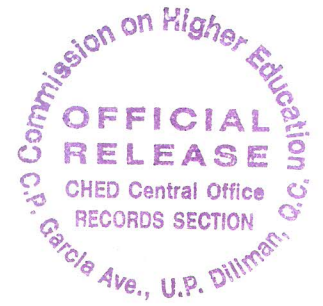




Republic of the Philippines
OFFICE OF THE PRESIDENT
COMMISSION ON HIGHER EDUCATION



CHED MEMORANDUM ORDER

NO. 52

Series of 2016

Subject: PATHWAYS TO EQUITY, RELEVANCE AND ADVANCEMENT IN RESEARCH, INNOVATION, AND EXTENSION IN PHILIPPINE HIGHER EDUCATION

1. RATIONALE

Pursuant to Republic Act 7722, “An Act Creating the Commission on Higher Education,” which states that “...the knowledge society or knowledge economy characterizes the university not just a generator of knowledge, an educator of young minds and a transmitter of culture but also as a major agent of economic growth, a Research and Development laboratory and a mechanism through which the nation builds its human capital to enable it to actively participate in the global economy” it is, therefore, imperative to inspire and enable Philippine higher education institutions (HEIs) become platforms for research and development, innovation and extension in pursuit of inclusive social and economic development.

Over the years, higher education has faced social and economic dynamics that have influenced the “architecture”, dimensions of and approaches to research, innovation and extension. Quite a number of interlocking discourses have also nuanced these definitions and approaches such as, to name a few, a) tension between basic and applied research, b) necessity to address questions of practical relevance, c) nurturing independent inventive and creative thinking and experimentation, d) research for innovation vs. research on innovation, e) partnerships between universities and industry, f) academic and intellectual freedom, g) global research partnerships, and h) trans-, multi- and interdisciplinary engagements and changing lifelong learning needs. In the process, we have noted shifts in paradigms of research, innovation and extension, patterns and structure of funding, and the formulation of outcomes.

As the Philippines enters another era of rapid change and faces a dynamic array of economic, social, global, and technological forces, there is a need to enable Philippine higher education institutions to optimally participate in national transformation through the production and transfer of knowledge that is fundamental to the country’s engagement in the knowledge-based global economy.

Philippine higher education institutions, particularly the universities, offer promising and unique platforms in Research, Innovation, & Extension which allow them to engage in discovery

and/or applied¹ research, disseminate research knowledge, inform government policies, and propel the country's overall competitiveness in the knowledge-driven global economy.

In particular, Extension programs in higher education institutions provide the space to discover practical, evidence and science-based answers that can address real-world social, economic, and environmental challenges of partner citizens and communities. The incubation, knowledge validation, diffusion, and utilization process in Extension, translational or applied research acquire a much deeper relevance when universities carry these out in mutually beneficial collaborations with partner communities such as industry, local businesses, or community groups². It is a set of iterative processes that enable evolution, revision, adaptation, and change. The dynamic synergy of Research, Extension and Instruction, wherein the interaction of faculty cum researcher with undergraduate, graduate and post-doctoral students further catalyzes the dynamic learning and knowledge-generation process, is the indispensable, foundational, distinctive and specialized hallmark of universities.

In both discovery and applied research, a number of Philippine universities have somehow shown distinctive niches in a variety of fields. Nonetheless, Philippine higher education institutions, in general, continue to face pressing challenges at various stages of the research enterprise³. Substantive concerns need to be addressed such as:

- a) improving the research capabilities⁴ of faculty, research staff, and graduate students,
- b) instilling a research culture and research vocation among faculty and graduate students,
- c) upgrading physical resources and research infrastructure⁵,
- d) building up, retraining and retaining a sustainable stream of a new generation of researchers,
- e) increasing research productivity, and raising research quality and impact⁶,

¹ Using OECD definition, discovery research (also known as basic, fundamental, curiosity-driven, open-ended research) is undertaken primarily to acquire new knowledge of the underlying foundations of phenomena without regard for a particular application or products or direct payoffs in mind. It is possible as well for discovery research, in some cases, to reveal or lead to applications and innovations. Applied research is the systematic study to gain knowledge or understanding necessary for determining the means by which a recognized and specific need may be met, and the systematic use of the knowledge and understanding gained from research for the production of useful materials, devices, systems, or methods, including the design and development of prototypes and processes. Applied research is also known as translational research which seeks to find solutions to development challenges and strengthen innovation systems through collaborative work.

It is also feasible to think of a discovery-applied research continuum which maintains a balance and blurs the boundaries between discovery and applied research. There may even be a conscious combination of basic and applied research which aims at providing the fundamental knowledge necessary to address a vital social priority, also known as use-inspired basic research or Pasteur's quadrant. Contemporary examples would include the neuroscience and cognitive science necessary to create better schools, the atomic and quantum physics necessary for nanotechnology, and molecular biology necessary for progress in health care (Duderstadt, J. "The Changing Nature of Research and the Future of the University". In L.E. Weber & J.J. Duderstadt, Eds., Reinventing the Research University, 2004).

² Conceivably, the geographical coverage of these university partnerships with industry, businesses, and community groups may go beyond the physically proximate neighborhoods of universities.

³ In The Global Innovation Index 2014: The Human Factor in Innovation, the Philippines ranks 100 out of 143 countries, compared to Singapore (7), Malaysia (33), Thailand (48), Vietnam (71), Bhutan (86), Indonesia (87), Brunei Darussalam (88), and Cambodia (106).

⁴ These research capabilities pertain to the following essential dimensions namely, a) research design, b) research methodology, c) research organization, i.e., data planning, management, assessment, and analysis, and most importantly, d) critical examination which demands from researchers the ability to critically examine research, whether one's own or those of others, to question the assumptions, methodology and results of research, and to explore alternative explanations and answers to the phenomenon being observed.

⁵ These refer to the presence of operational resources & infrastructure such as libraries, laboratories, workshops, computational technologies, software, etc.

- f) having and institutionalizing a research code of ethics that maintains the integrity, openness, and transparency of the research process and safeguards intellectual property, and
- g) in the case of extension or applied research, establishing structured partnerships with community, business and industry stakeholders in order to integrate “formal” research and innovation efforts with “informal” grassroots knowledge and innovation.

In addition, there are governance, administrative as well as structural challenges to achieving the optimum outcomes in HEI-based research such as a) inadequate capture among administrators, faculty, research staff and students about the role of universities in knowledge production and the knowledge economy, b) heavy teaching and advising loads of faculty on top of administrative, committee and other university assignments, c) low public understanding and opinion of university research, d) low level of research collaboration, e) dispersed or fragmented research interests, if there are any, f) internal barriers to researcher mobility and exchange, g) gender gap, h) lack of steady funding for research, and i) preparedness to engage in research through transnational and global networks among others.

The Commission on Higher Education’s pursuit to craft workable research, innovation and extension systems in Philippine higher education takes into account all these shifting dynamics.

Overall, the Commission on Higher Education believes that national direction and state investments in research, innovation and extension in higher education institutions must be anchored on the discovery-applied research continuum which maintains a balance between discovery and applied research. As it puts premium on the relevance, utility and social impact, it also recognizes that useful knowledge can be discovered in various ways and that, in some cases, long-term and in-depth investigations are essential for generating ground breaking knowledge. Indeed, some innovations with practical social impact are an unexpected spin-off of a much more thorough and ongoing research exercise.

This CMO articulates the strategic thrusts and pathways that can feasibly address these abovementioned dynamics and challenges in order to fully actualize the potentials of higher education institutions as: a) platforms for knowledge production and advancement, b) engines of development through responsive and relevant research programs, and c) producers of multi-specialists, creators, problem-solvers, collaborators, inventors, thinkers and innovators who can examine phenomena, explore new frontiers, and bring from multidisciplinary and interdisciplinary lenses.

Likewise, this document affirms the value of collaboration and multidisciplinary⁷ approaches in research, innovation, and extension. It encourages the establishment of a healthy ecosystem where faculty and students can examine a phenomenon beyond the parameters of their respective disciplines. A metacognition of human cultures and the physical and natural world informed by a study in the sciences and mathematics, social sciences, humanities, history, languages, and the creative arts provides one with the resources to fully enter into contextual knowledge production and co-sharing.

⁶ The Philippines currently ranks lower than Singapore, Malaysia, and Thailand in terms of the number and quality of peer-reviewed publications. The presence of predatory journals and academic conferences also poses a problem to quality.

⁷ Also known as inter-disciplinary and transdisciplinary approaches.



The 21st Century HEI researcher is someone who is comfortable with contextual knowledge production and co-sharing, recognizes improbabilities, and entertains multiple hypotheses.

Hence, total knowledge production and innovation is best served if studies, in the arts and humanities and social sciences are equally supported especially those that can mirror to each of us the dynamics of our national character, how we respond to the dynamics of local and global circumstances, what we do with the lessons of culture and history, and how the undercurrents of community relationships, state formation and nation building affect our response to everyday challenges such as having safe and nutritious food, living healthy and less disease-prone, building disaster-proof homes and schools, having sustainable livelihoods, among many others.

The incubation, knowledge validation, diffusion, and utilization process in extension, translational or applied research can be carried out by universities in mutually beneficial collaborations with partner communities such as industry, local government units, businesses, or community groups. Collaterally, the process and outcomes of the knowledge generation enterprise of HEIs can conceivably enhance the students' learning experience and enrich the symbiosis with both their local and global partners.

In pursuit of these desired ends, the CMO presents three interrelated pathways, namely **Pathways to Equity, Pathways to Relevance, and Pathways to Advancement** which specify key principles, programs and mechanisms. It is also hoped that these pathways will provide the scaffolding for the development and articulation of the new innovation and research ecosystem in Philippine higher education.

II. PATHWAYS TO EQUITY

CHED affirms the principle of inclusiveness in research and the optimum participation of bona fide researchers along the career span, working in research groups or in consortia.

2.1 Grants-in-Aid Program for Research and Innovation

The Commission on Higher Education (CHED) shall provide competition-driven grants-in-aid for HEI faculty to engage in a) basic-applied research and b) applied research.

CHED views the Grants-in-Aid (GIA) programs as two-fold strategic investments, first in developing the country's human resources as researchers and innovators, and second, providing opportunities for HEI consortia or groups to develop a distinctive niche in research and innovation.

In catalyzing research and innovation in higher education, CHED's Grants-in-Aid program for Research, Innovation and Extension (RIE) will be guided by the following organizing principles:

2.1.1 R&I Grants-in-Aid must cast a wide and inclusive net.

- a) They should engender collaborations among researchers, scientists, or investigators from small and big, old and new, and private and public HEIs;

- b) They should support multidisciplinary work;
- c) They must be gender-sensitive and ensure gender balance;
- d) They are staging grounds for producing a new generation of Filipino researchers, i.e., Start-Up Researchers and Early Career Researchers⁸; and
- e) They should be led by a Leading Researcher.

2.1.2 R&I Grants-in-Aid should provide opportunities for young researchers.

- a) They should engage and provide a conducive and supportive environment for Research Assistants or Research Associates who are at their pre-dissertation, all-but-dissertation, dissertation writing, or post-doctoral stages;
- b) Doctoral students, Ph.D. candidates or post-doctoral fellows who are officially engaged as researchers in a project shall be endorsed and given priority in twinning programs, placements and research collaborations with foreign universities facilitated by CHED;
- c) Principal investigators (usually, Leading Researcher and Established Researcher) are expected to provide mentorship to young researchers.

2.1.5 R&I Grants-in-Aid are competitive grants.

- a) Applications for Grants-in-Aid are generally evaluated according to 1) scientific, intellectual, scholarly, technical merit and innovative aspects of the proposal, 2) evidence of the proponent/applicant's continued productivity, and 3) the proponent/applicant's capability to produce the expected deliverables.
- b) Grants are awarded following a process that starts with a call for proposals. Each call for proposals will include 1) specific terms of reference, 2) expected deliverables, and 3) predetermined measures of performance.
- c) R&I proposals are reviewed and assessed for merit based on the following metrics:
 1. Proposal construction (sound theory, analytical and concise review of related research work and literature, discussion of the contribution of the proposed project to existing body of knowledge, robust methodology that is locally, culturally and gender-sensitive and how this will accomplish the target goals, compliance with the ethical standards of research, comprehensive data analysis plan, research dissemination, diffusion and utilization action plan);
 2. Goodness-of-fit between proposal and terms of reference specified in the call for proposals;

⁸ See also: Section 4.2: The Expected Core Competencies of the HEI Researcher



3. Technical qualifications of the investigators and their capacity to carry out the project through completion;
4. Proof of counterpart funding, support, or contributions in-kind from participating HEIs (*Note: Academic de-loading for principal investigators and researchers or similar arrangements from host HEIs can be considered counterpart support*);
5. Work and financial plan;
6. Monitoring and evaluation plan, with timetable;
7. Statement of undertaking to adhere to research ethics and integrity (*please refer to the annexes for guidelines on research ethics*);
8. Dissemination and utilization plan for R&I outputs, with timetable;
9. An outcome-based action plan and timetable to: a) build a new corps of researchers as Research Assistants or Research Associates (i.e., post-doctoral researchers, doctoral candidates, or doctoral students whose dissertation research and research interests are aligned with the RDE program proposal) who can develop expertise in the research area, and b) produce a specified number of high quality, high impact, peer-reviewed publications in ISI/SCOPUS journals, and/or awarded patents.

2.1.6 Answers to the call for R&I proposals may be along the following types of investigation or scholarship (Boyer, E. L. Scholarship reconsidered: Priorities of the professoriate. Princeton, N.J: Carnegie Foundation for the Advancement of Teaching, 1990):

- a) The scholarship of *discovery*: includes original research that advances knowledge;
- b) The scholarship of *integration*: involves synthesis of information across disciplines, across topics within a discipline, or across time;
- c) The scholarship of *application* (also later called the scholarship of engagement); and
- d) The scholarship of *teaching and learning*: involves the systematic study of teaching and learning processes; requires a format that will allow public sharing and the opportunity for application and evaluation by others

2.1.7 Proposals will be reviewed for their technical as well as financial meritsⁱ. The technical reviews will be conducted by a multidisciplinary panel of experts identified and designated by the Commission on Higher Education. The financial review will be conducted by representatives from CHED's Higher Education Development Fund Office and Administrative and Financial Management Services.

In order to facilitate the financial review process, proponents are strongly advised to check with CHED if their respective HEIs are unencumbered by past

and current liquidation issues and to work with their school auditors and finance officers to settle any outstanding financial obligations, if there are any, with CHED before submitting their proposals⁹.

2.1.8 The following strategies are viewed as meritorious and will be encouraged in as far as they meet research goals and the terms of reference such as:

- a) Formation of a consortium of investigators from several HEIs;
- b) Partnership of investigators from public and private HEIs;
- c) Partnership of investigators from big and small HEIs; and
- d) Good working balance between male and female investigators.

2.1.9 In the spirit of fair competition, non-consortium led R&I proposals (i.e., single proponent/principal investigator from one HEI, proposals for discovery or basic research) will be considered if they are equally meritorious and strategic to the attainment of the outcomes and consistent with the overall research thrusts of CHED.

2.1.10 Grants-in-Aid may not exceed Ten Million Pesos (Php10,000,000.00).

2.1.11 Grants, once awarded, will be coursed through the university, normally that of the principal investigator's or the co-principal investigator's. It is assumed that the attendant costs of administration by the host university are included in the project proposal.

2.1.12 At the call for proposals, CHED will conduct an orientation on grant administration, government procurement, accounting and auditing rules, and other pertinent regulations that need to be considered by investigators in crafting their proposals.

2.1.13 An additional prerequisite to HEIs' participation in CHED's R&I Grants-in-Aid program is the recognition of their university research boards that govern matters on research integrity and code of ethics, deterrents to scientific fraud and theft, and intellectual property rights systems. It shall be required of all participating investigators/HEIs to show proof of their fully functioning university research boards.

2.1.14 Proposals submitted must have the approval of their respective university research boards.

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Proponents are strongly advised to study and familiarize themselves with the provisions of the Commission on Audit (COA) and CHED's Higher Education Development Fund regarding the budgeting and utilization of research funds. Proponents are also enjoined to attend the grants management workshops conducted by the Research Management Division, OPRKM-CHED which focus on a) how to allocate expense and setup an expenditure allocation, b) when to propose and charge administrative expenses to a sponsored project, c) understanding proposing and tracking cost sharing, d) salary caps and how to administer the salary cap, e) grant limitations among many other topics on the financial aspects of the grant.



2.2 Grants-in-Aid Program for Extension

The Commission on Higher Education (CHED) shall provide competition-driven grants-in-aid for HEIs and their designated and qualified faculty to engage in extension. Conceivably, as producers of knowledge or hubs of innovations, HEIs are positioned to work in partnership with communities, business, and industry in facilitating the transfer of knowledge or technology on specific developmental areas that directly affect the lives of individuals, families and communities. Hence, extension, in this context, is broadly defined as the systematic transfer of technology, innovation or information generated by HEIs and its partners to seek solutions to specific developmental concerns. It is purpose-specific, target-specific, and need-specific program of action utilizing the best available data, science, and evidences from a range of disciplines to inform systematic approaches to developmental solutions.

For example, HEIs with fisheries programs can create creating distance education or ICT-assisted tools to extend information for modern fisheries engineering and fisheries capture techniques. HEIs with food and nutrition programs can focus on extension approaches that respond to food crises, food safety and nutritional concerns as well as on managing food distribution and education. Extension in the social sciences can work on training development workers with methods and tools for conducting socio-economic and gender analysis, heightening the awareness of gender issues and strengthen the capacity to incorporate gender considerations into development.

HEIs may work on industrial extension initiatives that address weaknesses in the competitiveness of small and medium sized enterprises in the communities by facilitating partnerships with the private sector for product development. Improving the competitive capabilities of small manufacturers which constitute the supplier base of Philippine industries is essential for the enhancement of industrial activity. Industrial extension can focus on improving the productivity of small manufacturers through the adoption of advanced manufacturing technologies. Industrial extension initiatives may also include the transfer of knowledge and technology on general business management information including personnel, accounting, and legal services, shared office and lab space for start-up companies, including shared business services, information exchange and outreach programs that assist in application of new technologies, or establishing university-based, industry-affiliated research centers.

Grants-in-Aid (GIA) programs in extension are viewed as:

- a. An investment in HEIs to develop their capacity and capability to systematically and sustainably work with communities on purposive, focused, and innovative approaches to developmental issues such as, for example, a) entrepreneurship/livelihood development, b) disaster risk reduction c) adult education, d) environmental management, e) industrial competitiveness, f) role of women, and g) community leadership and governance among other developmental concerns. Depending on the capacity of the HEI and its faculty, it may work on more than one developmental focus (see section on “Pathways to Relevance”); and
- b. An incubator for solutions-oriented research or innovation programs.

In catalyzing research and innovation in higher education, CHED's Grants-in-Aid program for extension will be guided by the following organizing principles:

- 2.2.1 Extension Grants-in-Aid are for HEIs only.
- 2.2.2 They must cast a wide and inclusive net.
 - a) They should engender collaborations among qualified researchers, scientists, or investigators
 - b) Proposals may come from small, big, old, new, and private or public HEIs;
 - c) They should support multidisciplinary work; and
 - d) They must be gender-sensitive and ensure gender balance.
- 2.2.3 Extension Grants-in-Aid are competitive grants.
 - a) Applications for Extension Grants-in-Aid are generally evaluated according to 1) scientific, scholarly, technical merit and innovative aspects of the proposal, and 2) the proponent/applicant's capability to produce the expected deliverables.
 - b) Grants are awarded following a process that starts with a call for proposals. Each call for proposals will include 1) specific terms of reference, 2) expected deliverables, and 3) predetermined measures of performance.
 - c) Proposals are reviewed and assessed for merit based on the following metrics: Proposal construction (analytical and concise review of related extension work and literature, discussion of the contribution of the proposed project to existing body of knowledge, extension approaches that is locally, culturally and gender-sensitive and how this will accomplish the target goals, compliance with the ethical standards of extension, dissemination, diffusion and utilization action plan);
 - d) Goodness-of-fit between proposal and terms of reference specified in the call for proposals;
 - e) Technical qualifications of the extension team and their capacity to carry out the project through completion;
 - f) Proof of counterpart funding, support, or contributions in-kind from participating HEIs (*Note: Academic de-loading for extension appointments or similar arrangements from host HEIs can be considered counterpart support*);
 - g) Work and financial plan;
 - h) Monitoring and evaluation plan, with timetable;
 - i) Statement of undertaking to adhere to extension ethics and integrity;
 - j) Dissemination and utilization plan for extension outputs, with timetable;
 - k) An outcome-based action plan and timetable that reflect the extension framework or philosophy.



- 2.2.4 Proposals will be reviewed for their technical as well as financial meritsⁱⁱ. The technical reviews will be conducted by a multidisciplinary panel of extension experts identified and designated by the Commission on Higher Education. The financial review will be conducted by representatives from CHED's Higher Education Development Fund Office and Administrative and Financial Management Services.
- 2.2.5 In order to facilitate the financial review process, proponents are strongly advised to check with CHED if their respective HEIs are unencumbered by past and current liquidation issues and to work with their school auditors and finance officers to settle any outstanding financial obligations, if there are any, with CHED before submitting their proposals.¹⁰
- 2.2.6 Extension Grants-in-Aid are for one year and may not exceed Two Million Pesos (Php 2,000,000.00).
- 2.2.7 Grants, once awarded, will be coursed through the university. It is assumed that the attendant costs of administration by the host university are included in the project proposal.
- 2.2.8 At the call for proposals, CHED will conduct an orientation on grant administration, government procurement, accounting and auditing rules, and other pertinent regulations that need to be considered by proponents in crafting their proposals.
- 2.2.9 An additional prerequisite to HEIs' participation in CHED's Extension Grants-in-Aid program is the recognition of their university research boards that govern matters on research and extension integrity and code of ethics, deterrents to scientific fraud and theft, and intellectual property rights systems. It shall be required of all participating investigators/HEIs to show proof of their fully functioning university research boards.
- 2.2.10 Proposals submitted must have the approval of their respective university research boards.

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Proponents are strongly advised to study and familiarize themselves with the provisions of the Commission on Audit and CHED's Higher Education Development Fund regarding the budgeting and utilization of research funds. Proponents are also enjoined to attend the grants management workshops conducted by the Research Management Division, OPRKM-CHED which focus on a) how to allocate expense and setup an expenditure allocation, b) when to propose and charge administrative expenses to a sponsored project, c) understanding proposing and tracking cost sharing, d) salary caps and how to administer the salary cap, e) grant limitations among many other topics on the financial aspects of the grant.



2.3 Grants-in-Aid for HEI Faculty and Staff Affected by the K-12 Transition “Discovery- Applied Research and Extension for Trans/inter- disciplinary Opportunities” (DARE TO)

With respect to research, the K to 12 Transition program recognizes the imperatives of a) increasing the individual and institutional research outputs of Philippine universities and b) creating mechanisms to support efforts undertaken by HEI faculty. The diminished load for instruction during this transition period allows HEIs to commit both time and resources for the pursuit of research and to enable the growth of renewed research culture.

The DARE TO grant is a competitive enabler seed grant of Fifteen Million Pesos (Php15M) per proposal to stimulate strong collaborative RI ventures and sustainable partnerships for extension activities during the K to 12 transition. These research grants give faculty and staff most affected by the K to 12 Transition a chance to participate and contribute in the work of research.

Special projects and other research opportunities for the qualified HEI faculties may also be funded through the DARE TO grant.

2.4 Technical and Financial Monitoring

All proposals must include a plan for monitoring and evaluation with clearly defined activities, timeline, financial resource estimates; clear and measurable indicators with baseline, targets, measurement methods, and data sources, with schedules for evaluation, surveys, other activities.

Periodic accomplishment reports of programs and projects shall be submitted by the HEI Program/ Project Leader duly endorsed by the HEI Head to the CHED-Research Management Division (RMD).

Periodic field evaluation, on-site visits and data quality check and verification will be done by OPRKM–RMD to: 1) monitor progress of the program/ project according to the approved/ programmed activities; 2) validate compliance to the deliverables set forth in the approved Memorandum of Agreement; and 3) resolve problems that have been identified or encountered during program/project implementation.

Evaluation results and outputs will be disseminated and utilized to improve key implementation, methodologies as well as in the appropriate formulation of policy and advocacy messages and program planning.

HEI Program/Project leaders are also advised to strictly comply with existing accounting and auditing rules and regulations.

2.5 Ancillary Support Programs and Activities

In order to spur productivity and efficiency, CHED shall endeavour to provide the following research management support activities to HEIs:

- a) Workshops on writing grant proposals

- b) Workshops on grant/project management, monitoring and evaluation
- c) Workshops for researchers along the career span, Researchers Level 1 through 4
- d) Seminars on Research Ethics and Intellectual Property Rights
- e) Workshops on Establishing an Institutional Research Board and Intellectual Property Office
- f) Workshops on writing for publications
- g) Training of editor-writers for writing and editing of scientific articles for international publications
- h) Conduct of national research conferences
- i) Conduct of national extension conferences
- j) Establishment of a registry of HEI scientists, researchers and extension experts
- k) Establishment of a registry of laboratories, engineering workshops, incubators, libraries, on-line databases and resources, and other research infrastructure
- l) Establishment of a grants management information system¹¹ of CHED-funded research projects since 2005

III. PATHWAYS TO RELEVANCE

Research, innovation, and extension in Philippine higher education must work contextually and purposively. Knowledge generation in HEIs should enable us to a) deepen our understanding of ourselves as a people and as a nation and b) discover practical, evidence- and science-based answers that can address real-world social, economic, and environmental challenges of families and communities.

3.1 R&I and Extension Grants-in-Aid for National Transformation

In this context, R&I or Extension Grants-in-Aid will focus on platforms that are based on the seventeen (17) Sustainable Development Goals (SDGs) in consonance with the United Nations 2030 Agenda for Sustainable Development¹². It is hoped that HEIs collaborating on common SDG platforms will also be able to establish a niche or expertise in those areas of interest.

¹¹The CHED RDE grants information system is designed to make it easier for HEI researchers to find details of CHED-funded research projects since 2005, including electronic and paper-based proposals. It will contain completed, new and on-going projects

¹²SDGs

Sustainable Development Goals

- Goal 1. End poverty in all its forms everywhere
- Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture
- Goal 3. Ensure healthy lives and promote well-being for all at all ages
- Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
- Goal 5. Achieve gender equality and empower all women and girls
- Goal 6. Ensure availability and sustainable management of water and sanitation for all
- Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all
- Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
- Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation
- Goal 10. Reduce inequality within and among countries
- Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable



CHED has clustered the 17 SDGs into six platformsⁱⁱⁱ, namely: a) Food Production and Security, b) Environment, Disaster Risk Reduction, Climate Change and Energy, c) Terrestrial and Marine Resources: Economy, Biodiversity and Conservation, d) Smart Analytics and Engineering Innovations, e) Health Systems, and f) Education for STEAM.

3.1.1 *Food Production and Security.* This platform serves the desired national development goal of increased agricultural productivity as well as the availability and accessibility of safe and nutritious food that meet people’s dietary needs. Under this platform, CHED will schedule a call for proposals that focus on¹³:

- a) Improved understanding of “food ecology” by examining farming production and systems that look at factors such as land, labor, capital, culture, customs, gender roles, material resources and other biophysical, socioeconomic, and political variables that impact on the total amount of crop and livestock outputs;
- b) Technological innovations such as small-scale irrigation projects and hydrologic mapping, heat and weather sensors, etc. to help cushion farmers from weather extremes and dwindling crop yields brought about by climate change;
- c) Technological innovations focused on reducing production losses as well as post-harvest technological innovations that can ensure the quality, freshness and marketability of agricultural products;
- d) Crop selection mechanisms that can help identify sources of resistance/resilience to abiotic stresses including heat, cold and drought; and
- e) Genetic enhancements that can help crops cope in variable growing conditions.

3.1.2 *Environment, Disaster Risk Reduction, Climate Change and Energy.* This platform is aimed at improving knowledge and understanding of the global environment and climate change, generating systems and public consciousness to conserve local environments, and developing locally appropriate technologies, systems and tools and procedures in preparation for natural disasters. Under this platform, CHED will schedule a call for proposals that focus on:

- a) New energy technology and energy-saving technology;

Sustainable Development Goals	
Goal 12.	Ensure sustainable consumption and production patterns
Goal 13.	Take urgent action to combat climate change and its impacts
Goal 14.	Conserve and sustainably use the oceans, seas and marine resources for sustainable Development
Goal 15.	Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
Goal 16.	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels
Goal 17.	Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development

¹³ The research topics listed in each of the six platforms are just indicative and serve to suggest possible areas of focus. The Research Management Division, OPRKM-CHED welcomes suggestions (email: chedresearch@gmail.com and Secretariat shall review and discuss these suggestions with the technical working group.)



- b) Prevention, monitoring and risk assessment of water, air and soil pollution;
- c) Sustainable utilization of bio-resources;
- d) Disaster prevention and mitigation measures;
- e) Environmental health management; and
- f) Planning, design and evaluation of energy systems from energy production to energy utilization, and safety countermeasures for environmental protection.

3.1.3 *Terrestrial and Marine Resources: Economy, Biodiversity and Conservation.* This platform is aimed at generating sustainable development strategies for activities based on the use of land and ocean resources. Under this platform, CHED will schedule a call for proposals that focus on:

- a) Improved trans-disciplinary understanding and perspective of the Philippine marine environment and the interactions within this environment (marine life and genetic resources, wind farms, coastal tourism and recreation, marine security, marine transport, etc.) and how this knowledge can contribute to integrated policies and plans/schemes to conserve the environmental richness of Philippine coastal communities;
- b) Innovations that help communities manage and restore ecosystems vis-à-vis climatic fluctuations and other stressors;
- c) Economic value of terrestrial and marine biodiversity and what this means for designing and planning effective and socially acceptable conservation strategies and interventions; and
- d) Nutritional and health impact of biodiversity.

3.1.4 *Smart Analytics and Engineering Innovations.* This platform is aimed at fostering and enabling research that can help data users such as small to medium business enterprises, industry, local governments, legislators, policy makers, teachers, students, individuals and families, and other stakeholders harness the potential of data, in varying levels of complexity, in order to make informed decisions. Innovations such as smart predictive informatics tools are needed to help make sense of ever increasing configurations of data, and thereby aid in day-to-day productivity as well as support macro goals of economic competitiveness. Under this platform, CHED will schedule a call for proposals that may focus on:

- a) Development of prototype smart farms via an integrated use of data analytics, weather, heat, and water sensors, information communication and phone apps;
- b) Application of data analytics in the development of urban systems;
- c) Utilization of data analytics by healthcare providers for disease surveillance; and
- d) Development and testing of techno-entrepreneurship programs in formal and non-formal education settings.

3.1.5 *Health Systems*. This platform is aimed at improving evidence-based knowledge and understanding on how to optimize health service delivery using a systems approach. It is concerned on how social factors, governance, workforce, financing systems, products and technologies, organizational structures and processes, personal behaviors, and information-seeking actions affect access to health care, the quality and cost of health care, and ultimately our health and well-being. Hence, the end view is to identify the most effective ways to organize, manage, finance, and deliver high quality care; reduce medical errors; and improve patient safety. Under this platform, CHED will schedule a call for proposals that focus on:

- a) Strategies for training, managing and supporting health care workers;
- b) Decentralization of care from hospitals out to more rural facilities, and from clinical to non-clinical staff;
- c) Strategies for enabling better integration of services, such as for maternal, neonatal, child health and nutrition, detection and prevention of tuberculosis, HIV, malaria, and other infectious diseases as well as for other chronic conditions such as hypertension and diabetes;
- d) Improving doctor-patient communication; and
- e) Communicating risk to the public.

3.1.6 *Education for STEAM*. This platform is aimed at generating innovations in undergraduate education in Science, Technology, Engineering, Agriculture-Fisheries, and Mathematics (STEAM). Under this platform, CHED will schedule a call for proposals that focus on:

- a) Case studies and other innovations in STEAM education from pre-K through university;
- b) Assessment of impact on student learnings in STEAM programs;
- c) Lifelong learning on STEAM: Improved understanding of how, why and when individuals learn STEAM across their lifespan in multiple settings and contexts; and
- d) Women and STEAM

IV. PATHWAYS TO ADVANCEMENT

CHED shall initiate mechanisms to motivate, reward, and recognize the work of Philippine HEI researchers and extension specialists.

4.1 Establish a Registry of HEI Researchers

It is important to understand and segment Philippine HEI-based researchers along a competency continuum in order to efficiently steer public resources and investments in HEI-based research and innovation, effectively develop a pipeline of human resources in research and innovation, and the sustain research careers in Philippine HEIs.

In light of these expected competencies, CHED encourages HEIs, particularly the graduate programs to: a) adapt or adopt international benchmarks for theses and dissertations (e.g. shifting to journal-ready rather than traditional formats for final papers), b) explore the possibility of creating more Ph.D.-by-research programs, and eventually integrating publications into the requirements for an advanced degree, and c) provide an academic and policy environment that is conducive to research expression, and an incentive structure that will encourage students and researchers to push their scholarly pursuits through to completion.

The following classification defines the expected competencies and characteristics of researchers at specific levels as guide to HEIs in growing and ascertaining their corps of researchers who may be engaged in CHED R&I Grants-in-Aid program. Nonetheless, this classification does not have a bearing on the parameters of evaluations and decisions of accrediting bodies and it is also totally up to the HEIs to adopt this classification to serve the purpose for career progression, advancement and recognition of higher education researchers.

First Stage Researchers

These are researchers at early stage of their research career in universities including doctoral candidates who conduct research under supervision of a principal investigator.

Researchers at this level possess the following characteristics:

- Carry out research under supervision
- Have the expressed intent to develop knowledge of research methodologies and discipline
- Have demonstrated a good understanding of a field of study
- Have demonstrated the ability to produce data under supervision
- Are capable of critical analysis, evaluation and synthesis of new and complex ideas
- Are able to explain the outcome of research and value thereof to research colleagues

Early Career Researchers

These are researchers who are holders of doctorate degrees (Ph.D.), but have not yet established a significant level of independence, experience and competence. They are generally at the beginning of their research careers and have been awarded their Ph.D. for not more than 10 years.

Researchers at this level possess the following characteristics:

- Exhibit all competences of First Stage Researchers
- Have demonstrated a systematic understanding of a field of study and mastery of research associated with that field
- Have demonstrated the ability to conceive, design, implement and adapt a substantial program of research with integrity
- Have made a contribution through original research that extends the frontier of knowledge by developing a substantial body of work, innovation or

application. This could merit national or international refereed publication or patent.

- ❑ Demonstrate critical analysis, evaluation and synthesis of new and complex ideas
- ❑ Can communicate with their peers - be able to explain the outcome of their research and value thereof to the research community
- ❑ Take ownership for and manages own career progression, sets realistic and achievable career goals, identifies and develops ways to improve respectability among peers
- ❑ Co-author papers at workshop and conferences

Established Researchers

These are researchers who have developed a level of independence.

Researchers at this level possess the following characteristics:

- ❑ Exhibit all necessary and most desirable competences of Early Career Researchers
- ❑ Have an established reputation based on research excellence in their field
- ❑ Make a positive contribution to the development of knowledge, research and development through co-operations and collaborations
- ❑ Identify research problems and opportunities within their area of expertise
- ❑ Identify appropriate research methodologies and approaches
- ❑ Conduct research independently which advances a research agenda
- ❑ Can take the lead in executing collaborative research projects in cooperation with colleagues and project partners
- ❑ Publish papers as lead author, organizes workshop or conference sessions
- ❑ Establish collaborative relationships with relevant industry research or development groups
- ❑ Communicate their research effectively to the research community and wider society
- ❑ Are innovative in their approach to research
- ❑ Can form research consortia and secure research funding/budgets/ resources from research councils or industry
- ❑ Are committed to professional development of their own career and acts as mentor for others.

Leading Researchers

These are researchers leading their research area or field, usually leading a team or a group of researchers. In particular disciplines as an exception, leading researchers may include individuals who operate as lone researchers.

Researchers at this level possess the following characteristics:

- ❑ Exhibit all necessary and most desirable competences of Established Researchers

- ❑ Have an international reputation based on research excellence in their field
- ❑ Have publications in particularly prestigious journals or by leading publishing houses
- ❑ Possess work of outstanding originality
- ❑ Recipients of competitive grants as Principal Investigators
- ❑ External recognition of research quality
- ❑ Demonstrate critical judgment in the identification and execution of research activities
- ❑ Make a substantial contribution (breakthroughs) to their research field or spanning multiple areas
- ❑ Develop a strategic vision on the future of the research field
- ❑ Recognize the broader implications and applications of their research
- ❑ Publish and present influential papers and books, serves on workshop and conference organizing committees and delivers invited talks
- ❑ Are experts at managing and leading research projects
- ❑ Are skilled at managing and developing others
- ❑ Have a proven record in securing significant research funding budgets/resources
- ❑ Can focus on long-term team planning (e.g., career paths for young researchers and securing funding for the team positions)
- ❑ Are excellent communicators and networkers within and outside the research community
- ❑ Are able to create an innovative and creative environment for research
- ❑ Act as professional development role models for others

4.2 Observe Research Integrity and Transparency.

In order to enable Philippine HEI researchers to productively and meaningfully engage in all forms of research activities, undertakings, and collaborations, this CMO strongly recommends that researchers observe the Macquarie University Code for the Responsible Conduct of Research (<http://www.mq.edu.au/research/about-research-at-macquarie/strategy-and-policy/research-integrity>) as a foundational reference point and a building block to the establishment of the Philippine Higher Education Code for the Responsible Conduct of Research.

4.3 Establish Brain Network - Philippines for Progress (BNPP)

Migrant scientists have historically brought scientific and technological advances for the host countries often times to the detriment of the homeland. In terms of S&T classification, the proportion of OFWs with S&T occupations that leave the country annually is 6% or around

16,000 S&T OFWS for the past 12 years. Among the top destinations of scientists are the United States, Singapore, Ireland and the Middle East ¹⁴(DOST-SEI, 2011).

Confronted by issues on brain drain and the "innovation fizzle", the Philippines continues to invest heavily in higher education in order to cultivate homegrown scientific and engineering talents and provide the proper ecology for research and innovation to retain them. A traditional 'brain gain' program was instituted by the government to lure scientists back from abroad is the "Balik-Scientist" Program, however, with the persistence of the existing challenges, e.g. lack of critical mass of scientists, the prohibitive cost of doing big-ticket the projects, etc., the level of productivity of transiting or returning scientists are likely much less compared to those who have opted to stay abroad. On the other end, non-returning Filipino scholars are considered 'academic renegades' often cannot bring their talent back to the country due to legal issues associated with their return service obligation.

With ICT and globalization, our world has "shrunk" and "flattened"¹⁵ (Friedman, 2005). Its networks of social capital have grown larger and continued to span greater distances. Now, scientists do not always need to stay in the countries where their research is done. As scientists and engineers are considered global rather than local assets, therefore bringing them back to their native land at the expense of science productivity could be considered a costly loss of talent to the world. Thus, to acquire the benefits of global science, CHED shall create a registry of members Filipino diaspora S&T communities around the world, a vastly untapped resource, and creates a mechanism to actively linking them back to the country through a science diplomacy platform that will be termed as Brain Network-Philippines for Progress (BNPP). BNPP aims to support science and engineering diaspora networks by forging scientifically productive, friendly and sustainable links through various tools and institutions so the once lost social and intellectual capital can flow back to the Philippines and even enhance cooperation to the foreign countries in both directions. By changing the 'Brain Drain-Brain Gain' paradigm to 'Brain Networks,' the country may still be able to catch up to meet the benchmarked critical mass of researchers, scientists, and engineers that will steer the country towards industrialization.

4.4 Establish the Journal Incentive Program

Peer-reviewed journals represent the most vital medium for disseminating research findings in modern academic science. Based on a 2015 survey, there were only 28 Philippine scientific journals out of 777 Philippine scholarly journals that were able to penetrate Web of Science (WoS) core collection of Thomson Reuters (TR) or/and the database of Elsevier's Scopus (Tecson-Mendoza, 2015). Despite the century-old scholarly publishing history by the Philippine's scholarly community, 19 out of 28 ISI/WoS-index journals¹⁶ (67%) still have

¹⁴ DOST-Science Education Institute (2011) International migration of Science & Technology (S&T) Manpower-OFWs. Manila: DOST-SEI. ISBN: 978-971-8600-50-4

¹⁵ Friedman, Thomas (2005) The World Is Flat: A Brief History of the Twenty-First Century. US: Farrar, Straus and Giroux Publishing ISBN: 0-374-29288-4.

¹⁶ Evelyn Mae Tecson-Mendoza (2015) Scientific and academic journals in the Philippines: status and challenges



zero (0) impact factor while the rest have not even exceeded an impact factor of 1. Among the negligibly-cited journals include the Philippine Journal of Science which is already 109 years old. With the obvious lackadaisical state of science publishing in the country and given that a large majority (87%) of the 777 Philippine scientific and academic journals are from HEIs, CHED shall develop a strategic funding portfolio to enable editors of Philippine scholarly journals to design and implement ethical measures to improve the international standing of local scholarly journals and to enable research outputs from HEIs to be more accessible to both local and international academic communities.

Under the Journal Incentive Program are the two categories of grants: Journal Challenge (JC) and Journal Incubator (JI). JC caters to ISI/WoS-indexed journals and aims to support activities that will lead to an increase in scientific citation (excluding self-citation) and promote social media presence and public engagement profiles of scholarly articles in the journal. On the other hand, JI will support promising Philippine journals towards the path to meet even just the minimum generally accepted standards for Scopus-/WoS-indexability.

4.5 *Institute the Philippine Citation Index*

In further pursuit of the quality, and to ensure that national journal publications are aligned to international standards, CHED shall initiate the establishment of the Philippine Citation Index (PCI) under the BNPP. The PCI will be responsible for collating, monitoring, coordinating and improving the standard of scholarly journal publications in the Philippines. PCI will maintain a citation system called *PhilCite* and will provide access to bibliographic as well full-text contents of scholarly journals published in the Philippines in the fields of Sciences, Technology, Engineering, Mathematics, Medicine, Social Sciences and the Humanities. *PhilCite* will also provide citation and bibliometric reports on Philippine researchers, journals and institutions based only on the contents within *PhilCite*. Through *PhilCite*, contents of Philippine journals will be made visible globally so that interested researchers can identify expertise, areas of possible collaboration, stimulate use and citations. *PhilCite* also hopes to provide researchers, administrators, faculty, and students with quick, powerful access to the bibliographic and citation information they need to find research data, analyze trends, journals and researchers, and share their findings.

Upon operationalization of the PCI, all recommended Philippine journals shall be submitted and linked to the ASEAN Citation Index (ACI).

4.6 *Adhere to relevant Philippine Code of Ethics on Research*

Philippine HEI researchers shall abide by the following codes of ethics developed by allied research institutes/agencies in the Philippines¹⁷:

4.6.1 Ethical Guidelines for Clinical Trials on Drugs, Devices, and Diagnosis

¹⁷ These guidelines may be accessed through the OPRKM-RMD.

- 4.6.2 Ethical Guidelines for Herbal Research
- 4.6.3 Ethical Guidelines for Complementary and Alternative Medicine Research
- 4.6.4 Ethical Guidelines for Research on Assisted Reproductive Technology
- 4.6.5 Ethical Guidelines for Emerging Technologies
- 4.6.6 Ethical Guidelines for Epidemiological Research
- 4.6.7 Ethical Guidelines for Social Research
- 4.6.8 Ethical Guidelines for HIV and AIDS Research
- 4.6.9 Ethical Guidelines for International Collaborative Researches
- 4.6.10 Philippine Biosafety Guidelines
- 4.5.11 DA Rules and Regulations on Conduct of Scientific Procedures using Animals and RA No. 10631

4.7 Institute a Biennial Program of Awards and Recognition

Through the Research and Publications Awards (REPUBLICA), Best HEI Extension Program Award, and Best HEI Program Award, CHED shall recognize and reward a) outstanding research outputs that contribute to the discovery of new knowledge, development or generation of concepts which propel significant advances in CHED priority disciplines, b) extension programs that demonstrate excellence in technology transfer and innovation processes, and c) research programs that have demonstrated significant or distinctive contributions to the development of a knowledge base, discipline or clusters of disciplines.

4.8 Develop a Network of Higher Education Institutions in research, innovation and extension

CHED shall provide support to the enhancement of HEIs that demonstrate leadership and outstanding productivity in research, innovation and extension.

CHED shall provide annual research funding to ten (10) leading universities, public and private, clustered as the Philippine Higher Education Research Network or PHERNet. PHERNet members conduct basic and applied, interdisciplinary research aimed at intellectual property generation in their own field of excellence. PHERNet members initiate collaborative R&D with their foreign counterparts or act as major linkage to international programs. In addition, they provide high quality post-graduate education and training environments for HEI researchers.

CHED shall provide funding to eighteen (18) universities, public and private, clustered as Higher Education Regional Research Centres (HERRC). HERRCs conduct R&D activities that are aimed to respond to the needs of their respective regions, undertake research capability building activities for HEIs in their regions, promote and facilitate regional networking for research, participate in regional innovation clusters, and promote the utilization of research outputs and technology transfer/extension programs in their regions.

V. DISCONTINUANCE OF GIA ASSISTANCE

CHED reserves the right to discontinue any program/ project at anytime for violation of the Memorandum of Agreement. With prior consultation with the RMD Monitoring Team and Technical Panel, CHED has the authority to terminate any project when key findings and deliverables are not met. The Program Leader will be notified at least 30 days before the date of termination.

VI. EFFECTIVITY

This CMO shall take effect immediately and shall remain in force and effective until otherwise revoked.

Quezon City, Philippines, October 3, 2016.



PATRICIA B. LICUANAN, Ph.D.
Chairperson



Table below shows the clusters of SDGs under the six RDE platforms.

CHED RDE Platforms	Sustainable Development Goals (SDGs)
1. Food Production and Security	SDG 1. End poverty in all its forms everywhere
	SDG 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture
	SDG 3. Ensure healthy lives and promote well-being for all at all ages
	SDG 5. Achieve gender equality and empower all women and girls
	SDG 6. Ensure availability and sustainable management of water and sanitation for all
	SDG 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
	SDG 10. Reduce inequality within and among countries
	SDG 12. Ensure sustainable consumption and production patterns
	SDG 13. Take urgent action to combat climate change and its impacts
	SDG 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels
	SDG 17. Strengthen the means of implementation and revitalize the global partnerships for sustainable development
2. Environment, Disaster Risk Reduction, Climate Change and Energy	SDG 3. Ensure healthy lives and promote well-being for all at all ages
	SDG 5. Achieve gender equality and empower all women and girls
	SDG 6. Ensure availability and sustainable management of water and sanitation for all
	SDG 7. Ensure access to affordable, reliable, sustainable and modern energy for all
	SDG 11. Make cities and human settlements inclusive, safe, resilient and sustainable
	SDG 13. Take urgent action to combat climate change and its impacts
	SDG 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels
	SDG 17. Strengthen the means of implementation and revitalize the global partnerships for sustainable development
3. Terrestrial and Marine Economy: Biodiversity and Conservation	SDG 3. Ensure healthy lives and promote well-being for all at all ages
	SDG 5. Achieve gender equality and empower all women and girls
	SDG 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
	SDG 10. Reduce inequality within and among countries
	SDG 11. Make cities and human settlements inclusive, safe, resilient and sustainable
	SDG 13. Take urgent action to combat climate change and its impacts
SDG 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development	



	<p>SDG 15. Protect restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification and reverse land degradation and halt biodiversity loss</p> <p>SDG 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels</p> <p>SDG 17. Strengthen the means of implementation and revitalize the global partnerships for sustainable development</p>
4. Smart Analytics and Engineering Innovations	<p>SDG 3. Ensure healthy lives and promote well-being for all at all ages</p> <p>SDG 5. Achieve gender equality and empower all women and girls</p> <p>SDG 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all</p> <p>SDG 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation</p> <p>SDG 10. Reduce inequality within and among countries</p> <p>SDG 11. Make cities and human settlements inclusive, safe, resilient and sustainable</p> <p>SDG 12. Ensure sustainable consumption and production patterns</p> <p>SDG 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels</p> <p>SDG 17. Strengthen the means of implementation and revitalize the global partnerships for sustainable development</p>
5. Health Systems	<p>SDG 3. Ensure healthy lives and promote well-being for all at all ages</p> <p>SDG 5. Achieve gender equality and empower all women and girls</p> <p>SDG 10. Reduce inequality within and among countries</p> <p>SDG 11. Make cities and human settlements inclusive, safe, resilient and sustainable</p> <p>SDG 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels</p> <p>SDG 17. Strengthen the means of implementation and revitalize the global partnerships for sustainable development</p>
6. Education for STEAM	<p>SDG 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all</p> <p>SDG 5. Achieve gender equality and empower all women and girls</p> <p>SDG 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all</p> <p>SDG 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels</p> <p>SDG 17. Strengthen the means of implementation and revitalize the global partnerships for sustainable development</p>

