



Adoption of Innovations and Productivity of Enterprises in French-Speaking sub-Saharan Africa: Case of Cameroon, Senegal and Ivory Coast

*Tsambou André Dumas,
Ndokang Esone Ludwick,
Nganguem Armelle Olive and
Zobo Aline*

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Abstract

The productivity of firms is the result of many factors, including their ability to innovate. For most authors, innovation can be diversified into product, process, organization, and marketing innovation. The objective of this work is to highlight the impact of the adoption of innovations on firms' productivity in Cameroon, Senegal, and Ivory Coast. This work is based on the survey "Determinants of firms' performance in Francophone sub-Saharan Africa: The case of Cameroon, Ivory Coast and Senegal conducted among 1,897 companies (639 in Cameroon, 723 in Senegal and 535 in Ivory Coast) in 2014 by the International Development

Research Centre (IDRC). This work uses a methodology consisting of two blocks of equations with a repeating structure. By estimating these equations using the bivariate probit and Double Least Squares (DLS) methods, the study finds that technological and non-technological innovation are complementary and have important effects on productivity of firms. This complementarity is proof that technological innovation contributes better to productivity when it is accompanied by non-technological innovation and vice versa. However, the introduction of new products (or services) accompanied by new methods of organization and marketing have a greater effect on the productivity of enterprises.

Introduction

The new global economic vision and competition from new emerging markets is shifting the focus from production towards more sophisticated products with high technological content. It makes the capacity for innovation the fundamental element of competition. In this new era, economic systems are under increasing pressure, which finds its originality in the complexity of cross-border networks of flows of knowledge, ideas, and technologies. Integrating the race for innovation through the appropriation of these flows of technology and knowledge becomes a vital issue for businesses and nations. This innovation, which can be divided into technological innovation (product and process innovation) and non-technological innovation (organizational and marketing innovation), is a key factor in economic growth (Krugman, 1990).

This business-level growth can be achieved by putting more inputs to produce or reach higher production levels with the same amount of resources. Innovation does not increase the quantity of these resources but affects growth through the total productivity of factors of production (Mohnen and Hall, 2013). This productivity is an indicator that describes the relationship between production and the factors needed to obtain it. To increase it, the firm will opt in some cases for the launch of radically new products and in other cases for the repositioning of a product in new markets or for the reformulation of a product. This can be either to have the benefit of a change in the cost of inputs or to better adapt it to the needs of its market. If these new activities classified as innovation are mainly adopted, firms will certainly expect productivity growth (Polder et al., 2010). In this regard, attention is given to innovation performance to assess the effect of innovation on firm productivity.

Although many theoretical and empirical studies have shown the importance of innovation in improving business productivity, this issue remains an important one for firms working in developing countries. This importance is much more pronounced in African countries in general and Francophone Africa in that innovation has an impact on the structural transformation that leads to a dynamism of industrialization and

development. One of the problems of these countries is that the economic fabric is unattractive (Doing Business Ranking between the 147th and the 178th rank over nearly 185 countries for five years) and constituted of small and medium size enterprises (99% in Cameroon, 78% in Senegal, 98% in Ivory Coast) while they aim to become emerging countries (Horizon 2035 for Cameroon, 2035 for Senegal and 2020 for Ivory Coast) with the overall goal of achieving the status of new industrialized countries. To achieve these objectives, businesses, although most of them small and medium enterprises (SMEs), must create wealth, employment and constitute a potential power in the creation of the industrial fabric. To do so, these firms must have high value-added products that can drive long-term and sustained growth. While it is recognized that innovation is a fundamental factor in business dynamism and economic growth, its consideration in African economic policies is weak.

According to the AfDB (2014), for 70% of African countries, innovation is of fundamental importance for their development, whereas none of them invests 1% of Gross Domestic Product (GDP) for the financing of research and development (R&D), which is a source of innovation. The World Bank (2017) argues this finding of the AfDB by showing that Africa must focus on scientific, technological and innovation research to make progress. Although this ambition is displayed by almost all countries taking note of the national strategy, few of them succeed in making innovation a driving force for development. Although the level of investment in R&D, technology and innovation has evolved in English-speaking African countries (0.78% in Kenya, 1.06% in Malawi) and North Africa (0.79% in Morocco, 0.68% in Egypt, 0.71% in Tunisia), much remains to be done in French-speaking sub-Saharan African countries (0.34% in Cameroon, 0.51% in Senegal, 0.53% in Ivory Coast).

With this low rate of R&D, the high-value-added secondary sector activities contribute little to GDP. This contribution is 28.5% in Cameroon (INS, 2009), 20% in Ivory Coast (PND, 2015) and 24.1% in Senegal (PSE, 2014). The contribution of exports to GDP is significant (50% in Cameroon, 76% in Ivory Coast, 50% in Senegal) but the share of industrial products in these exports is very small (World Bank, 2015). This low contribution to GDP is certainly due to the productivity weakness that is the result of under-utilization of development research results in the case of Cameroon, as nearly 89% of firms do not operate or carry out any research and development activities within their establishments (INS, 2009) while innovation contributes 31% to firms' productivity.

To encourage firms to innovate, a Ministry of Scientific Research and Innovation has been created in these countries (in 2004 in Cameroon) with the mission: the elaboration and the follow-up of implementation of the national innovation policy, the implementation of a regulatory framework favourable to strategic innovation development and innovation transfer. In addition to this are initiatives related to the emergence goals such as: promoting technology in the industrial sector, strengthening the protection of industrial property rights, promoting support

structures for technological development; the creation of a support fund for scientific research and technological innovation in Ivory Coast whose objective is the creation of economic centres through transfer of technology; and the accession to the African Union (AU) initiative on science and technology, since 2006 (DSCE, 2009). With these initiatives, the current efforts are scattered, and the research centres work in isolation. Firms in different countries of this region manage to adopt technological and non-technological innovations developed elsewhere (Zanello et al., 2016).

These innovations are adaptive in nature with little chance of reversing the process of creating value. According to the World Bank's "Enterprise Survey", the adoption of these innovations developed elsewhere allowed 45% of companies surveyed in Cameroon in 2009 to introduce new or significantly improved products in the market (respectively 43% of those surveyed in Senegal in 2007, 28% of those surveyed in Ivory Coast in 2009). In addition, it also shows that 19% of these companies surveyed in Cameroon in 2009 use technology under license (9% of those in Senegal in 2007 and 6% of that of Ivory Coast in 2009). To achieve the ultimate goals of introducing new products and processes (technological innovation) in the market, companies usually combine the different activities leading to innovation. Egbetokum et al. (2016) show that the combination of innovation activities in developing countries will outperform those obtained if activities are conducted in isolation. In fact, these innovation activities should be mutually reinforcing, and their complementarity should allow companies that combine innovation inputs to achieve better results.

Due to these innovations, firms can move their production possibilities frontier and improve their performance. This study therefore has an objective to assess the effects of the adoption of innovations on firms' productivity in three countries in French-speaking sub-Saharan Africa (Cameroon, Senegal, and Ivory Coast). The main contribution of this study is that it performs an econometric analysis of the effect of the separated and joint adoption of different types of innovations on the productivity of labour in firms of the secondary and services sectors in Cameroon, Senegal, and Ivory Coast. It draws from recent studies. It classifies activities of innovation into two groups according to the Oslo Manual (2018): technological innovation and not technological innovation. This approach reveals the heterogeneities present in the adoption of innovation and their effects on productivity between sectors (González-Blanco et al., 2019). It also shows the existing complementarity between innovations and their effect on productivity.

Data source

The data used in this work comes from the survey on "Determinants of the Performance of Companies in Francophone Sub-Saharan Africa: The case of Cameroon, Ivory Coast and Senegal" conducted in 2014 by the International Development Research Centre (IDRC). The objective of this survey was to identify factors explaining the performance

of firms operating in these countries, with the aim of understanding not only if companies can effectively contribute to achieving the objectives of emergence, but also if they can survive the competition if these countries were to ratify the Economic Partnership Agreements (EPAs). Thus, firms were asked about their activities from 2011 to 2013 using the database available at the National Institute of Statistics (NIS) of each country. For instance, that of Cameroon relied on the business directory resulting from the General Business Census (RGE, 2009) and on the results of the Annual Survey of Enterprises (EAE) as a basis for selecting the firms (Chameni et Fomba, 2015).

From this base, the survey was carried out in three cities in each country. It covered the cities of Douala, Yaoundé and Bafoussam in Cameroon, the cities of Dakar, Thiès and Saint Louis in Senegal and the cities of Abidjan, San Pedro, and Daloa in Ivory Coast. The three cities chosen in each country account for nearly 70% of the total enterprise sample available in these countries (Diene et al., 2015). In Cameroon, for example, 68.132% of all businesses on the sampling frame are in these three cities (INS, 2009). The survey is stratified to provide an adequate representation of the 70% of all businesses in the sample frame available in these three cities.

In general, the questions did not show information year by year, but on the data of the firm between these three periods (2011 to 2013). These questions were related to the firm, the manager, and the employees.

Conclusion and policy implications

The objective of this work was to highlight the impact of the adoption of innovations on firms' productivity in Cameroon, Senegal, and Ivory Coast. For this purpose, we used a two-step methodology method. The first step consisted in using the bivariate probit method to obtain adjusted values of innovation instruments and identify the existing correlation between technological and non-technological innovation. This correlation allows us to have a presumption of complementarity between these two types of innovation. By instrumentation of the explanatory variables of innovation, we introduced the adjusted values of innovation into the productivity equation. This productivity measured by value added is estimated by double least squares per country and per industry. This method generally used in the literature (Polder et al., 2010; Aboal and Tacsir, 2017; Fu et al., 2018) has allowed us to highlight both the heterogeneity in the adoption of innovations and their effects on productivity, and to show the complementarities between these innovations.

In accordance with the literature, we found significant correlations between technological and non-technological innovation in both the secondary and tertiary sectors after controlling for explanatory variables. This correlation enhanced the

verification of the effect of joint adoption of technological and non-technological innovation on productivity. Thus, although the adoption of innovations is a complex process involving these two inputs, their adoption in isolation has differential effects on the productivity of the firm according to the sector of activity and the country of establishment. But this effect is much more improved in terms of the level of significance when both types of innovations are introduced together. This shows, for example, that introduction of new products (or services) or new modes of production contributes more to productivity when accompanied by new methods of organization and marketing. In addition, the use of ICT has been necessary for productivity, depending on the sector of activity and the country. Specifically, the use of Internet for business is more prone to economies of scale for Cameroonian and Ivorian firms.

Ultimately, since non-technological innovation has a positive and significant impact on productivity, government policies should promote the adoption of new management and marketing methods that could provide countries with another engine of economic growth. Moreover, since the simultaneous adoption of technological and non-technological innovation has a strong effect on productivity, policies to support innovation should consider the fact that technological and non-technological innovation must be adopted together to move from factor-led to innovation-led growth. This type of study could be extended to all French-speaking sub-Saharan African countries by assessing not only the effect of innovation adoption on productivity, but also on demand and the structure of the enterprise labour force to place innovation at the centre of development and as an essential ingredient of growth.

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Consortium pour la Recherche Economique en Afrique
Middle East Bank Towers,
3rd Floor, Jakaya Kikwete Road
Nairobi 00200, Kenya
Tel: +254 (0) 20 273 4150
communications@ercafrica.org