

**DEVELOPMENT CO-OPERATION DIRECTORATE
DEVELOPMENT ASSISTANCE COMMITTEE**

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GROWING PROSPERITY: AGRICULTURE, ECONOMIC RENEWAL AND DEVELOPMENT

**Draft Outcome Document from the Experts Meeting on “Innovating Out of Poverty”
held 6-7 April 2009, OECD**

DAC Meeting, 22 September 2009

This document is submitted for DISCUSSION under Item 5 of the Draft Annotated Agenda [DCD/DAC/A(2009)11] of the 22 September 2009 DAC Meeting.

In particular, the Committee is invited to discuss whether the main messages mentioned in Paragraph 4 could be suggested for incorporation in the OECD Innovation Strategy.

This activity corresponds to the RWB Output 5.1.1.8 (as it was voted in the prioritisation exercise).

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INTRODUCTION

1. In 2007, at the Meeting of Council at Ministerial level (MCM), Participants called upon the OECD to develop an Innovation Strategy which could contribute to improving competitiveness and productivity performance, and thereby long-term growth and development. At the MCM of May 2009, an interim report¹ was submitted by the Directorate for Science, Technology, and Industry which co-ordinated the OECD-wide horizontal project. The final strategy is scheduled to be submitted to the MCM of 2010, possibly leading to a Declaration on Innovation. It is also envisioned to contribute to various international forums such as the G20, G8, European Union under the Spanish Presidency, and the Asia Pacific Economic Co-operation. With the economic crisis continuing to unfold globally, the development of this Innovation Strategy has taken on an even greater relevance and urgency. Specifically, the Strategy will be an important building block for the Green Growth Strategy, mandated by this year's MCM, as the former seeks to harness innovation to address different global challenges.

2. Needless to say, innovation is vital for social and economic development not only for OECD countries but for developing countries as well. While OECD countries and emerging economies have been able to build technological and innovation capacity, low income countries face greater difficulties in mobilising foreign direct investment, trade and human capital to make innovation the engine of development. Not only are there barriers such as poor framework conditions, limited human and social capital for producing, disseminating and using knowledge, but there is also a low capacity in policy making regarding innovation. Hence innovation is often a low priority for developing country governments and even for international donors. Poor countries therefore risk lagging further behind as OECD countries move to innovation-driven growth, increasing the wealth divide and diminishing the prospect of achieving the Millennium Development Goals. In fact, innovation is now more important than ever as it could be one of the keys for these countries to accelerate recovery from the economic crisis and drive sustainable growth.

3. The Development Assistance Committee (DAC) agreed to carry out horizontal work such as innovation under the Programme of Work and Budget 2009-2010² under Output 5.1.1.8, although outputs are not specified in the current plan nor were they budgeted. Furthermore, the In-Depth Evaluation of the DAC and the Reflection Exercise strongly recommends the DAC to carry out horizontal work with other policy communities. Therefore, with the help of a voluntary contribution, an experts meeting on "Innovating out of Poverty" was organised on 6-7 April 2009, in order to generate policy messages that could be incorporated in the OECD Innovation Strategy, thereby ensuring the inclusion of a development perspective. In the meeting, there was substantial focus on agriculture due to the vital contribution of the sector to pro-poor growth and the stark reality that 75% of the world's poor live in rural areas. Therefore, the meeting also contributed simultaneously to the other horizontal project on Food, Agriculture and Development, which was mandated by the MCM of 2008, in response to the food crisis that year.

4. This document presents the outcome of the experts meeting, which includes key issues, preface, and a chair's summary. However, the main messages for the DAC are summarised as the following:

- Donors could encourage and support poor countries to foster policies for innovation that would facilitate entrepreneurs to experiment, invest, and expand creative economic activities. In poor countries, as entrepreneurship is undersupplied, special support is economically justified and essential.

¹ See SG/INNOV(2009)2/REV1

² See Output Result No. 511008 in Table 1 of Page 3 of DCD/DAC(2008)31/FINAL.

- In particular, donors could support poor countries to transform agriculture into a knowledge-intensive modern sector through a comprehensive approach where agricultural productivity, entrepreneurship, and value addition become drivers of poverty reduction. It entails linking research, training, production, processing, packaging, safety standards, infrastructure, distribution systems, marketing, and exports in value chains. This requires multi-sectoral and regional processes of interaction among various ministries, research communities, business, the financial sector, civil society, and farmers.

5. As a note, agriculture and other areas such as health also offer opportunities for looking at innovation from a funding perspective. Although the DAC has not yet formally endorsed a specific work plan regarding innovative financing for development, the Action Plan endorsed in May 2009 by the DAC members includes a commitment to strengthen the monitoring and benchmarking of all sources of funding including innovative finance³. Furthermore, there are ongoing discussions around innovative financing for development in the health sector which are being monitored with regards to the aid effectiveness principles⁴. A separate document will be prepared at a later date that would include possible policy messages for DAC consideration in contributing to the Innovation Strategy.

6. The Committee is invited to comment on this document and discuss whether the above main messages in Paragraph 4 should be incorporated into the Innovation Strategy.

³ Paragraph 6 in <http://www.oecd.org/dataoecd/5/49/42867232.pdf>

⁴ See www.oecd.org/dac/effectiveness/health

KEY ISSUES

The current global economic crisis and rising food prices are forcing the international community to review their outlook for human welfare and prosperity. Much of the current concern on how to foster development and prosperity in developing countries reflects the consequences of recent neglect of agriculture and infrastructure as drivers of development. In fact, agriculture has through the ages served as the driving force behind national development. Furthermore, it has been historical practice to use returns from investment in agriculture to stimulate industrial development. Restoring it to its right place in the development process will require world leaders to take a number of bold steps.

Science and innovation have always been the key forces behind agricultural growth in particular and economic transformation in general. More specifically, the ability to add value to agricultural production via the application of scientific knowledge to entrepreneurial activities stands out as one of the most important lessons of economic history. If agriculture is to become a dynamic, innovative and rewarding sector in developing countries, world leaders will need to launch new initiatives that include the following strategic elements:

- **Bold leadership driven by heads of state** in developing countries, supported by those of developed and emerging economies, is needed so that the real value of agriculture in the economy of developing countries is recognised. Specifically, high-level leadership is essential to establish national visions for agriculture and rural development, champion specific missions for lifting productivity and nutritional levels with quantifiable targets, and engage various ministries in what is a multi-sectoral process. It is also important to recognise that in many poor countries, women are the main producers of food and providers for the household, while having limited access to land, credit and knowledge. At the same time, there is ample evidence of the large potential for women's ability to adopt new farming techniques, increase productivity, and develop new products and markets.
- **Agriculture needs to be recognised as a knowledge-intensive productive sector** that is mainly carried out in the informal private economy, largely consisting of small-scale entrepreneurs and individual farmers. As capacity building of human assets is essential to innovation, innovation in the agricultural system will require creating close interactions among government, academia, business and civil society. In other words, reforms will need to be introduced in knowledge-based institutions to integrate research, schooling, university teaching, farmers' extension and professional training, thereby involving them directly with the development and commercialisation of products.
- **Policies have to urgently address affordable access to communication services for people to use in their everyday lives, as well as broadband Internet connectivity for centres of learning such as universities and technical colleges.** This is vital to access knowledge which also triggers local innovations, boosting rural development beyond agriculture. It is an investment with high returns. Policy intervention to create good land information systems covering ownership would also boost investment in agriculture.
- **Improving rural productivity also requires significant investments in basic infrastructure,** including facilities such as transportation, rural energy and irrigation. There will be little progress without such foundational investments.
- **Creating entrepreneurship and facilitating private sector development** has to be highest on the agenda to promote the autonomy and support needed to translate opportunity into prosperity. This has to be seen as an investment in itself, with carefully tailored incentives for both men and women as well as risk-sharing approaches supported by government.

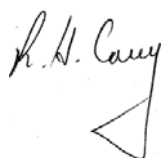
PREFACE

Agricultural productivity, entrepreneurship and value addition are all potential drivers of poverty reduction in rural-based economies. In many poor countries, however, farmers—particularly women—, small and medium-sized enterprises and research centres do not interact in ways that accelerate the move beyond low value added subsistence agriculture. Consequently, it is important to strengthen rural innovation systems, develop effective clusters that can add value to unprocessed raw materials, and promote value chains across diverse sectors related to food such as horticulture, processing, packaging, storage, transportation, safety, distribution systems and exports. These steps are all central to moving beyond subsistence agriculture, generating growth and moving towards prosperity.

Developed and emerging economies can do much more to identify and support policies and programmes that can assist developing countries to break out of poverty by taking a comprehensive approach to agricultural development. This requires rethinking the agenda in terms of innovation systems to foster interactions among government, industry, academia and civil society – all of whom are critical actors.

The Organisation for Economic Co-operation and Development (OECD) held a one and a half day experts meeting on “Innovating Out of Poverty” (6–7 April 2009) to gather state-of-the-art knowledge on innovation systems. Nearly 20 experts from academia, government, industry, civil society – from both developed and developing countries – as well as international organisations participated in a brainstorming meeting which was chaired by Calestous Juma, Professor of the Practice of International Development at Harvard Kennedy School and Director of its Science, Technology and Globalisation Project.

The meeting was guided by the view that innovation is the engine of social and economic development, in both developed and developing countries. There is a particular need to get innovation onto the development agenda and process, as well as to promote co-operation between developed and developing countries to achieve this. The outputs of the meeting will contribute to the Horizontal Project on Food, Agriculture and Development as well as to the OECD Strategy on Innovation, both for submission to the OECD Meeting of the Council at Ministerial Level in June 2009.



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CHAIR'S SUMMARY

Calestous Juma

Professor of the Practice of International Development

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1. Seeding new growth

1.1 We are entering a new age where our knowledge of global productive systems requires us to think and act in a more holistic way. Dealing with the challenges of sustainability demands greater imagination, creativity, and innovation than we thought was necessary. Once again, humanity is challenged to bring its best talents to the task of renewing agriculture as a foundation for regional economic development, particularly in Africa. The prospects of building a modern agriculture that is knowledge-intensive and rewarding are real. The current global economic crisis, rising food prices, and the general uncertainty over global ecological degradation generate new opportunities and imperatives to adapt agriculture in developing countries that is both more productive and more sustainable.

1.2 The good news is that the global community has over the centuries amassed extensive knowledge and experience in the field of agricultural development. We live in an age of technological abundance. Scientific and technical knowledge now accumulates at an astounding rate. In addition, our capacity to collect, store, and transmit knowledge has considerably expanded through the use of new technologies. As a result, many of the practices that had previously been a part of traditional knowledge can now be harnessed and put to the service of agricultural development. Moreover, local knowledge can now be applied globally because of advances in information and communication technologies.

1.3 The world is now one, both technologically and ecologically. We can also think globally and act globally in every locality. But to do this requires our political leaders to muster the courage to put agriculture in developing countries at the centre of our efforts to renew growth and promote prosperity. They must abandon the view that agriculture is a transient phase on the linear road to the post-industrial age. A focus on agriculture as the foundation for new prosperity is not a return to the past, but a new step forward in our socio-economic evolution. They must also recognise the gender dimensions of agriculture, in that in many poor countries, women are the main producers of food and providers for the household, while having limited access to land, credit and knowledge, which hamper their ability to adopt new farming techniques and to increase productivity. The demands of the new agriculture require executive leadership to align the wide range of actors needed to achieve specific economic and societal goals.

1.4 In other words, modern agriculture in developing countries can no longer thrive without the express guidance and direction of heads of state or government from both developing countries and developed or emerging economies. The success of ministries of agriculture will depend largely on the extent to which they can secure the executive support needed to implement long-term efforts to put agriculture at the centre of economic renewal and development. Ministers of agriculture around the world must take bold measures to advance their cause as a joined-up, cross-economy effort. They must harness the urgency of the food and agriculture agenda with the political force of their sovereign leaders in order to promote coherent policies and action in the national, regional and global arenas.

1.5 Thus it is not just ministers of agriculture who need to take bold action. Successful agriculture means that developing countries need to establish agricultural universities to train farmers, especially women, and improve the quality of agricultural research to solve local problems. It also means developing roads, ports, and fibre optic infrastructure to support rural development and access to markets, which are necessary for promoting entrepreneurship and fostering a spirit of innovation. Since each of these activities typically falls under the domain of a different ministry, co-ordinating them requires vision and leadership on the part of developing country leaders and the developed or emerging economies who work with them. As things are now, tangible support to this holistic approach is not always evident.

2. Harvesting technological opportunities

2.1 The most daring initiative to address hunger was the Green Revolution. This initiative enabled countries in Latin America and Asia to overcome chronic food shortages by focusing on agricultural productivity.

2.2 There were two important pointers from the Green Revolution. The first was that efforts must be focused on harnessing existing scientific knowledge and technological opportunities to address food security. The second was the creation of a new generation of agricultural research institutions whose focus was to adapt existing varieties to new terrains. With these research institutions came a wide range of innovations in property rights, dissemination of seed, access to inputs, creation of markets and the development of new businesses.

2.3 Today, the global community has more access to scientific and technical knowledge than it did in the 1960s. Advances in fields such as information and communication technology, genetics and ecology, as well as global connectivity have put powerful agricultural tools in the hands of the global community. For example, advances in genetics have made new tools available to local farmers that enable them to adapt crops to local conditions, respond to environmental stresses such as drought, and reduce the use of polluting agricultural chemicals.

2.4 The emergence of new digital banking is replacing conventional currencies and transforming rural business practices, especially for women. Farmers around the world are now using mobile telephony to exchange market information, transfer money, and organise their operations in ways that were not possible only a few years ago. Kenya's Safaricom Ltd., for example, was among the first companies in the world to introduce a service that enables the transfer of money through a mobile phone. The M-PESA service is available to all Safaricom subscribers even if they do not have a bank account. Its advent has transformed banking and created new employment opportunities for agents. It has also made these transactions more secure and affordable as well as simplified money transfers to rural areas that were previously excluded from financial services.

2.5 Geographically-referenced information such as the Global Positioning System (GPS) is also helping to provide precise information on location and thereby transforming agricultural logistics. Although many of these technologies have been developed outside the farming sector, they can now be harnessed to facilitate agricultural innovation. For example, digitisation of data is transforming property rights and making it easier for farmers to access credit, especially women. The digitalisation of over 20 million land records under the Bhoomi Project in India's State of Karnataka helped improve the availability of information on land rights and land use practices, disaggregated by gender. Not only has this lowered the costs of accessing records, but has also become a platform for further innovation, such as creating demand for the establishment of data access kiosks. Bankers are also now able to provide crop loans much faster. Land disputes are declining, which in turn is encouraging farmers to invest in their land without fear. Land markets are also growing at a faster rate. Emboldened by the success of the project, the government of India has launched the National Land Records Modernisation Programme (NLRMP) to cover the entire nation.

2.6 The ability of the agriculture sector to harness the power of emerging technologies will also depend in part on the existence of foundational infrastructure in rural areas. Infrastructure can be defined as the facilities, structures, and associated equipment and services designed to facilitate the flow of goods, services, and ideas. Poor infrastructure is a critical barrier to accelerating economic renewal and prosperity. For example, farmers cannot acquire inputs or sell their outputs without efficient transportation facilities. But more importantly, infrastructure facilities are also the centres for the diffusion of technical skills in society.

2.7 The construction of infrastructure facilities have the potential to become “schools” where most basic technical skills that are taught in the classroom are strengthened in the form of on-the-job training. For example, countries such as South Korea, Malaysia, Egypt, Ghana, and Kenya have created universities that are directly connected to the telecommunications ministry which seek to train students in skills that are directly relevant to the telecoms sector.

2.8 The need to expand infrastructure as a foundation for agriculture and prosperity is so great that it will require concerted efforts beyond standard private sector investments. It has to be treated as a matter of urgency. Creative approaches which include the use of existing resources, including those of the military for road construction, for example, need to be used to refocus attention on expanding critical rural infrastructure.

3. Learning to grow

3.1 Agriculture is by definition a networked activity that involves a complex web of actors forming clusters of creativity. Therefore, agricultural innovation is a product of interactions between actors from a wide range of fields related to food including agronomy, processing, packaging, safety, standards, metrology, and export development. For innovation to occur, the interactions need to be open, drawing on the best available knowledge. Defining agriculture as a knowledge-based activity requires a repositioning of learning institutions such as universities and research institutes. Most importantly, critical functions such as research, teaching, extension and commercialisation need to be much more closely integrated. This includes the need to take gender dimensions into perspective as often women are the ones who produce the raw materials and carry out processing.

3.2 The Brazilian Agricultural Research Corporation (EMBRAPA) represents a recent institutional innovation that has played a pivotal role in transforming Brazilian agriculture. This example and lessons learned should be considered in developing knowledge systems in developing countries. Taking a regional approach is also more likely to reflect the growing interest among developing countries in promoting integrated approaches to economic development.

3.3 But such agricultural agencies will need to forge close collaboration with local universities and research institutes charged with promoting rural development. Ministries of agriculture need to work closely with agricultural enterprises and farmers to create a new generation of universities that combine research, teaching and commercialisation of products. Some of the existing research institutes could be transformed into such universities along the lines of the emerging telecoms universities. In particular, these institutions should open their doors through “open classrooms” to especially female farmers and entrepreneurs who otherwise might be inhibited.

3.4 America’s land-grant colleges have been pioneers in fostering agricultural growth by combining research, education and extension services. This model is being reinvented around the world to address analogous challenges. One of the most striking examples is in the curriculum reform of the EARTH University in Costa Rica, created through a USD 100 million endowment provided by the United States Agency for International Development and the Kellogg Foundation. Its curriculum is designed to match the

realities of agribusiness. The university dedicates itself to producing a new generation of agents of change who focus on creating enterprises rather than seeking jobs.

3.5 Elements of this approach already exist in some African universities. For example, Kenya's Jomo Kenyatta University of Agriculture and Technology—built with the support of Japan International Co-operation Agency—works closely with farming communities. Furthermore, variants of the new model are in operation at the African Rural University for Women in Uganda—the first rural university devoted to training women—and the University of Development Studies in Ghana.

3.6 These models show how to focus agricultural training as a way to improve practical farming activities. Ministries of agriculture and farming enterprises in developing countries should be encouraged to create entrepreneurial universities, polytechnics and high schools that address agricultural challenges. Such colleges could link up with counterparts in developed or emerging economies as well as institutions providing venture capital in order to serve as incubators of rural enterprises. Establishing such colleges will require reforming the curriculum, improving pedagogy, and granting greater management autonomy. They should be guided by the curiosity, creativity, and risk-taking inclination of farmers.

4. Sprouting new businesses

4.1 Economic change entails the transformation of knowledge into goods and services through business enterprises. In this respect, creating links between knowledge and business development is the most important challenge facing agricultural renewal in developing countries.

4.2 One critical starting point is “knowledge prospecting” which involves identifying existing technologies and using them to create new businesses. The Chile Foundation, for example, stands out as an example of a “knowledge prospecting” agency that has played an inspirational role in economic diversification in Chile.

4.3 Many regions of the developing world have so far been too isolated to benefit from the global stock of technical knowledge. Countries in these regions, particularly in Africa, need to make a concerted effort to mobilise the diaspora, which can serve as a link to existing know-how and to global markets, train local workers to perform new tasks, and organise the process of developing and marketing more knowledge intensive, higher value-added agricultural products.

4.4 Advances in communication technologies and the advent of lower-cost high-speed Internet will also reduce this isolation dramatically. The laying of new fibre optic cables along the coasts of Africa as well as the potential use of lower-latency satellite technology can significantly reduce the price of international connectivity which will enable African universities and research institutions to play new roles in rural development. The further development of Internet Exchange Points (IXPs) in those African countries where they do not exist also has an important role to play. IXPs enable Internet traffic to be exchanged locally, rather than transversing networks located outside the continent, thereby improving the experience of users and lowering the cost to provide the service.

4.5 Much is already known on how to support business development. The available policy tools include direct financing via matching grants, taxation policies, government or public procurement policies, and rewards to recognise creativity and innovation. For example, China's mission-oriented “Spark Programme”, created to popularise modern technology in rural areas, had spread to more than 90 percent of the country's counties by 2005. The programme helped to improve the capability of young rural people by upgrading their technological skills, creating a nation-wide network for distance learning and encouraging rural enterprises to become internationally competitive. The programme was sponsored by the Ministry of Science and Technology.

4.6 But none of these measures will succeed in the absence of consistent and long-term policy guidance on the one hand and autonomy of action on the part of farmers and entrepreneurs on the other hand. The latter is particularly critical because a large part of economic growth entails experimentation and learning. None of these can take place unless farmers and associated entrepreneurs have sufficient freedom to act. In other words, development has to be viewed as an expression of human potentialities and not a product of external interventions.

4.7 As the emergence of a vertically integrated silk industry in Rwanda suggests, one motivated foreign entrepreneur and investor supported by the President can improve the financial well-being of hundreds, if not thousands of subsistence farmers instead of displacing them from rural areas to urban slums. This example also illustrates that entrepreneurs are more likely to excel if they feel that they are trusted and are given the autonomy or ownership needed to experiment and take risks. Ownership and risk taking are in fact two elements that need to be emphasised much more in the support by developed and emerging economies.

CREATING A SILK INDUSTRY IN RWANDA

Raj Rajendran, a textile engineer and entrepreneur, was sent to Rwanda in 1999 to close down a cotton textile factory that was rendered unviable by the events during the civil war. However, he soon realised that Rwanda's volcanic soil and climatic conditions were similar to those of southern India where sericulture was a major industry. Raj also had an occasion to meet President Paul Kagame, who gave his blessing to experiment with silk production in Rwanda. Raj therefore planted mulberry cuttings brought from India and received co-operation from a Korean expert from the Food and Agriculture Organisation who brought silk worm eggs from Korea. After experimentation, the worms grew into quality cocoons by eating the Rwandan mulberry leaves. Furthermore, they discovered that while cocoon production can only have 2-5 cycles in Asia, those in Rwanda could have 8-10 cycles a year due to the fertile soil and abundant rainfall.

Around that time (2003-04), the Ministry of Defense was searching for alternative employment for demobilised soldiers. Raj therefore proposed to provide employment for the ex-soldiers in sericulture. The Ministry of Defense considered this proposal and informed the President about its viability. The President immediately tasked the Ministries of Agriculture and Defense to expand sericulture in the country by including it as a priority in Rwanda's Vision 2020.

Raj converted an old refrigerator into an incubator to hatch silk worm eggs, imported second-hand machinery from India, and started reeling Rwanda's first silk yarn. He sent Rwandans to India for training and engaged local engineers to design and produce handlooms at local vocational centres. The Ministries of Agriculture and Defense jointly promoted sericulture farms and supported training and formation of co-operatives involving the local population. As a result, the produced silk materials, tested in Bangalore and Lyon, were rated as high quality. Indian experts were then hired to train locals for product development such as ties, scarves and traditional Rwandan attires using vegetable dyes.

The silk products are now ready to be exported to the African region and possibly to the US and Canada, with their own brand name 'Silk Hills', proudly emblazoned with a "Made in Rwanda" label. Raj's company has also become the largest private employer in Rwanda. He is working towards creating approximately 150 000 jobs in the silk industry in parallel with the Rwandan governments' programme of 10 000 hectares of mulberry cultivation. Raj was also able to revive the production of cotton-based textiles using cotton grown in the region, enabling his company to supply products such as bags to Macys and Starbucks. The company has also supplied promotional products for the Obama campaign and the inauguration ceremony. Raj is now working on banana stem and pineapple leaf-based textiles to make use of the abundant resources that are being wasted in Rwanda and elsewhere. As a result of these innovative ideas and support from leaders and government, Raj's company expects revenues to eventually reach the order of USD 250 million per year through exports in the next 5 years, making the company's slogan "Weaving Dreams into Prosperity" become a reality in Rwanda.

5. Plowing new ground

Entrepreneurial leadership in developing countries

5.1 It is not enough for governments to simply reduce the cost of doing business. Fostering agricultural renewal will require them to function as active facilitators of technological learning. Government actions will need to reflect the entrepreneurial character of the farming community; they too will need to be entrepreneurial. Moreover, addressing the challenge will require governments to adopt a mission-oriented approach by setting key targets and providing support to farmers who could meet quantifiable targets that they can achieve. This mission-oriented approach will require greater reliance on executive co-ordination of diverse departmental activities.

5.2 Fostering economic renewal and prosperity in developing countries will entail adjustments in the structure and functions of government. More fundamentally, issues related to agricultural innovation must be addressed in an integrated way at the highest possible levels in government. There is therefore a need to strengthen the capacity of presidential offices to integrate science, technology, and innovation in all agriculture-related aspects of government. Moreover, such offices will also need to play a greater role in fostering interactions between government, business, academia, and civil society. This task requires champions.

5.3 One of the key aspects of executive direction is the extent to which leaders are informed about the role of science and innovation in agricultural development. Systematic advice on science and innovation must be included routinely in policy-making. Such advisory activities must have access to credible technical information drawing from diverse sources including scientific and engineering academies. In fact, the magnitude of the challenge for regions like Africa is so great that a case could be made for new academies dedicated to agricultural science, technology and innovation.

5.4 Science and technology diplomacy is also a critical aspect of international relations. Therefore, foreign affair ministries of developing countries have a responsibility to promote international technology co-operation particularly by forging strategic alliances on issues related to agriculture. To effectively carry out this task, foreign ministries also need to strengthen their internal capability in science and innovation.

New roles for developed and emerging economies

5.5 We have examples which show that, with the appropriate policy space, developing countries can provide creative leadership on critical challenges. For example, Malawi's dramatic achievements in food security can largely be attributed to bold executive actions. Developed and emerging economies should therefore identify and work closely with leaders of these developing countries who demonstrate such leadership. This leadership and the associated institutional innovations may be more important than large financial flows. In fact, these are essential companions for effective scaling up of financial assistance.

5.6 Developed and emerging economies are also major repositories of scientific knowledge and lessons of relevance to developing countries. Their most important contributions might lie in their ability to help create new institutional arrangements that support application of existing scientific and technological knowledge in promoting agriculture in developing countries. They would need to do so as part of new and bold institutional innovations aimed at restoring the standing of agriculture as a leading driver of economic transformation and prosperity.

5.7 Along with support in terms of developing infrastructure and the supply of communication technology, the capacities of developed and emerging economies in serving as honest brokers in linking technical knowledge to funding sources has also become one of the most urgent roles they can play in developing countries. Such brokerage must be done at a scale that can make a difference. In particular, international co-operation can help create agricultural innovation systems in developing countries by supporting local efforts to: improve the quality and relevance of agricultural research; establish new agricultural universities; focus the work of agricultural universities and national or international research institutes on problems that are relevant to the needs of male and female farmers, food processors, and value added exporters; and promote rural entrepreneurship and innovation.

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