

INNOVATION POLICY IN BURKINA FASO PUBLIC PROCUREMENT AS A DEMAND-SIDE: THE NECESSITY TO SEARCH FOR FAILURE SOURCES

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ABSTRACT

In developed countries, public procurement is used to incentivize private companies to invest in innovation. But, governments of developing countries fail to do as much. However, since the size of the market in these countries is small, obtaining and carrying out large public contracts are opportunities that private companies must seize in order to innovate. This contribution analyzes the effect of public procurement on the incentive of private companies to innovate. We use primary data collected from private companies participating in large public tenders in Burkina Faso. The results obtained from probit model with instrumental variables (IV probit) show that public procurement effectively exerts positive externalities on the incentive of private companies to innovate. However, to further increase the influence of public procurement on the private companies' incentive to innovate, the government needs to ensure that the procurement process is free from imperfections such as corruption and information asymmetries that may limit their efficiency in this area.

Keywords: Public procurement, Innovation, Private Enterprises, Corruption, Burkina Faso

INTRODUCTION

Innovation is the major determinant of the growth and the competitiveness of enterprises (Schumpeter, 1934). Investment in research and development (R&D) has enabled Western and Asian countries to become the world best economic space that are more competitive and more dynamic. However, the majority of businesses in South Sahara African (SSA) countries are remained at the small and medium stage (Musa & Jibir, 2018; Georghiou et al., 2014). Private demand addressed to these companies is low, explaining a large part of their technical

inefficiency. Those of them who succeed in innovating and enriching themselves are those who obtain and carry out major public procurements (Nicholas & Fruhmann, 2014).

In each country, in order to offer social services to the population, or to build infrastructure, roads or to ensure the operation of public services, governments award orders to companies through calls for tenders. In order to be awarded these public contracts, companies must convince the public purchaser that they are the best (Geroski, 1990). This competitive game created by public tenders encourages companies to adopt innovative activities to present the most attractive offer in terms of quality and price. Thus, the competition exerts pressure to be the first to innovate in order to gain significant market shares. Therefore, it is the pursuit of super profit that drives entrepreneurs to invest in R&D (Beath et al., 1986).

When the size of the market for certain goods and services is small, public procurement can loosen this constraint by sufficiently increasing demand to a level that would encourage firms to invest in R&D (Gallup, 2011). Policy makers have always looked for ways to promote innovation in the private sector. Since social innovation incomes are higher than its private return, some authors (Georghiou et al., 2014; Guerzoni & Raiteri 2012) have recommended, in view of market failures, to use either tax reductions or R&D's subsidies in order to encourage private companies to innovate. However, Rothwell and Zegveld (1981) believe that tax reduction and R&D subsidy policies are less effective compared to public procurement as an instrument to encourage private companies to innovate.

The ability of public procurement to incentivize private firms to innovate is strongly influenced by the quality of institutions (Khan, 2005). So for that, public procurement can be used as an instrument of incentives for private companies' innovation, the government must clean up the business environment and fight against all kinds of imperfections that can reduce its effectiveness (Georghiou et al., 2014). The use of public procurement as a policy tool can also pose a lot of challenges for policy makers. In fact, the capacity of public procurement to encourage innovation is limited by the fact that it is multi-objective. The first objective of public procurement is to ensure the quality of government services. Innovation is therefore a secondary objective of public procurement (Cave & Frinking, 2003). Therefore, Uyarra, and Flanagan (2010) think that it is companies that must seize the opportunity offered by public procurement to improve and develop.

International experiences are diverse and contradictory showing that we still cannot use public procurement to encourage innovation from private companies successfully (Rolfstam, 2015). The majority of governments in developed countries today use public procurement to encourage companies to innovate (Uyara et al., 2014). In these countries, the question is no longer how to rationalize public procurement, but rather how to use it in such a way as to encourage innovation. It seems however that the governments of developing countries use them only to acquire the goods and services they need to run their administrations (Uyarra, 2013).

Nowadays, public procurement is seen as a powerful accelerator of the innovation in the private sector. Uyarra et al. (2014), however, believe that the information asymmetries (moral hazard and adverse selection) may prevent the public sector to act as an intelligent and informed applicant. For example, when state services that demand goods and services lack the capacity to control, companies that have this information are not encouraged to innovate. Similarly, when state services are adverse to risk, they will avoid ordering goods or products too complex characteristics which also reduces incentives to innovate (Dius, 2008). From the analysis of (Edler et al., 2006) and those of (Edquist & Hemmen, 2000), it appears that when the process of

offer and award public procurement is affected by corruption, public procurement loses its incentive to innovation.

The decision to invest in R&D activities of a company depends on the expected profitability that it expects (Baker & Sinkula, 2005). When the public procurement process is affected by corruption, the risk that innovation will not be profitable is very high which inhibits the incentives to innovate (Alchian & Woodward, 1988). Rose-Akerman (2004) showed that the level of corruption and the quality of institutions affects unconditional incentives to innovate. According to Anokhin and Schulze (2009), corruption can also limit innovation activities in developing countries in that it slows down foreign direct investment. Large foreign companies with the best technology and highly skilled employees avoid foothold in countries where the level of corruption is very high (Rodriguez et al. 2005).

The capacity of public procurement to encourage innovation in the private sector also depends on the amounts allocated to it. According to Chicot (2017), to successfully analyze the effects of public procurement on the incentive to innovation, it is necessary to both make a typology of public procurement and of private companies. Large-value public contracts are incentive contracts and can only apply to competitive companies (Uyarra & Flanagan, 2010). Therefore, the analysis of the effects of public procurement on the incentive to innovate must be made considering the private companies that manage to make the award of contracts with largest amounts.

Like most African countries in the southern Sahara, private demand is so low in Burkina Faso and large companies rely only on public procurement to enrich (Bako & Akouwerabou, 2015). Some authors such as Akouwerabou (2016), Nassè (2019), and Nassè (2021) demonstrated how corrupt practices in public procurement are so prevalent in Burkina Faso at the point that some entrepreneurs believe that it is impossible to be awarded public contracts without corruption. In Burkina Faso, during the last decade, the government awarded public contracts to an annual average of 522 million dollars (Regulatory Authority of Public Order [ARCOP], 2018). Through this analysis, we want to see whether obtaining and executing public contracts encourages private companies in Burkina Faso to innovate.

MODEL

The general objective of a company's strategic behavior in a market is to maximize its profit. Public procurement has an oligopolistic market structure where a small number (n) of companies compete with each other. In these markets, price is the main variable that companies use to distinguish themselves from one another. We can then represent the profit of the company i as a function of its price and those of its competitors.

$$\pi_i = \pi(p_1, p_2, \dots, p_i, \dots, p_n) \quad \forall i = 1, 2, \dots, n \quad (1)$$

Suppose two companies i and j . If they offer the same price, $p_i = p_j$ and they share the market. On the other hand, if $p_i < p_j$ the company i obtains all of the market demand and the company j leaves the market.

Assuming that the goods are homogeneous and that the applicant buys with the company that offers the lowest price, we can write that:

$$\pi_i = \pi^{\max} \quad \text{ssi } p_i < p_j \quad \forall j \in n - i \quad (2)$$

What then are the conditions for the company to be able to offer a lower price than its competitors? The likelihood of this happening is determined by several factors, one of which is primarily its ability to innovate and corrupt. In a competitive world, only companies that innovate can crowd out competitors.

On the other hand, when institutions function poorly, incompetent companies can be awarded contracts through corruption. When these possibilities exist, they inhibit the incentive of companies to innovate. However, we can retain that whether these are countries where institutions work well or those where they are of poor quality, innovation is always important for a company. However, in countries where public officials use public contracts for illicit enrichment, the most effective strategy a company can employ to obtain public contracts appears to be corruption.

In his theory of innovation, Schumpeter (1934) indicates that innovation leads to productivity gains. For example, process innovation enables the company to reduce production costs and thus reduce prices. Process innovations also make it possible to gain structural competitiveness when they improve the quality of products. To develop new processes, companies must invest in R&D. According to (Rothwell & Gardiner, 1989), companies which have the financial resources to support the effort of R&D activities are those which have the strongest capacity for innovation. For Baldwin (2003), R&D is not a sufficient condition for innovation, but its contribution is important in the innovation process. In the majority of cases, innovation in small and medium-sized enterprises takes place without actual R&D activity, but rather through small changes or imitations (Penin, 2003).

According to Barney (1991) innovation is primarily determined by the human capital of the people who work in the company. This human capital is strengthened and renewed by the new knowledge that company employees accumulate. This new knowledge can be accumulated through training or through employee incentive mechanisms. However, the knowledge held by employees can depreciate and become obsolete over time.

To maintain or even improve employee productivity, (McKenzie & Woodruff, 2012) recommend that companies permanently implement retraining and training sessions for their staff. The company, with the objective of adapting to changes in its environment, must set up competitive intelligence (permanent search for information on new technologies, the structure of the market, new outlets, etc.).

The search for information is expensive and this is why innovative companies are often the ones who invest enormous resources in obtaining information on the strategies of their competitors (Gonne & Feudjo, 2017). The size of the company can also influence its behavior in the innovation process. Schumpeter (1934) and more recently Van Dijk et al. (1997) believe that large firms, that is, those with market power, are more likely to innovate than small firms.

The above data shows that while innovation influences a firm's ability to crowd out its competitors, it is in turn determined by other factors.

The literature on the innovation of private enterprises in developing countries generally retains competition, equity (Nasse, 2019), investment in R&D, employee training; information and public procurement, as the main factors that determine a company's ability to innovate.

$$Innov_i = Inov(\text{Concurrence, Fonds propres, } R \& D, \text{Formation, Mar_Pu, Corruption, } X)$$

(3)

X represents the control variables of the innovation equation.

Estimation Method

The dependent variable of relation (3) is a binary variable. It takes the value 1 when the company innovates. The classic methods used to estimate binary dependent variable models are either probit or logit. The parameters of the determinants of innovation model presented above cannot be obtained through these classical methods. In fact, some explanatory variables of relation (3) are endogenous variables. It is therefore necessary to combine these classical methods with a method which makes it possible to instrument the endogenous explanatory variables. In our analysis, we use the Probit model with instrumental variables (IV probit).

Data

The data used in our analysis come from a benchmark survey carried out by the Private Enterprise Development in Low-Income countries (PEDL) in collaboration with the National Anti-Corruption Network (RENLAC). The survey was carried out in 2014 and focused on companies participating in public tenders for which the amount of the envelope exceeds US \$ 180,000. These companies were identified thanks to the publications of the General Directorate of Public Procurement (DGMP). These publications give the names of all the bidders and recipients of public contracts in Burkina Faso. This identified 1,172 companies. The names of the companies are insufficient to locate them. To facilitate data collection, the Chamber of Commerce's file of national companies (NERE file) was used as a benchmark to obtain the addresses (street, telephone, etc.) of the companies identified. Out of the total of 1,172 companies found in DGMP publications, only 660 companies from three branches of industry (Buildings and public works, general trade and provision of intellectual services) were found in the chamber of commerce file. After eliminating the lines for companies that did not answer important questions, the sample size shrank to 611 companies. The information collected focused on the economic and financial characteristics of the company, the number of public tenders to which the company applied, as well as the number of contracts obtained. Variables relating to the contribution of public procurement to the financial performance of the company were collected. The education level of the manager of the company as well as his experience in public procurement and other information was also collected.

Characteristic of formal enterprises in Burkina Faso

In Burkina Faso, from a formal point of view, a distinction is made between Small and Medium Enterprises (SMEs) as well as Large Enterprises. An SME is any natural or legal person producing goods or services, having made a declaration in the trade register whose number of permanent employees is less than 100 employees and the annual turnover excluding tax is less than US \$ 2 million. This category of companies alone represents more than 80% of the country's economic fabric. Large companies are defined as any company with a turnover greater than or equal to US \$ 2 million. The industrial and commercial census carried out by the National Institute of Statistics and Demography (INSD) in 2009 showed that the majority of these companies are located in the two large cities of the country, including 58.3% in Ouagadougou and 20.7% in Bobo-Dioulasso. In Burkina Faso, the Maison de l'Entreprise (2018) indicates that

the largest private companies operate mainly in mining, the distribution of hydrocarbons, banking, wholesale trade and heavy industry (steel, cement, cotton and derivatives) so that the majority of private companies applying for public contracts of interest to us are classified in the category of SMEs.

Model's Variables

The dependent variable of the model is innovation. It is a binary variable that takes the value 1 when the company has innovated. This variable was measured as follows. Entrepreneurs were first asked to define what is meant by innovation in their field of activity. The answers given are listed in Table 1. Analysis of this information shows that the majority of entrepreneurs are well aware of what innovation is in their field of activity. The proportions of respondents who do not know what innovation is are very few in the field of buildings and public works as well as in the supply of office equipment. The unexpected finding is the high proportion (26.32%) of those involved in the provision of intellectual services who do not know how to innovate in their sector of activity. All in all, the majority of entrepreneurs think that innovation comes down either to changing the organization of work, or to identifying new opportunities. Next, entrepreneurs were asked if they have made any progress in their field of activity over the past five years. The entrepreneurs who were selected as innovators are those who indicated that they had made progress in one of the items in Table 1 and who were able to define the innovation well. By proceeding in this way, 70% of construction contractors, 70% of those in the supply of office equipment and 67% of those in the provision of intellectual services were able to innovate. Thus, out of the total workforce of the 611 companies, we selected 68% of them as companies that have made progress in their field of activity. A company is therefore considered as a company which innovated when it undertook a reorganization of work and this brought it productivity gains. But also those who have acquired new high-tech equipment in their production process or those who have identified new markets are also selected as innovative companies.

Definitions	Construction	Office equipment	Intellectual services
Do not know	26.23	19.22	26.32
New working methods	22.4	14.7	40
Identify new opportunities	5.46	5.11	4.21
Improve product quality	10.38	15.02	11.58
Introduce a new product	4.37	10.02	4.21
Adapt to market requirements	4.92	4.5	4.21
Acquire new equipment	8.2	8.11	1.05
Other	18.03	15.32	8.42
<i>Source:</i> authors' construct			

Descriptive statistics for all the variables are presented in Table 2. Among the explanatory variables, two main categories can be distinguished. Some of them are purely exogenous while others are endogenous. Thus, the variables representing the practice of

corruption and the result of the enterprise are assumed to be endogenous. The corruption variable was measured using the method proposed by Svenson (2003). It is a technique of asking the entrepreneur if his competitors are engaging in corruption in order to obtain government contracts. Then use each entrepreneur's response as their own behavior.

In our approach, each entrepreneur was asked to say how many out of 100 contracts were won through bribery by their competitors. The statistics in Table 2 show that entrepreneurs perceive on average a low level of corruption in public procurement in Burkina Faso. They believe that on average 27.72% of public contracts are awarded fraudulently.

The business climate also influences the motivation of entrepreneurs in the innovation process. When the justice system functions poorly in the sense that property rights are not well secured, this can inhibit the incentive to innovate.

In the interval going from 0 (the judicial system works poorly) to 100 (property rights are well assured), entrepreneurs think on average that the business climate is very poor (38.42) in Burkina Faso. Entrepreneurs will only embark on innovation if they anticipate profitability. In our sample, 78% of entrepreneurs believe that innovation is beneficial to a business in Burkina Faso.

However, we see that companies spend only a small part of their income on employee training. On average, they allocate only 0.38% of their annual net income to employee training, while the best in this field go up to 20%. The companies surveyed spend an average of US \$ 150 per year in researching information on new markets, new products and new technologies.

Their rate of access to bank credit (60.7%) shows that access to credit is still difficult in developing countries. In fact, the companies considered in the analysis are companies that win and perform large government contracts. If among them, there are still more than 39% who do not have easy access to credit, we can conclude that there is credit rationing (Stiglitz & Weiss, 1981). A large proportion of these entrepreneurs believe that being competitive is not enough to obtain a public contract in Burkina Faso. In fact, only 58.6% think that public procurement is competitive. During the last five years preceding the survey, the companies in the sample obtained on average 0.33 public contracts.

The variables used as instruments to control the endogeneity of the explanatory variables are variables derived from the characteristics of the manager of the company. In fact, in our sample, entrepreneurs are both managers of their companies.

The level of education measured by the actual number of years that a company manager has spent school, his gender as well as his age can influence the result of the company as well as his ability to practice corruption. The fact that the leader has received professional training in his field of activity can also influence the results of the company. In Burkina Faso, many businesses are often large family businesses.

When the majority of employees come from family relationships, it can negatively influence the performance of the company, as Carbonell et al. (2020-1) because employees are no longer recruited according to their abilities. In some cases, those who have been recruited have no skills in the field. Business leaders have an average of 10 years of effective education and 245 of them have received vocational training. Almost all entrepreneurs are men, which show that women rarely hold positions of responsibility in large companies in developing countries (Akouwerabou, Bayala & Legala, 2018). The average age of business leaders is around 41 years old. Businesses hire an average of 12 employees through family connections.

variables	Nbr.	average	Err. type	Min	Max
Innovation	611	416	-	0	1
Corruption	611	27.72	32.07	0	100
Log_result_net	611	14.87	1.35	10.46	20.73
M p_obtained	552	0.33	0.21	0	2
Mp_Competitive	611	358	-	0	1
Access_credit	611	371	-	0	1
Cost_information	611	150	663	0	8400
Clima_business	611	38.42	28.47	0	100
Inov_profitable	611	474	-	0	1
Profi_training (%)	611	0.88	2.87	0	20
Instruments					
Education	611	10	6	0	25
Profssional_training	611	245	-	0	1
1[Male]	611	576	-	0	1
Age	611	41	13	30	75
Family_workers	611	12	23	0	100
<i>Source:</i> authors' construct					

Econometric Tests

The results of the estimation of the determinants of business innovation are reported in the subsequent Table 4. In order to ensure that these estimates are of good quality, we performed specification tests. The tests used are the table of good predictions, the likelihood ratio test and the Wald test. Wald's exogeneity test indicates that after having instrumentalised the explanatory endogenous variables, the model no longer suffers from an endogeneity problem. The prediction table (Table 3 below) shows that the rate of good predictions (74.64%) is very high.

Prédications	Actual values			Total
		1	0	
1		374	114	488
0		42	81	123
Total		416	195	611
<i>Source:</i> authors' construct				

The data in this table also shows that the good prediction rate of 1 is high showing that the model predicts well the behavior of those who innovate. The statistics values of the nullity test of all slopes of the likelihood ratio (7000.36) and that of Wald (2588.54) are all very high compared to the theoretical chi-square values at 9 degrees of freedom. All these tests confirm that the model is well specified and does not suffer from the absence of relevant explanatory variables.

Interpretations and Discussion of Results

Empirical evidence from our data shows that companies that win and perform public contracts are companies that are engaged in innovation activities. Those who think that you have to be competitive to obtain a public contract in Burkina Faso are also innovating. The data also supports the hypothesis that companies that invest large portions of their profits in training their employees are also successful in implementing techniques that improve their productivity. Among the companies that succeed in innovating are those entrepreneurs who believe that innovation is profitable. The results in Table 4 show that having a good performance and having access to credit facilitates innovation. The only unexpected result is that relating to the corruption variable. Our data shows that despite perceiving corrupt practices in public procurement, some companies still embark on innovation activities.

	Coef.	Sdr. Err.	Dy / dx	Sdr. Err.
Log_resultat_net	0.09 ***	0.012	0.09 ***	0.012
Corruption	0.01 **	0.004	0.01 **	0.003
Profit_formation	0.04 **	0.02	0.05 **	0.02
Mar_pub_obtained	0.64 **	0.25	0.64 **	0.25
Cost_information	0.002	0.008	0.0001	0.01
Acces_credit	0.27 *	0.16	0.27 *	0.09
Inov_profitable	0.83 ***	0.14	0.83 ***	0.14
Mar_pu_competitif	0.28 **	0.12	0.28 **	0.11
Clima_business	0.002	0.002	0.002	0.002
Constant.	-2.4	24	-	-
N = 611 Wald chi2 (9) = 2588.54 Wald test of exogeneity chi2 (2) = 39.26				
Source: authors' construct				

Public procurement influences the incentive of companies to innovate. We arrived at results similar to those of Geroski (1990) and Beath et al. (1986). According to these authors, in a competitive environment, the company must convince the public purchaser that it is the best and this pushes it to invest in innovation. We find that when we go from a company where the

managers think there is no competition in the public procurement to one where the managers think the opposite, the probability of innovating increases by 0.28 points. This result supports Khan (2005)'s idea that public procurement can effectively encourage private companies to innovate, but their effect will be greater if the procurement processes are transparent and non-discriminatory. Thus, even if we find the same result as (Rothwell & Zegveld, 1981), we will say that competition and corruption allow us to identify the net effect of public procurement on the incentive to innovate. In their analysis, these authors managed to show that public procurement promotes innovation. However, their analysis focused on the case of European countries where corrupt practices are less widespread. We also find that obtaining and performing a public contract increases the company's chances of innovating by 0.64 points.

Authors like Uyarra (2013) have already shown that governments in developing countries do not directly use public procurement as a means to incentivize private companies to innovate. Analysis of our results shows that it would be enough for them to promote competition in these markets to achieve this. Thus, even if public procurement cannot be used as an active instrument to encourage innovation as in developed countries, governments of developing countries can do so passively, by only ensuring that the process of public procurement is competitive. We defend the same idea as that put forward by Georghiou et al. (2014) who state that by cleaning up public markets and combating all forms of imperfection that reduce their effectiveness, they produce positive externalities in the sphere of private sector innovation.

Entrepreneurs in Burkina Faso perceive an average frequency of corruption in public procurement. However, this does not prevent them from investing in innovation. The data in Table 4 show that when the corruption perception index increases by one unit, the company's chances of innovating increase by 0.01 probability points. This result indicates that companies are aware that the practice of corruption alone is insufficient to enable them to win a public contract. They seek to be among the best in their field first through innovation, but from time to time they offer bribes to build social capital with public officials. Our result can therefore be understood by interpreting corrupt practices perceived as inactive corruption. In fact, authors like (Kaufmann & Wei, 1999), Huntington (1969) and Leff (1964), supporters of the "efficient grease" hypothesis, believe that in countries where the administrative system is too slow, companies are forced to pay bribes to facilitate their activities. We can therefore conclude that the threshold of the practice of corruption which inhibits the incentive to innovate by private companies has not yet been reached in the case of Burkina Faso. This makes it possible to relativize the conclusions of Edler et al. (2006) as well as (Edquist & Hemmen, 2000) who found that public procurement corruption completely prevents innovations from private companies. This is why, even if it is impossible to eradicate corrupt practices in public procurement in developing countries, it would suffice to reduce them as much as possible in order to allow the latter to produce their externality on the incentive to innovation. Our results do show that it is not corrupt practices, but rather their upsurge that can inhibit the incentive to innovate. However, we will not interpret our result by adopting the idea that a small dose of corruption is needed to accelerate economic processes as argued by (Tan, Yang & Veliyath, 2009) and Fan (2002), adherents of the theory of efficient grease. We will rather see it from the angle defended by Rose-Akerman (2004). This author believes that it is from a certain threshold that corruption negatively influences the economic performance of a nation. The ability of public procurement to encourage innovation in developing countries is justified by the fact that private demand from businesses is too low. In fact, since innovation requires the investment of enormous financial

resources, before embarking on innovation activities, the company always makes sure that it can get a return on its investments. The results indicate that when you move from a company that thinks innovation is unprofitable to one that rather thinks innovation is profitable, the probability of innovating increases by 0.83 points. This result is similar to that of (Baker & Sinkula, 2005). When the probability of making a return on their investment is not high, as is the case in countries where the rate of corruption is very high, or in politically unstable countries, companies always avoid engaging in R&D activities. On the other hand, when companies anticipate high gains from innovation, it motivates them to take risks in order to innovate. For example, they can invest in the training of their employees. But this investment is a risk in the sense that once formed, the company can lose these to the benefit of its competitors. It pays off, however, for a company to take this risk when it is assured of retaining qualified employees. The results show that companies that invest a significant portion of their profit in training their employees increase their likelihood of innovation. Barney (1991) did get it right when he said that human capital is necessary for innovation in small and medium enterprises. Our result formally confirms that companies that want to innovate must continuously retrain their employees as indicated by (McKenzie & Woodruff, 2012).

The likelihood of innovating is also influenced by other variables such as performance and access to credit. These two variables increase the financial capacity of the company which allows it to take risks. A company with a large financial capacity may allow itself certain activities that are not profitable in the short term. Like Van Dijk et al. (1997), we find that when a firm's net income increases by 1%, its probability of innovating increases by 0.9 points. Our data support the hypothesis that access to credit increases the probability of innovation by 0.27 points.

CONCLUSION

Firms in developing countries face a very weak private demand that does not encourage investment in R&D activities. Public procurement offers them opportunities to land large contracts. The desire to be awarded public contracts can then encourage them to innovate. But for this incentive to be effective, the public procurement process must be competitive. When we want to use public procurement as an instrument to encourage innovation by private companies, we can group countries into two large blocks. In developed countries, public procurement is now used as the main instrument to encourage innovation (Uyara et al. 2014). In contrast, in developing countries, public procurement is used only to acquire goods and services necessary for the functioning of the administration or to meet the social needs of the population (Uyara 2013).

As in developing countries, the market size is small so as not to encourage private companies to innovate, we have looked for strategies that can be implemented to allow public procurement to influence the activities of innovation in the private sector. To achieve this, we used primary data collected from companies participating in large-scale public tenders in Burkina Faso. These data were collected with the support of the National Network for the Fight against Corruption (RENLAC). In fact, since corruption issues are very sensitive, RENLAC, with its authority, has intervened to assure companies that there will be no repercussions regardless of their responses. The fact that the survey was carried out with the support of RENLAC enabled companies to comment objectively on questions relating to corruption.

The results were obtained from a probit model with instrumental variables (IV probit). We have reached the result that the public procurements are a source of motivation for innovation for private companies in Burkina Faso. However, it appears that we can improve the benefit effect of their externalities on incentives to innovate by making them more competitive. In view of our results, we can say that corrupt practices are not so exaggerated in Burkina Faso so as to inhibit the incentive for innovation. This implies that authorities in developing countries can indirectly use public procurement to encourage private companies to innovate. The only effort that governments need to make in order to achieve this is to ensure that the public procurement process is competitive.

Private companies in turn must also make efforts to improve their productivity. These companies do not allocate a consistent training and retraining of employees. Our results are consistent, however, with those of (McKenzie & Woodruff, 2012), and show that the training and retraining of employees facilitates innovation. It is obvious that the innovation we are talking about in our analysis is not that which consists in inventing new products, or new technologies. We considered as innovation, all the efforts to reorganize the work process within the companies, the search for new outlets and new products as well as imitation.

Our results show that even if developing country governments do not use public procurement in order to encourage private companies to innovate, it is the latter that must make the necessary effort in order to use public procurement in this effect. To achieve this, private enterprises must train and retrain their employees. This effort will not be productive, however, if governments do not make the effort to clean up public procurements. The main information we can retain from our results is that to use public procurement as a positive externality in the sphere of innovation, each actor must fully play its part. Governments must do everything in their power to clean up public procurement. Companies must against their side ensuring the training and retraining of employees. When, considering developing countries, the economic fabric is made up of local private companies, but also companies that are nothing but subsidiaries of large multinational companies.

It is obvious that the large international firms are attracted by developing countries' public procurements or by natural resources. However, their establishment in developing countries can benefit local businesses. These can imitate the process of work or establish cooperation agreements with subsidiaries of multinational firms. This would eventually allow local businesses to improve their skills. Carbonell et al. (2020-2) show that this has so far been difficult. But future research could get down seeing if local businesses are able to take advantage of the expertise of international companies that obtain and execute procurement in Burkina Faso.

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