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Reflections on demonstrating development-oriented innovations in South Africa

Innovation demonstrations are an important means of first-time testing and fine-tuning innovations outside of the laboratory. Through demonstrations, scientists shift the focus from research and innovation quality and novelty, towards issues of acceptability, usability and value-addition for different social groups. It is erroneous to assume that usefulness will follow simply because the technical aspects of the innovation meet scientific standards. South Africa is intent on improving its science, technology and innovation (STI) capabilities, and promoting the use of STI to achieve social development outcomes. Science councils and universities are developing technologies aimed at improving and expanding access to basic municipal services and recent practical work involves demonstrating these among the local poor in rural areas as a means to promote inclusive development.[1] These innovations include water, sanitation and energy technologies. They are often combined with information and communication technologies (ICTs) or require access to ICTs to ensure that they function.

Using provisional results from the monitoring and evaluation of the Innovation Partnership for Rural Development Programme (IPRDP), we reflect on some of the challenges observed in relation to implementing the innovation demonstration process. These challenges are drawn from the perspective of the multiple actors involved in the innovation demonstration process using a range of methods. Our observations point to the need for scientists and researchers to seriously consider how we go about demonstrating innovations to local government, ward councillors and household members. A well-considered process of demonstration planning and implementation could reduce some of the challenges outlined here. The demonstration and introduction of new ideas is unlikely to be met with initial overwhelming acceptance. There is always resistance to change; however, such opposition can be mitigated through careful planning and collaboration.

Policy context

In 2011 the Department of Science and Technology (DST) initiated the IPRD working group to enhance the links and foster a culture of knowledge sharing among organisations working in rural areas. The partnership aims to increase the awareness about innovation and its potentials for rural development, thereby creating an enabling environment for innovation dissemination.[1] The historical innovation focus in rural areas has largely been in agriculture, mining, health, education and ICT.[2,3] The shift to basic services is novel. The DST sees itself responsible for brokering long-term networks and bridging the gap among the innovating agencies, such as science councils, universities and private firms, and national departments, local government, non-governmental organisations and communities, to demonstrate the prowess of innovation within a national system of innovation approach.[4] The IPRDP, launched in 2013, was the first rural-focused and large-scale innovation demonstration programme under the auspices of the IPRD.[5] Its aim is to demonstrate eight innovations at 31 field sites, across 23 of the 27 distressed municipalities in South Africa. Distressed municipalities are those identified by the Department of Rural Development and Land Reform as being the poorest in terms of revenue and services.[6] Key state actors in the rural development space include the Department of Rural Development and Land Reform, Department of Cooperative Governance and Traditional Affairs and the South African Local Government Association.

The IPRDP emphasises innovation for inclusive development through a focus on meeting basic service needs of poor settlements and households. Pro-poor approaches to innovation include ideas of participation by and inclusion of the poor in innovation processes[7], echoed in the initial research and innovation agenda proposed in the 1996 White Paper on Science and Technology and reiterated in the 2017 Draft White Paper on Science and Technology.[8,9] However, the notion of inclusiveness is not clearly articulated in the latter document and paradoxically proposes a definition in which active participation is deemed unnecessary, as long as the poor are included as recipients of innovations.[9] Such a definition goes against recent robust definitions that include the poor as active contributors to the innovation process and/or innovators in their own right.[10-13] It also contradicts citizen participation as accentuated in the National Development Plan (NDP).[14,15] Inclusion in the context of inclusive growth and development is about 'social processes and dynamics of change, and not simply distributional outcomes'[15]. The importance of human agency must be emphasised.[16] The poor are not simply observers or passive recipients but are rather the 'shapers' of change through 'bottom-up' participation.[15] The September 2018 Draft White Paper on Science, Technology and Innovation provides little assurance of what inclusiveness means and how it can be practised, although it does mention users and grassroots innovators. It is shrouded in policy ambiguity.

The IPRDP Programme

The preliminary identification of suitable service delivery innovations was based on a call for proposals by the DST. Innovators presented selected proposals to a group of district municipal representatives. Municipal representatives selected the innovations they wanted but quite soon after the presentations some withdrew their interest, often for financial reasons or because they realised the demonstrations did not meet their needs. Most of the technologies presented had been developed under the auspices of the Water Research Commission and the Council for Scientific and Industrial Research, in collaboration with various local universities. These institutions subsequently managed aspects of the demonstrations. Ultimately, the DST, along with South African Local Government Association, Department of Cooperative Governance and Traditional Affairs and the science councils, selected the 23 districts and the technologies. The innovators visited the districts and engaged with officials but left the selection of households and villages to the local municipalities, ward councillors and the community leaders who went about the process in a manner that seemed to benefit allies and others less needy. For example, households with standpipes in the yards

were selected as beneficiaries of the pour-flush latrine that was intended for households with limited access to water so that they would recycle water to flush the toilet.

The eight sanitation, water and energy demonstrations are presented in Table 1. They are characterised as being recently developed/adapted but not yet demonstrated outside the research station/laboratory. The implication is that their compatibility with the social and physical landscape (mainly rural areas) in which they are to be used is untested.

Methodology

Since 2015 we have worked as researchers monitoring and evaluating the design, process, ongoing implementation and impact of the IPRDP in eight districts. The study was approved by the Human Sciences Research Council Ethics Committee (REC 9-20-05-15). Methods included 14 semi-structured interviews with programme planners, project managers, demonstrators and officials. Evaluators reviewed reports related to the programme. Two workshops with innovators (science councils, universities and private firms), state departments and municipal officials elicited accounts of progress and the challenges experienced. During and after these workshops the researchers engaged in consensual discussions with participants. Field visits enabled discussions with beneficiaries at municipal, ward and household level as well as observations of the demonstration process. More than 64 municipal officials were interviewed. For impact evaluation purposes, two rounds of household surveys were conducted: a retrospective baseline survey with 857 households in March 2017 and a follow-up survey with 653 of the original households in March 2018. The surveys were done across 15 settlements, incorporating intervention sites and control sites (where no intervention occurred) as well as beneficiary and non-beneficiary households.

Findings and discussion

Inclusiveness

Reviews of the various demonstration project plans for each innovation indicate that, in most cases, systematic needs assessments were not conducted, local participation was limited and monitoring and evaluation plans were non-existent.[17] The results of the community impact survey, targeted at households who received IPRDP technologies, concur by revealing that there has been little, if any, consultation with community members about their immediate needs in relation to basic services, let alone participation in the design of the technologies. Where needs assessments were undertaken, no clear framework was used, thereby restricting consistency, scope and focus. Accessing the recipients at household and village level was usually left to the local government structures and community leadership. However, these institutions lack the technical knowledge of the technology and the likelihood of its suitability at village and household levels. One should also not presume that these institutions speak on behalf of community members. This approach is a huge departure from ideals of active citizenry promoted by the National Development Plan[14,15], or user inclusion as advocated in inclusive and open innovation scholarship[18], all of which are necessary for democratising innovation-driven development[13].

Suitability

The 2017 baseline survey shows that the IPRDP innovations fit with household service delivery needs – flush latrines, improved sanitation, clean water and energy supply – at a very broad level. Yet at a more site-specific level, the demonstrated technologies do not coincide with local circumstances, including the physical environment and the available infrastructure necessary for these technologies to work effectively. In one or two cases it was found that sites were geologically unsuitable and the proposed demonstrations were relocated – a resource-consuming process. Some energy regulatory requirements were only realised at the time of demonstration, thus causing delays. The failure to conduct robust needs assessments overlooks current solutions used by local people to address their immediate problems or how, as potential users, they are able to aid the design of proposed innovations. It also fails to ensure a fit between the residents and the technologies. In some instances, the pour-flush latrine was provided to households with standpipes in their yards rather than households without water. Some selected households then 'adapted' the system by adding a cistern and connecting a hosepipe to it, which risks destroying the leach pits and causing environmental and health threats. In some instances, the smart geysers could not be coupled to the smart technology because the necessary ICT infrastructure was not available. The point-of-use water filter was readily accepted but took the longest time to demonstrate because of challenges in regard to manufacturing at scale.

A number of challenges prevailed at municipal level. Many municipalities had their own version of CARRS (Corrective Action Request and Report System) and preferred this customised software that catered for their specific requirements rather than a generic system. The integration of

Table 1: Descriptions of the IPRDP Innovations and the level of demonstration

Service sector	Innovation: Technology	Description	Level of use
Sanitation	Pour-flush sanitation	Toilets that make use of two leach pits and about 2 L of greywater for flushing.	Household level
	Integrated Algae Ponding System (IAPS)	A low-cost system that uses fermentation, algae and extra ponds to enhance the natural purification processes that occur in conventional wastewater ponds.	Municipal level
	High Rate Algae Ponding System (HRAPS)	Ponds use improved algae to remove pollutants from waste water at an enormous cost saving compared to the conventional ponding process. Treated effluent can be used for aquaculture and irrigation.	Municipal and village level
Water	Corrective Action Request and Report System (CARRS)	An ICT-based platform used for the reporting and monitoring of water system faults.	Municipal and village level
	Water Safety Planning (WSP) and Wastewater Risk Abatement Planning (W2RAP)	A risk management, planning and reporting system to ensure drinking water quality and manage wastewater treatment.	Municipal level
	Point-of-use Water Filtration System	A water filtration system using a bucket and a special membrane.	Household level
Energy	Smart geysers	Software application linked to hardware on geysers to reduce water leakages and optimise energy consumption.	Household level
	Small-scale hydropower	Technology to generate electricity using stream velocity and floating turbines.	Village level

CARRS and existing municipal systems with expanded functionalities proved problematic. User involvement in the design of CARRS would have been advantageous. A similar problem was encountered with the ponding systems. IAPS (Integrated Algae Ponding System) became very expensive as the construction of more ponds was required. The High Rate Algae Ponding System (HRAPS) team encountered local resistance when they attempted to promote the use of treated effluent for irrigation purposes and the algae for animal feed. While the innovations are commendable, many do not fit with the requirements of the intended users.

Networks and collaboration

Distances affected the establishment of strong national–local networks and lines of communication. Site visits were irregular and this undermined collaboration. There were misunderstandings between the innovators and the beneficiaries about their responsibilities and the overall purpose of the demonstrations. The scientific purpose of the demonstrations was to test and showcase new technologies, deemed as improvements because they were environmentally friendly, cost-effective and efficient. However, municipal officials prioritised their Integrated Development Plan responsibilities, often at odds with new technologies.

Innovating agencies expressed frustration at the general lack of engagement and leadership, low-levels of technical capacity, delays caused by bureaucratic processes and administrative ineptitude at local government level.[6,19,20] Moreover, in these distressed municipalities, a lack of revenue prevents the municipalities from providing basic services.[6]

Elsewhere, one could explore the debate about whether any of these innovations are likely to be adopted unless they are virtually cost free and require little maintenance. However, it is sufficient to say that scientists should ensure that demonstrated innovations are appropriate, useful and add value to the services required in a specific social and physical environment.

Conclusion

So how do we improve our demonstration of innovations to ensure maximum social buy-in and value-additions? For innovations to succeed in contributing to improved service delivery (result in adoption) they must be linked to local priority needs of municipalities, settlements and households. We acknowledge that certain bulk services may require little to no user participation or needs assessments and that user participation in the design of basic services might not be practical in all instances. Nevertheless, when the development of innovations for the benefit of the poor is promoted as inclusive innovation or innovation for inclusive development, thorough user needs assessments and social research are required at the very least. This means that needs assessments, environmental feasibility assessments and the identification of recipients must be comprehensive, structured and undertaken in conjunction with local residents and officials. Strong lines of communication must be opened and sustained with all actors. The innovations demonstrated must be aligned with the local Integrated Development Plan priorities. If Integrated Development Plans follow the same robust inclusive processes proposed for other assessments, then there should be limited conflicts of interest amongst the innovators, officials and residents.

One of the key challenges of the IPRDP was its extensive scale and costs of operation – 31 demonstration sites of various sizes across 23 districts. This scale caused logistical problems and delays, it fragmented rather than strengthened relationships, and was extremely costly. Lack of knowledge about the conditions at many sites meant that innovators had limited understanding of local circumstances. An alternative is to conduct these first-time demonstrations at a much smaller scale and closer to the innovators. This approach would enable regular contact with stakeholders and the development of capacity-building programmes to empower officials to improve their innovative and service delivery performance. Proximity would also facilitate sustained communication. Many peripheral areas around the eight metropolitan municipalities in South Africa provide destinations for demonstrations. They offer similar situations of income and service poverty as those in the IPRDP municipalities. Yet some have the necessary infrastructure to ensure that the technologies can be demonstrated. Proximity and availability of infrastructure enable a more practical, cost-effective and resourceful means of demonstrating and field-testing new innovations. Experience from these 'closer' encounters can then inform the roll out to other more distant areas.

To conclude, better needs assessments that include social scientists, increased participation of the users, smaller demonstration programmes and closer field sites would facilitate improved understanding, better collaboration and communication, and stronger networks, enabling us to ultimately achieve more effective innovation and development rather than less in the long term.

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References

1. Hart T, Jacobs P, Letty B, Ramoroka K, Mangqalaza J, Mhula A, et al. Promoting Innovation for inclusive rural transformation in South Africa. HSRC Policy Brief October 2014. Cape Town: Human Sciences Research Council; 2014.
2. Wild S. Innovation: Shaping South Africa through science. Johannesburg: Macmillan; 2015.
3. Gulube SM, Wynchank S. Telemedicine in South Africa: Success or failure? J Telemed Telecare. 2001;7(Suppl 2):47–49. https://doi.org/10.1258/1357633011937100
4. Booyens I, Hart T. Innovation in a changing South Africa: Extant debates and critical reflections. In: Knight J, Rogerson CM, editors. The geography of South Africa – contemporary changes and new directions. Cham: Springer; 2018. p. 269–277. https://doi.org/10.1007/978-3-319-94974-1_29
5. South African Department of Science and Technology (DST). Innovation Partnership for Rural Development Business Plan: Socioeconomic partnerships. General budget support submitted to Department of National Treasury Republic of South Africa. Pretoria: DST; 2013.
6. Ndabeni L, Rogerson CM, Booyens I. Innovation and local economic development policy in the global South: New South Africa perspectives. Local Econ. 2016;31(1&2):299–311. https://doi.org/10.1177/0269094215621865
7. Lorentzen J, Mohamed R. To each according to his (or her) needs: Where are the poor in innovation studies? Paper presented at: The 7th Globelics International Conference; 2009 October 6–9; Dakar, Senegal.
8. South African Department of Arts, Culture, Science and Technology (DACST). White Paper on Science and Technology. Pretoria: Government Printer; 1996.
9. South African Department of Science and Technology (DST). Draft White Paper on Science and Technology. Pretoria: DST; 2017.
10. Schillo RS, Robinson RM. Inclusive innovation in developed countries: The who, what, why and how. Technol Innov Manage Rev. 2017;7(7):34–46. https://doi.org/10.22215/timreview/1089
11. Organisation for Economic Co-operation and Development (OECD). Innovation policies for inclusive development: Scaling up inclusive innovations. Paris: OECD; 2015.
12. Petersen I, Kruss G, Rust JA, Tele A. Is South Africa ready for 'Innovation for Inclusive Development'? A systematic review across national policy. Cape Town: Human Sciences Research Council; 2016.

13. Von Hippel E. Democratising innovation. Cambridge, MA: MIT Press; 2005.

14. National Planning Commission (NPC). Our future – make it work: National Development Plan 2030. Pretoria: NPC, The Presidency, Republic of South Africa; 2012.

15. Turok I, Visagie J. Inclusive urban development in South Africa: What does it mean and how can it be measured. IDS Working Paper volume 2018 no. 512. Brighton: Institute of Development Studies; 2018.

16. Hart T, Ramoroka KH, Jacobs PT, Letty B. Revealing the social face of innovation. S Afr J Sci. 2015;111(9/10):109–114. http://dx.doi.org/10.17159/sajs.2015/20140126

17. Human Sciences Research Council (HSRC). Innovation dynamics report 1: Implementation process of service delivery technologies in priority municipalities: A preliminary overview. Pretoria: HSRC; 2016.

18. Lundvall B-A. Innovation as an interactive process: User-producer interaction to the national system of innovation. Afr J Sci Technol Innov Develop. 2009;1(2&3):10–34.

19. Nel E, Binns T, Bek D. Misplaced expectations? The experience of applied local economic development in post-apartheid South Africa. Local Econ. 2009;24(3):224–237. https://doi.org/10.1080/02690940902895877

20. Rogerson CM. Reframing place-based economic development in South Africa: The example of local economic development. Bull Geogr Socio-Econ Ser. 2014;24:203–218. https://doi.org/10.2478/bog-2014-0023