Transdisciplinarity in Citizen Science, Grassroots Innovations and Disaster Risk Communication in Developing Countries

Seminar 2 Report

Developmental, Capable and Ethical State Research Division

Report prepared by

The Human Sciences Research Council

(HSRC)

to

The Department of Science, Technology and Innovation

(DSTI)

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1. Background

In October 2015, the Human Sciences Research Council (HSRC) was commissioned by the then Department of Science and Technology (DST) (now the Department of Science, Technology and Innovation- DSTI) for hosting of Government Cluster Policy Workshops (GCPWs) to build upon the previous DST Human and Social Development (HSD) contract awarded to the then Research Use and Impact Assessment Unit (RIA) of the HSRC in 2011.

The proposal had two connected components:

- GCPWs, which focused on the research and policy needs of government and held with the Directors-General of the Social and Economic clusters;
- Science seminars, which highlighted research at previously historically disadvantaged universities, facilitating dialogue across departments and faculties, and which addressed policy concerns.

While the three-year contract covered the period from 1 April 2015 to 31 March 2018, it was only signed at the beginning of 2016. This meant that HSRC effectively had only two years to meet the contract deliverables. When the contract ended, HSRC expectedly had outstanding deliverables, which also meant that a significant proportion of the contract budget had not been spent. DST agreed to grant HSRC a no-cost extension from 1 April 2018 to 31 March 2020, to meet its outstanding obligations in terms of the original contract. In addition, the HSRC committed to publishing a book on IID. The book emerged from the realisation that, while the concept of inclusive innovation for development (IID) has become increasingly prominent in academic, research, and innovation policy circles, it is fraught with contestations around its conceptualisations, as well as how it is constructed and framed. It was therefore imperative to unpack the concept of IID and what it means in a country such as South Africa, that is characterised by endemic poverty, deepening inequality, and a high level of unemployment. It was envisaged that the multi-pronged South African perspective of the book would offer a critical analysis of IID in South Africa that would enhance the understanding of this phenomenon with respect to theory and practice. It would provide fact-based understanding of IID as well as its opportunities and challenges. This information should be of great value to policymakers, decision-makers, innovation practitioners, researchers, and government officials, post-graduate students in the field of innovation.

The editors acquired the services of a South African-based open-access publisher AOSIS (African Online Scientific Information System) to publish the book. AOSIS publishes open access books written by scholars for fellow scholars (AOSIS Books), for students and practitioners (ITUTA Books) or for the general public (KROTOA Books).

The book an edited volume entitled: *Innovation for inclusive development and transformation in South Africa* edited by Charles Hongoro, Cyril Adonis, and Konosoang Sobane, was available online on 23 February 2023(https://books.aosis.co.za/index.php/ob/catalog/view/384/559/7586-1). This was made possible through generous funding obtained from the DSTI [Funding Agreement: DST/CON 0277/2015].

1.1 Book Description

Science, technology and innovation (STI) are generally accepted as major drivers of growth and can help address poverty and directly improve the well-being of different groups in society. However, many countries are facing the challenge of attaining economic growth that is socially inclusive and equitable. Under certain circumstances, STI can reinforce social exclusion and inequalities. *Innovation for inclusive development and transformation in South Africa* explores discourses around directionality and the importance of IID to address policy questions that explore the relationship between IID with inequalities in income and opportunities.

The book seeks to unpack the concept of IID and what it means in a country such as South Africa – a country characterised by endemic poverty, deepening inequality and high levels of unemployment. It contributes to the understanding of IID and its application in low and middle-income countries, and it uses specific examples to demonstrate technical and contextual factors that affect its impact. Most studies on IID have been done in developed countries, and the intention of this book is to fill this knowledge gap and raise an understanding of the enablers and constraints of its application.

This book is based on a series of chapters that are authored based on a systematic review of relevant literature, empirical work on local innovations and a series of policy dialogues on IID, which the Human Sciences Research Council (HSRC) conducted. It has been written by various scholars who understand the various notions of IID and how it can possibly be applied and the relevance of such knowledge for policy, programmes and practice. The book's target audience is academics and specialists in the field of various notions of IID.

The first seminar was held on 7 August at CSIR Convention Centre and on 30 October 2024, the HSRC in collaboration with DSTI convened the second seminar at the Sheraton Hotel in Pretoria. The seminar explored the intersection of transdisciplinarity, citizen science, grassroots inclusive innovations and disaster risk communication in developing countries. The seminar was based on two chapters from the IID book. Professor Cyril Adonis from UNISA who also co-edited the book was a Programme Director.

The attendees included valuable HSRC stakeholders from the universities and government including the Department of Science, Technology and Innovation, the Department of Social

Development, the National Disaster Management Centre, the North West District Municipality, HSRC staff and other independent stakeholders.

2. Setting the Scene

Professor Cyril Adonis from UNISA and co-editor of the book was the Programme Director, provided introductory remarks.

Professor Narnia Bohler-Muller, DCES' Divisional Executive provided opening remarks on behalf of the HSRC. She highlighted that the HSRC with the support of the DSTI is at the forefront of research that seeks to strengthen social cohesion and create inclusive and resilient communities in South Africa. This could be achieved within the background of the Sustainable Development Goals, Africa Agenda 2063 and the South African National Development Plan, vision 2030. She emphasised a need to start making some contribution to the priorities of the 7th Administration and the Government of National Unity and remarked that, the first 100 days seem to have gone quite well. She further commented that over 226 million people globally are affected by disasters every year and most of them are living in developing countries and are poor, vulnerable, and marginalized. She reminded the audience that it has been repeatedly demonstrated that the most vulnerable in society are those with poor housing conditions, with minimal access to water, food and shelter and who face social and political discrimination.

Prof Bohler-Muller also drew from the experience of the United Nations International Strategy for disaster, risk management practitioners and policymakers. Noting how they have experienced challenges in understanding how to include vulnerable communities in disaster risk management. She concluded by expressing aspirations that the two chapters of the IID book that form the basis for the seminar tackle the critical issue of transdisciplinarity when addressing disaster, risk management, and communication from a bottom-up approach and not a top-down approach and that the seminar would interrogate the rationale for the inclusion of localized innovation in developing and implementing disaster risk communication initiatives, best practices and opportunities for implementation. The core message of the seminar should be that there be local level implementation where vulnerable communities must be involved in risk reduction to ensure that recurring disasters in their lives and livelihoods are prevented or at least mitigated.

Mr Ephraim Phalafala, S&T for Sustainable Human Settlements Deputy Director at DSTI's presentation firstly focussed on the relationship between the HSRC and DSTI highlighting the following:

DSTI signed the contract with the HSRC in 2015/16 financial year. Since then, they hosted seminars on the following topics,

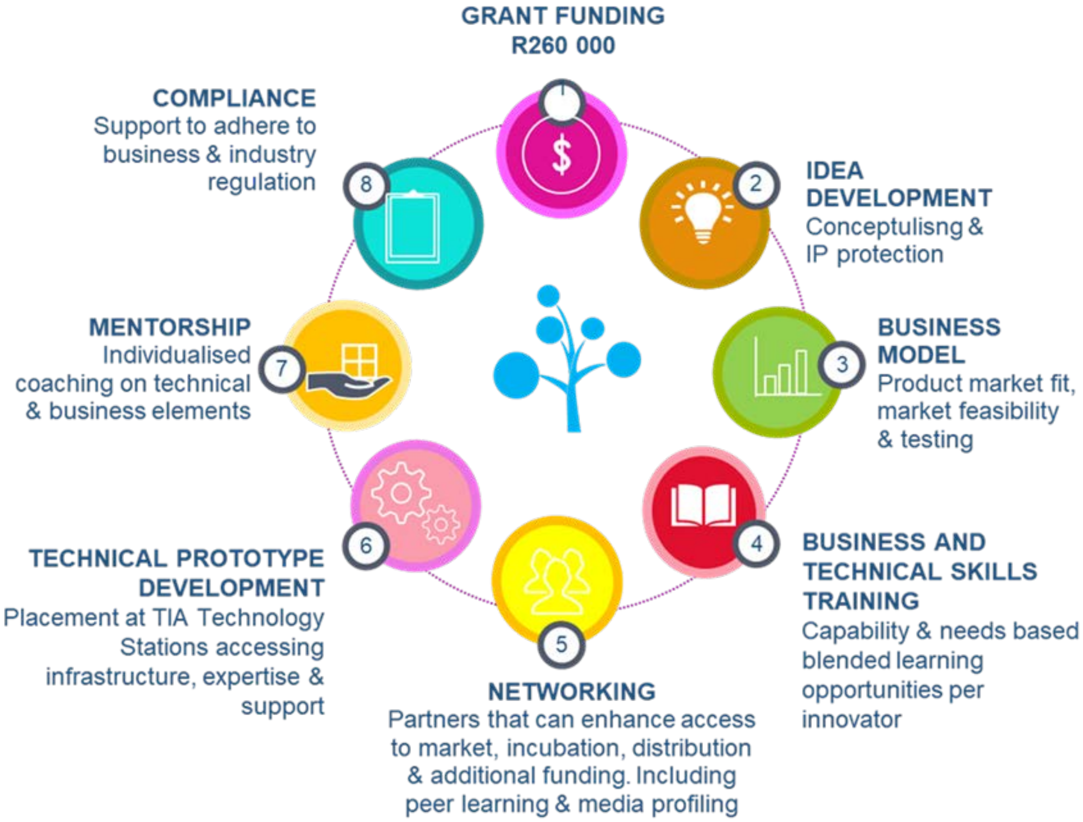
- Innovative Sanitation Technologies
- ICTs in Basic Education,
- Conceptualization of Innovation for Inclusive Development,
- Innovative Building Technologies in the context of human settlements,
- Disaster and Risk Management / Communication in the Municipal context
- Grassroots Innovations
- ICTs in Agriculture, and
- Intellectual Property Protection for Grassroots Innovators

HSRC submitted a proposal to develop the IID Book out of these seminar topics and more. He also highlighted DSTI's Strategic outcomes mentioning that the DSTI has adopted the following outcomes for the MTEF period (2019 TO 2024)

- Outcome 1: A transformed, inclusive, responsive and coherent NSI
- Outcome 2: Human capabilities and skills for the economy and for development
- Outcome 3: Increased knowledge generation and innovation outputs

- Outcome 4: Knowledge utilisation for economic development in (a) revitalising existing traditional industries (b) stimulating R&D-led industrial development.
- Outcome 5: Knowledge utilisation for inclusive development
- Outcome 6: Innovation in support of a capable and developmental state

2.1.1 A snapshot of the DSTI Grassroots Programme and some of the ongoing projects was presented



South African Sanitation Technology Demonstration Programme

SASTEP – Non Sewered Sanitation Technologies in Schools

No	Name of School/Area/Site	Province	Number of leaners/users	Innovation/Technology	Progress to date
1	Tsholetsega Primary School	GP	1301	Clear technology	In operation for 38 months
2	Tirelo Farm School	NW	128	Clear technology	Operational, asset transfer underway
3	Esikhisini Primary School	GP	735	Water efficient cistern and urinal	Operational
4	Olievenhoutbosch Primary School	GP	1164	Water efficient cistern and urinal	Operational
5	Barkerville Primary School	EC	194	Arumloo and dewdrop	Operational, monitoring completed, and project being finalized.
6	Celinkungu Primary School	EC	154	Envirosan Eazi split	Project Finalized and asset transfer underway
7	Dlungwana Senior Primary School	EC	158	Aqounic Tank Treatment system	Construction in progress.
8	Khanyisani Junior Primary School	EC	174	USF generator	System was handed over, monitoring in progress
9	Marialinden JSS	EC	447	Clear technology	Commissioned and handed over
10	Qhobosheaneng primary school	EC	237	Arumloo and dewdrop	Commissioned and handed over
11	Madonsi Combined School	KZN	916	Clear technology	Commissioned and hand over planned for January 2024

VVISDP ENERGY PROJECTS

sanedi
South African National Energy Development Institute (SOC) Ltd.

CITY OF CAPE TOWN

GEYSER TAG

- An electronic device that provides real-time info on the geyser condition.
- Provides energy consumption of geyser and detects any leakages.
- Data is transmitted from the geyser via GSM network which links to an App that receives real time data.

CITY OF CAPE TOWN

FBAE COUPON

- A coupon subsidy system is to be developed for households to buy FBAE.
- LPG dispensed in metered amounts poorer households can buy what they can afford.
- They can also access Solar Home Systems (SHS) for basic lighting; media use; and cellphone charging.

DRAKENSTEIN MUNICIPALITY

SMART METERS

- Installation of Smart Meters will improve meter reading and billing, with the unit offering two-way communication.
- Metering system automation reduces errors, avoids physical reading; time wasted gaining access to properties; and real time data.
- Provides integration of data, data analysis, and use for decision making.

CITY OF MBOMBELA

RENEWABLE ENERGY

- Mbombela aims to pilot Renewable Energy and Alternative Fuel Sources.
- One option looks at distributed mini hydro electric generation technology.
- The other involves PV Rooftop installation on the municipal building and sports field.

RUSTENBURG MUNICIPALITY

LOAD MANAGEMENT

- Geyser ripple control devices to reduce the impact OF load shedding.
- Streetlight load control technologies to reduce impact.
- 4 IR electricity - fault detection and system protection.

uMHLATHUZE MUNICIPALITY

CCTV CAMERAS

- Cameras to be installed in Richards Bay; Empangeni; Esikhaleni, Vulindlela, Enseleni, and Mzingazi.
- Fiber and radio infrastructure will be deployed for additional Wi-Fi hotspots so communities can connect and use municipal services.

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He concluded by demonstrating a spatial footprint of IID projects as shown in Table above.

3 Keynote addresses

3.1 Keynote Address 1 by Dr Hester du Plessis: A transdisciplinarity approach to citizen science and grassroots innovation

Dr du Plessis started by defining key concepts and meanings of transdisciplinarity.

- That transdisciplinarity recognises the complex character of realities which calls for more than one discipline in terms of interpretation and application.
- That this approach also acknowledges the need for joint problem-solving mechanisms.
- It acknowledges problem solving through 'collectives' and global 'networks'.
- That it seeks to stimulate the unification of epistemologies (knowledge) and knowledge paradigms.
- Moreover, it is a movement in a direction towards case studies and problem-solving solutions and
- That it bridges the social and science gap, as argued in the SDGs, the IPPC and UNESCO reports.

3.1.1 Science Literacy

Science literacy includes the understanding of unifying science concepts and processes, science as inquiry, physical science, life science, earth and space sciences, science and technology, science in personal and social perspectives and history and nature of science.

There are 3 types of science literacy:

- **'Practical scientific literacy'** which indicates the possession of a kind of scientific knowledge that is used to solve practical problems.

- ‘**Civic scientific literacy’** enables citizens to become aware of science and the scientific process in order to participate in the politically democratic processes.
- **‘Cultural scientific literacy’** which is the knowledge and appreciation of science as a major human achievement and a cultural heritage.

3.1.2 Grassroots Innovation

- Grassroots innovation requires a complex environment to flourish. The reason for this is that innovation, at grassroots level, involves multiple transdisciplinary interactions, between often very polarised conceptual domains.
- The activities related to grassroots innovation have the tendency to blur the boundaries between informal and formal knowledge, based on individual and professional actions versus organised corporate action.
- It sometimes even infringes upon local and global interests and is restricted by social and economic limitations.
- *Government support role: Grassroots innovation is supported by the South African DSTI), in collaboration with its entity, the Technology Innovation Agency (TIA). Government officially launched the Grassroots Innovation Program (GIP) in March 2019.
- GIP is designed to identify and support innovators and inventors who do not have a formal education or access to formal innovation facilities.
- The DSI White Paper on Science, Technology and Innovation of 2019 commits South Africa to an inclusive and responsive National System of Innovation (NSI) that is able to support all kinds of innovations.

3.1.3 Concluding remarks

Transdisciplinarity comes with tremendous intellectual and practical benefits. It can also lead to a different way of being scholars; more humble but more creative, more aware of, and responsible for our own creativity, more appreciative of intellectual history and also open to criticisms of the undoubted limitations of our approaches, eager to listen each other, to exploring new avenues of inquiry and new possibilities for teaching and learning, opening avenues for collaboration, and mobilizing the transformative potential of inquiry and scholarship in this time of global crisis’.

3.2 Presentation 2 by Drs Wilfred Lunga and Konosoang Sobane: The value of developing inclusive innovations for disaster risk communication and management in developing countries

The presentation started with the question:

Why has disaster risk communication become an essential element of community resilience and response strategies? Dr Lunga then presented a few African thinkers who have inspired innovative, inclusive, and transdisciplinary approaches including Cabral, Nkrumah, Nyerere, Maathai and Eze.

This was followed by a presentation of the latest technological innovations in communication; the origin of inclusive innovations in risk communication; and practical guidance in designing inclusive disaster risk communication.

3.2.1 Technological innovations advanced in recent years

This focused on the following 3 key issues.

1. The social network service/system (SNS) also known as 'social media'.
2. Disaster prevention radio and the telemetry system.
3. Disaster resilient materials.

3.2.2 Origin of inclusive innovations in risk communication

Dr Lunga covered the following topics in his presentation.

- Community based disaster risk reduction/risk management,
- Hazard mapping,
- National platforms for DRR,
- Safe schools and hospitals,
- Post-disaster assessments,
- Crowdsourcing, traditional practices and evacuation behaviours and
- Indigenous Disaster Risk Reduction technology

His main message was that the community has a big role to play in risk communication; however, they need to be capacitated to do so effectively and harness local knowledge.

3.2.3 Practical guidelines on designing inclusive disaster risk communication

He went on to talk about guidelines for inclusive disaster risk communication which included the following:

- Understand Diverse Audiences Identify Target Groups:
- Use Clear and Accessible Language Simplify Language:
- Adopt Various Communication Formats Accessible
- Engage with Communities Participatory Approaches
- Implement Feedback Mechanisms Collect Feedback:
- Prioritize Timeliness and Relevance Immediate Information Dissemination:
- Build Partnerships Collaborate with Local Organizations

The main message from this was that the communication design must be multi-pronged given the various target audiences, and that collaboration of relevant stakeholders is critical to effective risk communication.

3.2.4 Other considerations for effective Disaster Risk communication

Other considerations for effective disaster risk communication include:

- Cultural Sensitivity and Ethical Considerations
- Local Engagement and Trust
- Capacity building, and

- Institutional recognition of Indigenous knowledge

Without due consideration of these issues, many disaster risk communication strategies that have been shown to work elsewhere might not work in other communities. Local communities that have been affected by disasters for generations also have local ways of dealing with them, and any new interventions must consider this.

3.2.6 Conclusion

The Webinar inputs and discussions can be distilled to the following points:

First, the need to use innovation and new technologies in Disaster Risk Reduction is greater in the face of an increase in the occurrence of disasters.

Second, to increase innovations, it is important to simply work with all people including those who are worse off and vulnerable and share innovations.

Third, there is a need to understand that innovations go beyond high technological products to include approaches as excellent innovations for adoption.

Fourth, transdisciplinary approaches in citizen science, grassroots innovation, and disaster risk communication emphasize the significance of local engagement, valuing indigenous knowledge, fostering capacity building, effective communication, and institutional support.

4. Way Forward

Given the evidence shared by the DSTI on the impact of the IID book on some of its programmes and activities, it was agreed that HSRC prepares an impact story that systematically captures the research to programme and practice links.

It was also agreed that the HSRC prepares a funding proposal on building capacity for community resilience in collaboration with Municipalities (Municipal/ Community interventions). This proposal will build on existing work on the impact of climate change in Limpopo, with an emphasis on utilisation of grassroot innovations, local knowledges and augmenting DSTI various interventions at local level.

5. Appendices

- Seminar advert
- Programme with presenters' profiles