Special Theme
New and emerging science, technology and innovation strategies

Science, Technology and Innovation for Inclusive Development

Reorganising the National and Regional Systems of Innovation

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Abstract
This article aims to discuss on how universities, research institutions and research councils can take a more proactive role in promoting inclusive development within a nation and across borders. The authors argue that there is a need for regional coordination mechanism (RCM) to effectively promote cross-border science, technology and innovation initiatives that align with the national inclusive development agendas. The authors further argue for the reorganisation of the existing RCM for sustainable development agendas. Some lessons were drawn, from case studies, on the features of an effective regional coordination mechanism.

Introduction
The post-2015 agenda on sustainable development has emphasised the role of science, technology and innovation (STI) in promoting sustainable development. Indeed, the agenda is of importance given the rise in the common problems and issues within as well as across the borders. More importantly, cross-border issues such as pollution, climate change, food shortage, clean energy and others require collective efforts and the transfer of technology and know-how. Although STI is seen to play a crucial role in achieving the goals of the sustainable development, the benefits can only be seen if STI is inclusive, be it at national or international level. In other words, inclusion should also be inclusive enough to include the disfavoured and poorer population as consumers of public policies or helping the disfavoured to build their capacity and capabilities through the transfer of know-how and technology. Technological learning as well as capacity building to improve the absorptive capacity has become a crucial part in this process. It implies that it is time for countries to develop national STI policies that promote cross-border initiatives through the promotion of knowledge as well as dissemination and the utilisation of the innovation outcomes in a broader context.

In this article, the authors discuss how universities and research councils can take a more proactive role in promoting inclusive development. Furthermore, they determine issues and challenges faced by universities and research councils in performing their inclusive development agendas. In addition, the authors argue on the need for a regional coordination mechanism (RCM) to effectively promote cross-border STI initiatives to achieve and promote STI for inclusive development. Finally, the authors discuss how the existing regional coordination bodies should be reorganised in promoting inclusive development.

Universities and research councils: innovation for inclusive development

The role of institutions, such as the universities and research institutions, are crucial in providing, sharing and directing their research outcomes for inclusive development. Indeed, such outcomes can only be utilised when they involve the grassroots in the process and if the outcomes are shared among countries to solve common global problems. In this regard, universities and research institutions as well as research councils can play various roles which include:

- industrial and societal capacity development;
- social and cultural development;
- human capital and skill development;
- institutional capacity development; and
- regional innovation development.

In innovation studies, universities and research councils are considered the supply side in the innovation value chain. Universities are mandated to perform three core missions, namely, teaching, research and outreach, whereas research councils are focused on national research and policy agenda setting and funding. Both universities and research councils, in this regard, are important innovation system factors that contribute to development primarily through knowledge creation and to a

Note: The findings of this study are partly based on a larger study sponsored by Canada’s International Development Research Centre (IDRC). See Ng et al. (2015) for more details on the effectiveness of the regional coordination mechanism.
certain extent, diffusion through extension services and grant making.

A landmark study on *Science and Technology Innovations for the Base of the Pyramid in Southeast Asia* (iBoP Asia) provides some insights into the innovation for inclusive development (IID) roles among several universities in Southeast Asia (SEA). The study highlighted 11 inclusive development projects that engaged academic institutions at different stages of the innovation process. In general, universities in SEA were able to perform two functions in IID, namely (i) intermediary for innovation project implementer, and (ii) direct innovation project implementer. As intermediaries or partners, universities in SEA mainly played their roles in demand articulation (i.e., scanning and diagnosis), knowledge, technology development and brokering (i.e., matching with demand, dissemina
tion or transfer and communication), and technology assessment. Besides, universities are engaged by the industries and communities to develop research methodologies and tools, conduct laboratory testing and develop and test innovation prototypes. On the other hand, as a direct innovation project implementer, apart from demand articulation and knowledge/technology brokering, universities also engage in innovation management (i.e., execution and monitoring), network brokering (i.e., linking and coordinating with collaborators and capacity-building (i.e., community development and training) (Dator-Bercilla et al., 2012).

IID, in this respect, is understood as a continuous effort in translating the outputs from innovation-related activities to all levels of communities (especially the disadvantaged groups or individuals). Such efforts will eventually catalyse into inclusive development. A number of mechanisms and processes lacking capability can learn from others to significantly contribute to inclusive development.

For universities and research councils, in playing their role more effectively, inclusion of societal needs as well as the regional needs is of importance. Figure 1 shows the interconnected and the interaction among the various actors within the national system and their connection at various regions. Universities and research institutions are the core producers of scientific outputs (knowledge production and transfer), whereas industries are the core producers of technology outputs. Both institutions collaborate for knowledge transfer and research. This collaboration is advantageous for reducing the long lags between new knowledge or discoveries and useful applications derived from the knowledge.

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The role of the government (the public authorities) is central for development of infrastructures to stimulate science and technological activities. The society/user involvement in the processes of science and technology can range from developers responding to the users’ demands without actually involving users (low social involvement to users themselves develops the final product or services — high social involvement).

However, what is evident currently is the missing link to society. Currently, there is a lack of interaction at societal level. As for society engagement with academia, industry and government, the bridging role of NGOs or community leaders are of importance. As such, universities, industries as well as government should proactively engage with NGOs as well as community leaders to bridge the gap and provide the needed solutions to the common problems, which can be social, technology or economic. Second, at regional level, there is limited evidence of commonly established interest especially in promoting STI as the platform to provide solutions to the common problems. Countries lacking capability can learn from others to significantly contribute to inclusive development. A number of mechanisms are available for these purposes. These include advice, a platform to exchange knowledge, promoting best practices, facilitating networks, establishing regional

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1iBoPAsia ran from 2008 to 2011 with the aim to foster S&T innovation to contribute to the development of affordable solutions to unmet needs, increase productivity and incomes and facilitate the integration of poor and excluded in the formal economy.
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intervention programmes and projects, providing funding sources, staff mobility and student participations and sharing innovation outcomes.

In the process of facilitating the relationships, attention should also be paid on how other intermediaries can play a role. The possible intermediaries and their roles are exhibited in Table 1.

SEA also lacks the formal framework for systematic interuniversity, intercountry knowledge management, resource pooling and sharing, and network for IID. Hence, the presence of effective and efficient RCM as one of the important intermediaries between the engagement of these institutions (i.e., universities and research councils) with industries and communities is crucial. Figure 2 shows the basic framework of how the RCM can work with the national level innovation systems including with major factors like the research councils. The roles of RCM, in this context, include industrial and societal capacity development, social and cultural development, human capital and skill development, institutional capacity development and regional innovation development with a focus on inclusive development. As such, nations lacking capability can learn from others to significantly contribute to inclusive development. For instance, regional coordination in fighting avian flu in ASEAN\(^2\) was a success story given that the participating countries were able to share the best practices and information to basically control and eradicate the spread of the flu. Since all the countries had a common interest, this programme was successful. Similarly, in areas of inclusive development, a similar platform can be established. However, there is a significant difference between the case of avian flu and efforts to coordinate the programmes of inclusive development. First, in the case of avian flu, all countries have a common interest; however, in the case of innovation and inclusive development, countries are basically competing to be at the frontier, limiting the utilisation of full cooperation.

**Challenges, strategies and lessons learned**

Despite having various regional coordinating agencies/bodies in the existing system in SEA, challenges still remain. Ng et al. (2015) identified the main challenges and attributed this to the systemic failure of the regional coordination bodies in addressing STI as a platform for inclusive development. Among them include lack of recognition, commitment and appreciation for using innovation in inclusive development agenda, inadequate funding supports, weak coordinating leadership, and lack of engagement with NGOs and business enterprises and absence of coordinating role on IID. Listed below are, among others, key issues in promoting IID at the regional level:

- Limited budget for sending people for programmes, activities and collaboration work;
- Rigid intellectual property regulations that hinder the sharing of knowledge and technology;
- Lack of standard and well-coordinated monitoring and evaluation processes;
- Too much of dependence on the chair and leadership; change of leadership will result in changes in priority and different priorities from different countries;
- No mechanism by which the poor can participate in the process (from the planning to defining the project and the implementation);
- Limited communication to transfer the research benefits to the people; science and technology (S&T) culture not embedded in the psyche of the people; and
- No follow-ups after workshops or trainings which make initiatives unsustainable.

Although university staffs are mandated to undertake teaching, research and outreach activities, the focus of the latter is seldom given attention. Such outreach activities are not accorded emphasis in staff annual assessments. There is no strategic roadmap developed to promote outreach activities among the universities. The varying capacities (such as manpower and financial endowments) among the universities and research councils have thwarted many of them from engaging in such outreach activities. IID issues have not been featured prominently in the agendas of most of the universities and research councils and many of the so-called social engagement programmes are organised in an *ad hoc* and unsustainable manner. As a result, IID-related activities have been seen as a “hobby” of the individual or a group of like-minded researchers or activists. Besides, ASEAN countries are at different stages of development which has witnessed the differing extent in the countries paying attention to IID. In many occasions, there is a lack of bilateral or multilateral projects in the region that is able to establish a network of scientists in addressing the region’s common problems in a more effective engagement. This engagement is to provide a platform for a multi-stakeholder dialogue that works in an academic setting and which also takes into account technical merit as well as social development advocacies. In addition, engaging in discussions with targeted groups or beneficiaries at the outset of the project is required to enhance buy-in from the community.

The government should act as a facilitator by providing necessary material and financial support for IID-related programmes. Local champions (such as local leaders or village chiefs) are needed to drive the project and obtain the support of the local community in sustaining the project. For instance, in the case of the Indonesian Sub-national System (or Sistem Inovasi Daerah), various efforts have been made to undertake action-oriented policy studies, making available technical assistance for the region’s government officials as well as intermediation in the areas of preparing medium- and long-term strategic planning or local regulations to provide an ecosystem conducive for creating and diffusing innovation, as well as promoting industrial clusters for the

\(^2\)Through Asian Development Bank (ADB) projects.
The basic principle that underpins these efforts is that for IID to work, the absorptive capacity of marginalised societies has to be improved as well as the capabilities in disseminating research results and innovation of the “more knowledgeable” group in society. In addition, effective mechanisms in the associated transfer of knowledge and technology must be put in place. This process must be supported by the government in the form of friendly regulations for innovative businesses, good public services and adequate infrastructures (physical and social fabric). The main token is systematic learning.

Indeed, as mentioned in the earlier part of this section, most universities have already initiated and conducted social engagement programmes. However, the main concern is about an effective regional network – how to encourage university members to look at the problem and issue beyond the national model. Many problems and issues are cross-border or “borderless”. For example, diseases and environmental problems are not national problems and it is more of a global or regional problems that should be looked at without the prejudices of national commitment or even nationalism. The experiences of the ASEAN University Network (AUN) in fostering collaborative mechanism among its members informed us that a sound regional collaborative mechanism should comprise two strengths, namely, management and value and belief. Even if there are high efficient managerial officers in the system, the regional IID efforts are still unsuccessful in this cross-border collaboration. A community has commitment only if it has the same values and beliefs in doing things together. The AUN success depends on the sharing of beliefs and institutional memory, i.e., the culture of working together within long-term collaboration. As a result of 10–15 years of working together among the members, we have witnessed a strong commitment from AUN’s members. Quoting the words from AUN’s Deputy Executive Director, “In eastern culture, I think friendship is more important than formal recognition or formal position”.

Looking at the experience of AsiaEngage will provide us some lessons as well. AsiaEngage is one of the successful stories of AUN’s agenda in promoting a regional coordinating mechanism for IID. AsiaEngage was officially launched in Malaysia on May 7, 2012. AsiaEngage serves as the regional community-industry engagement alliance for the Asia-Talloires Network of Industry and Community Engaged Universities, the AUN Thematic Network for University Social Responsibility and Sustainability and the ASEAN Youth Volunteer Programme. These networks aim to create mutually beneficial partnerships among the research, education and volunteerism missions of higher education with industry and community stakeholders across ASEAN and Asia. The secretariat for the AsiaEngage network is hosted by Universiti Kebangsaan Malaysia (or the National University of Malaysia) through its Office of Industry and Community Partnerships, and its core activities are supported by Malaysia’s Ministry of Higher Education as well as the Ministry of Youth and Sports. To date, AsiaEngage's
## Table 1: Roles and functions of intermediaries

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<th>Types</th>
<th>Terms</th>
<th>Roles and functions</th>
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| Organisation           | Intermediaries/intermediary firms or agencies/intermediary level bodies | • Support technology transfer to small firms  
                        |                                                                       | • Exploitation of technology  
                        |                                                                       | • Formulation of research policy  
                        |                                                                       | • Effect change within science networks and local collectives  
                        |                                                                       | • Adapt solutions available in the market to the needs of the individual user  
                        |                                                                       | • Transfer technology between hosts and users  
                        |                                                                       | • Orient the science system to socio-economic objectives  
                        | Brokers/knowledge brokers/technology brokers/knowledge intermediaries | • Facilitate the diffusion of new ideas from outside the system  
                        |                                                                       | • Help innovation by combining existing technologies in new ways  
                        |                                                                       | • Fill gaps in information and knowledge in industrial networks  
                        |                                                                       | • Facilitate a recipient’s measurement of the intangible value of knowledge received  
                        | Third Parties            |                                                                       | • Intervene in the adoption decisions of others  
                        | Consultants as bridge builders                                   | • Bridge  
                        |                                                                       | • Builders in the innovation process  
                        | Bricoleurs              |                                                                       | • Develop new applications for new technologies outside their initial development field  
                        | Superstructure organisations                                     | • Facilitate and coordinate the flow of information to substructure firms  
                        | Regional institutions                                          | • Provide “surrogate ties” by serving as functional substitutes for a firm’s lack of “bridging ties” in a network  
                        | Boundary organisations                                         | • A boundary organisations in technology transfer and “co-production” of technology  
| Process/activities      | Innovation consultancy services                                     | • Promote innovation; involve a variety of factors including consultancy firms and intermediary agencies  
                        | Technology brokering                                            | • Create new products by making connections between existing solutions in other sectors or technologies  
                        | Innovation bridging                                            | • Provide knowledge or services that are complementary to firms  
                        | Knowledge brokering                                             | • Facilitate the exchange of information about innovation amongst companies  

*Source: Extracted from Howells (2006)*
members have undertaken a number of community engagement projects. The key practices and principles drawn from these projects can be summarised as follows:

• Research must be considered as an integral part of engagement with communities, i.e., a research-driven community engagement;
• Academics apply their expertise, but are cognisant of the fact that they are not the sole custodians of knowledge and they work closely with communities to share and gain knowledge, i.e., principles of respect and knowledge exchange;
• Multi-sector partnerships which address and jointly solve problems faced by communities; and
• Develop community champions and build up confidence in the community for them to proceed and progress with jointly developed solutions. This approach will ensure the sustainability of the community project.

In short, the following features are needed for effective RCM of IID:

• Commitments by countries and the regional agendas should be aligned with the priorities of countries;
• Common understanding of issues and needs and funding commitments from countries are critical;
• Networks should be committed to doing research and communicating/advocating effectively best practices across countries, which should go down from national to local levels;
• Regular reporting of the country’s performance helps put pressure in the countries to perform better in driving inclusive development;
• S&T is detached from poverty alleviation efforts; and
• Dealing with issues/problems as a collective and articulate it as policy recommendations.

Figure 2: Role of regional coordination mechanism in inclusive development

Source: Authors

WIPO-WEF Inventor Assistance Program

The WIPO-World Economic Forum Inventor Assistance Program (WIPO-WEF IAP) is the first global programme of its kind. It matches developing country inventors and small businesses with limited financial means with patent attorneys, who provide pro bono legal assistance to secure patent protection.

For more information, access: http://www.wipo.int/iap/

References