BRITISH COUNCIL

Leveraging the Newton Agham Programme: improving innovations capacity and university-industry relationships in the Philippines

Delivering

Newton Agham Programme

ABOUT THE BRITISH COUNCIL

The British Council builds connections, understanding and trust between people in the UK and other countries through arts and culture, education and the English language.

We help young people to gain the skills, confidence and connections they are looking for to realise their potential and to participate in strong and inclusive communities. We support them to learn English, to get a high-quality education and to gain internationally recognised qualifications. Our work in arts and culture stimulates creative expression and exchange and nurtures creative enterprise.

ABOUT THE NEWTON FUND

The Newton Fund builds research and innovation partnerships with 17 active partner countries to support their economic development and social welfare, and to develop their research and innovation capacity for long-term sustainable and equitable growth.

By fostering world-class collaborations between academics and innovators in the UK and developing countries we aim to address critical development challenges including: poverty, access to healthcare, climate change, and peace and security. As well as growing the research and innovation capacity of developing countries, the programmes we fund contribute to the continued strength of the UK's research and innovation system, and support our wider prosperity and global influence.

The Newton Fund was launched in 2014 and originally consisted of £75 million each year for 5 years. In the 2015 UK Spending Review it was agreed to extend the Newton Fund from 2019 to 2021 and double the investment, leading to a £735 million UK investment up to 2021, with partner countries providing matched resources within the fund.

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List of abbreviations

BEIS	Department for Business, Energy, and Industrial Strategy
CHED	Commission on Higher Education
CRADLE	Collaborative Research and Development to Leverage Philippine Economy
DOST	Department of Science and Technology
DTI	Department of Trade and Industry
HEIs	higher education institutions
ICT	Information and Communications Technology
IPR	Intellectual Property Rights
MOOCs	Massive Open Online Courses
ODA	Official Development Assistance
OECD	Organisation for Economic Development Assistance
R&D	Research and Development
STEM	Science, Technology, Engineering, and Mathematics
U-I	university-industry
UN	United Nations

1 Introduction to the Newton Agham Programme

The Philippines is one of the 17 partner countries listed by the Organisation for Economic Cooperation and Development (OECD) as recipients of Official Development Assistance[1]. The partnership in the Philippines is called the Newton Agham Programme. The programme identified the following priority areas for the Philippines.


Health and life sciences


Environmental resilience


Energy security


Future cities


Agritech


Digital, innovation and creativity

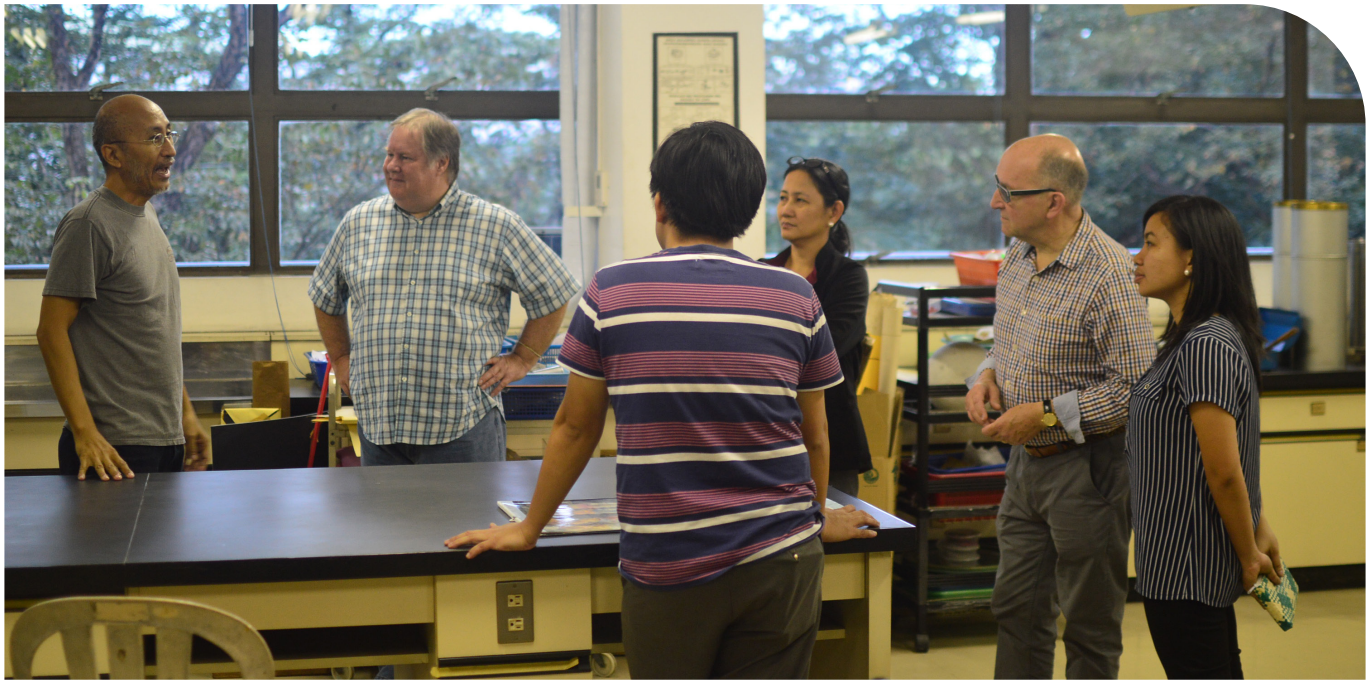
The budget committed for the Newton Fund in the Philippines from 2014 to 2020 is £26.3 million. This represents the overall spending from both the UK and the Philippines. To date, 93 Philippine and UK higher education institutions (HEIs) have participated in projects funded by the Newton Agham Programme, as shown in Table 1.

Table 1

Newton Agham Programme projects	Number of grants	UK HEIs	Philippine HEIs
PhD scholarships	27	21	18
Institutional links	21	14	17
Researcher links travel grant	5	4	2
Researcher links workshops	11	8	8
STEM Education Programme	2	1	
TOTAL	**66**	**48**	**45**

1
For details see the Newton Agham Fund website: https://www.newtonfund.ac.uk/about/about-partner-countries/philippines/

2 Research scope and objectives



CHED-Newton STEM Education Programme, 2016. ©Danie Gonzalvo

The report covers four aspects of university-industry engagement:

- Opportunities and challenges for the Newton Agham Programme and how the British Council could leverage this experience to support the overall university-industry relationships in the Philippines.
- Perspectives and evaluation on developments in the university-industry (U-I) engagement in the Philippines.
- Assessment of priorities, challenges, and opportunities within HEIs working to encourage innovation and the introduction of the Fourth Industrial Revolution.
- Drawing a list of recommendations for DOST and the British Council to support the university-industry relationships.

Having mapped the university-industry practices in the research literature, we identified a cluster of activities which the Newton Agham Programme can support.

This study identifies opportunities for the development of U-I relations in the Philippines and puts forward recommendations for the British Council and DOST on how to support them.

Through the Newton Fund, the British Council could connect Philippine higher education institutions with those in the UK to address these challenges by organising conferences, bringing together practitioners and academics and staff exchange.

3 Innovation and university-industry relationships: priorities, challenges, and opportunities for HEIs

A national innovation system requires an inclusive framework, which addresses opportunities for innovation in organisations, and will support service industries, agriculture, natural resources, tourism and recreation, government and public services. The priority industries and areas for research and development (R&D) identified by DOST and the Department of Trade and Industry include: agri-processing industries (including drug and herbal development); agriculture; fishery and forestry; IC design; semiconductor and electronics, creative industries and knowledge-based services; renewable energy; industrial waste treatment; information and communication technology (including artificial intelligence); infrastructure and logistics; environment and climate change; and manufacturing.

These priorities are similar to those identified in the UK's Industrial Strategy. Through the Newton Fund, the British Council could connect Philippine HEIs with those in the UK to address these challenges by organising conferences, bringing together practitioners and academics and staff exchange. The level of English proficiency in the Philippines is very high, which positions the country's HEIs favourably for international exchanges.

3.1 Nature of the innovation system in the Philippines

The Republic Act No. 11293, known as the 'Philippine Innovation Act' (the 'Act')[2], was enacted on 17 April 2019. It aims to promote a culture of strategic planning and innovation in the Philippines across all sectors, through the adoption of a whole-government approach to governance, facilitating coordination between and among different government agencies and between government and the private business sector.

The Act recognises the richness of the country's resources and culture and the ways these can be harnessed to further innovation and entrepreneurship.

Innovations differ principally in their novelty, ranging from 'incremental' to 'radical'. Incremental innovations are those that provide improvements in terms of product performance, product quality, or the cutting of costs in the production and manufacturing processes. Innovation is radical when it creates a product that is new either to the company or the market; when it is new to the market, it is called 'disruptive innovation'.

Most of the innovations in the Philippines are incremental and based on reverse engineering. As such, they focus on improving the existing products and processes, making them more efficient.

Any innovation, regardless of whether it is incremental or radical, requires implementation, either by putting it into active use or by making it available for use by other parties, firms, individuals or organisations.

The economic and social impact of inventions and ideas depends on the diffusion and uptake of related innovations. It is worth reinforcing that innovation is a dynamic and pervasive activity that occurs in all sectors of an economy; innovation is not the sole prerogative of the business enterprise sector, and can happen in any organisation, including HEIs and the public sector.

A knowledge baseline is fundamental to the development and implementation of innovation. Knowledge is non-rival[3], because its use by one organisation or person does not diminish the amount potentially available to others through spill-overs. However, the resources required to use knowledge effectively can be rival (for instance, if there is a limited supply of skilled and proficient people, or other scarce complementary resources such as access to finance or technology), as well as the ability to realise value from knowledge.

2 Philippine Innovation Act (2019, No. 11293) www.neda.gov.ph/the-philippine-innovation-act/.

3 'Rival' as used here is an economic term meaning that the use or consumption of a resource by one agent prevents another agent from using or consuming it.

3.2 Definition of university-industry relationships in the Philippines

Interviews carried out with higher education representatives revealed a lack of a common definition of university-industry relationships. Therefore, we recommend a clear definition that could be embedded in universities and companies strategies. Drawing on the interview findings, we recommend the following definition for university-industry relationships in the Philippines:

University-industry relationships refer to the transfer of knowledge through systematic interactions between HEIs and business enterprises, and between HEIs and the public sector. These interactions aim at the exchange of knowledge related to research, science and technology to commercialise patents, improve the innovation ecosystem, and achieve a positive impact in broader society, from local communities to government.

n the Philippines, the growth of the innovation rate is not yet fully integrated within the innovation ecosystem. As such, there is no formal policy for continuous training in innovation management, innovation systems or open innovation, nor are rewards provided to universities that undertake risky research. In recent conferences, DOST has promoted the idea of fostering interdisciplinary work. There is little collaboration across disciplines, and there is scope to support both universities and industry to increase multidisciplinary work to prepare for the Fourth Industrial Revolution.

The Fourth Industrial Revolution will require developing critical thinkers who are lifelong learners, through the redesign of undergraduate and postgraduate curricula suitable for this industry shift. There is a widespread need to change from solely theoretical to practical training, creating an employability agenda, engaging with challenges coming from the local contexts, and developing social and economic values through relationships.

Several researchers observed that U-I relationships are not well developed, mainly because universities are focused on theoretical knowledge. One researcher into university-industry relationships in the Philippines identified the lack of interaction in the classroom with practitioners as one of the main issues.

DOST supports the opening of incubators and accelerators. However, universities felt there were no guidelines or funding to run these properly. For example, one of the universities participating in this study was struggling to cover the operational costs of the funded incubator, and it did not have enough resources to pay the administrative and service staff. Because of the lack of

CHED-Newton STEM Education Programme, 2016. ©Danie Gonzalvo

There is a widespread need to change from solely theoretical to practical training, creating an employability agenda, engaging with challenges coming from the local contexts and developing social and economic values through relationships.

funding, the university had to compromise and introduce market-based interventions. The procurement situation meant that much of the management time was spent working on procurement issues and liaising with potential donors looking for funding. Some of the incubators proposed that select companies join their space so that they can access a larger market for research and product testing.

Some universities are trying to develop a cluster of innovative companies. Clusters are areas in which the economic activity of interconnected industries is concentrated. Clusters are significant for supporting entrepreneurship, exchanging ideas, building a supply chain and partnerships, and attracting complementary activities. While the literature has proven that clusters should be spontaneous and not top-down, more incentives should be provided, and new policies to guide firms towards higher-value activities.

Earlier attempts to develop clusters resulted in attracting insurance companies and cafes instead of high-tech companies. The clusters failed because the universities expected that the businesses would move in the new infrastructures; however, there were no incentives to invite companies in or retain those who moved in initially.

Clusters in business are more likely to succeed if an open innovation strategy is implemented; however, open innovation is relatively unknown and rarely applied in companies. Open innovation lies in the purposive inflows and outflows of knowledge to accelerate internal innovation and expand the markets for external use of innovation, and it needs ad hoc processes. Therefore, there is a need to develop courses to create awareness of open innovation, knowledge of how to run new businesses or innovations in products or business processes, and the measurement of the economic impact of these innovations.

Currently, few universities offer entrepreneurship courses. The interviewees commented on a lack of structured and systematic capacity-building training courses for scientists that would help them to develop an invention and bring it to market. Innovations derive from 'knowledge-based activities that involve the practical application of existing or newly developed information and knowledge,' according to the OECD's Oslo manual[4]. Universities are essential to this process. However, any innovation, regardless of whether it is incremental or radical, requires implementation. Inventors and scientists need to know how to put their ideas into active use or make them accessible to companies, individuals or organisations. Therefore, 'the economic and social impacts of inventions rely on the diffusion and uptake of related innovations'[5]. Continuous training is essential for the successful development of a knowledge economy and innovation.

This report distils analytical concepts from innovation studies and analyses the relevant links between university and industry. The interviews and the reports were analysed according to:

- innovation processes
- university-industry relationships
- the Triple Helix model
- skills to perform innovation
- training
- firm competences
- acceptance of the Fourth Industrial Revolution
- engagement with entrepreneurship
- mobility of researcher-level of international collaboration as well as collaborative research.

4
OECD/Eurostat (2018), 'Chapter 2. Concepts for measuring innovation' in 'Oslo Manual 2018: Guidelines for Collecting, Reporting and Using Data on Innovation', 4th Edition, The Measurement of Scientific, Technological and Innovation Activities, OECD. https://www.oecd-ilibrary.org/concepts-for-measuring-innovation_5j8jr639sd37.pdf?itemId=%2Fcontent%2Fcomponent%2F9789264304604-5-en.

5
Ibid.

To improve the country's performance on the Global Innovation Index, a more holistic multidisciplinary programme and framework is needed.

3.3 Priorities, challenges and opportunities for HEIs to encourage innovation

HEIs in the Philippines are under pressure to become more innovative, to increase the commercialisation rate of their intellectual property (IP), and to perform better in terms of engagement with industries. This is due to a call by the Commission on Higher Education (CHED) and DOST aimed at improving the Philippines' position in the Global Innovation Index ranking, being more reactive to rapid technological change and to intensified global competition, and shortening product life cycles.

The country's performance on the Global Innovation Index[6] was discussed at a conference in Manila. The current efforts from the education agencies and institutions focus on science and engineering, and less on the social sciences and humanities. However, to improve the country's performance on the Global Innovation Index, a more holistic multidisciplinary programme and framework is needed.

Most firms in the Philippines operate without R&D centres. DOST and CHED recognise the transformative power of new technology in the current competitive environment. However, there is little research into creating and developing new digital business models. HEIs are under

6
The Global Innovation Index measures the following:

i. institutions (political environment, regulatory environment and business environment)
ii. human capital and research (education, tertiary education, research and development)
iii. infrastructures (ICTs, general infrastructures, ecological sustainability)
iv. market sophistication (credit investment, trade, competition and market scale)
v. business sophistication (knowledge workers, innovation linkages, knowledge absorption)
vi. knowledge and technology outputs (knowledge creation, knowledge impact, knowledge diffusion
vii. creative outputs (intangible assets, creative goods and services, online creativity).

pressure to commercialise their knowledge and to make it publicly available, and to be engines for economic growth. Despite these objectives, education institutions do not recognise their researchers' commercialisation of IP in terms of career progression. If academics want to focus on commercialising their work, they need to do it in addition to their existing workload. As an incentive, they would receive royalties from any successful development; however, they are reluctant to engage in this process because of the lack of administrative support and inability to gain work release.

University interviewees reported difficulties in bringing a contract to the university and potential industry partner because the HEIs would take too much administrative time to process it. On the other hand, companies are not incentivised to work with HEIs, because they know the process is lengthy and cumbersome.

Knowledge exchanges initiated by HEIs positive contribute to reducing R&D market failures and realising the full social benefits of R&D investments. If successfully implemented, from a macroeconomic perspective, both HEI and businesses would benefit from exchanging knowledge:

- Universities would obtain financial support from the private sector and increase the experience and employment opportunities of students and faculty professionals.

- Firms would get access to university research infrastructures and expertise, gain opportunities for recruiting highly skilled personnel, and keep abreast of cutting-edge academic research.

However, since the process is perceived as complicated, there are difficulties in making knowledge exchanges happen.

Many academic respondents indicated that the government should provide more support to develop university-industry relationships, as universities are undertaking riskier innovations than companies: academics are less worried about market failures and keener to push the boundaries of discoveries. An example of support for industries working with universities is the Collaborative Research and Development to Leverage Philippine Economy (CRADLE) Program[7]. CRADLE encourages a synergistic relationship between academia, research and development institutions and the industry, through collaborative R&D projects. Under the CRADLE programme, the private sector industry identifies the problem and the HEI or R&D institution undertakes the R&D to provide a solution.

Future policy dialogues should discuss how academic job descriptions might be changed and the work allocation of the researchers modified to make visible their work to create an impact on society.

The academics interviewed admitted difficulties in working on university-industry relationships projects because that was not part of their job description. Some universities can include an 'extension' in their workload model and reduce their academics' teaching load if the project is considered essential. However, these are sporadic cases aimed at commercial success, rather than societal and policy engagement. The Triple Helix model seeks to benefit the parties involved – society, government and industry – as well as to provide commercial success. Future policy dialogues should discuss how academic job descriptions might be changed, and the work allocation of the researchers modified to make visible their work to create an impact on society. Such changes would allow academics' workload to include time allocation on knowledge exchanges, to be recognised for career progression purposes. There is a range of activities within the spectrum of 'appliedness', such as problem-solving, technology development, ideas testing, and knowledge generation, each of which requires different efforts – and they should be recognised in the workload model.

7
Collaborative Research and Development to Leverage Philippine Economy, http://dost.gov.ph/23-announcements/1819-cradle-challenge-2020-equipping-industries-for-the-new-normal.html.

Furthermore, if interdisciplinary and interdepartmental collaborations are not fostered, the development and implementation of the Fourth Industrial Revolution will be challenging. The Fourth Industrial Revolution is based on transdisciplinary practice and the inclusion of social sciences and humanities in the science, technology, engineering and mathematics (STEM) curriculum. It is essential to have a well-developed financial market to facilitate the development of innovation, especially for digital start-ups. It is necessary to create a new focus on financial support. For the Fourth Industrial Revolution to grow, it needs to be managed through 'bootstrapping', funding to reach scale through government grants, and to incentivise private investment in start-ups through loan guarantee programmes, co-investment funds and tax relief schemes. Becoming a start-up in the innovation ecosystem is considered challenging. All respondents, when asked about their difficulties of initiating a start-up, indicated that the entry barriers are perceived as very strong, and access to credit is constrained. There are few government grants supporting commercialisation, and these are not well known, or applicants are not trained to apply for them, resulting in poor applications.

Furthermore, the respondents admitted that there are psychological barriers in applying for grants because of cumbersome administration which is difficult to navigate. Substantial entry barriers included a static and inflexible system, administrative issues and slow procurement preventing academics from engaging in active and dynamic collaborations with enterprises and businesses. Moreover, respondents indicated that the innovation ecosystem is disconnected, hierarchical, slow, and not supportive of new enterprises.

DOST-Newton researcher links workshop by the University of the Philippines-Los Baños and Lancaster University, 2018.

3.4 Strengths and weaknesses of the university-industry practices in the Philippines

It is essential to cultivate a pipeline of trained researchers in technology, natural science, engineering and in the social sciences. Alongside this, however, there is a need to create a framework for research leadership development, which needs to be implemented holistically – starting with undergraduate and graduate students, then doctoral students, postdoctoral researchers, early career researchers, mid-career researchers and finally senior research leaders. The needs of each career stage have to be addressed within a coherent, overall structure. It is necessary to systematise the offer of leadership-training courses with a career progression, and support from colleagues with high-quality mentorship.

Having an infrastructure in place for leadership support means having a mentorship programme, which rewards and incentivises behaviours that nurture future generations. Mobility via cross-institutional and cross-sectoral collaborations need to be central, and should be further developed to catalyse, drive and sustain change, and promote leadership. All research councils should consider offering the leadership training courses at all stages in their funding, as well as supporting individuals such that they can prioritise it alongside other competing demands. There is a lack of support for working across different disciplines. While there are training programmes, they are not widely advertised; hence the attendance is low.

The National Research Council was keen to build mechanisms to assess the impact of the grants on broader society, and identifies the following priorities for 2017–22:

- food production and security
- the environment, disaster risk reduction, climate change and energy
- terrestrial and marine resources: economy, biodiversity and conservation
- smart analytics and engineering innovations
- health systems
- education for science, technology, engineering, the arts and mathematics.

CHED-Newton scholar Kevin Jace Miranda finished his PhD degree in Chemistry at the University of Aberdeen. He will be focusing on biodiscovery when he returns to Adamson University, his home institution. ©Kevin Jace Miranda

It is necessary to systematise the offer of leadership-training courses with a career progression and support from colleagues with high-quality mentorship.

Science and policymaking summit at Westminster Abbey, 2019. ©Frank Noon

The Philippines has favourable prerequisites upon which to build U-I relations, including the youthful population, excellent fluency in the English language. The country has already attracted international collaborations. DOST is already providing resources to create incubators, accelerators and academic grants to commercialise patents. Also, U-I will benefit significantly from the following:

- Developing an ecosystem that supports innovation and entrepreneurship. This should be coupled with the development of absorptive capacity and open innovation.
- Developing promotion schemes for academics engaged in U-I relations.
- Providing financial incentives and tax breaks for companies participating in U-I relations.
- Providing training o how to create viable business plan.
- Supporting the development of a technology market.
- Nurturing the development of social capital that can be mobilised for the improvement of U-I relationships.
- Building trust on the part of companies on how to moderate risks of IP infringements and contain spillovers.
- Facilitating openness among companies to adopting technologies developed elsewhere.
- Developing policies on how to manage legal issues surrounding U-I relations.
- Strengthening the connections between industry and academia by embedding industry-relevant knowledge in university curricula.
- Embedding the employability agenda, and strengthening the engagement between industry managers and scientists in the collaborative development of university curricula.
- Promoting a culture of sharing and working together for impact.

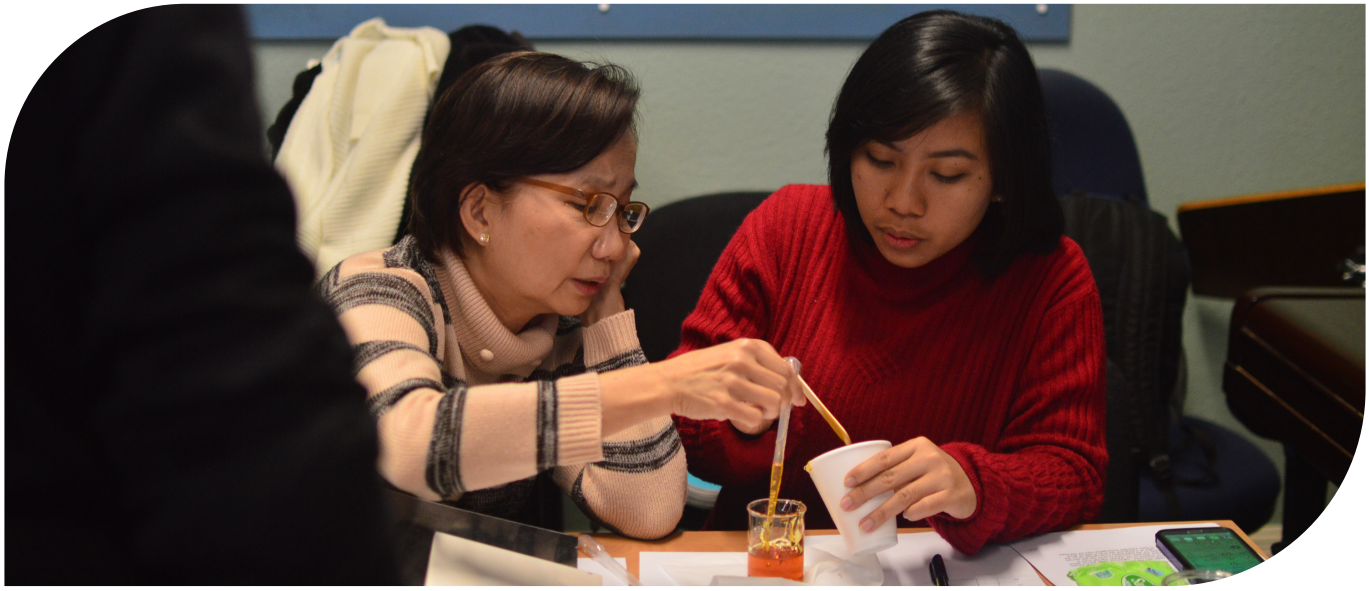
The Annex of this report provides a detailed analysis of the perceived risks for both universities and industrial partners engaged in U-I relations.

4 Recommendations to improve the Philippines' innovation capacity and university-industry relationships

This section draws on the experiences of the Newton-Agham Programme. It identifies recommendations for the Department of Science and Technology and the British Council to improve innovation capacity and university-industry relationships in the Philippines.

There is also an opportunity for broader engagement in the area of U-I across government departments and stakeholders in the community, to embed the culture of entrepreneurship and innovation in young learners' mindsets, e.g. through the school curricula. Such initiatives may include the following:

1. Providing schools (from primary schools upwards) with appropriate IT equipment.
2. Including digital skills in curricula.
3. Ensuring that teachers themselves are appropriately digitally trained and incentivised to include digital skills in their lessons.
4. Ensuring that parents appreciate the need for their children to gain digital skillsets.
5. Ensuring that parents, teachers and professors recognise the value of interdisciplinary, transdisciplinary and practical learning; working with CHED on the creation of experimental curricula based on 'learning by doing' and design thinking for undergraduates and graduate students; and giving university students the option of trying out innovative projects. The following criteria are needed in order to compete in the Fourth Industrial Revolution:
   - Interdisciplinary focus.
   - Focus not only on basic science, health and engineering but also including arts, humanities and social science.
   - Thinking outside the box, integrating arts and humanities.
   - Reflecting on the UN Strategic Development Goals and on ethical practices.

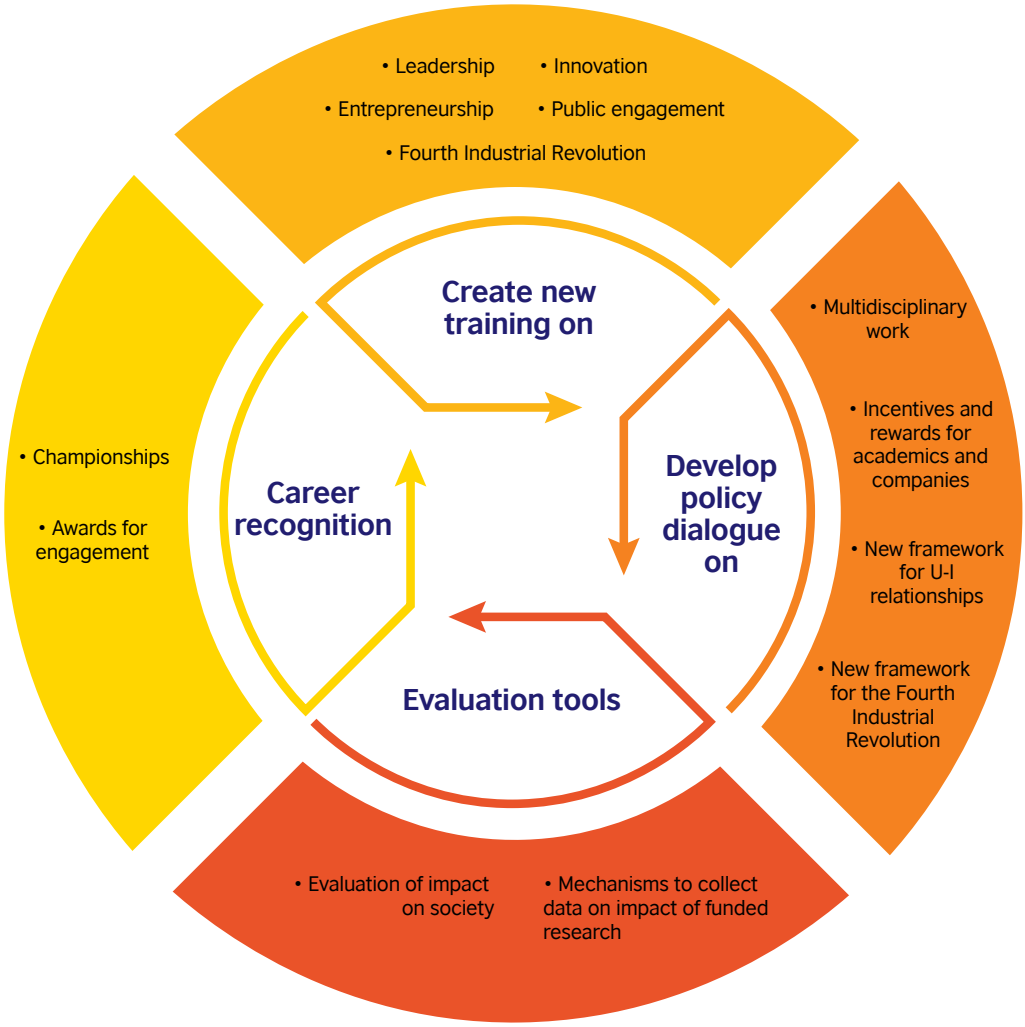


CHED-Newton STEM study tour, 2016. ©Danie Gonzalvo

4.1 Recommendations for government partners to enhance innovation capacity and university-industry relationships

Based on our findings, we recommend priority be placed on four key areas to strengthen university-industry relationships; these are summarised in Figure 1.

Figure 1: Key areas of recommendations to DOST and CHED



Training

1. Organise and promote training to teach new skills to adapt to the changing demands of work and create the conditions for the Fourth Industrial Revolution. The training must include entrepreneurs and arts professionals, and must include reaching out to large companies and academics in innovation management and entrepreneurial programmes, and combining social sciences with engineering and management sciences.
2. Develop the necessary skills training in topics of relevance to business, entrepreneurs and academics to make a long-term contribution and to improve mutual understanding between the businesses and academic communities, and ease the movement of people between them.
3. Develop courses to support students and early career researchers to acquire skills relevant to business.
4. Value and promote academics who work in both business and academia and who excel at collaborative and translational activities.

Being able to cross this divide requires skill and builds expertise and experience. For an academic, gaining experience in industry should be considered career enriching and a mark of distinction, analogous to gaining international experience.[8]

5. Provide leadership training in innovation and research:
   - Develop a national approach to leadership training.
   - Drive performance and signal change.
   - Promote a dynamic and inclusive culture.
   - Establish a nationwide network of research leaders.
   - Support mobility between sectors and develop researchers' skills to work collaboratively with users.
   - Create leadership courses for newly appointed principal investigators.
   - Develop mentorship and coaching programmes.
   - Extend the training to newly appointed principal investigators in projects.
6. Organise national and international tours for research and innovation leaders. This would help the research and innovation leaders meet the actors undertaking the research and innovation, and to hear about their work. At the same time, they would learn from the other nations concerning public engagement, cluster development and brokerage.
7. Support training, learning and development for research leaders, funding bodies and agencies on impact and open innovation.
8. Organise public engagement and media training.
9. Organise open innovation training.

8
Department for Business Innovation and Skills (2015, p34), The Dowling Review of business-university research collaborations July 2015; https://dera.ioe.ac.uk//23491/.

Career recognition

1. Appoint interdisciplinary champions to prepare for the Fourth Industrial Revolution.
2. Include external relations and engagement activities alongside impact on society as criteria for academic promotion.
3. Appoint 'public champions' to lead by example and advise on the most appropriate methods and timings to engage the public, whether via public dialogue or online debate, a survey or a piece of participatory theatre. Public champions should be skilled mediators, who are experienced in working between communities and policymakers on issues of science, research and innovation.
4. Recognise the work on public engagement, and train researchers to consider how they can document the impact of their work.
5. Create awards for developing U-I relationships.

Evaluation tools

1. Develop a public engagement scorecard to reward achievements and engagement with stakeholders to co-create policies.
2. More effectively analyse the data on U-I relationships, impacts of research, and weigh up the costs and benefits of different approaches, to inform policymakers.
3. Develop baseline data and standardised tools to collect data on U-I relationships and assess the impact of the research on society.
4. Create tools to analyse and assess the value of more rigorously applying social cost-benefit analysis models to innovation policy and investments in new technologies.
5. Create analytical tools to support decisions about investments in innovation.

DOST-Newton researcher links workshop by the University of the Philippines-Los Baños and Lancaster University, 2018. ©Rio John Ducusin

Policy recommendations

1. Develop a definition of U-I relationships.
2. Address changes in the labour market, to prepare students for the Fourth Industrial Revolution.
3. Support programmes aiming to develop, nurture or promote an ecosystem in digital education and 'e-skills'.
4. Commission research on challenges and needs of the Fourth Industrial Revolution in terms of innovation, and adopt an evidence-based approach.
5. Promote and support the development of HEIs' leadership capability on innovation.
6. Support projects that incentivise universities to engage more with industry.
7. Develop ad hoc infrastructures, for example, research and enterprise offices, with administratve staff working on contracts with industries. Encourage consultancies that connect the academia and the industry.
8. Create a strategy facilitating the development of U-I practices.
9. Increase the use of digital tools to promote debate and knowledge sharing.
10. Consider the development of inclusive innovation policy, including groups in society that are excluded or underrepresented. Timely data capture is needed on the outcomes of innovation and emerging technologies for different social groups, developed by incubators, universities and entrepreneurs funded by DOST.
11. Consider tax incentives or vouchers for companies that engage in U-I relationships.
12. Ensure that academics deposit non-technical summaries of their research in searchable depositories. This will facilitate engagement with relevant policy committees. Policymakers should use the evidence collected by the researchers in natural and social sciences. A new agenda needs to support openness and participation. Currently, research conducted by academics is not widely used by policymakers. Scholars and policymakers are perceived as two separate communities. There is an opportunity for DOST to create an infrastructure for data collection to inform decision making. Equally, academics need mechanisms to communicate the results of their research, to achieve public policy change. DOST can facilitate this through experienced policy professionals, training researchers in presenting the results as 'policy narratives', and enabling them to engage in policy debates.
13. Include pathways to impact government-funded projects (at least 10 per cent of the total value of the fund). Pathways to impact are the plans that researchers put in place on how to enable their research to connect with others and make a difference in the community.
14. Develop structured approaches to international collaboration, and create ways to absorb knowledge.
15. Analyse skills gaps and address the gaps. Common mechanisms include Massive Open Online Courses (MOOCs), ICT apprenticeships, and inviting managers and specialists from the private sector to give presentations in the classroom. The courses are self-directed and embedded in a community of fellow learners through online forums. MOOCs may have formal university credits assigned to them if they meet the same academic standards that apply to on-campus and distance learning courses.
16. Seek to demonstrate the effectiveness of collaborative research leadership.
17. Ensure that an intellectual property office is put in place at each university and adhere to the principles for commercial use of IP created through publicly funded research.
18. Develop knowledge-transfer partnerships frameworks.

A new agenda needs to support openness and participation.

4.2 Recommendations for the British Council

DOST-Newton researcher links workshop by the University of the Philippines-Los Baños and Lancaster University, 2018.
©Rio John Ducusin

In this section, we recommend how the British Council can leverage experience with the Newton Fund to work with DOST and HEIs locally to support collaborations and U-I relationships and contribute to the development of an impact agenda.

The Newton Agham Programme has been successfully deployed in the Philippines, leading to collaborations between Philippine and UK HEIs, capacity-building opportunities for local researchers and an increase in the U-I links. However, as our data and findings have demonstrated, several areas require further improvements to ensure that the U-I relationships support the move towards the Fourth Industrial Revolution in the Philippines.

Recognise and support projects that are undertaking risky research, but with high impact on society. Build multiple initiatives and support funded research not only from the Newton Agham Programme but also from DOST-funded projects.

© Patrick Roque

Showcasing achievements and leading by example to create an open culture

1. Promote, display and publicly showcase the projects that address the private and public sector needs. Newton Agham funded projects are solving local problems to promote the economic development and welfare of the Philippines.
2. Promote the multi- and interdisciplinarity of the funded projects.
3. Support DOST in embedding theory of change in the projects it funds.
4. Promote and showcase the projects that are financed by the Newton Agham Fund.
5. Give greater exposure and awards to researchers whose career success has been enhanced by U-I.
6. Showcase the number of women involved, to help promote the idea of female entrepreneurship in society.
7. Recognise and support projects that are undertaking risky research, but with potentially high impact on society. Build multiple initiatives and support funded research, such as conferences, information meetings for new grant holders (evenings in which the grant holders meet, socialise and present their research, learning from each other), not only from the Newton Agham Programme but also from DOST-funded projects.

Training and capacity-building for developing impact of research

1. Systematise capacity-building workshops such as leadership and open innovation training
2. Introduce a mentoring system in collaboration with DOST for grant-holders.
3. Develop inclusive links with universities outside Manila, e.g. by including in projects a co-applicant from Manila and a co-applicant from the districts outside.
4. Develop continuous training in innovation management and innovation systems, and organise workshops and courses of professional development.
5. Support critical thinking through ad hoc training.
6. Support social and economic studies among policymakers and university managers.
7. Support capacity-building of Philippine HEIs on developing and managing consultancy services, providing expertise to clients and engaging with partners.

Reporting

1. Support DOST in the development of metrics and reports to create evidence concerning the value created by academic research on society (e.g. returns in terms of improvements in knowledge; growth of local companies), and how it provides more employment for the communities and economy.
2. Support the creation of an infrastructure for grant holders to report research outputs, activities and impact.

5 Concluding remarks

The Newton Agham Programme has performed very well in addressing local problems and making an impact on society, and it has developed research capacity at the institutions involved.

The main achievements of the programme include: teaching new skills methodologies and how to conduct research partnerships; creating international links; developing new literature methods and publication skills; and creating policy dialogue and pathways to impact.

In the assessment of the Newton Fund, we found strong evidence of advancing practices of U-I relationships. These were developed during the research grant, building on the experience of the UK team's approach to industry and engagement with government and public bodies. Academic interviewees were not fully aware of how their work might impact society, since there is not a clear definition of U-I relationships in the Philippines. This report addresses the issue by proposing a working definition for U-I relations.

There is an opportunity to build on the models created under the Newton Agham Programme to develop new partnerships and expand the support to the existing ones. Communicating the success of the newly formed partnerships will generate greater awareness of and interest in U-I among the academic and business community in the Philippines. The country's Innovation Act further signals the country's progressive approach to levelling innovation through business networking, cross-sectoral collaborations and linkages with other countries and markets.

There is an opportunity to build on the models created under the Newton Agham Programme to develop new partnerships and expand the support to the existing ones.

The Philippine grant holders learned from the UK experience in developing specific relationships that support U-I links and practices alongside building the capacity to work and publish in international settings. Most of the grant holders, through the programme, have learned to work on interdisciplinary and multidisciplinary projects, learning new literature and methodologies.

Formal networks of U-I professionals and Newton Agham grant holders are yet to be established. The British Council in the Philippines has the opportunity to develop a comprehensive system to promote, display and publicly showcase the projects that are addressing the needs of the private and public sectors. Leadership courses for new principal investigators in research projects should facilitate the leadership and project management roles of academics.

ANNEX

Perceived risks by the businesses and academia in engaged in U-I relations[9]

	Risks for academia	Risks for businesses[10]
Intellectual property	IP and other contract negotiations are difficult to complete. The processes are difficult to navigate or take too long.	IP and other contract negotiations are difficult to complete. The processes are difficult to navigate or take too long.Same
Capabilities	University metrics prioritise the production of high quality publications and teaching. Lack of administrative support for university-industry relationships	Business find it difficult to identify academic partners
Priorities	Other pressures on academic time (teaching and research) limit resources for collaboration	Business and academia operate in a different timescale, business is faster and does not need to wait long time
Funding	Lack of funding	Lack of funding
Objectives	Collaborative experience not valued as part of the academic career progression	Lack of aligned objectives: tensions between business and university needs
Scope	Lack of time/resources for networking or project development.	Lack of mutual understanding
Focus	Focus on long term achievements rather than short term	Business focus on the short term, rather than long term R&D
Priorities	Tensions between academic desire to publish work and secrecy of businesses that are concerned with competition. Lack of trust or mutual understanding	Businesses are afraid to lose IPs or competitive information and don't facilitate new competitors entering the market. Lack of trust or mutual understanding
R&D	Lack of resources	Low levels of business investment in R&D, including a lack of absorptive capacity
Benefits	Low levels of business investment in R&D, including a lack of absorptive capacity and open innovation	Lack of understanding of benefits of working with universities, due to a lack of open innovation

9
Adapted from Yu, Hai Sui (2016), Research Coll ba oration between Universities and Business: A University Perspective; Presentation at the RAE-CAE Symposium. http://www.cae.cn/cae/html/files/2016-07/19/20160719141915253270966.pdf

10
Additional risks were identified in BIS (2015), The Dowling Review of Business-University Research Collaborations; https://www.raeng.org.uk/publications/reports/the-dowling-review-of-business-university-research

University-industry links can be in the Philippines through creating

	In academia	In industry
Cluster	Opportunities to work with industries	Strong and trusting relationships through the establishment of clusters
Goals	Research goals that are aligned with the business goals	Shared visions, goals and objectives, and clear expectations
Strategy	External engagement as strategy of the university	Processes that facilitate dialogue with academic partners
Rewards	Rewards for academic staff working cross institutional boundaries, such as de-loaded from teaching, inclusion of external engagement in the career map	Tax incentives and grants (e.g. knowledge transfer partnerships) for companies that work with academia
Open innovation	Courses on open innovation	Mechanisms to facilitate open innovation
Organisational support	Processes, infrastructures and offices to manage contracts and facilitate the interaction of academics with industrial partners	Ad-hoc offices that could facilitate the creation of links with academia
Training support	Senior management buy-in, leadership courses, mentorship, public engagement courses and championing	Courses on open innovation, absorptive capacity, external engagement

Recommendations to overcome the risks and challenges:

- Academics should spend time in industry; this experience should be seen as a mark of esteem that enriches their career
- The definitions of impact of research on society and university-industry relationships are unclear
- Principal Investigators to consider gaining industrial experience; funding agencies should ensure that grant conditions encourage this practice
- Stimulate cultural exchanges for undergraduate and doctoral given their role within the research community. Ensuring that students gain industrial experience and entrepreneurial skills are essential for the development of the university-industry relationships
- Celebrate long-term contribution to improving mutual understanding between the business and academic communities (e.g. Newton Agham Programme)
- Train students and academics in public presentations, poster making, and leadership
- Promote people working within University-industry relationships. Those who can work in both business and academia need to be valued and recognised[11].
- Business/industrial partners should be invited to teach in the classroom and to contribute to the building of an employability agenda
- Give greater exposure to the stories of those researchers whose career success has been enhanced by movement between industry and academia. Promoting these role models, creating mentorship programmes and training can contribute to removing the dichotomy between excellence and relevance that is sometimes made in academia[12].
- Develop inclusive long-term growth to produce solutions for long-term problems in society and increase/improve employment prospects
- Attempt to measure the value of society – hard to quantify it. Still, they see returns in terms of improvements in knowledge and tech, which then provides more employment for the community/ economy.
- Showcase the number of women involved to promote the idea of female entrepreneurship in society.
- Build multiple initiatives and types of support (such as physical space, IP advice, mentorship, business plan competitions, hackathons, pitching days, student enterprise societies, connections to VCs, in-house funds, networking sessions)
- Nurture an innovation ecosystem around the universities
- Create digital education and ‘e-skills.’
- Offer additional incentives for people to train as computer science teachers
- Develop skills gaps analysis. Common mechanisms include Massive Open Online Courses (MOOCs), ICT apprenticeships, ensuring that schools have adequate IT equipment and that the curriculum includes digital skills[13].
- Upgrade workers technological skills. Training courses are meant to confirm/renew the license, not to improve workforce skills. Upgrading the capabilities of the workers is necessary to survive and enhance technological development, drive growth, remain resilient and increase the innovation rate. Furthermore, with the Fourth Industrial Revolution, it means that jobs arising from automation will require new industry roles and skillsets.

11
Ibid.

12
Ibid.

13
NESTA (2016, p83), Digital Entrepreneurship: An ‘Idea Bank’ for Local Policymakers; https://media.nesta.org.uk/documents/digital_entrepreneurship_an_idea_bank_for_local_policymakers_.pdf