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WHOSE INNOVATION COUNTS? EXPLORING THE INTERFACE BETWEEN INFORMAL AND FORMAL INNOVATION IN SEED DEVELOPMENT IN SOUTH AFRICA

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Exploring the interface between informal and formal innovation in seed development in South Africa

Seed innovation in South Africa has historically been interpreted to encompass formal systems of plant breeding, with traits for improving farming efficiency and performance of a handful of major crops a central focus of research and development. In line with global developments, a striking and continuing trend has been the escalation of private sector interest in agricultural research and an associated decline in public sector research (Kirsten et al, 2010). Nearly all R&D done by the private sector has been based on crops and traits important to large-scale commercial farmers, with little attention paid to crops important to small-scale farmers, who often represent poorer farming communities. There has also been an upward trend of patents or plant breeder's rights, which restrict access to new varieties by emerging or small-scale farmers.

So-called informal seed systems, in contrast, have been sorely neglected in the formal innovation system, despite the well-recognised role that informal innovation plays in local seed and agricultural systems in many farming communities throughout Southern Africa. While these have been eroded by decades of policies and laws that have promoted the interests of commercial farmers and multinational seed companies, there is now increasing recognition that traditional agricultural knowledge and seed systems are critical for food security, enabling rural communities to cope in a world faced with rapid environmental change, conflicts over dwindling natural resources, and crises

of economic, social and ecological sustainability. At the same time, there is also growing interest and investment in crop wild relatives and so-called orphan crop species[1], due in part to the fact that they contain important genes for stress resistance and improved productivity, especially in the context of climate change, population growth, shrinking areas of arable and, and the rapid erosion of agrobiodiversity.

Linking this newfound interest in orphan crop species to traditional market-centred innovation systems raises questions about how such systems respond to the alternative organizational forms and divergent contexts of the small famer communities that use, innovate and develop orphan crops, as well as the different resource base and drivers of innovation that function in these settings. In this paper we explore the growing interface between informal and formal systems of seed innovation, with a particular focus on responsible or societally desirable innovation, and the policy implications for how R&D is pursued and funded in South Africa.

An initial review of available data shows an interesting division of R&D expenditure per sector. While science councils and government contribute over 65% of the total funding that goes towards agricultural research in the country, business enterprises contribute only 22% (HSRC CesTII Survey 2010). As a percentage of R&D funding for natural sciences as a whole (of which agricultural science receives only 7% percent), it is government, the science councils and the not-for-profit sectors that contribute substantially more of their R&D budgets to agricultural science. This paints an interesting picture of how innovation in agricultural science is viewed in the country and who values it most. A survey conducted by Kirsten et al (2010) showed that although private sector funding of agricultural sciences had increased over the past decade, this had mainly been in the form of 'adaptive research'- research that is done on adapting foreign technologies for the local market rather than developing new technologies to meet uniquely local needs.

This macro-view of the South African agricultural R&D space leaves many questions that need to be answered in order to identify for whom the innovation system is working. Even in the formal seed system, there is little to no aggregate data on what crops are being researched, what types of farming systems this applies to, and whether any research extends further into the agricultural value chain. Analysing innovation in the informal seed system is equally challenging, requiring approaches that go beyond the use of traditional metrics. The importance of scale in these different innovation processes is critical to consider because factors will be weighted differently depending on which level of the system one is analysing. Recent groups working on "Transitions" have tried to

[1] Orphan crops is the term we use to refer to plant species that have both been neglected by scientific research as well as underutilized species that have not yet reached their full potential in certain locations.

understand how different levels within the innovation system speak to each other (See Seyfrang and Smith 2007). They use the concept of the 'niche' as a small, protected space at the local level where innovation can occur free from the dominant set of rules set by the incumbent network - what they refer to as the 'regime.' The 'landscape' is the environment in which these regimes evolve. The 'grassroots innovation' that happens within these protective 'niches' requires different analytical tools because it differs substantially from the dominant regime in terms of its organizational form, the resource base supporting the innovation, the presence of divergent contextual situations and the mechanisms driving such innovation (Hargreaves et al 2013: 2). Such grassroots innovation can be likened more to innovation processes taking place in the informal seed system than those in the formal seed system. However, with increasing interest of the formal seed innovation system (the dominant regime) in the grassroots innovation of the informal seed system there is a need to see how best to bridge these two different worlds to ensure that innovation is socially just and responsible.

There are many constraints to bridging these two systems, including the fact the incentives for innovation are so different. The traditional seed innovation system functions on financial incentives to innovate and secure returns on R&D investment, typically through intellectual property rights protection and license agreements. In contrast, seed innovation in traditional communities has developed over centuries, often driven by non-monetary benefits and often intangible incentives such as reciprocity, cultural norms, taste and climate adaptability.

A more responsible formal innovation system requires new incentive structures that integrate social benefit, environmental sustainability, agrobiodiversity and food and nutrition security and that is more inclusive in serving the needs of resource-poor farmers. This shift necessitates a transformation in the formal seed innovation regime through the process of 'disruptive innovation'- innovation that meets the needs of those not served by the dominant institutional and organizational systems (Hwang and Christensen 2007). Westley et al (2011) provide an interesting framework through which such innovation could occur through the process of intermediary actors that are able to bridge the micro and macro-scales. These 'institutional entrepreneurs' or shadow networks are able to harness the diversity and social learning processes that take place at the local level in order to experiment within the wider system.

Such processes of disruption require an enabling environment in order to overcome the constraints to transformation imposed by the dominant regime and this is where we return to the policy implications of recognizing these different types of innovation. As a starting point, there is a need for inter- and trans-disciplinary research approaches that can bridges local communities and formal

science, for example through co-innovation processes like conservation breeding schemes (See Galluzzi et al, forthcoming). At the broader level, regulatory and legislative tools can be employed to alter the institutional framework that reinforces the dominant regime. 'Reflexive' law and regulations - those that reflect social expectations - are less rule-bound and recognize that as long as basic certain procedural and organizational norms are respected, participants can arrive at positive outcomes and self-correct (Westley et al 2011: 769). Less revolutionary tools include a shift in governmental budgetary allocations and investments to support 'disruptive' innovation. This in turn will impact on the institutions governing higher education and science councils, forcing them to adjust their own practices.

This paper presents preliminary approaches about the relationship between formal and informal seed innovation systems in South Africa. It forms part of an ongoing research process to elucidate factors that contribute towards building a more just and sustainable seed innovation system in South Africa, and that makes use of the diverse knowledge bases in the country in order to improve the country's food security and make it more adaptive to potential future stresses.

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