SELECTING THE MOST EFFECTIVE INSTRUMENTS TO INVEST IN INNOVATION IN SUSTAINABLE AGRICULTURE INTENSIFICATION (SAI)

INCEPTION REPORT

Submitted to:

Secretariat of the International Commission on Sustainable Agricultural Intensification (CoSAI)

International Water Management Institute (IWMI)

Submitted by

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Table of Contents

List of key acronyms

CoSAI	Commission on Sustainable Agriculture Intensification
FAO	Food and Agriculture Organization
GS	Global south
ICT	Information and communication technology
ISS	Innovation investment study
KI	Key informant
KII	Key informant interview
MENA	Middle East and North Africa
NGO	Non-governmental organisation
OECD	Economic Cooperation and Development
OG	Oversight Group
R&D	Research and development
SAI	Sustainable agriculture intensification
SDG	Sustainable development goals

List of figures

List of tables

1 Background

The Commission on Sustainable Agriculture Intensification (CoSAI) was established to increase effective investment in innovation for Sustainable Agriculture Intensification (SAI) in the Global South (GS), to support the United Nations Sustainable Development Goals (SDGs), and the climate goals of the Paris Agreement (United Nations Framework Convention on Climate Change, 2015).

For CoSAI, SAI is defined as transformative changes in agriculture and food systems that are urgently required to meet rapidly-increasing global needs for affordable, nutritious, safe and healthy food, while protecting and improving the natural environment and promoting resilient livelihoods and social equity.

There is a need to shift away from the current paradigm in agriculture that focuses primarily on increasing productivity, with sustainability being a secondary outcome, if given attention at all; sustainability is at the core of SAI (Rockström *et al*., 2017). This shift, which is underway in many parts of the GS, is leading to an increased focus on *Agricultural Innovation*, defined as "the process whereby individuals or organisations bring new or existing products, processes or ways of organizing into use for the first time in a specific context to increase effectiveness, competitiveness, resilience to shocks or environmental sustainability and thereby contribute to food security and nutrition, economic development or sustainable natural resource management" (Food and Agriculture Organization [FAO], 2019). Innovation thinking concerning SAI has moved beyond the 'pipeline' approach of simple input/output research and increasingly recognises the need to embrace complexity, adopt multidimensional and multidisciplinary practices and embrace technological innovations (especially in terms of Information and Communication Technology [ICT]) (Devaux *et al*., 2018; Brookfield Institute, 2018). Further, decentralisation of innovation processes with a people-focused and proactive approach is seen as necessary elements for more comprehensive innovation to achieve SAI's objectives (Barret et al. 2020). While these new paradigms are being explored and promoted across different parts of the agriculture sector, challenges associated with reduced funding availability and funding for novel approaches to innovation are declining, necessitating new and blended approaches to funding innovation (Echeverria and Beintema, 2009).

With this drive to fund agricultural innovation, funding instruments have become diverse in terms of both design and focus. While the pool of funders focusing on agricultural innovations has grown, so too has the number of deserving beneficiaries. This has necessitated more focused funding instruments and resulted in more results/impact driven funders. All of the above have collectively resulted in greater research emphasis on methods/tools/approaches to assess the impacts of funding instruments focussed on agricultural innovation, motivated by the need to assist and in some cases direct funders to areas of greatest need and/or impact. In this context, we need to critically evaluate the effectiveness of different instruments and strategies to support novel innovation processes for SAI in the global south (GS).

2 Objectives of the study

The objectives of the study, as provided in the ToR, are to:

1. Categorise, tabulate, and summarise the state of evidence on how well different investment approaches and instruments to promote innovation have supported the multiple objectives of SAI and drawing, to the extent possible, on lessons from other sectors and the Global North.
2. Develop lessons and guidance based on this evidence to help innovators and investors make choices about funding approaches and instruments to support SAI innovation.

3 Scope of work

The review will cover the following areas:

- Investment in innovation that directly or closely affects agricultural production or production decisions, or input and output markets and value chains.
- Investment in innovation that intends to benefit the GS.
- Investment from national or international entities, the private sector, producers' associations, other non-governmental organisations (NGOs) or combinations thereof.
- Focus on investment since 2010 but include older literature that provides valuable lessons.

The scope will take into account relevant findings of the CoSAI Innovation Investment Study (ISS), which has developed global estimates of the value and types of investment in SAI innovation and is expected to be completed by July 2021. A key element of this is the range of innovation outputs considered in the current study. These can include product innovations (new goods and services), process innovations (new ways of doing/making things), marketing strategies and organisational arrangements (for example, collective action to achieve some goal) (Gault 2010).

The study has three main components:

(1) Inception phase (complete with this report): Review and summarise basic background information and propose the scope, approach and work plan to deliver the requirements of the study;

(2) Main phase: Collection and analysis of published material (both peer-reviewed and grey literature) – including that sourced through requests for information directed to selected stakeholders, and key informant interviews to produce the listed outputs;

(3) Reporting phase: Production of the final report and other listed outputs.

The study will address the three main questions (two of which have embedded questions):

1. What types of investment instruments have been tested to support innovation in SAI in the GS? How can these be categorised into a working typology?
2. What is the evidence on how well different instruments have worked towards supporting SAI's multiple objectives at scale? (e.g., social equality, environmental objectives). What are the contextual and design factors that affect their success or failure in achieving these objectives (e.g., type of value chain, who participates)?
3. What advice can be given to innovation investors and practitioners about the instruments that can be selected for different objectives and contexts, and how these can be designed to achieve better impacts?

4 Method statement

4.1 Defining terminology to guide instrument identification

A preliminary review of the literature on agricultural innovation revealed the need to first define the terms 'investment approaches, instruments and tools' as this would inform the keywords that will be used to query the literature, categorise the findings, inform the language used in the stakeholder engagements and discuss the learnings that emerge from the study. In fact, there are indications in the literature that these terms are sometimes used interchangeably by different authors.

For the purposes of this study, we are using the following definitions, which led to our decision to focus only on instruments:

- *Instruments:* arrangements for financing or disbursing support to those engaged in research/innovation (i.e. research performers) – adapted from a definition offered by the Organization for Economic Cooperation and Development (OECD, undated).
- *Approaches:* ways of dealing with situations or problems, e.g. agrifood systems perspectives, socio-ecological systems)
- *Tools*: means of doing specific tasks, e.g. field demonstrations, multi-stakeholder platforms).

Approaches and tools have been excluded from the study on the basis of being too broad or too specific, respectively. For example, Schwester (2015) refers to in-depth interviews, focus groups, and field observation being empirical tools associated with qualitative research. It is not the purpose of the study to provide guidance at this level to decision makers or investors. Similarly, in the field of agricultural research or innovation, examples of approaches that are found in the literature include, participatory action research (Milich et al. 2020) and big data (Young et al. 2018).

In addition, we will in this study differentiate between two broad categories of instruments: (1) those that aim to provide access to finance for innovation, and (2) those that aim to strengthen social capital and access to knowledge for innovation. It is already apparent that some instruments will serve both these purposes (OECD, undated).

4.2 Generation of preliminary list of instruments

Table 1 provides a preliminary list of the **instruments** that have been identified for inclusion in the study, but the indepth review process and engagement with key informants may lead to removal and/or replacement of some of these to result in a final collection of 10 to 15 instruments.

The process of identifying instruments to include in the study took into account the target audience, which comprises the direct investors and decision-makers who determine the type of activities to be funded and instruments to be applied. These could include research and development (R&D) or innovation or research project managers as well as investors from public and private sectors. The funds may target innovators directly or via a third party.

Starting with an extensive list of documented mechanisms that have been used to support innovation in the broad field of agriculture, those perceived to be tools and approaches were eliminated, leaving a list of 14 instruments.

Table 1 Preliminary list of instruments to cover in the study

Type of instrument
1. Challenge funds
2. Farmer driven innovation support funds
3. Innovation funds/grants
4. Prizes/awards
5. Insurance for innovation
6. Innovation platforms
7. Innovation hubs
8. Farmer research networks
9. Living labs
10. Farmer field schools
11. Incubators
12. Accelerators (and pitch events)
13. Results based funding contracts (for innovation)
14. Brokerage / intermediaries[1]

[1] *Could be seen as a tool supporting other instruments rather than an instrument*

Each of these instrument types is described in relation to the use of the term in the literature in the glossary in Annexure 1.

Besides the types of instruments presented in Table 1, there are also broader modalities of work that should be considered, such as whether a specific initiative makes use of participatory (bottom-up) or top-down approaches and the data capturing process will distinguish between top-down / non-participatory and bottom-up / participatory modes of working. This will allow us to further unpack the reasons for the effectiveness (or lack thereof) of different modalities.

4.3 Designing the data collection and assessment framework

The first step following appointment has been for the researchers to design the framework for data collection and assessment. The draft framework has been designed considering the following:

1. Factors that define the context in which the instrument has been used.
2. Types of innovations being supported (products, processes, marketing strategies, institutional arrangements).
3. Types of instruments being used.
4. Sources of funding.
5. Effectiveness in terms of economic sustainability, productivity, environmental sustainability, social/relational effects, and human condition/wellbeing.

In parallel with confirming a common understanding of the range of instruments that will be included in the study, the data collection framework is being developed in Excel, using a combination of drop-down menus and fields that will require user input, being qualitative descriptions in some cases. The first draft of the framework is included below in Table 2. The dropdown menu lists are shown to provide an idea of the options that will be provided to the team members that are populating the framework with information from different sources.

Table 2 Summary of column headings and drop-down options for the data capturing framework

Column heading	Types as per drop-down menu options
Evidence type (Based on type of document)	Peer-reviewed article/Peer-reviewed review/ Project report / Project evaluation report / External evaluation report / Website info
Main instrument	
Supporting instruments	
Region	MENA/Sub-Saharan Africa/Asia/Latin America/Pacific
Country	
Context (rurality)	Urban/Peri-urban/Rural
Type of farming system	Mixed/Livestock/Agronomic/Vegetables/Fruit/Aquaculture
Farmer types	Individuals/Groups/Collectives
Scale of production	Primarily subsistence/Small-scale commercial/Large-scale commercial
Implementing Agency / recipient of funding	
Funders	
Investment amount	
Overall project approach	Top down / non-participatory or Bottom-up / participatory
Clear gender focus	Yes / No
Clear youth focus	Yes / No
Clear Economic Objective	Yes / No
Clear Social objective	Yes / No
Clear Environmental objective	Yes / No
Clear Productivity objective	Yes / No
Clear Human wellbeing objective	Yes / No
Citation	
Source - website / DOI / Link	

4.4 Data collection

Having now developed, piloted and refined the data collection framework, which will also serve as an analytical framework, the process of gathering data will be conducted using a mixed-methods approach:

- Interviews with key informants, starting with the CoSAI Commissioners, to (1) draw on their experiences and obtain useful documents and (2) identify websites, organisations and individuals to explore.
- Guided (purposive) literature review:
    - Review of grey literature
    - Review of peer-reviewed material.

While the focus is on the GS and agricultural innovation, examples of instruments used to support innovation related to SAI in the Global North, as well as innovation within other sectors identified through the literature review and stakeholder engagement will also be documented if they can make a meaningful contribution to this study.

4.4.1 Key informant consultation

There are two types of consultation that will take place using key informants. The range of stakeholders to be engaged for these two activities is provided in Table 3 but this will be informed by the input received from key informants (KIs) and from the review of literature. Different levels of engagement are envisaged for different stakeholder groups. The specific activities that they will be engaged in will be based on our review of the literature and input from the Commissioners.

Requests for information

Key informants (KIs), being contact points in relevant organisations as well as individuals known to the research team or identified by the OG, will be sent a request to provide any documentation pertaining to application of the selected instruments and any information about other instruments that they believe strongly need to be included in the study. In addition, a short request for information will be sent out through networks such as Peregrine, Ag2Nut and Paepard.

Key informant interviews

Key informant interviews (KIIs) will be conducted with selected individuals and snowballing will be used whereby the KIs engaged will be asked to provide contacts for other organisational or individuals that they believe can make a meaningful contribution to the study. The purpose here is to source relevant literature pertaining to sustainable agriculture innovation and intensification in the global south that we may have overlooked or do not have access to. The KIIs will be conducted using a virtual or web-based platform (e.g. Zoom, Skype, MS Teams, etc) and will be in the form of semi-structured interviews, using a pre-developed set of guiding questions (See Annexure 3).

Table 3 Stakeholder groups to be represented in each of the consultation activities

Stakeholder	**Requests for information**	**Key informant interviews**	**Stakeholder engagement event**
CoSAI Commissioners	X	X	X
Investors			
• Multi-laterals / global funds			
Global Agriculture and Food Security Program (GAFSP)	X		
Henan Green Agriculture Fund (GAF) Project (GAF)	X		
Food and Agriculture Organisation (FAO)	X	X	X

International Fund for Agricultural Development (IFAD)	X	X	X
Green Climate Fund (GCF)	X		
African Development Bank (ADB)	X		X
United Nations Development Programme (UNDP)	X	X	X
• Bi-laterals			
Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)	X	X	
UK Research and Innovation (UKRI)	X		
Canada International Development Research Center (IDRC)	X		
Sweden international development agency (SIDA)	X		
United States Agency for International Development (USAID)	X		
• Philanthropics			
McKnight Foundation		X	X
Misereor		X	X
Other funders identified by KIs			
Research managers			
• International Agricultural Research Centres			
CGIAR and its research centres	X	X	X
• National Agricultural Research			
Specific countries identified by KIs	X	X	X
• Industry			
Relevant commodity / input organisations			
• Universities			
USAID-funded Sustainable Intensification Innovation Lab at Kansas State University		X	X
Other universities identified by KIs	X	X	X
Global and regional forums and structures			
• Global Forum on Agricultural Research (GFAR)		X	X
• Forum for Agricultural Research in Africa (FARA)		X	X
• Central Asia and the Caucasus Association of Agricultural Research Institutions (CACAARI)	X		
• Asia Pacific Association of Agricultural Research Institutions (APAARI)	X		
• Association of Agricultural Research Institutions in the Near East and North Africa (AARINENA)	X		
• Forum for the Americas on Agricultural Research and Technology Development (FORAGRO)	X		
• African Forum for Agricultural Advisory Services (AFAAS)		X	X
• Platform for African European Partnership on Agricultural Research for Development (PAEPARD)		X	X
• International Centre for Integrated Mountain Development (ICIMOD)		X	X
• Aspen Network of Development Entrepreneurs (ANDE)		X	X
Non-governmental organisations			
• Practical Action		X	X
• World Neighbors		X	X
• Technoserve		X	X
• Others identified by KIs			

4.4.2 Review of the literature

The literature review consists of two subcomponents, namely grey literature and peer-reviewed material. It is necessary to source multiple types and topics in the literature to answer the three key questions. The processes for collecting these two bodies of evidence are described below.

Review of grey literature

The review of grey literature will include material that is sourced in the following ways: (1) that provided by key informants, (2) that identified by searching on websites, (3) that identified via the Google search engine, as well as (4) that which the team already has in its possession.

Besides the KIIs, an email will be circulated to a list of commissioners, KIs and contacts at key organisations requesting any documentation related to the application of the identified list of instruments. The request will also request the recipients to make available information about other instruments that they feel have been particularly effective in achieving multiple objectives.

A scan of the websites of a range of organisations that fund and/or implement agricultural development or research and development has been conducted. Those websites that have a search function and which have already been found to potentially contain relevant material are summarised in Annexure 2 and will form the basis for identifying project reports and evaluations.

Review of peer-reviewed material

The review of peer-reviewed material will rely largely on searches of various databases of prominent scientific journals by the Human Sciences Research Council (HSRC) Information Consultants using the search engine EBSCO-Host and supplementing with searches on SAePublications, Sage and JSTOR. Lists of abstracts that have been generated will be reviewed manually by the research team and inserted into the framework. In addition to using search engines as discussed above, the team will also make use of forward and backward linkages from literature to expand the body of articles.

Textbox 1: Results of initial search

Using the following search string on EbscoHost retrieved 2105 items, of which 721 were related to the search string.

Agricultur* AND innovat* AND Challenge fund OR farmer innovation fund OR Innovation grant OR Prize OR Award OR Insurance OR innovation platform OR innovation hub OR farmer research network OR living lab OR farmer field school OR incubator OR accelerator OR results-based contract OR Broker OR intermediar*

Examples of relevant instruments identified through this search included NGOs as intermediaries (Dyck et al. 2019), results-based payments and innovation networks (Zoraida et al. 2013), innovation co-production (Klerkx et al. 2013), innovation networks (Klerxk et al. 2010), knowledge brokering (Klerkx et al. 2012), network brokering (Hellin et al. 2012; Hellin et al. 2017) and entrepreneurial institutional ecosystems - including brokering (Keith, 2021). Items also identified other considerations such as dealing power asymmetries when there is a diverse range of actors involved in a process (Sanya et al. 2018).

4.4.3 Stakeholder engagement event

A (virtual) stakeholder consultation event will be held to triangulate the evidence obtained regarding the effectiveness of the different instruments. This will take place once preliminary findings have been documented to ensure that any additional knowledge made available can also be incorporated. The nature of the participant group will be confirmed with the CoSAI secretariat and commissioners once we are in the main phase of the project. We propose a virtual workshop approach with invited participants (See Table 3 for the list of proposed participants). The structure will be co-developed with the CoSAI secretariat but is likely to take the form of a presentation of preliminary findings and break-out discussions about different instruments.

4.5 Data capture

The capturing of the literature (peer-reviewed and grey literature) into the spreadsheet tool will be managed by a subset of the team. Review documents will be captured separately from documents that provide more detailed information about a particular initiative.

Trade-offs and design issues to consider will be identified when each piece of literature is captured into the spreadsheet tool. When the final guideline document is developed, this will be one of the categories that is provided so that investors know upfront what the possible trade-offs and drawbacks are and can make decisions related to their particular focal area (for example, innovation platforms can be dominated by certain actors if not well facilitated). The extent to which literature highlights these drawbacks and trade-offs will be determined during the review process and is more likely to be found within grey literature.

4.6 Data analysis

In the data collection framework, types of instruments will be categorised primarily by investment type, then by the relevant scale of production and other characteristics to allow for the drawing of comparative lessons (such as whether implemented within a rural, urban or peri-urban context, or more or less market-oriented production systems) as shown in Table 2.

The analysis of the different cases / examples will also consider whether there is evidence that the instrument that supports the innovation is addressing the five sustainability domains of SAI. The factors that have contributed to a particular instrument being effective will be determined. For example, it may be found that a particular project was effective because government invested in an innovation platform – and that was effective (i.e. assisted producers to access markets effectively) because the stakeholders included the private sector and the platform had a source of funding. This would start to explain why certain instruments and context factors are associated with successful projects/initiatives.

Matrices such as the hypothetical example in Figure 1 will be used to compare instruments in terms of key factors and to answer questions we may have such as contexts where certain instruments seem to be most effective. These matrices will also be used to form part of the activities of the stakeholder engagement event, which will provide opportunity for participants to refine the allocation of instruments to the quadrats of the various matrices.

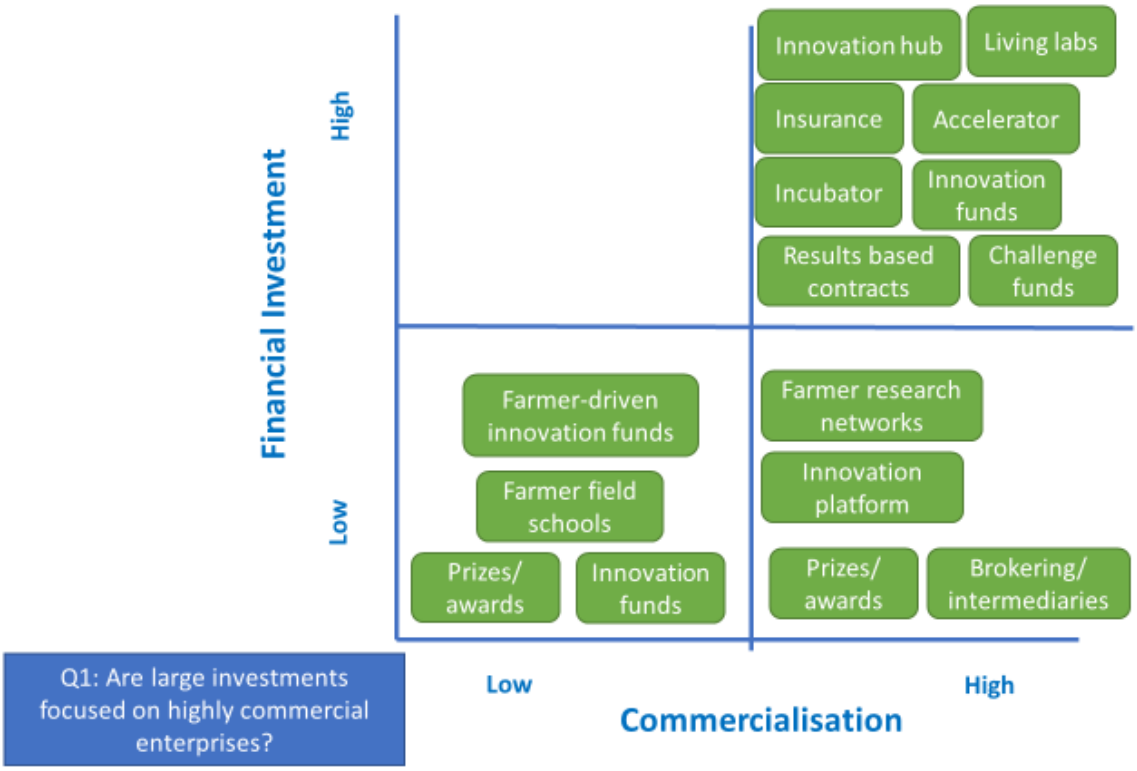

Figure 1 Hypothetical characterisation of instruments that support innovation considering amount of investment and level of commercialisation.

Given that the objective of the study is to provide guidance to the target audience about the types of instruments and tools that have proved to be useful, the contexts in which such instruments have been used will be compared and contrasted to inform decision-making in relation to the selection of instruments that can be applied by investors.

Table 4 Notional classification of instruments based on the nature of producers being supported

Producer nature	Commercialisation	Instruments
Individuals	High commercialisation	Accelerators / Incubators / Challenge funds Prizes/awards
	Low commercialisation	Farmer driven innovation support funds
Collectives	High commercialisation	Innovation hubs / Innovation platforms
	Low commercialisation	Farmer field schools / Farmer research networks
Groups	High commercialisation	Living labs / Results-based contracts
	Low commercialisation	

Note: Collectives are producers who produce individually but have some collective action such as marketing or sourcing inputs. Groups are individuals that produce and market collectively and share the benefits equitably.

4.7 Final report

The final report will collate all the findings from the study and all materials that are used as well as all key informants engaged with be referenced and documented. The quality and shortcomings of all sources of information will be clearly indicated in the report. The report will clearly explain the

methodology used to access information (i.e. searching using web browsers, snowballing techniques to identify additional key informants, etc).

A section will be included in the report that documents lessons learned about the usefulness of different instruments within different contexts, as well as the most appropriate funding mechanisms. The recommendations will also consider opportunities for application of instruments for new/expanded contexts, or for combining of certain instruments to increase their effectiveness.

The report will contain a two-page summary for each instrument. The summary will cover the following areas: description of the instrument; common context for application; benefits, risks and drawbacks of the instrument; design factors for effective application; sources of information. A summary table will be prepared that provides basic information about each instrument and links to sources of additional information (building on Table 5). This table will assist investors and innovation managers to make decisions about which instrument is likely to be most effective within a specific context. The table and the instrument summaries will form the basis for the simple guideline document that is one of the communication materials.

4.8 Communication materials

A key element of the assignment is developing products that can be used to share the findings with different audiences. These are the planned products:

- A briefing paper and associated policy briefs to support CoSAI policy advocacy activities.
- A simple guideline for investors about instruments/approaches suitable for specific contexts.
- We will also share information using face-to-face fora or via the online platforms that previously circulated our requests for information.
- Content will be provided for the CoSAI website (including one draft blog).

The final products will be developed in collaboration with the CoSAI communications team and team members will participate in at least two virtual engagement events to share the findings.

Table 5 Summary table of instruments

	Type of support			Common objectives					Agricultural production			Value chain			
Instrument	Financial	Non-financial	Mixed	Economic	Productivity	Environmental	Social	Human	Subsistence	Small commercial	Large-scale commercial	Input supplier	Production	Processing	Marketing
Challenge funds															
Farmer driven innovation support funds															
Innovation funds/grants															
Prizes/awards															
Insurance for innovation															
Innovation platforms															
Innovation hubs															
Farmer research networks															
Living labs															
Farmer field schools															
Incubators															
Accelerators (and pitch events)															
Results based funding contracts (for innovation)															
Brokering / intermediaries (e.g. producer – service provide linkages)															

4.9 Overview of sharing of tasks across project team

The allocation of tasks across the members of the project team is presented below in Table 6 .

Table 6 Roles of team in the project

Development of the framework	B Letty, J McCosh and T Hart
Data gathering	**Client liaison and overall guidance:** Brigid Letty
	Key informant interviews KIIs in their region based on snowballing: Sharad Rai, Djibril Thiam, Joshua Zake, Tafadzwa Mabhaudi (UKZN) KIIs with commissioners and their contacts: Brigid Letty, J McCosh or regional team members
	Literature searches Peer-reviewed articles: HSRC (Tim Hart and Jacqueline Masoelane) Grey literature searches (INR – research assistants Theo Naidoo and Simone Murugan) Financial instruments: Michelle Browne and Andisa Agri (Duncan Pringle and Mike Corfe)
	Requests for information B Letty, D Thiam, S Rai, J Zake, T Mabhaudi
	Stakeholder engagement events Core team members will participate in stakeholder events
Organisation of the collected data	B Letty with S Murugan and T Naidoo
Sorting of the data into the framework	T Naidoo and S Murugan Oversight: B Letty
Descriptive analysis based on the framework	T Hart, B Letty, J McCosh, M Browne
Second order analysis of recurring patterns and themes and Development of typology	T Hart, B Letty, M Browne, T Mabhaudi
Report writing and internal review	B Letty, T Hart, M Browne, S Naidoo
Communication materials – development and sharing	B Letty, T Hart, J McCosh

5 Project timeframe

The assignment will to run from April to October 2021, with the following deadlines being negotiated with the CoSAI secretariat.

Deliverables and associated activities	**Revised timeframes**
Signed contract in acceptance of offer	15 May
Inception report	4 June
Oversight Group Meeting to consider inception report	16 June
Submission of revised inception report	7 July
Draft report	3 September
Draft presentation of results (for stakeholder engagement)	10 September
Oversight Group Meeting to consider draft report and presentation	16 Sept
Stakeholder engagement	16-30 September
Final report	15 October
Oversight Group Meeting	21 October
Launch event	31 October 2021

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Annexure 1: Glossary

Name of instrument	Description (including purpose)	Similar terms used	Reference
Challenge fund	A challenge fund is an innovative and versatile funding instrument for channelling public funds for development. These (donor) funds are allocated for a specific purpose and uses competition amongst organisations as the leading principal for disbursement. The purpose for the challenge fund is to financially support / test innovative, socially worthwhile projects to improve market outcomes. Innovation carries risk, one of the challenge fund's main goals is to hedge against loss, promote innovation and, in doing so, increase access and choice for the poor. In order to ensure that the public funds are used befittingly, a recipient of the fund has to match a certain percentage of the grant with their own funds, promoting ownership and commitment. Partnerships between the private and public sectors are forged to ultimately provide local solutions to local problems.		Pompa, C., 2013. Understanding challenge funds. *ODI, London. UK*.
Results based funding contracts	Results-based approaches (RBA) are relatively recent developments and are seen as innovative financial instruments that offer payment once certain pre-defined actions have been taken or results / outputs have been delivered. RBA promises to incentivise greater aid effectiveness while documenting development progress. A contract is used to define the desired results and then link funding to performance indicators. They offer a range of advantages over other funding instruments in that they include a greater focus on results, have better accountability systems and improved incentives. RBAs can also be used as a tool for accelerating innovation and leveraging additional resources from the private sector. This approach however, has not been widely applied in the agricultural sector due to a number of challenges, namely; lack of control over the result (influenced by external conditions), measuring trends in production can only occur after a	• Results-based aid • Results-based finance • Development impact bond • Cash on delivery • Payments by results	Janus, Heiner & Holzapfel, Sarah. (2017). Introducing Results-based Approaches in Agriculture: Challenges and Lessons. Janus, H. and Holzapfel, S., 2016. Results-based approaches in agriculture: what is the potential? *Deutsches Institut für Entwicklungspolitik Discussion Paper*, (25).

	number of years, and competition with the private sector can influence market forces.		
Farmer driven innovation support funds	Farmer driven agricultural innovation grants aim to support research/learning and experimentation on key constraints in farmers' agricultural systems. The grant can therefore be used for service providers such as input providers, NGOs or community-based organisations. Farmer-led innovation supports funds are unique in that the grant can be financially or logistically managed by a third part (and not only the farmer). The essence of this type of grant is that the farmer leads the experimentation in developing innovative ways to solve constraints faced with on a daily basis (of which some constraints are only noticeably by farmers). Participation of farmer organisations in the governance (e.g. members sitting on decision-making boards) of the grant improves the overall effectiveness of reaching smallholder farmers who often get side-lined in traditional government/private interventions.	• Farmer innovation support funds	Ton G, de Grip K, Klerkx L, Rau M-L, Douma M,Friis-Hansen E, Triomphe B, Waters-Bayer A, Wongtschowski M. (2013). Effectiveness of innovation grants to smallholder agricultural producers: an explorative systematic review. EPPI-Centre, Social Science Research Unit, Institute of Education, University of London.
Innovation funds/grants	Innovation grants are used in countries around the world to stimulate the private sector and farmers to engage in activities related to technology generation, technology dissemination and innovation. Agricultural innovation have developed as a co-evolutionary process combining technological, social, economic and institutional change. Grants for agricultural innovation have been designed to address limitations in the innovation system. It is acknowledged that much of the innovation relevant to smallholders happens informally (outside of research institutions), which is why there is a strong need for not only financial support (at research institutes) but also research approaches to support experimentation for and by smallholder producers. Innovation grant funds for smallholder farmers are becoming a promising avenue for agricultural innovation and are seen to stimulate smallholders to be more pro-active and critical towards research.	• Grant scheme • Research fund	Ton G, de Grip K, Klerkx L, Rau M-L, Douma M,Friis-Hansen E, Triomphe B, Waters-Bayer A, Wongtschowski M. (2013). Effectiveness of innovation grants to smallholder agricultural producers: an explorative systematic review. EPPI-Centre, Social Science Research Unit, Institute of Education, University of London.

Prizes	Provision of research prizes is a financial incentive that induces change through innovation and competition. Prizes are offered to recipients in the form of awards for meeting a pre-specified technical criteria (pre-commitment). The prize is often awarded to the one who solves a problem first or most effectively met the challenge. Prizes and awards aim to reward and disseminate innovative and sustainable initiatives. The prizes are often financial contributions, but can also take the form of sponsored equipment, technical assistance or educational resources.	• Research prizes • Awards • Innovation inducement prize	Masters, William. (2005). Research prizes: A new kind of incentive for innovation in African agriculture. Int. J. Biotechnology Int. J. Biotechnology. 7. 195-211. 10.1504/IJBT.2005.006454. Gould, C., Brown, C. and Stott, C., 2020. Evaluating the results of innovation prizes for development: Reflections and recommendations from practice. *Ideas to Impact, UK*.
Insurance for innovation	Insurance innovation should be seen as a policy instrument that alleviates the risk to producers often associated with using unknown or new technologies. By providing such insurance, producers particularly small farmers, are encouraged to adopt innovations which often carries the higher risk. Insurance offers a plan to safeguard the farmers against unsuccessful innovations, similar to that of crop insurance (protection against weather, insects and disease risks). An insurance plan is developed to encourage farmers to increase their production and income whilst ensuring some minimum income should their crop fail. These plans could also be incentivised, whereby an increased income can be earned for increased yields.	• Insurance plan	Herdt, R.W. and Dehn, M.M., 1978. Insurance for small farmers to encourage innovation. *The Bangladesh Development Studies*, pp.191-200.
Innovation platforms	Innovation platforms are used as a means of bringing a variety of stakeholders (representing various organisations) together to identify and resolve common problems. These groups can also be used to develop a vision and achieve specific goals, identify opportunities and transfer	• Concentration and Innovation group • Innovation	Tui, S.H.K., Adekunle, A., Lundy, M., Tucker, J., Birachi, E., Schut, M. and Klerkx, L.W.A., 2013. *What are innovation*

	knowledge and inspire change. The outputs of these platforms are usually activities that are designed and implemented through the platform or coordinated by members within. Members can range from farmers, traders, food processors to researchers and government officials. Innovation platforms are used by the private sector to gather data and improve networking amongst key stakeholders i.e. economic sector. Innovation platforms tend to be used by the agricultural sector quite often because agricultural issues are often very complex and involve a variety of stakeholders and varying scales. By bringing the stakeholders together, innovation platforms allow concerns to be identified and addressed more effectively.	network • Innovation coalition • Innovation configuration • Multi-stakeholder platform	*platforms?* (No. 1). ILRI.
Innovation hubs	These hubs enable collaboration amongst its members whilst supporting knowledge creation for the stimulation and strengthening of businesses and projects. Additionally, they have been noted to build flexible and dynamic collaborative communities with entrepreneurial individuals to achieve innovations. In a developmental context, innovation hubs have been framed as supporting a digital and mobile boom in the African continent by filling a gap amongst academic and private sector players in which technology innovation needs to spur economic growth.	• Innovation labs • Incubators • Co-working spaces	Jiménez, A. and Zheng, Y., 2017, May. A spatial perspective of innovation and development: Innovation hubs in Zambia and the UK. In *International Conference on Social Implications of Computers in Developing Countries* (pp. 171-181). Springer, Cham.
Farmer research networks	Farmer research networks are an association of farmer groups, working together with research and development organisations to facilitate access to technical, institutional and financial support, which engages in research and is networked so as to share information and data. These groups aim to enhance farmers' access to new and old options in a scalable manner, whilst supporting a systematic learning process that allows insights on the interactions of options and contexts to be derived.		Nelson, R., Coe, R. and Haussmann, B.I., 2019. Farmer research networks as a strategy for matching diverse options and contexts in smallholder agriculture. *Experimental Agriculture*, *55*(S1), pp.125-144.
Living labs	The Living labs concept can be described as a research methodology for sensing, prototyping, validating and refining complex solutions in multiple		Arabska, E., Shopova, I. and Dimitrova, V., 2014. Living labs in

	and evolving real life contexts (Mabrouki *et al*., 2010). However, other academics have defined them as open innovation infrastructures shared by several stakeholders which provide a novel approach to foster innovative thinking within a user-centric environment (French *et al*., 2013). These labs aim to support actors such as SMEs by offering a neutral arena where stakeholders can meet and co-develop innovations in real-world contexts. They have also been noted to promote an alternative innovation paradigm in which the end-user's role shifts from research object to a pro-active position where user communities are co-creators of product and service innovations. According to Nyström *et al.* (2014), "Living labs can be defined as physical regions or virtual realities where stakeholders form public–private–people partnerships (4Ps) of firms, public agencies, universities, institutes, and users that collaborate to create, prototype, validate, and test new technologies, services, products, and systems in real-life contexts". Nyström *et al*. (2014) describes the labs as enabler for users to shape innovation in their daily real-life environments by not only acting as sources of information, but also testers, developers, and designers of innovation on an equal basis with the others in the living lab.		integrated agriculture and tourism activities: Driving innovation for sustainable rural development. *Zeszyty Naukowe Małopolskiej Wyższej Szkoły Ekonomicznej w Tarnowie*, *25*(2), pp.27-35. Nyström, A.G., Leminen, S., Westerlund, M. and Kortelainen, M., 2014. Actor roles and role patterns influencing innovation in living labs. *Industrial Marketing Management*, *43*(3), pp.483-495.
Farmer field schools (for innovation)	Farmer field schools are an education and extension approach which utilises a participatory method of learning, technology development, dissemination, experiential learning, and a group approach to facilitate farmers in making decisions, solving problems, and learning new techniques. According to Waddington and White (2014), farmer field schools' function as a special approach that uses elements of pedagogy and social capital to influence agricultural practices, and includes a growing emphasis on empowerment.		Davis, K., Nkonya, E., Kato, E., Mekonnen, D.A., Odendo, M., Miiro, R. and Nkuba, J., 2012. Impact of farmer field schools on agricultural productivity and poverty in East Africa. *World development*, *40*(2), pp.402-413. Waddington, H. and White, H.,

			2014. Farmer field schools. *From Agricultural Extension to Adult Education. Systematic Review Summary*, *1*.
Value chain development (for innovation)	The term "value chain" can be described as the sequence of interlinked agents and markets that transforms inputs and services into products with attributes that consumers are prepared to purchase. Within this context, value chain development refers to a type of intervention that aims to address poverty through improved linkages between businesses and poor households within a value chain. The concept represents an important change in thinking about development and the relationships among agricultural producers, traders, processors, and consumers. Value chain development for innovation can be seen as a process by which individuals or organisations master and implement the design and production of goods and services that are new to them, irrespective of whether they are new to their competitors, their country, or the world (World Bank, 2012, p. 2).		Devaux, A., Torero, M., Donovan, J. and Horton, D., 2018. Agricultural innovation and inclusive value-chain development: a review. *Journal of Agribusiness in Developing and Emerging Economies*.
Incubators	Incubators stimulate and manage the flow of knowledge and technology amongst universities, research and development institutions, companies and markets; they facilitate the creation and growth of innovation-based companies through incubation and spin-off processes; and provide other value-added services together with high quality space and facilities. They function as the bridge between universities, research and companies and are seen as the 'translators' of the often-different language and different interests of the academics and the entrepreneurs (Monkman, 2010). Agribusiness incubators are institutions which seek to turn barriers into opportunities, to harness knowledge and information infrastructures as underlying mechanisms to encourage demand-driven research and for-profit		Ozor, N., 2013. The role of agribusiness innovation incubation for Africa's development. *African Journal of Science, Technology, Innovation and Development*, *5*(3), pp.242-249.

	entrepreneurship.		
Accelerators (and pitch events)	According to some authors (Gliedt et al. 2018; Hausberg and Korreck 2018), accelerators are described as a type of incubator which functions on a significantly smaller scale and with far less institutional support depending on the services they provide to their start-up users. Accelerators are characterised by a much shorter time of their support programs when compared to incubators. They are not designed to provide physical resources or office space over a long period of time for start-ups, are less focused on venture capitalists as next step of finance, and aim to encourage business development through the provision of intensive time-limited support (Miller and Bound 2011; Pauwels et al., 2016).	Incubators	Crișan, E.L., Salanță, I.I., Beleiu, I.N., Bordean, O.N. and Bunduchi, R., 2019. A systematic literature review on accelerators. The Journal of Technology Transfer, pp.1-28.
Brokers / intermediaries	An agricultural broker according to Cai *et al*. (2011) is defined as, '*a natural person, legal person and other economic organisation who is engaged in intermediary, commission agency or brokerage, in order to promote re-combination of agricultural resources, for the purpose of a commission in the agricultural economic activities'*. The agricultural broker often functions in an active, independent middle position and does not possess commodity, instead uses their resources, knowledge, information, capital, networks, and exclusive supply and marketing connections for principal or related parties. In the context of the supermarket supply chain, the agricultural broker functions as the connection between farmers and supermarkets in order to provide an effective long-term supply and demand relationship in which win-win outcomes are archived. As a systematic intermediary, innovation brokers are responsible for building appropriate linkages in agricultural innovations systems, and facilitate the interactions of multiple stakeholders within the innovation system (Klerkx *et al*., 2009).	• Innovation broker • Agricultural broker	Cai, S.Y., Fang, X., Wang, Z. and Pu, X.J., 2011. Research on Supply Chain Operation of Connecting Agriculture with Supermarkets Based on Agricultural Brokers System. *Asian Agricultural Research*, *3*(1812-2016-143563), pp.107-115. Klerkx, L., Hall, A. and Leeuwis, C., 2009. Strengthening agricultural innovation capacity: are innovation brokers the answer?. *International Journal of Agricultural Resources, Governance and Ecology*, *8*(5-6),

			pp.409-438.

Annexure 2: Websites to be searched for case studies and project reports

Name of organisation	Web address	Detail about project documentation
African development bank	https://www.afdb.org/en	Selected projects - but would need to look for innovation
Alliance for a green revolution in Africa	https://agra.org/	Search for innovation and find calls for innovation grants https://agra.org/resource-library/more-publications/
Asia Pacific Rural and Agricultural Credit Association	https://www.apraca.org/	Various documents in knowledge library
Australian Centre for International Agricultural Research	https://www.aciar.gov.au/	Indo-pacific region, Project documents
Belgian development cooperation	https://www.enabel.be/content/enabel-grants	Some agric projects and some innovation - under Stories
Brazilian Agricultural Research Corporation (Embrapa)	https://www.embrapa.br/en/international	Key innovation ecosystems page
Canada international development research center	https://www.idrc.ca/en	Many innovation projects
Collaborative Crop research Program	https://www.ccrp.org/	Many documented cases - farmer researcher networks plus other
Ford Foundation	https://www.fordfoundation.org/about/library/	https://www.fordfoundation.org/about/library/
Fund for innovation and transformation	https://fit-fit.ca/	https://fit-fit.ca/innovative-solutions/#filter=.agriculture case studies - focus on innovation
German federal ministry for economic cooperation and development	https://www.giz.de/en/workingwithgiz/134.html	Many innovation projects
Global development network	https://www.gdn.int/	https://www.gdn.int/global-research-competition

Global environment facility	https://www.thegef.org/	Good project info - some funded by UNDP
ICIMOD	https://www.icimod.org/who-we-are/	https://lib.icimod.org/search-guide
International Fund for Agricultural Development (IFAD)	https://www.ifad.org/en/web/ioe/home	Project evaluation reports, Books and publications
Japan International research center for agricultural sciences	https://www.jircas.go.jp/en	JIRCAS - Some English publications, Africa and Asia
Misereor	https://www.misereor.org/	https://www.misereor.org/publications/food-security-and-agriculture
Netherlands Ministry of foreign affairs	https://www.government.nl/ministries/ministry-of-foreign-affairs	Can search for agricultural innovation
South Asian network for development and environmental (SANDEE)	https://www.icimod.org/initiative/sandee-publications/	https://www.sandeeonline.org/
Swiss agency for development and cooperation	https://www.enterprise-development.org/agency-strategies-and-coordination/switzerland/	https://www.eda.admin.ch/dam/deza/en/documents/die-deza/strategie/Leitbild_Privatsektor_2021-2024_EN.pdf
Swiss Re Foundation	https://www.swissrefoundation.org/	Entrepreneurs for resilience awards; testing micro-insurance schemes - how? Digital innovations
UN Environment progam	https://www.unep.org/	Knowledge repository - can search on agricultural innovation
USA - Africa Development Foundation	https://usadf.gov/	Impact stories
USA - Inter-American Foundation	https://www.iaf.gov/	Latin America and Caribbean / Grassroots Development Journal
USA Department of Agriculture	https://www.fas.usda.gov/programs/scientific-cooperation-research-program	Scientific Cooperation Research Program -relevant focal areas
Volkswagen Foundation	https://www.volkswagenstiftung.de/en/news-press/news/innovation-prize-for-two-africa-cooperations%C2%A0	the German-African Innovation Promotion Prize
World Bank	https://www.worldbank.org/en/home	List of projects -can search on agricultural innovation

Annexure 3: Questions for the key informant interviews (draft)

Introduction to yourself and the CoSAI study

Have you had any direct experience with using the following instruments to support agricultural innovation?

Type of instrument	**Direct use**	**Knowledge of use**
Challenge funds Farmer driven innovation support funds Innovation funds/grants Prizes/awards Insurance for innovation Innovation platforms Innovation hubs Farmer research networks Living labs Farmer field schools Incubators Accelerators (and pitch events) Results based funding contracts (for innovation) Brokering / intermediaries (e.g. producer – service provide linkages)		

Please select two instruments that you think are most effective and answer the following questions:

Instrument 1

Name of instrument: _____

Context in which effective:

_____
_____
_____

Factors to consider (design issues, drawbacks, etc):

_____
_____
_____

Please send any links to relevant documents such as project reports.

_____
_____
_____

Instrument 2

Name of instrument: _____

Context in which effective:

_____
_____
_____

Factors to consider (design issues, drawbacks, etc):

_____
_____
_____

Please send any links to relevant documents such as project reports.

_____
_____
_____