Policy Brief

Voeten, Jaap; Barasa, L.

Research and Development (R&D), Foreign Technology and Technical Efficiency in Developing Countries

Policy brief DFID/Tilburg University research: *'Enabling Innovation and Productivity Growth in Low Income Countries' (EIP-LIC)'.*
http://www.tilburguniversity.edu/dfid-innovation-and-growth/

Laura Basara (University of Nairobi) and Jaap Voeten (Tilburg University)

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In today's globalising world, economists and business community actors acknowledge the importance of innovation for productivity growth in supporting economic growth and development in low income countries. There is, however, little literature and theory on the relationship between firms' innovation activities and technical efficiency, which addresses how a firm converts inputs of capital and labour into outputs.

In the framework of a DFID-funded research project entitled *'Enabling Innovation and Productivity Growth in Low Income Countries (EIP-LIC)'*, a team of researchers from the University of Nairobi and Radboud University Nijmegen investigated how innovation activities including (i) internal R&D and (ii) adoption of foreign technology affect technical efficiency in firms in Kenya, Tanzania and Uganda. The original working paper is entitled 'R&D, Foreign Technology and Technical Efficiency in Developing Countries' (2015) by Laura Barasa, Peter Kimuyu, Bethuel Kinyanjui, Patrick Vermeulen and Joris Knoben[1].

Research findings

A key finding of the study is that internal R&D in the firms in Africa actually decreases technical efficiency. This is surprising because earlier studies suggest that inefficiency in manufacturing firms arises from a lack of organised R&D and low levels of investment in R&D. The adoption of foreign technology on the other hand has a positive, but not statistically significant, effect on technical efficiency. The combination of internal R&D and the adoption of foreign technology is found to significantly decrease technical efficiency.

The study further suggests that, in contrast to the robust level of human capital necessary to make the adoption of advanced foreign technology worthwhile, the low levels of human capital found in Africa indicate a lack of capacity for sophisticated R&D activities. Such levels require additional skills to achieve technical efficiency from R&D, in combination with foreign technology imported from more advanced economies.

There are several further explanations for the negative effect of R&D on technical efficiency. One possible explanation could be that investment in R&D has only a lagged impact on efficiency. Other explanations concern the types of innovation. The R&D in the surveyed companies appears not to focus on process

[1] The paper is accessible at the project's website (http://www.tilburguniversity.edu/dfid-innovation-and-growth)

innovation, with a view to increasing productivity and efficiency, but on other forms of innovation such as product innovation.

In factor-driven economies like Kenya, Uganda and Tanzania, such product innovations, following the introduction of technologies that develop products from locally available raw materials, are a common phenomenon.

This is confirmed in the EIP-LIC qualitative studies in Kenya and Tanzania, where innovating entrepreneurs seek to compete with imports of manufactured goods, which could be produced locally. The entrepreneurs indicate that they only require the technology enabling them to actually manufacture the product. This R&D motivation was much more relevant than increasing the efficiency of the production process in order to increase overall business efficiency.

Policy implications

Innovation promotion policies and programmes focusing on African realities could take a more nuanced view, taking the types of innovation into account. Before launching R&D promotion policies for instance, an initial focus on the adoption of foreign technology for product innovation may result in a more substantial increase in technical efficiency.

In factor-driven innovative companies, the greatest technical efficiency impact is to be expected from a focus on the adoption of foreign technology. Looking at this from the policy angle, government policies that foster engagement in R&D activities are most likely to be effective only if companies pursue a more process efficiency driven innovation model. Likewise, the internal absorptive capacity of enterprise hampers the optimal use of the R&D. Policies addressing the low rates of human capital are therefore a prerequisite to strengthen R&D, possibly complemented by the adoption of advanced foreign technology.

Another policy approach concerns the operational environment, which is an underlying factor behind the mismatch between internal R&D and efficiency in many African countries. The ‘usual suspects’ in the environment include limited access to credit and inputs, low levels of human capital, poor infrastructure and poor governance. Entrepreneurs aiming to increase efficiency through their R&D efforts may find such factors neutralise any positive benefit. This strengthens the argument that assuring basic conditions for economic development and institutional reforms is a prerequisite to focusing specifically on R&D.

This policy brief is the product of a research project funded by the British Department for International Development (DFID) entitled ‘Enabling Innovation and Productivity Growth in Low Income Countries (EIP-LIC)’. The project is implemented by Tilburg University (The Netherlands) and explores SME-level innovation in Low Income Countries (LICs) and factors that contribute to or limit its diffusion. Data collection and research collaborations took place in 10 African and Asian countries (Bangladesh, Ethiopia, Ghana, India, Indonesia, Kenya, Tanzania, South Africa, Uganda and Vietnam). The policy implications of this research are presented in a series of policy briefs, targeted at a broad audience of policy makers within governments, business and development agencies.