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Contrasting innovation networks in smallholder agricultural producer cooperatives: Insights from the Niayes Region of Senegal

Graeme Reed*, Gordon M. Hickey

Department of Natural Resource Sciences, Faculty of Agricultural and Environmental Sciences, McGill University, Macdonald Campus 21, 111 Lakeshore Road, Ste-Anne-de-Bellevue H9× 3V9, Canada

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ABSTRACT

Despite growing support for agricultural cooperatives as mechanisms for rural development, relatively little is known about how innovation spreads through, or is created within, the formal structure of a cooperative. This paper provides an 'inside' look at the social relationships operating within two agricultural cooperatives in rural Senegal (one well-functioning and the other poorly-functioning), focusing on self-reported innovation sharing and provisioning between members. Findings indicate that for both cooperatives, innovation was predominantly spread through formal vertical linkages (i.e. between hierarchal representatives), but was significantly controlled by key actors in leadership positions, resulting in large disparities in the innovation potential of different cooperative members. Social Network Analysis can help inform the design and evaluation of agricultural cooperatives by shifting the analysis to individual actors within the formal structure, potentially enabling new opportunities for enhanced cooperation to be identified and collectively strengthened.

1. Introduction

Increasingly, farmers, policymakers, academics, and donors have been identifying agricultural cooperatives as essential institutional vehicles to facilitate information exchange, improve collaboration, innovation, and market access for smallholder farmers (Bernard & Spielman, 2009; Fischer & Qaim, 2012). As a result, cooperatives have been receiving increased financial and other support from development and government agencies to facilitate agricultural system innovation and poverty alleviation (Johnson & Shaw, 2014). On the African continent, cooperatives have been experiencing a revival on both theoretical and practical grounds; following decades of often inefficient and unsustainable practices by colonial and post-independence governments (see Deininger, 1995; Swinnen & Maertens, 2007). According to Develtere, Pollet, and Wanyama, 2008, approximately one in seven Africans now belong to a cooperative, with countries such as Senegal, Rwanda, and Egypt possessing membership rates of over ten percent. These 'contemporary' cooperatives have been reported to benefit smallholders economically by reducing transaction costs, increasing market access, and improving bargaining power (Bernard & Taffesse, 2012). For example, Markelova and Mwangi (2009) argued that by harnessing collective action, cooperatives could help smallholder farmers aggregate their surplus output, pool both tangible and intangible resources, generate economies of scale and scope in marketing, and strengthen their bargaining position to improve their place in the market (Blokland & Gouët, 2007; Collion & Rondot, 1998). Further, agricultural cooperatives can simplify marketing and values by directly bypassing intermediaries and lowering horizontal and vertical coordination costs (Shiferaw, Okello, & Reddy, 2009). However, despite the broad international support, academic research on cooperatives has revealed both failures (see Hill, Bernard, & Dewina, 2008) and successes (see Bernard, Taffesse, & Gabre-Madhin, 2008; Okello, Narrod, & Roy, 2011), raising questions concerning their ability to facilitate positive and sustainable innovation amongst their members.

Agricultural system innovation involves bringing new ideas, practices, or processes into diverse smallholder farming systems (Klerkx et al., 2011; Spielman, Davis, Negash, & Ayele, 2011). Such systems *"consist of a wide range of actors from the public, private, and civil sector to bring new products, new processes, and new forms of organization into economic use, together with the institutions and policies that affect the way different agents interact, share, access, and exchange and use knowledge"* (World Bank, 2008). In this context, agricultural innovation is not only concerned with new technologies, but also with alternative ways of organizing: including

* Corresponding author.
E-mail addresses: graeme.reed@mail.mcgill.ca (G. Reed), gordon.hickey@mcgill.ca (G.M. Hickey).

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institutions, markets, labour, gender relations, and the distribution of benefits (Leeuwis & Ban, 2004) in order to facilitate joint learning, create new institutional arrangements and practices (Klerkx, Hall, & Leeuwis, 2009; Sumberg, 2005; van Rijn, Bulte, & Adekunle, 2012). Although agricultural innovation studies at the regional and national levels are fairly numerous (for example: Borda-Rodriguez & Vicari, 2014; Saint Ville, Hickey, & Phillip, 2015), relatively few have addressed the smallholder innovation system at its most basic level – the producers. Examples in Sub-Saharan Africa include Spielman et al. (2011) who examined how social networks facilitate the transfer of knowledge between Ethiopian smallholders, and Raini, Zebitz and Hoffmann (2006) who used social network analysis as a tool to detect disparities in information flows among key agricultural actors in Kenya in the development of integrated pest management techniques for tomato cultivation, as well as others such as Hermans et al. (2013). With some exceptions (see Douthwaite, Carvajal, Alvarez, Claros, & Hernández, 2006), few of these studies have focused specifically on how innovation spreads within formal institutional structures, such as agricultural producer cooperatives. In this context, cooperatives have been identified as contributing to the innovation potential of smallholder farmers by: linking and bridging external actors (Clark, 2002; Gouet & Van Paassen, 2012), articulating technological needs and demands for skills (Kilelu, Klerkx, Leeuwis, & Hall, 2011), and creating and supporting new knowledge (Hall & Clark, 2010).

Within this discourse, an important knowledge gap relates to the activities of individual actors within agricultural co-operatives (members) and their relative roles in facilitating innovation (Markard & Truffer, 2008). Further, while a number of studies have reported the positive impacts of cooperative membership using economic indicators, including farm income, farm profits, technological adoption, and market participation (see Fischer & Qaim, 2012; Francesconi & Heerinck, 2010; Shiferaw et al., 2009), few have focused on the social dimension of cooperatives, including the distribution of benefits, social networks, and power hierarchies (Develtere, 1994). In particular, social networks are known to be essential for smallholders to access agricultural information and innovations (van Rijn et al., 2012), to manage risk and vulnerability (Woolcock & Narayan, 2000), and build adaptive capacity to withstand external shocks (Brown & Westaway, 2011). Previous research focusing on the social dimension of agricultural co-operatives has generally identified that social networks are either: a) the product or outcome of functioning cooperatives (see Majee & Hoyt, 2011; Majee, 2007; Richards & Reed, 2015); or b) a contributing factor to the re-popularization of cooperatives (see Myers, 2004). However, recent research has focused more on the external organizational linkages of co-operatives in the context of innovation (Novkovic & Holm, 2012), poverty reduction (Simmons & Birchall, 2008), and economic cooperation (Muthuma, 2011; Valentinov, 2004), but significantly less on the internal social networks and relationships operating within and underpinning cooperatives. Recognizing the importance of this knowledge gap, we sought to explore how the internal social organizational structure of cooperatives can influence their ability to spread agricultural innovation, focusing on two smallholder agricultural cooperatives operating in rural Senegal.

In what follows we provide a brief historical description of the cooperative movement in Senegal. We then outline our research methods, followed by detailed results and a discussion of their significance for research, policy and practice.

2. A brief history of agricultural cooperatives in Senegal

Agriculture is an important sector of Senegal's economy, employing approximately 73% of the population and comprising 16.6% of national GDP in 2013 (CNCR, 2014). Smallholders, who make up approximately 95% of the agriculture sector in Senegal, are primarily organized into producer cooperatives, which have experienced a tumultuous history over the last four decades (Republique of Senegal, 2014). The French colonial tradition of '*societies indigenes de prévoyance*' imposed centrally-organized cooperatives on Senegalese smallholders in order to support the growing of cotton and peanuts for export markets (CNCR, 2014; Johnson & Shaw, 2014). The first leaders of independent Senegal, Prime Minister Dia and President Senghor, believed that the cooperative movement would transform Senegalese politics into a self-managing socialism (Fall, 2008). However, this vision was not realized, with cooperatives instead becoming state-led and externally imposed (Sylla, 2006). In the period following independence (1960–1984), the government controlled, supervised, and distributed agricultural inputs and managed the marketing, storage and sale of farmer's production, leaving smallholders primarily responsible for cultivation (CNCR, 2014). In 1984, a radical change occurred in Senegal's cooperative system through the imposition of structural adjustment policies by the World Bank (Fall, 2008). The subsequent New Agricultural Policy (*Nouvelle Politique Agricole*) in 1984 brought economic liberalisation and the introduction of an Economic Interest Group (GIE), effectively eliminating the state's role in agriculture and ostracizing many smallholders and their livelihoods (Cissokho, 2008). Despite the state's withdrawal, a number of historical legacies have led to what Gellar (2005) argued as being "...unsuitable organizational modes, governance rules, and regulations" placed on rural associations, which have generally been seen as impeding smallholders' innovation capacity.

More recently, the cooperative movement in Senegal has experienced a revival in both national and regional policy frameworks. At the national level, the introduction of the Agro-Sylvo Pastoral Law in 2009 provided both legal and financial support for agricultural professionals to organize, strengthening agricultural cooperatives. Furthermore, the recent amendment and adoption of the Policy for Cooperatives in 2010 (*Politique de développement coopérative)* has provided an important update to the previous 1984 Cooperative Law. Regionally, the Senegalese government has also supported negotiations with the Uniform Act related to the Rights of Cooperative Societies of 2010 *(Acte Uniforme Relatif au Droit des Sociétés Coopératives)* held by the Organization for the Harmonization of Business Law in Africa, in order to help bolster cooperatives in the West African region.

3. Methods

Working within a multiple-case study research design (Creswell, 2013; Yin, 2003), we drew on both qualitative and quantitative methods to explore the role of social networks in agricultural cooperatives (and more specifically, their impact upon self-reported innovation and cooperative performance). Adopting a mixed-methods approach to data collection and analysis allowed us to increase the reliability of our findings through recursive data triangulation and methodological overlap (Harwell, 2011).

3.1. Study setting and case selection

On the western coast of Senegal lies a vital agro-ecological and economic region known as the Niayes (Fig. 1). The region is home to approximately 52% of the Senegalese population and produces up to 80% of Dakar's fresh agricultural produce (Dasylva, 2012; Touré & Seck, 2005). The predominant economic activity is horticulture production, with approximately 98% of this controlled by smallholder farmers (CNCR, 2014). As with other parts of Senegal, smallholders in the Niayes region face a wide range