

Barriers to innovation: Evidence from South African manufacturing companies 2010–2012

Summary

Innovation is widely viewed as a driver of company competitiveness and, indeed, the economic growth of countries. However, in carrying out their innovation activities, companies often encounter obstacles. In this policy brief, we identify how South African manufacturing companies perceive the relevance of a range of barriers to their innovation activity (whether cost, market, knowledge or other barriers) and assess how these barriers impact companies with different characteristics. Building on this analysis, we consider ways for existing South African innovation support mechanisms to become more responsive to the innovation obstacles companies face.

Introduction

Innovation is widely viewed as a driver of company competitiveness and economic growth. For this reason, countries have taken great strides in promoting innovation by providing incentives for companies to innovate. At company level, a range of capabilities provide the necessary “ingredients” for successful innovation. These include the

capacity to access finance, understand market needs, recruit high-skilled staff and establish effective interactions. Empirical evidence suggests that innovative companies are able to devise strategies to limit the obstacles they encounter in the innovation process (Galia, Mancini & Morandi 2012).

For some companies, however, the attempt to innovate can be thwarted altogether if they are unable to overcome their obstacles and, as a result, they may not succeed in bringing new products or processes to market (D’Este *et al.* 2012). It is, therefore, essential to identify the different types of barriers to innovation so that policy makers can design supportive policies for companies (see Box 1).

Studies on barriers to innovation typically focus on the impact of obstacles on the propensity to innovate as well as the factors affecting perceptions of the importance of these barriers. Drawing on data from the South African Business Innovation Survey 2010–2012, this policy brief concerns factors affecting how companies perceive the importance of a range of barriers to innovation.¹

Box 1: Support for innovation in South Africa

The SEDA (Small Enterprise Development Agency) *Technology Programme* provides financial and non-financial support to small enterprises through technology transfer, quality services and business incubation. The *R&D (research and development) Tax Incentive Programme* offers a tax deduction as a means of encouraging locally registered businesses to invest in research and experimental development in South Africa. The tax incentive is available to companies of all sizes and in all sectors that perform R&D. The *Industry Innovation Partnership (IIP)* is another mechanism that provides co-funding to support organised industry partners in their R&D and innovation initiatives. The Department of Trade and Industry/Industrial Development Corporation's (dti/IDC) *Technology Venture Capital Programme* provides funding and business support to small companies in the early stages of the commercialisation of innovative products, processes and technologies across all sectors which have the potential to make a significant developmental impact on the South African economy.

One mechanism implemented to help grow South Africa's human resources for innovation is the *Technology and Human Development Programme (THRIP)*. THRIP is a triple-helix partnership programme of the dti that promotes collaboration between industry and academia/science councils, and is aimed at enhancing competitiveness in South African industries through new technology and skills generation. The Department of Science and Technology/Technology Innovation Agency's (DST/TIA) *Seed Fund* is also geared to assist researchers from higher education institutions, science councils, technology entrepreneurs and small, medium and micro-enterprises (SMMEs) to advance their research outputs and ideas towards proof of concept, development of prototypes and business cases. The *Technology Development Fund* assists innovators from higher education institutions, science councils, SMMEs and start-ups to advance technologies along the innovation value chain from proof of concept and prototyping to technology demonstration.

Commercialisation of innovation remains a big problem for entrepreneurs, start-ups and smaller companies. Efforts to address this include services provided to SMMEs and entrepreneurs for product development, product improvement, prototype development and a range of other engineering services. These services are offered through a network of 18 "technology stations" containing state-of-the-art equipment and experts in specialised fields located at universities of technology. The *Support Programme for Industrial Innovation* offers grants to all South African registered enterprises in manufacturing or services that are engaged in pre-competitive development activity leading to the commercialisation of the product, process, system or prototype being developed.

The *Manufacturing Competitiveness Enhancement Programme* offers financial support in the form of loans to manufacturing companies to stimulate their competitiveness and ensure job retention in the sector. The *Technological Localisation Programme* of the DST and Council for Scientific and Industrial Research is aimed at raising the capabilities of local manufacturing companies so that they can earn a share of recapitalisation investments and, ultimately, enter export markets as competitive suppliers in the original equipment manufacturer global supply chains.

A number of support mechanisms, both financial and non-financial, have been introduced to assist companies in accessing the range of resources needed to improve their products and processes (see Box 1). But are these mechanisms able to address the main barriers to innovation as perceived by manufacturing companies? We conclude this policy brief by considering concrete policy options for overcoming these barriers.

What determines companies' perceptions of barriers to innovation?

D'Este *et al.* (2012) draw a distinction between *revealed* and *detering* barriers

to innovation. Companies that face *detering barriers* view barriers as a hindrance to their pursuit of innovation, resulting in their lack of engagement in innovation activities. Financial barriers (internal and external funds), knowledge barriers (lack of qualified personnel and information on technology) and market barriers (uncertainty about or lack of demand for innovation products) all contribute to *detering* companies from engaging in innovation activities. It is possible that the same effects can be responsible for slowing down/delaying – though not completely stopping – companies from partaking in innovation activities. In this case, the *effects* are viewed as *revealed barriers* of innovation.

What are the various factors that can influence a company's perception of the relevance of cost, knowledge and market barriers to innovation? For instance, does it depend on the size of the company or whether it is part of an (inter)national group? Do start-ups perceive barriers differently? Are more innovative companies or companies that cooperate with other partners more likely to perceive knowledge factors as barriers to innovation? Table 1 provides a summary of an assessment of how cost, knowledge and market barriers are perceived, depending on these factors.

Table 1: Summary of findings of the assessment of factors influencing companies' perceptions about the relevance of barriers to innovation

Factor	TYPE OF BARRIERS			
	Cost	Knowledge	Market	Reasons not to innovate
<i>Number of innovation activities</i>		Companies with one or two innovation activities are more likely to perceive lack of qualified personnel as an important barrier to innovation than companies with no innovation activities.		
<i>Number of employees</i>		The higher the number of a company's employees, the higher the likelihood that the company will perceive lack of qualified personnel as an important barrier to innovation.		
<i>Part of a larger group</i>	Companies that are part of larger group perceive cost barriers as less relevant than companies that are not part of a larger group (lack of finance within or lack of funds from outside company/group).	Companies that are part of a larger group (foreign based) are less likely than companies that are not part of a larger group to perceive (1) lack of information on markets and (2) difficulty in finding cooperation partners for innovation as barriers to innovation.		Companies that are part of a larger group internationally are more likely to perceive that "no need to innovate due to prior innovations" is a barrier. Companies that are part of a larger group locally are less likely to see "no need to innovate because of no demand for innovation" as a barrier to innovation compared to companies that are not part of a larger group.
<i>Start-up (whether the company was established after 2007)</i>	Companies established after 2007 are more likely to perceive cost as a barrier than older companies (lack of finance within or lack of funds from outside company/group).			
<i>Extent of international cooperation</i>	Companies that cooperate with international partners have a higher likelihood to perceive innovation costs as too high.			
<i>Number of types of cooperation partners</i>	Companies with a higher number of types of partners are less likely to perceive innovation costs as too high.			
<i>Information source</i>	Companies rating internal and/or external sources of information as of high or medium importance perceive high innovation costs as a barrier to innovation compared to companies rating these sources as of low importance.	The more diverse a company's sources of information (external or both internal and external), the higher the likelihood that the company will perceive lack of qualified personnel as a barrier to innovation.	Companies that use diverse information sources (external) are more likely to perceive "market dominated by established enterprises" as a barrier to innovation when compared to companies that use only internal sources. Companies that use both internal and external sources of information are more likely to perceive "uncertain demand for innovative goods or services" as an innovation barrier.	Companies that use diverse sources of information (both external and internal) are less likely to hold the perception that there is "no need to innovate because of no demand for innovations" than companies that place less or no importance on all sources of information.

Why are barriers to innovation perceived differently?

Table 1 demonstrates that companies that are part of a larger group internationally are significantly less likely than companies that are not part of a group to perceive lack of funds as important barriers to innovation, whether from within or outside the enterprise or enterprise group. Notably, several authors (Hanson, Mataloni & Slaughter 2005; Desai, Fritz & Forbes 2008; Segarra-Blasco, Garcia-Quevedo & Teruel-Carrizosa 2008) found likewise in other contexts. Larger companies and those that are part of a larger group are also expected to have a lower likelihood of encountering deterring barriers compared to their smaller counterparts or those that are not part of a larger group (Hanson, Mataloni & Slaughter

2005; Desai, Fritz & Forbes 2008). This is indeed the case for South African manufacturing companies: both larger companies and those that are part of a larger group are less prone to report that knowledge barriers hamper their innovation activities or projects.

Companies with one or two innovation activities are more likely than companies with no innovation activities to regard lack of qualified personnel an important barrier to innovation. This confirms the observation by scholars (Mohnen & Rosa 2002; Baldwin & Lin, 2002) that the higher the degree of a company's innovation activity (in terms of the number of innovation activities), the higher the company's propensity to encounter revealed barriers to innovation. Companies with diversified sources of information for innovation

(either external or both internal and external) are less prone than companies that use only internal sources to assign high or medium importance to market barriers to innovation: they cite the fact that the market is dominated by established enterprises and uncertain demand for innovative goods or services.

Policy recommendations

In order for the South African government to assist the private sector to overcome the barriers to innovation identified in this brief, it is *vital to target the incentive mechanisms and support programmes to companies that have specific characteristics and to specific types of barriers*, as highlighted in Table 2 below.

Table 2: Evidence-based policy recommendations

TYPE OF BARRIER	KEY RESEARCH FINDING	POLICY RECOMMENDATION
<i>Cost barriers</i>	For a significant number of companies, financing their innovation efforts is a major barrier to deciding whether or not to embark on innovative activities. Start-ups experienced cost barriers more strongly than established companies. In addition, companies that have international and many other types of partnerships are less likely to experience cost barriers than those without such partnerships. This is probably because their international partners are able to assist them with funding.	The government has already created funding opportunities specifically focused on beneficiaries that include start-ups. These programmes include the Technology Development Fund, Commercialisation Support Fund, Technology Venture Capital, Support Programme for Industrial Innovation, Manufacturing Competitiveness Enhancement Programme and SEDA Technology Programme. The government should extend the reach and coverage of these programmes to more start-ups. The Strategic Partnership Programme should target companies with no international partnerships. Through the Technology Localisation Programme, the capabilities of local companies can be raised so that they can earn a share of recapitalisation investments, and ultimately enter export markets as competitive suppliers.
<i>Knowledge barriers</i>	Companies that innovate are more reliant on qualified personnel than companies that do not innovate. Innovative companies with high personnel numbers are also more likely to perceive lack of qualified personnel as a barrier to innovation.	The government has a number of strategies and programmes in place to address the lack of qualified human resources. These include the Human Capital Development Strategy for Research Innovation and Scholarship, and the DST/National Research Foundation's Internship Programme. To be more effective, these programmes should target large innovative companies. Fostering linkages, through the Technology and Human Development Programme, between large innovative companies and the beneficiaries of the DST/TIA Seed Fund (researchers from higher education institutions, science councils, technology entrepreneurs and SMMEs) could contribute to addressing the lack of skilled personnel so critical to innovation.
<i>Market barriers</i>	Diversifying information sources adds to the knowledge about innovation in the market and the world, and assists in the creation of more novel innovations.	Companies that use diverse sources of information should be included among those targeted for the R&D Tax Incentives Programme and the Technology Localisation Programme to encourage them to produce innovations with a high degree of novelty (i.e. innovation that is not only new to the company but also new to the market, and not just a first in South Africa but also new to the world of innovations). This would, in turn, assist these companies in overcoming market barriers to innovation.

References

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Endnote

1. The Business Innovation Survey 2010–2012 data allows for an evaluation of various factors that influence a company’s perceptions of different barriers to innovation. The results presented in this brief do not represent the population of all the business enterprises in South Africa, but only a sample of 128 manufacturing enterprises.

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