UKCDS Making science work for development

Five trends driving change in research for development

UKCDS has identified five key trends that will drive the research for development landscape over the coming decade, based on interviews and research.

Responding to these trends will require new research agendas, cultures and capacities to enable all countries to respond to their sustainable development challenges.

 House of flags - Karen Roe/London 2012

1. A new global development landscape

2015 was a landmark year for action on global development with international agreements on disaster risk reduction, sustainable development, climate change and development finance (Box 1). Research and innovation is embedded within these ambitious agendas as a prerequisite for characterising the challenges, developing solutions and for evaluating progress towards targets.[5]

The four agreements signed in 2015 are indicative of the growing number and diversity of international development initiatives which have, at their core, a need for research and research capacity to address challenges in low- and middle-income countries (LMICs). This is an opportunity to drive new research approaches, particularly to achieve join-up of the environmental and development agendas and develop localised solutions. However, moving from ambition to action will require an understanding of where targeted research can be transformative in enabling the delivery of the Sustainable Development Goals.

Key challenges:

- Production and analysis of high quality disaggregated data to enable measurement of progress and support decision-making.
- Identifying synergies and trade-offs between the 17 Sustainable Development Goals (SDGs).[6]
- Supporting countries to prioritise and interpret goals in different contexts.
- Ensuring join-up of science and technology mechanisms between the international agreements.

Box 1: International agreements

In 2015, four major international agreements were signed: Transforming our world: the 2030 Agenda for Sustainable Development;[1] the Addis Ababa Agreement on Finance for Development;[2] the Sendai Framework for Disaster Risk Reduction,[3] and the Paris Agreement on Climate Change.[4] A further global conference, Habitat III, reviewed the global urban agenda in October 2016.

The four agreements share a common framing focused on aspirational targets, their universal applicability to all countries, and voluntary, non-binding commitments. There is a recognition of differentiated action '*taking into account different national realities, capacities and levels of development and respecting national policies and priorities.*'[1]

All of the agreements emphasise the role of research, technology, innovation and capacity building within their implementation. Mechanisms include the Technology Facilitation Mechanism established under the Addis Ababa agreement and the Climate Technology Centre and Network and Technology Mechanism within the Paris Agreement.

2. Uneven, but rising, commitment to research and innovation

The gap between high-income and LMIC countries in research investments and outputs is narrowing, but this hides uneven distribution between and within countries. In Africa, the levels of GDP invested in research & development ranges from 0.01% in Lesotho to 1.06% in Malawi.[11] In Brazil, 40% of R&D investment is spent in the São Paulo region alone.[12] The number of researchers in LMICs rose by 800 million from 2007-13, although half of this was within China.[11] The number of research papers with at least one African author grew by 60% from 2008-2014, whilst Asia nearly doubled its publication output.[7]

Responding to this, LMICs are increasing their R&D spending commitments at national and regional levels, with an emphasis on research excellence and capacity strengthening in-country (Box 2). This commitment is based on an analysis that the knowledge economy is critical for economic and social development and vital for ownership of development.[13]

Box 2: Investments in research

- SDG article 9.5 commits countries to '*substantially increasing the number of research and development workers per 1 million people and public and private research and development spending*'; although no specific level was set.
- **Science, Technology & Innovation Strategy for Africa (STISA-2024)** is a continental framework for '*accelerating Africa's transition to an innovation-led, knowledge-based economy*' with a goal for each country to commit 1% of their GDP towards R&D.[13]
- Africa currently has only 169 researchers per million inhabitants, compared with 710 in Brazil and 1071 in China.[7] Investment in tertiary education and PhDs is seen as vital. This is leading to new initiatives in Africa,[8] the UK[9] and by the World Bank.[10]

These trends are leading to a few new global research powerhouses which, combined with increasing investment and political commitment towards research in LMICs and internationalisation globally, is predicted to be a driver towards more varied North-South and South-South research collaborations. Increased competition amongst countries to be 'preferred research partners' could act as a positive driver towards equal research partnerships around topics of mutual interest, with the location of gravity for decisions about research topics and research management moving to the 'South'.

Key challenges:

- Greater understanding of the role of science, technology and innovation in economic transitions in different contexts to support the optimum outcomes for new R&D investments.
- Ensuring that the poorest countries with insufficient critical mass of researchers and research infrastructure do not get 'left behind'.
- Identifying areas of mutual interest to build equitable research partnerships.
- Supporting capacity to modify and apply existing research to local contexts.

3. Fragmented and rapidly changing development landscape

Varied dynamics including rapid economic growth, rising inequality and increasing fragility, due to climate shocks, a downturn in the commodity 'super-cycle' and conflict, in different countries is leading to fragmentation in the development landscape. Countries affected by conflict and fragility have poverty rates that are double the average,[17] whilst a global refugee crisis saw 65.3 million people displaced at the end of 2015, the highest level ever recorded.[18] Simultaneously, middle-income countries such as India, China and Nigeria, where the majority of the world's poor still live, increasingly face issues normally associated with developed nations around inequality, obesity, air pollution, traffic safety and mental health. Worldwide food security, pressures on resources, adaptation to climate change, urbanisation and clean energy are collective challenges (Box 3).[19]

Box 3: International development trends

1. **Demographic shifts:** developing countries face both a youth bulge, with high unemployment and poor educational access, and ageing populations with low levels of pension provision.
2. **Urbanisation:** by 2050, urban dwellers are projected to make up 62% of Africa's population and 65% in Asia, although the distribution across countries is predicted to be uneven.[14]
3. **Climate change:** adaptation efforts could cost LMICs US$70-100 billion a year,[15] whilst Brazil, India, Indonesia, China and South Africa are predicted to contribute 44% of greenhouse gas emissions increases by 2050.[16]

This diversity in the development landscape requires varied research agendas that respond to the needs and priorities of different countries and regions. It could also lead to tensions, particularly between climate mitigation and poverty alleviation efforts, if there is no increase in funding.

Key challenges:

- Understanding what works and doesn't work in humanitarian and health emergencies, fragile states and in protracted crises including methodologies and ethical processes for research under these circumstances.
- A greater focus on inequality and intersecting disadvantages such as gender, sexuality and disability.
- Shared but differentiated agendas with rising economies that support sustainable development pathways on and between topics such as agriculture, energy, cities, health and wellbeing, consumption and environmental change.

4. **Natural resource scarcity:** resource pressures could arise due to other trends such as population increases, urbanisation, rising wealth, climate change and innovation. There is huge uncertainty on the likely trajectory and impacts and how much innovation will limit scarcities.[15]
5. **Poverty and inequality:** economic growth has helped lift hundreds of millions of people from poverty. Remaining pockets of extreme poverty are predicted to be in fragile, mainly low-income and African states.[20] Inequality is likely to be a major issue which *'might gradually displace poverty eradication as the overall goal of 'development''.*[21]
6. **Conflict:** migration and humanitarian crisis: By 2030, 75% of the world's poor could be living in fragile states with protracted crises becoming the new normal.[22]

4. Transformative innovation

The number of internet users has tripled, from 1 billion in 2005 to an estimated 3.2 billion in 2015. Of the poorest households, 70% have a mobile phone.[24] In areas, such as mobile financial services, a number of African countries are global leaders. Automation and robotics could radically alter jobs and livelihoods.[25] Digital technology and big data are predicted to transform everything from governance, to finance and energy management. Open science, citizen science and online learning such as Massive Open Online Courses (MOOCs) could disrupt access to, and the production of knowledge, in transformative ways.

Promising new technologies and social innovations will drive research investments to further develop ideas and to explore their impact on society. However, the hype around new innovations will not always transform into reality (Box 4, Case Study 1). It will be necessary to keep the focus on development needs, to predict the right ideas to back, to build a better understanding of implementation processes and to scale innovations that do work '*instead of obsessing with the newest and latest technologies*'. There is also a need to ensure that research is 'future-proofed'; conducted in a way that can respond rapidly to changing dynamics and with a broad awareness of research and innovations across fields and sectors (Box 4, Case Study 2).

Key challenges:

- Replicating and scaling successful projects including a greater focus on implementation research.
- Enabling universal access to research and new innovations.
- Developing adaptive research approaches that can respond to rapidly changing dynamics.

Box 4

Case study 1: Digital technology

The World Bank's Digital Dividends Report highlights both the opportunities and risks of new innovations.[24] In Kenya, the cost of sending remittances dropped by up to 90 % after the introduction of M-Pesa, a digital payment system. However, nearly 6 billion people globally do not have access to high-speed internet. Digital technologies generally demand higher skills and can replace low-skilled jobs, polarising labour markets and exacerbating inequality.

The report highlights that the wider 'analog' environment, beyond internet access, is essential for spreading the benefits of technology. This includes ensuring people have the skills and knowledge to take advantage of digital technologies, good governance mechanisms to ensure accountability to citizens and regulations that prevent monopolies forming.

Case Study 2: Malaria, climate change and bed nets

Modelling studies on malaria highlight the importance of incorporating new innovations into future predictions. Initial projections of the impact of rising temperatures on malaria suggested that its range would spread and that it would become more deadly. However, these models had not taken into account the spread of medical interventions. Recent work by the Malaria Atlas Project (MAP) concluded that interventions such as insecticide-treated bed nets or modern anti-malarial drugs would vastly outweigh the effects of climate change, as much as tenfold.[23]

5. Wicked problems' and interdisciplinary research

Few research for development topics are entirely new. The challenges that remain are intractable, difficult to tackle 'wicked' problems.[27] This is driving research towards interdisciplinary and co-creation approaches in an attempt to ensure that social, environmental and economic dimensions are aligned and that research embeds complexity (Box 5). Simultaneously there is an increasing focus on impact and research metrics within academia in both the Global North and South. The culture of results is viewed as a strong driver towards demonstrating tangible outcomes with benefits for development, but it can also create short-termism and risk aversion in research and innovation. Traditional research metrics can drive 'research excellence' but also deter complex, interdisciplinary or locally-grounded research that is relevant to policymakers, businesses and local communities. Developing cultures and incentive systems that balance excellence, impact and the space for risky, long-term or difficult to attribute research is vital.

Box 5: The need for interdisciplinary research: Ebola case study

The response to the Ebola crisis in West Africa highlights the need for interdisciplinary approaches to tackle complex challenges. Initial public health responses to the Ebola crisis faltered, often for social and cultural reasons. The Ebola Response Anthropology Platform (ERAP) enabled experts with extensive experience in the region to provide advice and support to workers on the ground, particularly around burial practices.[26] Knowledge and practice in community engagement and safe burials alongside robust laboratory support (including genetic sequencing) were all necessary to control Ebola in West Africa.

Key challenges:

- Understanding how to foster genuine interdisciplinary research, especially across the natural and social sciences.
- Identifying research challenges with large areas of unmet need for public research investment that won't be supported by other investors.
- Providing overviews of mixed discipline research at policy-relevant timescales.

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