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The more the merrier? Network portfolio size and innovation performance in Nigerian firms

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ABSTRACT

A positive relationship between firms' networking activities and innovativeness has been consistently established in the literature on innovation. However, studies considering different innovation types, and on developing countries are scarce. This paper addresses questions concerning the relationship between networking strategies and innovativeness of firms, using innovation survey data on Nigerian firms. Quantile regression is applied to trace the link between portfolio size and innovation at different levels of innovative success. The results show a positive relationship between a firm's innovation performance and the size of its networking portfolio. This relationship varies across different innovation types and with increasing innovation performance. The findings suggest that the widely accepted portfolio approach to external search for knowledge is not necessarily always the best—its utility depends on the firm's current level of innovative success. This poses a challenge for open innovation.

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1. Introduction

The locus of innovation has shifted away from the individual firm to the network within it is embedded (Powell et al., 1996). Here, a network is understood as a firm's set of relationships with other economic agents including suppliers and customers, universities, competitors and financial institutions (Pérez Pérez and Sanchez, 2002; Souitaris, 2001; von Hippel, 1988). Networks are important because of their role as a basic platform for knowledge diffusion. They are especially crucial in the knowledge-based global economy where change is rapid and no single firm can possibly possess all the knowledge and capabilities necessary to innovate (Chesbrough, 2003). In this regard, three important results are established in the existing innovation literature: first, the innovation landscape is now such that firms can no longer 'go it alone'; second, firms increasingly network with and draw upon multiple external sources to complement internally generated knowledge; and third, such networking enhances innovation

performance. By participating in networks or establishing external linkages, firms gain access to knowledge, lower transaction costs, division of labour, shared risks and higher probability of innovation success (Pittaway et al., 2004; Malerba and Nicholas, 2009). Several empirical contributions in the open innovation tradition have indeed shown that the use of external knowledge sources or collaboration partners tends to make firms more innovative (de Man and Duysters, 2005; Lee et al., 2010; Tomlinson, 2010). However, a better and more holistic understanding of the relationship between networking and innovation involves certain dimensions which are relatively under-explored in the existing literature.

Firms pursue different strategies to acquire knowledge relevant for innovation from several possible sources. These strategies could be formal, involving active participation in joint R&D and other technological innovation projects (Tether, 2002; WIPO, 2011). They could also be informal—simply 'talking to' actors as sources of information without any formal arrangements (von Hippel, 1987; Freitas et al., 2011). One major difference between these two approaches is that formal collaboration often involves pecuniary commitments which is not necessarily the case with informal knowledge sourcing. According to Pyka (1997, p. 201),

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'Informal networking means any action that can contribute to disclosure, dissemination, transmission and communication of knowledge. Many different methods such as talking, listening, showing, debating, etc. at different occasions such as exhibitions and conferences, and even telephone calls, can be employed in some haphazard way to convey and receive knowledge and the underlying concepts.' Networking strategies could also be intensive (implying 'depth' or intensive use of certain knowledge sources) or extensive (implying 'breadth' or the so-called 'portfolio' approach whereby the firm involves many actors) (Duysters and Lokshin, 2011). Studies have shown that breadth of knowledge sources improves innovation performance up to a certain limit (Amara and Landry, 2005; Laursen and Salter, 2006; Leiponen and Helfat, 2010). But, does this hold true at all levels of innovativeness? Dutta and Weiss (1997) tackled a similar question and indeed found variations in firms' pattern of partnership agreements as technological innovativeness increased. However, their analyses included only pecuniary partnerships and precluded any form of informal linkages. Besides, they were explicitly interested in the partnership agreements rather than the entities with whom these are formed.

In this paper we are interested in the link between networking strategies and a firm's level of innovativeness. Specifically, we examine the hypothesis that maintaining a larger portfolio of information or knowledge sources tends to be less relevant as a firm becomes more innovative. We operationalise the portfolio of sources with the notion of variety which refers to the number of different types of actors with whom a firm interacts either formally as collaborators or informally as information sources. We link these with innovation measures that take variations in firms' innovative success into account. By using broad definitions of innovation and distinguishing between two types (product and process), we also examine how the size of a firm's portfolio of sources varies in importance with its innovation strategy. In addressing these issues, the absorptive capacity of the firms is taken into account. Since the acquisition and exploitation of externally generated knowledge has associated costs, mostly in the form of learning and capacity building investments (Cohen and Levinthal, 1994), we expect that the absorptive capacity of firms will play a role in the network–innovation relationship.

This paper contributes to the literature in several ways. First, much of the evidence presently available is heavily tilted towards the developed country context. The empirical evidence on learning and collaboration for innovation in developing countries is thin, even though linkages are fully recognised as important determinants of knowledge (Goedhuys, 2007a). This is particularly true for Africa where, due to the scarcity of micro-level innovation data, most existing studies are either based on clusters or case studies. The analyses in this paper are based on the first CIS-type innovation survey dataset collected from manufacturing and service enterprises in Nigeria. The dataset allows us to operationalise the research questions by focusing on the ego-centric networks of the individual firms and not on the details of the sectoral or industrial network structure. Second, the distinction between formal and informal networking strategies enriches the analysis particularly because each of these modes of interaction would involve different levels of efforts by the firm. Finally, and very importantly, the paper draws attention to the inconsistent utility of network portfolio size for different innovation strategies. Practically, this result suggests that the relevance of a portfolio of partnerships depends on both the firm's current level of innovativeness and the type of innovation it seeks to implement. As one moves from the less innovative to highly innovative firms, the importance of portfolio size reduces significantly. This calls for caution in adopting open innovation. The results, being based on data from a latecomer context, are especially applicable in developing countries.

The rest of the paper is structured as follows. In the next section the characteristics of the empirical context are discussed. The hypotheses are laid out thereafter before describing the data and empirical approach. The results are then presented and discussed before the paper concludes in the final section.

2. The empirical context

2.1. Innovation and networking in the developing country context

Innovation is an interactive process requiring that innovators relate with a broad range of actors (Lundvall, 1992, 1988). It has also been argued to be a social process contingent upon the institutional structures within which it is embedded (Oyelaran-Oyeyinka, 2006). The popular innovation systems approach is actually based on the main idea that firms' innovativeness is strongly influenced by the institutional and socio-economic context within which they operate (Edquist, 2005; Lundvall et al., 2009). This is consistent with the notion of contingency which suggests that context matters. Different actions and outcomes occur under different conditions; thus, what works in one context might fail in another (Nooteboom, 1994). Consequently, one would not expect that the theoretical and empirical findings from the developed country context will be directly applicable to developing contexts.

In the context of developing countries innovation has been described as a process by which firms master and implement the design and production of goods and services which are new to them, irrespective of whether they are new to their competitors, their countries or the world (Mytelka, 2000). Hence, innovation takes place when products and processes that are new to a country or to an individual enterprise are commercially introduced, whether or not they are new to the world (UNCTAD, 2007). Consequently, minor and incremental changes including innovative approaches to organisation and marketing are a major part of innovation in developing countries. In particular, marketing and organisational innovations are of major importance for firms in this context (OECD, 2005).

One of the main sources of the differences between firms in developed and developing countries is the costly nature of innovation. In backward economies it is much more difficult to find sufficient financial, knowledge and institutional support for innovation (Schmitz, 1982). In the specific case of Nigeria, Biggs et al. (1995) as well as Radwan and Pellegrini (2010) noted that the context for manufacturing is of a harsh economic and institutional nature. One specific way by which firms substitute for their resource deficiencies is through networking. In a Nigerian case study, it was found that among all the potential sources of innovation information, the sectoral network institution created by the firms themselves particularly supported technological learning and innovativeness (Egbetokun et al., 2010). In Tanzania, the evidence presented by Goedhuys (2007a) showed that collaboration can support innovation in local firms in developing countries, even when they invest less in new machinery, training and R&D. In particular, these firms prove to be more embedded in the domestic industrial structure and also source information from the internet. Furthermore, in a comparative study of two enterprise clusters in Nigeria, Oyelaran-Oyeyinka (2005) reported that informal collaboration among enterprises (induced mainly by competitive forces) grew over time.

2.2. The private sector in Nigeria

Situating this study in the Nigerian context is attractive for several reasons. First, by every available estimate, the country is one of the very largest in Africa and is an economic powerhouse in

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