according to Klaus Schwab, WEF founder and executive chairman, "have a great potential to connect billions of people to the web, drastically improve the efficiency of businesses and organizations, and help regenerate the natural environment through better asset management" (Dadios et al. 2018). Schwab said this age will mark the "fusion of physical, digital, and biological" worlds.

Filipino translation:

Ano ang Fourth Industrial Revolution?

Ang Fourth Industrial Revolution or FIRe, na mas kilala sa tawag na Industry 4.0, *ay naging popular noong 2016 nang ito ay gawing tema sa taunang pagtitipon ng* World Economic Forum (WEF). *Ayon sa* WEF, *ang* FIRe *ay bunga ng mga pagbabago at pag-unlad sa genetics, artificial intelligence, robotics, nanotechnology, 3D printing, biotechnology, at iba pang teknolohiya. Ayon kay* Klaus Schwab, Founder at Executive Chairman ng WEF, *sa panahong ito masasaksihan ang pagsasanib ng mundo ng pisikal, digital, at biolohikal.*

6) **What were the other industrial revolutions?**

There have been three previous industrial revolutions. The **first industrial revolution (1760-1840)** is marked by the emergence of mechanization, which shifted the main economic activity from agriculture to industry. This era started the use of steam power, which in turn, brought the coal-powered external combustion engine.

The **second industrial revolution (1870-1914)**, or the technological revolution, took place toward the end of the 19th century up to the onset of the 20th century. People during this period started using electrical machines and equipment, trains, automobiles, and airplanes—mostly science-based. This era is the birth of power stations, power generators, and the perfection of the light bulb.

The **third industrial revolution (1950s-1970s)**, known as the Information Age or Digital Revolution, is marked by the emergence of digital electronics such as computers, cellular phones, automated teller machines, industrial robots, electronic bulletin boards, video games, and the Internet. Communication as well as access to information greatly improved during this time.

Filipino translation:

Anu-ano ang iba pang industrial revolutions?

May tatlong industrial revolution *na nagdaan bago ang FIRe. Ang tanda ng unang* industrial revolution (1760-1840) *ay ang pag-usbong ng mekanisasyon o paggamit ng mga makina, na naging daan upang lumipat ang mga tao mula sa mga gawaing pang-agrikultura tungo sa mga gawaing pang-industriya. Sa panahong ito nagsimulang gamitin ang* steam

power, *na siya namang nagbigay-daan sa* coal-powered external combustion engine.

Ang pangalawang industrial revolution (1870-1914), *o tinatawag ding* technological revolution, *ay nagsimula bago matapos ang ika-19 siglo hanggang sa unang bahagi ng ika-20 siglo. Ang mga tao sa panahong ito ay nagsimulang gumamit ng mga makina at kagamitang pinapatakbo ng kuryente (o* electrical machines and equipment*), tren, mga sasakyan, at eroplano—na karamihang batay sa siyensiya. Sa panahong ito ipinanganak ang* power stations, power generators, *at mas lalong pinaghusay ang bombilya.*

Ang ikatlong industrial revolution **(1950s-1970s***), o kilala rin bilang* Information Age or Digital Revolution, *ay nagbigay-daan sa tinatawag na* digital electronics *tulad ng* computers, cellular phones, automated teller machines, industrial robots, electronic bulletin boards, video games, *at ang* Internet. *Ang komunikasyon at pagkuha o pangangalap ng impormasyon ay bumilis at bumuti sa panahong ito.*

7) **What are the technologies associated with the FIRe?**

The technologies associated with FIRe are expected to alter the existing patterns of production, consumption, and employment. In general terms, these technologies can disrupt the economy and society.

According to a 2018 PIDS study (Dadios et al. 2018), the following are some of the technologies associated with FIRe: Internet of Things, artificial intelligence, blockchain, big data, robotics, neurotechnology, nanotechnology, 3D printing, cloud computing, energy storage, and synthetic biology, among others.

Filipino translation:

Anu-ano ang mga teknolohiyang may kaugnayan sa FIRe?

Ang mga teknolohiyang kaugnay ng FIRe *ay inaasahang magdudulot ng pagbabago sa kasalukuyang pamamaraan ng produksiyon, pagkonsumo, at maging sa ating mga trabaho. Sa pangkalahatan, ang mga teknolohiyang ito ay makakaapekto sa ating ekonomiya at lipunan.*

Ayon sa pinakabagong pag-aaral ng PIDS (Dadios et al. 2018)*, ang mga sumusunod ay halimbawa ng teknolohiyang kabilang sa* FIRe*:* Internet of Things, artificial intelligence, blockchain, big data, robotics, neurotechnology, nanotechnology, 3D printing, cloud computing, energy storage, at synthetic

biology.

Definition of terms

- **Internet of Things (IoT)** - refers to the connectivity of electronic devices, vehicles, (also known as 'connected devices' and 'smart devices'), structures, buildings, and other devices with electronics, software, sensors, actuators, and communication capabilities which equip these items to send, transmit, and process information. Through the IoT, devices and sensors can now be remotely connected, allowing people to operate appliances at home using wireless networks (Dadios et al. 2018).
- **Artificial Intelligence (AI)** - commonly known as AI, is the programmed reasoning and thinking skills applied to machines to mimic human or animal intelligence. A promising application of AI is on the use of self-driving cars (Dadios et al. 2018).
- **Blockchain** - is simply a digital ledger of transactions shared by a network of computers, making use of cryptography to secure the authenticity of the transactions. Cryptocurrencies, such as the bitcoin, is the most popular use of blockchain technology. In other countries, this technology is used for decentralized authentication in traditional banking transactions and clearing of transaction records such as land titles (Dadios et al. 2018).
- **Big Data** - According to IBM, big data is a term applied to data sets whose size or type is beyond the ability of traditional relational databases to capture, manage, and process the data with low-latency. It has one or more of the following characteristics—high volume, high velocity, or high variety. Big data comes from sensors, devices, video/audio, networks, log files, transactional applications, web, and social media. Much of it generated in real time and in a very large scale. Analyzing big data allows analysts, researchers, and business users to make better and faster decisions using data that was previously inaccessible or unusable.
- **Robotics** - refers to the science of design, construction, operation, and implementation of robots, as well as computer systems for control, feedback, and information processing (Dadios et al. 2018).
- **Neurotech** - refers to the technology that changes how people perceive and appreciate the brain and several characteristics of consciousness, thought, and complex activities in the brain. It also refers to the products that are made to augment and heal brain activities and allow researchers and clinicians to see, map, and visualize the brain (Dadios et al. 2018).
- **Nanotechnology** - is involved in energy storage, lighting, and photovoltaics which are required in the popularly growing applications such as smart cities, electric cars, and smart vehicles. It is also used in

medical fields such as diagnostics and treatment of cancer, as well as early detection of body contaminants and biological substances that may lead to diseases (Dadios et al. 2018)

- **3D-printing** - also known as additive manufacturing, it refers to processes use to create a three-dimensional product in which a computer control assembles materials into layers. Products can be in any form or size and geometry from a 3D model (Dadios et al. 2018)
- **Cloud computing** - as defined by Indiana University, it is the practice of hosting files, computing operations, or technology services on remote servers connected via the internet. It can allow people to access and share information at any time from multiple devices, as well as rapidly deploy computing services without purchasing hardware, temporarily leverage massive computing power, and much more. Cloud computing includes familiar examples of cloud storage, such as storing pictures on Flickr and videos on YouTube, among others.
- **Energy storage** - is the technology that stores generated energy. Devices used for storage are sometimes referred to as accumulators or batteries. Sources of energy include gravitational, solar, electrical potential, temperature, kinetic, and many others (Dadios et al. 2018).
- **Synthetic biology** - is the union of biology and engineering disciplines. It includes the areas of biophysics, biology, electrical engineering, evolutionary biology, and molecular biology. The greatest potential of synthetic biology is in the field of energy which is possibly a replacement for fossil fuels, improving efficiency, and a solution to pollution (Dadios et al. 2018).

On impacts (benefits and risks)

8) What are the potential benefits of the FIRe?

As in all other industrial revolutions, FIRe aims to improve the quality of people's lives. In its 2016 report on *The Future of Jobs*, the WEF said that through FIRe, developments in the fields of genetics, artificial intelligence, robotics, nanotechnology, 3D printing, biotechnology, and other technologies will be seen. These are expected to improve transportation, communication, and health care; boost the productivity and efficiency of businesses; and enhance food security.

Filipino translation:

Ano ang mga benepisyong maaaring idulot ng FIRe?

Tulad ng mga nagdaang industrial revolutions, layunin ng FIRe na mapabuti o mapaganda ang kalidad ng pamumuhay ng tao. Ayon sa 2016

report ng World Economic Forum *na tinawag nilang* [The Future of Jobs](#), *ang* FIRe *ay magdudulot ng pag-unlad sa larangan ng* genetics, artificial intelligence, robotics, nanotechnology, 3D printing, at biotechnology. *Malaki ang maidudulot nitong pagbabago sa ating transportasyon,* komunikasyon, at healthcare. *Makakatulong din ito ng malaki sa pagpapalago ng tinatawag na* business productivity and efficiency *gayundin sa pagpapaunlad ng ating* food security.

9) **How prepared is the Philippines for the FIRe?**

In the WEF's [*Readiness for the Future of Production Report 2018*](#), the Philippines is categorized as a "legacy country" which "has a strong production base today, but is at risk for the future due to weaker performance across drivers of production". The drivers of production include technology and innovation, human capital, global trade and investment, institutional framework, sustainable resources. The Philippines, therefore, needs to improve its performance in those aspects first before it is able to harness the benefits of FIRe.

Filipino translation:

Gaano kahanda ang Pilipinas sa FIRe?

Ayon sa [Readiness for the Future of Production Report 2018](#) *na nilabas ng* World Economic Forum*, ang Pilipinas ay nasa kategoryang "legacy country".* Ang ibig sabihin nito ay ang Pilipinas ay may malakas na production base ngayon, ngunit may kaakibat na risk sa hinaharap dahil sa mahina nitong pagganap sa kanyang drivers of production. *Kasama sa* drivers of production *ang sumusunod:* technology and innovation, human capital, global trade and investment, institutional framework, sustainable resources. *Batay dito, nangangailangan pa ng malaking improvement ang Pilipinas pagdating sa* performance *nito hinggil sa mga nabanggit na* drivers of production *upang makinabang sa benepisyo ng* FIRe.

10) **What sectors will mostly be affected by the FIRe?**

While in general, technologies associated with FIRe will affect almost all sectors of society, these will mostly be felt in the labor (including the manufacturing, transportation, and service sectors), education, and business sectors.

Filipino translation:

Anu-ano ang mga sector na lubhang maaapektuhan ng FIRe?

Bagaman lahat ay maaapektuhan ng FIRe, *ang isa sa mga hanay na lubhang maaapektuhan ay ang sektor ng mga manggagawa (kabilang na dito ang* manufacturing, transportation, and service sector*), edukasyon, at pagnenegosyo.*

11) **How will the FIRe affect our jobs?**

The WEF's [2016 report](#) also estimated that about seven million jobs will be lost due to automation brought about by the FIRe. These jobs are mostly "routine jobs" or those that involve pattern, require less creativity, and are repetitive. A study by the International Labor Organization (ILO) also predicts that about half of jobs in five Southeast Asian countries (Cambodia, Indonesia, Philippines, Thailand, and Viet Nam)—or about 137 million workers—are a high risk of being affected by automation (Chang and Huynh 2016).

Nevertheless, new jobs will also be created—about 2 million jobs, according to WEF, mostly focusing on technology, software development, and more importantly, critical thinking and soft skills, or the so-called "non-routine" or "non-codifiable" jobs.

Filipino translation:

Paano maaapektuhan ng FIRe ang ating mga trabaho?

Batay sa 2016 report ng World Economic Forum, *tinatayang nasa pitong milyong trabaho ang mawawala dahil sa automation na dulot ng FIRe. Kabilang sa mga trabahong lubos na maaapektuhan ay ang tinatawag na* "routine jobs" *o yung mga trabahong may kinalaman sa* pattern, *gayundin ang mga hindi masyadong nangangailangan ng pagkamalikhain, at mga trabahong paulit-ulit na ginagawa. Ayon din sa isang pag-aaral ng* International Labor Organization, *tinatayang halos kalahati ng mga trabaho sa limang bansa sa Southeast Asia tulad ng Cambodia, Indonesia, Pilipinas, Thailand, at Viet Nam—o halos 137 milyong manggagawa—ang malalagay sa tinatawag na "high risk" o lubhang maaapektuhan ng automation (Chang and Huyn 2016)*

Gayunpaman, may mga bagong trabaho ring lilikhain ang FIRe—ayon sa WEF, tinatayang nasa dalawang milyong trabaho na naka-pokus sa technology, software development, critical thinking and soft skills, *o ang mga tinatawag na* "non-routine" o "non-codifiable" jobs.

12) **How will social protection systems be affected?**

The FIRe is expected to greatly alter the way people will work as more non-traditional ways of employment such as gig economy and independent contracting become more popular. With this new employment arrangements, more flexible and portable social protection systems are needed.

According to a 2006 journal article by Peter Auer, the coverage of the new social protection system should not be dependent on an individual's firm or job, but rather, the individual himself, who will more likely transfer from one employee to another. Furthermore, workers who will be displaced because of the FIRe should receive protection (e.g., unemployment insurance) from the government as they equip themselves with the required new set of skills.

Filipino translation:

Paano maaapektuhan ng FIRe ang mga sistema ng pangangalagang panlipunan (social protection)?

Inaasahang lubos na mababago ng FIRe *ang paraan ng pagtatrabaho ng mga tao dahil maraming* non-traditional *o makabagong paraan ang ibubunga nito tulad ng* gig economy *at* independent contracting. *Dahil sa mga pagbabagong ito, higit na kailangan na magkaroon ng mas* flexible *at* portable social protection systems.

13) **How should the education sector prepare for the Fourth Industrial Revolution?**

According to the authors of the 2018 PIDS study, our education system must "encourage as well as enable flexibility and modularity". It should also mainstream digital skills in basic education, develop and promote courses in science, technology, and mathematics, and incorporate both cognitive and non-cognitive skills development in the curriculum. The education system must also ensure that both students and workers alike are encouraged to learn new things, re-learn what they studied before, and unlearn things that they have learned but are not applicable to the new demands of FIRe.

Filipino translation:

Ano dapat ang mga paghahanda na ginagawa ng education sector para sa FIRe?

Ayon sa mga may-akda ng PIDS *na nagsagawa ng pag-aaral hinggil sa* FIRe, *dapat ay hinihikayat at pinapagana ng sistema ng edukasyon sa Pilipinas ang* flexibility *at* modularity. *Dapat ding gawing bahagi ng* basic education *ang* digital skills *at linangin at itaguyod ang mga kurso sa*

larangan ng siyensiya, teknolohiya, at matematika. Marapat ding isama sa curriculum *ng mga eskwelahan ang paghubog sa* cognitive at non-cognitive skills*. Dapat ding mahikayat ang mga estudyante at manggagawa na matuto ng mga bagong kaalaman, muling matuto sa tinapos na kurso, at iwaksi ang mga natutunan na hindi naaangkop sa* FIRe.

On government initiatives

14) **How can the Philippine government help the country harness the benefits of the FIRe?**

A [book](#) published by the World Bank in 2010 compared the role of government in harnessing innovation to a gardener, also known as "Gardening Innovation". In the book, it is said that the government should "prepare the ground" (invest on education and human capital development), "water the plants" (finance and support innovators), "remove the weeds and pests" (encourage competition and deregulation), and "fertilize and nurture the soil" (boost research & development and access to information). More importantly, it should be the first sector to adapt to new technologies and innovation.

Filipino translation:

Paano makikinabang ang Pilipinas sa FIRe?

Sa librong ipinalabas ng World Bank *noong* 2010*, inihalintulad sa pagiging isang hardinero ang papel na gagampanan ng gobyerno sa pagsulong ng mga pagbabago sa teknolohiya. Ito ay tinawag nilang* "Gardening Innovation"*. Nakasaad sa nasabing libro na tungkulin ng pamahalaan ang "ihanda ang lupa" (mamuhunan sa edukasyon at* human capital development*), "diligan ang panamin" (pondohan at tulungan ang mga* innovators*), "tanggalin ang damo at peste" (hikayatin ang kompetisyon at regulasyon), at "lagyan ng pataba at alagaan ang lupa" (palakasin ang sektor ng pananaliksik at pagpapaunlad at pangangalap ng impormasyon). Higit sa lahat, dapat manguna ang pamahalaan sa paggamit at pagpapatupad ng mga makabagong teknolohiya.*

15) **Are there policies/programs related to innovation that are already being implemented by the Philippine government?**

Although it still has a long way to go when compared to other countries, the Philippines has already been implementing several programs and policies related to innovation.

For one, the Department of Science and Technology (DOST), the lead agency for all science, technology, and innovation-related programs, has begun implementing the Science for Change Program. There are also a number of laws which aim to protect and give more incentives to scientists, inventors, and engineers, such as the Technology Transfer Act (Republic Act 10055). The Balik Scientist law (Republic Act 11035) was also signed into law in June this year. This law will strengthen the Balik Scientist Program, which aims to motivate expatriate S&T professionals to return to the Philippines for short- and long-term visits to share their expertise.

In terms of industry-related strategies, there is the Inclusive, Innovation-led Industry Strategy (i3S or "i-cube") of the Department of Trade and Industry (DTI). The i-cube is an upgraded framework of the Comprehensive National Industrial Strategy that aims to encourage industries to foster an innovation-centered ecosystem, among other things.

In education, a number of laws have also been passed in an effort to improve the education system, including its quality and reach. One recent example is the Enhanced Basic Education Act of 2013, which aims to improve learning outcomes, access, and equity. It also puts the country at par with other countries and helps students prepare for college and employment.

Filipino translation:

May mga polisiya o programa bang ipinapatupad ang gobyerno hinggil sa mga makabagong teknolohiya?

Bagaman medyo nakakaangat sa atin ang ibang bansa pagdating sa makabagong teknolohiya, may mga hakbang na ginagawa at polisiyang pinapatupad ang pamahalaan upang makaagapay tayo sa mga pagbabagong ito.

Halimbawa nito ay ang Science for Chance Program o S4CP *na pinapatupad ng* Department of Science and Technology. *Layunin ng programang ito na maglaan ng malaking pondo para sa* education, training, and services *na may kinalaman sa siyensiya at teknolohiya. Maliban dito, meron ding mga batas na naglalayong mabigyan ng proteksiyon at insentibo ang ating mga* local scientist *tulad ng Balik Science Program at Technology Transfer Act.*

Pagdating naman sa industry-related strategies, meron tayong tinatawag na Inclusive, Innovation-led Industry Strategy (i3S or "i-cube"). *Ito ay isang* upgraded framework ng Comprehensive National Industrial Strategy *na naglalayong himukin ang industriya na pagyamanin ang ating* innovation-centered ecosystem *upang dumami pa ang tinatawag* nating technological

innovations *sa bansa.*

May mga batas na ring naipasa upang maitaas ang kalidad ng edukasyon sa bansa. Isang halimbawa nito ay ang Enhanced Basic Education Act of 2013. *Layunin nitong ihanda ang mga estudyante pagpasok sa kolehiyo at tulungan silang makahanap kaagad ng trabaho.*

16) **What are examples of technological innovations that are being developed by local scientists and are being adopted by Philippine industries?**

- Some expensive houses and high-end condominiums in the Philippines are equipped with IoT devices. Smart farms also employ this type of technology.
- The National Institute of Molecular Biology and Biotechnology under the University of the Philippines Los Banos makes use of biofertilizers, vaccines, antibiotics, and biopesticides with synthetic biology.
- To enable efficient government operations and improve the delivery of public services to the people, the Philippine government has established the government cloud (GovCloud). The GovCloud facilitates easier exchanges of resources and documents among government offices. For instance, if the DTI and the LGU is connected to the same cloud, duplication of documentary requirements will be reduced, and so is the costs. It also offers PhPay, a government online system that allows citizens and businesses to issue payments to government through online transactions. This will reduce time in making payments and eliminate graft and corruption practices in government.
- The Agapay project is funded by the Department of Science and Technology – Philippine Council for Health Research and Development (DOST-PCHRD). The research team, composed of biomedical engineers from De La Salle University and rehabilitation experts from the University of the Philippines - Philippine General Hospital, created two robotic exoskeleton prototypes with a biofeedback mechanism for rehabilitation of post-stroke and injured patients by assisting motor movements in the shoulder, arm, and hand. The biomedical devices, which were 3D-printed, offers a cost-effective solution to production and works by utilizing a real-time biofeedback system that records neuromuscular activity using surface electromyography (sEMG).
- The Axis Knee System is another project funded by DOST-PCHRD. It is a total knee replacement system that is designed for a wide range of sizes. This world-class, FDA-approved product was conceptualized and developed by Filipino doctors and engineers, together with some consultants from Japan, China, and US, and is being locally produced in an ISO-certified manufacturing plant in Cabuyao, Laguna.

Filipino translation:

Anu-ano ang mga halimbawa ng technological innovations na ginawa ng mga lokal na siyentipiko at ginagamit ng iba't-ibang industriya sa Pilipinas?

- *Ilan sa mga magagarbong bahay at mamahaling* condominiums *sa Pilipinas ay gumagamit ng mga* IoT devices.
- *Ang* National Institute of Molecular Biology and Biotechnology *na nasa ilalim ng Unibersidad ng Pilipinas sa* Los Banos *ay gumagamit ng* biofertilizers, vaccines, antibiotics, at biopesticides *na may kasamang* synthetic biology.
- *Upang maging maayos ang pamamalakad sa gobyerno at mapabuti ang serbisyo publiko, i*tinatag ng pamahalaang Pilipinas ang government cloud o GovCloud. *Layon ng* GovCloud *na mapabilis ang pagpapalitan ng mga dokumento at ibang serbisyo sa pagitan ng mga ahensiya ng gobyerno. Halimbawa, kung ang* Department of Trade and Industry *at ang lokal na pamahalaan ay konektado sa iisang* cloud, *maiiwasan ang* duplication *ng mga dokumento, gayundin ang gastos para dito. Meron din itong* PhPay, *isang* online system *na nagbibigay pahintulot sa mga tao at may-ari ng negosyo na magbayad sa pamahalaan sa pamamagitan ng* online transactions. *Dahil dito, umiiksi ang oras sa pagbabayad at naiiwasan ang* graft and corruption practices *sa gobyerno.*
- *Ang* Agapay project ay pinondohan ng Department of Science and Technology – Philippine Council for Health Research and Development (DOST-PCHRD). *Ang* research team *na binubuo ng mga* biomedical engineers *mula sa* De La Salle University at rehabilitation experts *mula sa* University of the Philippines - Philippine General Hospital *ay nakalikha nang* robotic exoskeleton prototypes *na may* biofeedback mechanism *para sa rehabilitasyon ng mga pasyenteng nakaranas ng stroke at nasugatan sa pamamagitan ng pagtulong sa* motor movements *sa bandang balikat, braso, at kamay.* Ang biomedical devices *na pawang mga* 3D-printed *ay may murang produksiyon at ginagawa ito sa pamamagitan ng paggamit sa* real-time biofeedback system *na nagre-rekord ng* neuromuscular activity *gamit ang* surface electromyography (sEMG).
- *Isa pang proyekto na pinondohan ng* DOST-PCHRD *ay ang* Ang Axis Knee System. *Ito ay isang* total knee replacement system *na dinisenyo para sa iba't-ibang sukat. Ang* world-class at FDA-approved product *na ito ay pinag-isipan at binuo ng mga Pilipinong doktor at inhinyero, kasama ang ilang* consultants *mula sa* Japan, *Tsina, at Estados Unidos, at ito ay ginagawa sa isang* ISO-certified

manufacturing plant *sa* Cabuyao, Laguna.

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