New Approaches for Funding Research and Innovation in Africa

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Structure of the Presentation

- The case for new approaches for funding research and innovation
- Problem statement and research questions
- New approaches in conceptual context
- Historical and contemporary context
- Research methodology
- Findings
- Key messages
- Recommendations
Why new approaches?

• Societal development has many definitions (Chambers, 1997; Hettne, 2009; Cowen and Shelton, 1996)

• Or … development as a system-wide manifestation of the way that people, firms, technologies and institutions interact with each other within the economic, social and political system (Barder, 2012).

• Research and innovation are a key driver of economic growth, sustainable development and societal prosperity (Oyeyinka et al, 2018; Chataway et al., 2009; NACETEM, 2010; NEPAD, 2006)
Why new approaches?

- African countries have many economic development challenges and opportunities to deal with (Agenda 2063)
- New knowledge and innovations seen as key drivers in these
- These drivers need resources
- Different ways of funding have been deployed, but some shortcomings remain, with respect to, *inter alia*
  - **Consistency** of the funding
  - **Sufficiency** of the funding
  - **Relevance** of the funding
- Affecting **impact** of the funding and actions funded
Why new approaches?

- Persistent funding shortcomings part of larger *global, national and sectoral structural and operational realities*

- Aim of this paper is to identify and analyse “new approaches, mechanisms, schemes or models for funding research and innovation in Africa”

- **Funding** – the actual money provided for a purpose, usually with no expectation to repay; while **financing** is money or capital provided, with a repayment expectation

- **Funding approaches** – broadly to denote the different ways, models, schemes, mechanisms or institutional arrangements to deal with funding challenges

- **Newness** necessary, but not sufficient

- We also explored **effectiveness** of the research and innovation funding approaches with respect to mutually reinforcing and complementary multiple impacts on the R&I value chain
Conceptual context - research and innovation

• **Research** - the robust knowledge generation activities using the scientific method carried out in universities, research institutions as well as the private and public sector.

• **Innovation** as the introduction of new or significantly improved products (goods or services), processes, organizational methods, and marketing methods in internal business practices or in the open marketplace.

• Innovation as any **combination of activities or technologies** that breaks existing performance trade-offs in the attainment of an outcome, in a manner that expands the realm of the possible (Raynor, 2013).
Disruptive and Incremental Innovation

- "Incremental innovation fits well with the current business model of a firm. It generates competitive advantage and contributes to the economy through more efficient use of resources, or elimination of wasteful or environmentally damaging practices. It is likely to have a pre-existing regulatory framework in place, will not lead to sectoral transformations and is unlikely to lead to stakeholder or citizen concerns or opposition" (Tait et al, 2017)

- "Disruptive innovation involves discontinuities in innovation pathways, requires new areas of research and development, creation of new modes of production and new markets. It can lead to sectoral transformations and the displacement of incumbent companies, and the creation of entirely new sectors with significant societal and economic benefits. There may be no obvious regulatory precedent to govern potential human and environmental safety issues, in some cases it may lead to citizen and stakeholder concerns from an early stage of development. For a disruptive innovation, there may be no existing business model on which a company can build, and there may also be a need to create a new value chain, or to create a new role in an existing value chain" (Christensen et al, 1995).
Research and innovation continuum

Challenges of funding innovation

Source: Osawa and Mizaki (2006)
Historical and contemporary context

- Empire and enclave economic structures to serve the centre
- Tropical and International Health and Agriculture key focus areas
- Agricultural Productivity and establishment of Agricultural Research Institutes
- State run Boards to support growth and research
- As a result of Economic Structural Adjustment Programmes –
  - De-Industrialisation
  - Decreased spending in tertiary education in favour of primary education
  - Decreased funding to research
  - Brain drain
- Decreased international and local finance for research
- Increasingly inward looking policies by the international community

- 1885 – Colonisation
- 1939-1945 – World War 2
- 1957: 1st Independent African Country
- 1963: OAU Formed
- 1967: East African Community
- 1973/9: Oil/Energy Crisis
- 1975: Economic Community of West African States
- 1977: East African Community
- 1980s – 1990s: Economic Structural Adjustment
- 1981: Preferential Trade Area
- 1992: Southern Africa Development Community formed
- 1994: Common Market for Eastern & Southern
- 1994: Last Independent African - South Africa
- 1999: East African Community Re-Established
- 2001: New Partnership for Africa’s Development
- 2008 World Financial Crisis

Source: Developed by authors using various sources including Mouton (2008), Waast and Krishna (2003) and government and regional economic communities’ websites
Research questions

1. How **important** is the funding of research and innovation among African countries and what is the evidence to demonstrate the level of importance?

2. What are the **new and innovative** funding approaches (schemes, models and mechanisms) that have been applied across the world and what lessons could be drawn for African countries?

3. What **historical and current factors** facilitate or constrain the implementation of the funding approaches and how have/can the gains be enhanced or the challenges resolved?

4. What **institutional reforms** accompanied the new approaches and how could Africa re-position its own institutional architecture for enhanced research and innovation funding?

5. How are other **broader issues** pertinent to research and innovation broadly being taken into consideration towards more efficient and effective funding for research and innovation?
Conceptual Framework

- Actors in research and innovation
- Research type and innovation
- Funding rationale

- Universities, Research Institutions (RI), Private sector
- Universities, RI, SMEs and PPs
- University spin outs, RIIs, SMEs and PPPs

- Basic Research
- Applied Research
- Commercialisation

- Investing in public goods
- Solving "valley of death" challenge
- Supporting entrepreneurship
Methodology

- Multi-method, multi-stage study, involving multiple countries
- **Stage one** involved collecting and analysing published and grey academic, policy and practice literature on research and innovation in Africa broadly, and funding models in particular.
- **Stage two** covered two related aspects – development of a semi-structured research and drawing up of a participants’ list.
- A total of 60 participants were targeted, 15 of them being officials in science granting councils from SGCI countries (list provided by ATPS), 28 were from the UK regenerative medicine network, while 17 were from research organisations, funding agencies or policy bodies in Africa or elsewhere (key informants purposively targeted based on researchers’ experience and literature reviews).
- **Stage three**, the research instrument was administered via email in all the cases, with varying response rates among the respondent clusters; 73.3% (11/15) for SGC respondents; 64.3% (18/28) for UK regenerative medicines respondents; and 35.3% (6/17) for academic, policy and practitioner, including private sector, respondents in Africa and elsewhere.
Methodology cntd

• In stage 4, data from the research instrument was collated, anonymised, aggregated and analysed using Thematic Analysis using a combination of themes drawn from literature and from the research findings.

Limitations

• Relatively low response rate among the third category respondents
• Less detailed responses from some respondents
• Time
• There were no other significant constraints or limitations to the research process.
Findings - summary

• Dynamic changes and complexity noted in the practice of research and innovation

• Ensuring context-driven, efficient and effective utilisation of scarce resources a high imperative

• Dynamic changes have entailed that new forms of collaboration are required not only among the key players around research and innovation, namely academia, industry/business and government, but with other players outside these sectors as well

• Not surprising therefore that the new approaches hinge on enhancing partnerships, co-funding and multi-disciplinary approaches
Importance of funding R&I – rated medium to high

Importance Placed on Funding Research and Innovation

- Low
- Medium
- High
Why Fund Research and Innovation?

Why fund research and innovation?

- Catching up
- Leapfrogging
- Home-grown economic development
- Following global trends
Current Sources of Finance for Research and Innovation

Key: 1 is most important and 7 is least important. The closer to 1 the more important the source of finance.
Challenges faced by organisations funding research and innovation

- Adequacy of funding
- Timely availability of funding
- Compliance with funding requirements
- Seeing benefits of funding
Preference for local funding – for sake of sustainable funding

Preference for locally derived funding models

- Yes
- No
- No Opinion
# Old and New Funding Models

<table>
<thead>
<tr>
<th>Funder</th>
<th>What is funded</th>
<th>Funding Mechanism</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government</td>
<td>Basic Research</td>
<td>Grants and grand challenges</td>
<td>Traditionally governments have funded basic, applied and translational research as investment in economic growth and development. These are deemed public goods.</td>
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<tr>
<td></td>
<td>Applied Research</td>
<td>Public institution co-funding on interdisciplinary and multidisciplinary programmes</td>
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<td></td>
<td>Translational Research</td>
<td>Innovation brokerage</td>
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<td></td>
<td>Commercialisation</td>
<td>Formation of national research funding consortia</td>
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<td></td>
<td>Entrepreneurship (SMEs)</td>
<td>Co-funding with SGCIs in the Region</td>
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<td></td>
<td></td>
<td>Investment in high-end research programmes, incl. Chairs (240 in SA) and Centres of Excellence, with 15-year funding horizons</td>
<td></td>
</tr>
<tr>
<td>Private Sector</td>
<td>Applied Research</td>
<td>Retained profits and borrowing for capital markets</td>
<td>Profit driven motives</td>
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<tr>
<td></td>
<td>Commercialisation</td>
<td></td>
<td></td>
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<tr>
<td>Public Private Partnerships</td>
<td>Applied Research</td>
<td>Equity and project funding</td>
<td>Solving market failure issues</td>
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<tr>
<td></td>
<td>Commercialisation</td>
<td></td>
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<tr>
<td>Impact Investors</td>
<td>Commercialisation</td>
<td>Equity or debt</td>
<td>Solving market failure with a focus on social goods</td>
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<tr>
<td>Non-Governmental Organisations</td>
<td>Commercialisation</td>
<td>Equity or debt</td>
<td>Solving market failure</td>
</tr>
<tr>
<td>Capital Markets</td>
<td>Commercialisation</td>
<td>Equity</td>
<td>Attractive return on investment in the venture</td>
</tr>
<tr>
<td>Crowdfunding</td>
<td>Research and commercialisation</td>
<td>Equity</td>
<td>Social investment because of market failure</td>
</tr>
<tr>
<td>Local and International collaborative research grants</td>
<td>Research</td>
<td>Grants</td>
<td>Scarcity of local funding for research in many African nations</td>
</tr>
<tr>
<td>Private sector</td>
<td>Take-over of applied research after proof of concept, safety and efficacy</td>
<td>Patent buyouts</td>
<td>Innovators either selling off patents to fund more innovation or researchers not interested in entrepreneurship</td>
</tr>
<tr>
<td>Charities</td>
<td>Basic and applied research as well as clinical trials</td>
<td>Grants and co-funding academia and SMEs working neglected areas</td>
<td>These tend to be niche areas such as rare diseases where market failure is common</td>
</tr>
<tr>
<td>Cities or regions</td>
<td>Land, labour and utilities</td>
<td>Grants given as incentives to firms that relocate to a city or region targeting industrial development</td>
<td>Attracting particular industrial activities to a particular city or region to boost economic activity and contribute to rejuvenation of de-industrialised places</td>
</tr>
</tbody>
</table>
## Examples of Innovative Funding Models

<table>
<thead>
<tr>
<th>Funding model/mechanism</th>
<th>Features/characteristics of model</th>
<th>Countries adopted</th>
<th>Impacts recorded so far</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Patent buyouts</td>
<td></td>
<td>Zambia</td>
<td>Strengthening research programmes and research dissemination</td>
</tr>
<tr>
<td>2 Local and international collaborative research grants</td>
<td></td>
<td>Zambia, Ivory Coast, Malawi</td>
<td>Strengthening research dissemination</td>
</tr>
<tr>
<td>3 Rewards and incentives for specific outcomes</td>
<td>Fund for renewal, replacement and acquisition of essential national research infrastructure</td>
<td>Zambia, Ghana</td>
<td>Enhancing research expertise and research dissemination</td>
</tr>
<tr>
<td>4 Research infrastructure fund</td>
<td>Funded specifically human capital development for R&amp;I activities</td>
<td>South Africa</td>
<td>Improvement of research infrastructure</td>
</tr>
<tr>
<td>5 Public-Private Partnerships</td>
<td>Focused particularly supporting human capital development for R&amp;I activities</td>
<td>Mozambique and South Africa</td>
<td>Strengthening of research and innovation expertise</td>
</tr>
<tr>
<td>6 Investment in high-end research programmes</td>
<td>15-year funding horizons for research chairs and centres of excellence</td>
<td>South Africa</td>
<td>240 research chairs in post</td>
</tr>
<tr>
<td>7 Multi-institutional co-funding for inter- and multidisciplinary research</td>
<td></td>
<td>Kenya and Zambia</td>
<td>Strengthening research and innovation programmes</td>
</tr>
<tr>
<td>8 International strategic research partnerships</td>
<td></td>
<td>Kenya, South Africa</td>
<td>Strengthening research and innovation institutions and policy</td>
</tr>
<tr>
<td>9 Human capital development pipeline</td>
<td>Funding for emerging and established researchers</td>
<td>South Africa</td>
<td>Enhancement and retention of research and innovation expertise</td>
</tr>
</tbody>
</table>
# UK Regen. Med - Types of funding, who uses them and why

<table>
<thead>
<tr>
<th>Type of Funds</th>
<th>Who uses them and why</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grants</td>
<td>These funds are available to universities, research institutions and private firms. There are specific challenge funds that especially encourage collaborative partnerships between industry and academia</td>
</tr>
<tr>
<td>Innovation Challenge Funds</td>
<td>Firms at various stages of innovation translation compete for funds to move them to the next level on the value chain</td>
</tr>
<tr>
<td>Regional Regeneration Funds</td>
<td>Firms located in old industrial cities are promised to be paid a flat amount for each person they employ. One firm used this approach to raise over £100 000 to fund its early operations because it is not yet generating revenue</td>
</tr>
<tr>
<td>Equity Markets</td>
<td>Firms with promissory medical technologies to meet unmet needs such as cancer therapy. Investors fund the early stages based on the promise to be paid out when an initial private offering is made</td>
</tr>
<tr>
<td>Consultancy Income</td>
<td>Early movers who have become experts of the regulatory process or optimisation of production processes or assaying methods use their skills as consultants for late comers. They then use the consultancy fees to finance innovation in their firms.</td>
</tr>
<tr>
<td>Contract Manufacturing</td>
<td>Firms that had invested in cGMP (current Good Manufacturing Practice) contract manufacture for firms which have not yet constructed their own manufacturing plants or are at the early stages of proof of concept. The income from contract manufacturing is used to finance research, development and translational activities.</td>
</tr>
<tr>
<td>Early stage exit through sell off of IP rights to large firms</td>
<td>These are usually researchers with no interest in entrepreneurship who exit by selling off IP rights after proof of concept, safety and efficacy for their therapies</td>
</tr>
</tbody>
</table>
Other funding case studies

• TIBA (Tackling Infection to Benefit Africa) Research Consortium – collaboration - “shifting the centre of gravity to African researchers”

• UK Regenerative Medicine: Business models and financing mechanisms – mixed approaches for funding SMES – grants, contracts

• Cell and Gene Therapy Catapult – De-risking early stages of innovative technologies

• Innovative procurement in the pharmaceutical sector – partnership - procurement as a industry policy tool

• Chilecon Valley – enhancing the Chilean entrepreneurial and start-up culture – pooled funds and co-funding for incubators

• African Network for Drugs and Diagnostics Innovation (ANDI) - Centres of excellence, pan-African networking and harnessing global resources
Other funding case studies

• African Agricultural Technology Foundation (AATF) - Facilitating public private partnerships, harnessing local and global intellectual and technological resources to address local problems

• Grant-making for transformative agents – AGRA – Alliance for a Green Revolution in Africa

• Local and cross-national collaborative research and innovation – NEPAD SANBio

• Academia and supranational agency partnership – (AESA) Alliance for Accelerating Excellence in Science in Africa
Advantages of new funding models

- Relevance to local contexts:
  - 5
  - 4
  - 3
  - 2
  - 1
  - 0

- Scope for cross-sectoral collaboration
- Inclusion of new researchers
- Sufficiency of funding provided
- More rapid application turnaround time
Factors facilitating or constraining the implementation of funding approaches

Facilitators

- Harmony with global, continental and national agendas
- Increasing political will
- Increasing access to knowledge resources

Constrainers

- Limited government financial resources,
- Unfavourable institutional traditions,
- Policy incoherence across sectors,
- Mismatch between research priorities and developmental challenges,
- Lack of long-term policy planning,
- Rapid technological changes
- And poor strategic partnership choices
Reforms that accompanied the new approaches
Reforms that accompanied the new approaches

- Focus on responsibility and assured output (Kenya)
- Emphasis on international competitiveness, consideration of transdisciplinary, multidisciplinary and interdisciplinary approaches;
- Greater science-policy linkages (South Africa)
- Ensuring enhancement of human and societal benefits (Namibia)
- Learning from the past (Malawi), including potential to revive old models
Broader issues pertinent to research and innovation

- Some actors said to be too dominant in discourses, while others were missing
- Weak links with informal researchers and innovators
- Insufficient translation of political will to political action
- How to cushion R&I agendas across political and policy regimes
Conclusions

• Overarching key message from this study is on consistency, sufficiency and relevance of funding

• A wide range of capabilities and funding options is required for different stages of the research and innovation value chain

• A number of dynamic new funding models have been developed, adopted and deployed in countries and sectors to deal with the realities of decreasing traditional funding for research and innovation sources.

• New and innovative funding approaches have been developed emphasizing partnerships, co-funding and multi-disciplinary arrangements
Conclusions

• A number of historical and current factors facilitate or constrain the implementation of the funding approaches.

• New funding approaches were said to have brought more standardisation of research applications, better resource tracking and accountability among recipients and stronger research-policy institutions.

• There are numerous context-specific and context-transcending technical, social, political and economic issues that stakeholders in the research and innovation ecosystem need to be aware of and to take into consideration in order to optimise use of research and innovation resources.
Recommendations – AU/RECs/National Govts

Increasing, sustaining and operationalising political will

1. Funding commitment by African Union and RECs

There is need for committed funding for continental and regional programmes which such as Agenda2063 and STISA2024

2. Honouring 1% GDP to STI commitment by National governments

• Government funding is trusted and strategic. National governments need to explore innovative ways to expedite meeting and sustaining the 1% commitment

• Beyond tactical addressing of current socio-economic challenges, African governments need to develop unifying long-range, yet operable ideologies on R&I
1. **Generate and document evidence of R&I impact**
   As part of their mandate to support and manage research programmes, SGCs should assist researchers to generate research and innovation impact evidence and sustained relevance which will result in political will and commitment to funding research and innovation.

2. **Map out research and innovation ecosystems**
   As part of their objective of strengthening research and evidence-based policies, SGCs should lead processes of mapping out different stages of the research and innovation value chain, for the purposes of defining research and innovation policy objectives and identifying appropriate approaches for funding research and innovation.

3. **Leadership and oversight role**
   Access to and deployment of effective approaches for funding research and innovation require strong leadership and oversight from governments and SGCs, especially with respect to identifying and balancing the disparate requirements of different sectors and areas of application with their points of commonality.
Recommendations – private and non-profit sectors

1. Increase levels and relevance of funding and activities

Work with national and local governments, as well as academia in co-designing policies and R&I responses that are aligned to sectoral and national developmental objectives.

2. Harness and leverage financial resources and partnership models at their disposal for strengthening sectoral and national research and innovation ecosystems.
Recommendations – development partners

1. Support countries to reconfigure the R&I systems

Leveraging their access to global knowledge resources, development partners should help countries develop or reconfigure their STI policies to be not only forward-looking and agile, but also how they influence funding approaches and other interventions towards strategic goals, and stimulate demand for research and innovation.
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merci beaucoup
About UCL STEaPP