

**Promoting innovation in SMEs in
developing countries:
A case study of Costa Rica's PROPYME program**

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ABSTRACT

The Program of Support for Small and Medium Enterprises (PROPYME) in Costa Rica was initiated in 2002 by the Ministry of Science and Technology and is ongoing as of 2015. It provides nonrefundable grants for small and medium sized enterprises to develop innovation-related projects, including R&D and human resources training. This case study looks at how the program was designed and implemented, and summarizes its main results. Special attention is paid to how the program has been reformed and fine-tuned over the years based on accumulated experience and policy learning. This is useful to illustrate the importance of innovation in public sector agencies providing private sector support, understood as the capacity to adapt programs appropriately based on monitoring and evaluation, user feedback, and changes in the environment. Finally, building on this case study, some lessons that may be useful for other developing countries are drawn.

Key Words: SME, innovation, matching grants, R&D, Costa Rica

Introduction¹

As in many other Latin American countries, one of the current policy priorities for improving Costa Rica's competitiveness is the promotion of innovation. The country's performance in key science and technology indicators - such as research and development (R&D) expenditures, patents, and scientific production - lags behind other countries at similar levels of development (Crespi, 2010). The innovative performance of Costa Rica's private sector is especially weak; a critical problem which is also observed in other Latin American countries (Lederman et al., 2014). In recent years some large multinational companies have engaged in advanced manufacturing in high technology industries, where they have progressively upgraded the value-added of their operations and increased R&D investments (OECD, 2012). However, the vast majority of firms, especially small and medium-sized enterprises (SMEs), hardly invest in innovation. Strong obstacles to innovation at the firm

¹ *List of acronyms*

CONICIT	National Council for Scientific and Technological Research, Costa Rica
IDB	Inter-American Development Bank
MICIT	Ministry of Science and Technology, Costa Rica
OECD	Organization for Economic Cooperation and Development
PROPYME	Program of Support for Small and Medium Enterprises
R&D	Research and development
SMEs	Small and medium-sized enterprises

level, as identified by industry surveys and expert assessments, include limited managerial and technical skills, organizational rigidity, insufficient information about markets and technologies, lack of access to finance, obsolete infrastructure, and insufficient collaboration on innovation among firms and between firms and universities or public research centers.

Since the creation of the Costa Rican Ministry of Science and Technology (MICIT) in 1990, the promotion of science, technology and innovation has become a top priority on the Government's agenda (MICIT, 2011). The PROPYME fund was instituted in 2002 with the belief that without government intervention, investment by SMEs in innovation, technology adoption, and skills development, would be suboptimal. MICIT is responsible for the design, implementation and funding of the program, through its National Council for Scientific and Technological Research (CONICIT).

The PROPYME fund addresses the key bottlenecks facing the national innovation system: low innovation in SMEs, insufficient collaboration in R&D between firms, lack of collaboration with universities, and low training in firms (Monge et al., 2010). The program excludes large firms, focusing instead on promoting innovation and skills development in SMEs, defined as firms with less than 100 employees. The grants are provided only to SMEs that have been in operation for more than six months.

The government decided to provide grants for innovative projects because relying on market forces alone resulted in suboptimal investment in innovation by SMEs. In Costa Rica the private sector accounts for about a third of total R&D, while in more technologically advanced countries the figure is around two-thirds. The PROPYME program aims to reverse this over-reliance on public sector R&D. The program design assumed that public grants produce an *additionality* effect, that is, increased expenditures by SMEs on innovation — expenditures that would not occur without the public funding incentive. In addition to low levels of investment in R&D, science and industry linkages in Costa Rica were underdeveloped. By funding joint proposals presented by companies and research centers, the program aimed to correct this systemic failure. Thus the grants were expected to produce also a *behavioral additionality* effect, that is, an increase in the propensity of firms to collaborate in innovation with other firms and universities. The program also aimed to induce changes in the mentality and business practices of Costa Rican SMEs, encouraging the development new innovation strategies.

The Government recognized the barriers to success for such a program in the planning stages, and it was clear that the program's relatively low budget could not realistically address all that SMEs needed to innovate in a country like Costa Rica. The low funds available also meant that the fixed management and coordination costs could take a large part of the budget. There was also the question of whether enough SMEs were interested and if there would be a sufficient number of SMEs with capabilities to submit sound proposals. Costa Rican SMEs might not even be accustomed to a culture of applying for grant funds. The capacity of universities and public research centers to meet the technological demands of firms was also a concern, as was the capacity of CONICIT to efficiently manage the program, given its limited resources and skills. Finally, all parties were aware of the difficulty of establishing science-industry links in a developing country like Costa Rica.

This case study describes in detail how the PROPYME program was designed and implemented and, in particular, it looks into how the program has evolved through time to

overcome challenges and improve its efficiency. This is useful to illustrate the importance of innovation in public sector agencies providing private sector support, understood as the capacity to adapt programs appropriately based on experience, user feedback, and changing conditions. The ultimate objective is to provide some insights that may be useful for other similar programs in developing countries aimed at supporting innovation in SMEs. The case study was developed through a review of secondary sources and an interview with Mr. Josué Fumero, former Director of Innovation at MICIT (2010-2014).

Program Design

The PROPYME fund offers non-refundable grants to SMEs (or groups of SMEs) to implement innovation-related projects and finance personnel training. Initially, the program focused mostly on formal R&D, but over time it broadened in scope to include other types of innovation: process innovation, new business models, organizational change, and human capital development. To better respond to the needs of local firms, it was decided the grants should be used not only for R&D projects but also for training, quality certifications, consulting services, machinery, improvements to equipment or infrastructure, and related needs. In addition, PROPYME also promotes collaborations with universities or research centers to deliver technological solutions and training programs to the applicant firms.

Until the 2014 call, PROPYME did not limit the amount on funding requests, and the non-reimbursable grants it makes could finance as much as 80 percent of the total project cost, with the SME putting up the rest. However, this was changed in the 2014 call, which set new limits of funding requests of US\$ 37,500 and 60 percent of total project cost.

Funds are to cover a project for 24 months or less, although the projects may continue indefinitely. Periodic reports are required to help identify longer-term outcomes and impacts of the funding. The grants can be used only to finance new projects, and cannot be used to cover past expenses.

Types of projects funded

Initially, there were three types of projects funded by the PROPYME program, as follows:

1. For project proposals with solutions, the proposal must describe a technological innovation/ development project to be executed. The proposal must also identify the research center or consulting company that will support the SME in implementing the project. The projects may include the development of new or improved technologies and processes, achieving certifications, obtaining intellectual property protection, or other similar needs.
2. For project proposals without solutions, the project proposal must describe the technological innovation and/or development project to be executed. However, the solution for this type of proposal does not require the SME to identify who the supplier will be. For these cases, CONICIT must help the SME (or SME group) in selecting an ideal supplier. This category was discontinued since the 2013 call because previous experience has demonstrated that CONICIT's matchmaking was a challenging task. Indeed, it became apparent that efficient collaboration takes time and requires a pre-

existing relationship and deep understanding among the parties, such that matching partners becomes a risky endeavor.

3. The projects to develop human capital involve training programs to, for example, develop technological and management skills, or to learn how to adapt and assimilate new technologies or conduct technology transfer activities. These projects may involve: short courses within the country or abroad; internships or specialized training in a different company or institution; the hiring of expert trainers and consultants; the organization of conferences and seminars; or support for national or international conferences or online courses.

Application and selection process

To apply for support from the PROPYME program, the applicant must fill out the application forms and submit application documents to the Incentives Fund Technical Secretariat at MICIT. Starting with the 2014 call, the application process is done through an online platform. Applications that meet submission requirements are then submitted to CONICIT which provides a technical evaluation and recommendation for funding. CONICIT may require additional information from the firms or ask to meet with the firm's managers or research unit representatives. Its recommendation is then forwarded to the Incentives Commission, a group under MICIT staffed with representatives from the public, private, and higher education sectors, which makes the final funding decision.

Evaluation criteria

Proposals are evaluated according to the following criteria:

- Type of scientific activity or technological area the firm is involved in
- Potential impact on firm and sector productivity and competitiveness
- The firm's scientific and technological capacity
- The firm's management and administrative capacity
- Probability that the project proposal will meet the firm's requirement for an innovative solution
- Potential for industrial application and commercialization of the technological solution to be developed
- Cost of the project and commitment of the firm (or partnering firms) to match the grant with internal resources.

Implementation

As mentioned earlier, the PROPYME program has been financed by MICIT and managed by CONICIT. From early on, a total of 39 research centers and consulting firms participated in the program by providing the technological and training services needed by the applicant firms. The most significant providers were the Costa Rican Chamber of

Industry, the National Center of Food Science and Technology of the University of Costa Rica, and the business incubator ParqueTec.

From 2003 to 2011 the PROPYME program operated at a relatively low scale. The interest of Costa Rican SMEs in applying for grants was lower than expected. In total 163 proposals were received from 2003 to 2011, most of which (83 percent) were approved. More than 100 companies were awarded grants to undertake 136 projects during that time frame (CONICIT, 2011). Most projects were related to technological development, followed by human capital development. No patent-related projects were financed, although this was one of the program's targets.

In general terms, the quality of the projects presented by firms was relatively poor, often with a lack of clear objectives and with inadequate budgets, according to Josué Fumero, former Director of Innovation at MICIT. The capacity of firms to efficiently execute the projects was also weak in general. The PROPYME fund did not manage to allocate its full budget to grants, given the low response of SMEs and the fact that some beneficiary firms did not make effective use of all of the resources allocated to them.

From 2003 to 2011 almost 50 percent of the program's budget was dedicated to the program's administrative and overhead costs rather than direct grants, which is too high by international standards (Maggi et al., 2012). This can be explained by the low scale of the program and low volume of resources, which raises the fixed overhead costs per project funded. It also suggests that the scale of the program must be increased to improve its efficiency.

Since 2012 the program expanded substantially. In 2012 the program disbursed around US\$2.5 million, which represents more than ten times the amount allocated in the year 2011 (Monge and Rodríguez, 2013). Overall, 117 proposals were received in the 2012 call, of which 88 projects received grants, representing a total of 70 firms (some firms participated in several projects either independently or as part of a proposing consortium). Preliminary data available for 2013 and 2014 shows that funds disbursed by the program were much less but still significantly above the 2002-2011 period.

Assessment of early challenges

Several reasons were identified to explain the low interest of SMEs and the relatively poor initial performance of the program. SMEs in Costa Rica were not engaged in formal R&D and did not have experience in applying for public funding. It was found that many SMEs were not aware of the program or did not understand it properly; in particular many of them thought the grants were only relevant for firms already active in the generation of technological innovation.

Feedback from firms indicated they found the application procedure was too complex, long, and uncertain. A proposal evaluation period of more than one year was considered excessive from the perspective of industry planning, and many companies preferred to undertake their projects faster through bank loans. Planning for growth through developing new or expanded products or services becomes risky if future funding is uncertain for such a long time. In addition, in some instances the PROPYME program did not commit to finance 80 percent of the project's cost but rather a lower share, which increased firms' uncertainty even further. Firms also complained of not receiving appropriate feedback following the approval or rejection of a proposal.

The low application rate from businesses for PROPYME support suggested that not enough SMEs saw the need to improve their R&D capacity; they were not aware of their eligibility for the grants; or they lacked sufficient capacity to apply. It also suggested problems with the application or administration procedures, as well as a lack of sufficient outreach and promotion efforts on behalf of the program managers. Administrative costs needed to be kept low, while running the project efficiently at a relatively low scale. The recent effort to improve the program entails cost increases, while overhead costs are already high by international standards. The program could be more ambitious and achieve economies of scale, but the government budget has been limited, and delicate choices must be made among competing priorities.

Furthermore, insufficient linkages were built with other policy programs targeted to SMEs and cluster development, such as the Costa Rica Provee program which focuses on building productive linkages between SMEs and multinational companies located within the country. For example, in order to stimulate linkages, it was noted that multinational companies could be encouraged further to participate in the program as providers of technological services, training, and capacity-building for local firms.

Advantages of adaptive program management

The program has had strong support from high levels of government and constitutes one of the country's main funds for R&D. The program was managed by the national R&D funding agency, CONICIT, which had previous experience providing these types of grants to SMEs, and the CONICIT program managers were flexible enough to modify the program throughout its implementation in order to improve the application process, increase promotion and coordination efforts, and make other changes required to produce the necessary program results.

As the program evolved, in view of the challenges related to the quality of the proposed projects, more effort began to be placed on providing support services in the initial phase. Also, the program managers began offering greater communication, outreach, and support to firms. The next section explains in further detail how the program was restructured.

Restructuring the program

In 2011 the Costa Rican Government realized that the program needed to be more formally restructured to better address its objectives. PROPYME management requested technical assistance from the Inter-American Development Bank and the World Bank to expand the program and make changes in (1) the application and selection procedures; (2) the promotion, communication, and support services; (3) administrative functions; and (4) the types of projects funded.

Application and selection procedures

Initially the system operated through a rolling acceptance process, without pre-specified deadlines. However, since 2013 the program operates with an annual call for proposals and a unique deadline in order to facilitate the program's management and a more efficient allocation of limited funds. The period of application and approval is being reduced to three months, which is in line with global good practices. The application form has been modified with the following objectives: (1) make the questions clearer and easier for SMEs to

answer, thus reducing the time needed to provide answers; (2) bring the questions more into line with best global practices; and (3) match more closely the application form with the evaluation criteria and make answers to the proposal questions easier to evaluate.

Since 2012 the role of MICIT in the selection process has become more active, moving beyond a secretarial role to provide a technical evaluation that CONICIT considers in its final evaluation.

Promotion, communication, and support services

MICIT started delivering workshops to SMEs on how to apply for the PROPYME grants. A promotional brochure was developed which included a description of the grant application procedure, and the website information was improved. PROPYME managers made promotional visits to Costa Rica's regions. Also, MICIT-certified "innovation managers" have been introduced to support project design and implementation.

Administrative changes

Over time, the number of applications to the PROPYME fund has grown substantially. If the fund is to increase the number and amount of grants to SMEs while at the same time achieving optimal evaluation time periods and adequate monitoring and evaluation, more staff will be needed, especially in CONICIT. Starting with the 2013 call, administrative changes will help address this constraint. The application process will be 100 percent online, using online forms and digital signatures, which will allow for the easier capture of data for interim evaluations.

Previously, the results of implementing PROPYME were captured at the output level without the reporting of intermediate outcomes, which could help trace the results chain to the higher level objectives of the National Science, Technology, and Innovation Plan. Now, evaluation has become more embedded in the implementation and re-design of the grant fund. Based on a defined set of output and outcome indicators, the PROPYME fund will regularly monitor its progress against the goals and desired impact. The fund will use monitoring and evaluation systems as a way of ensuring that appropriate changes are introduced in a timely manner.

Types of projects funded

Based on the low level of response in the earlier years of the program, the program managers recognize that the program was too focused on technological research, while the local context demanded a higher attention to other drivers of innovation. Thus, in the 2013 call for proposals, funds for grants were allocated to the following four types of projects:

- 50 percent of the budget for innovation and technological development;
- 30 percent for technological services (including support for obtaining quality and technical certifications);
- 10 percent for human capital (for training in innovation and technology); and
- 10 percent for support for patenting and intellectual property matters.

In addition, as of the 2013 call, proposed PROPYME projects no longer need to rely on a third party (research center or university) to provide technological services for the project or carry out the project. Through MICIT, firms can now register themselves as “implementation units” or hire the services of a MICIT-certified “innovation manager” to manage the project and funds.

The new PROPYME projects will deliberately adopt a broader scope, to include not only formal R&D but also other types of innovation projects, such as process innovation, new business models, organizational change, and human capital development. The PROPYME fund’s objectives have been more clearly defined as: “Finance SME activities and projects through which their management capacity and competitiveness will be enhanced.”

Results and future challenges

Since the PROPYME program’s inception, CONICIT has tracked program execution metrics such as number of projects funded per year; budget committed and executed, distribution of funds per sector, among other measures. The program data show recent signs of success compared to earlier years. In the past the program faced significant obstacles, such as the lower-than-expected interest of firms and communication problems. However, as noted, the PROPYME staff was proactive in responding to the needs of SMEs through adaptations and enhanced support services. They are continuing to make significant improvements to their grant procedures. In addition, since 2012 the quality of the proposed projects has been increasing, according to Josué Fumero, former Director of Innovation at MICIT.

In any case, the overall success of the PROPYME fund has not yet been completely proven. Beyond simply capturing outputs, a more comprehensive and deeper evaluation is needed to assess the program’s results and guide future reforms. This would involve introducing a clear results-based framework for evaluation, using quantitative and qualitative methods, and baseline measures for outcome indicators. As discussed above, the administrative changes implemented in 2013 aim to address these shortcomings.

A recent evaluation study using control group firms found evidence of a positive and significant impact of the PROPYME program on employment and on the probability of exporting of beneficiary firms (Monge and Rodríguez, 2013). However, there is still little evidence to support the impact of the program on firms’ innovative behavior. Ultimately, it is of utmost importance to better understand how the program enables firms to expand product lines, access scientific research results, obtain certifications, manage internal and external R&D, and take products to market. Regardless of the recent administrative enhancements to the program, these higher-level results will still be difficult to judge for the PROPYME program for quite some time, as it is not yet suitable for a quantitative impact evaluation due to the overall small number of projects financed and the low levels of financing.

In the future, as the PROPYME program proceeds, CONICIT needs to build the necessary capacity to manage an increase in the volume of applications with shorter evaluation cycles, closer communication, and improved monitoring and evaluation. At the same time, it faces pressures to keep administrative costs low. In addition, it is important to stress that innovation grants for SMEs in developing countries need to be coupled with improvements in the overall business environment and institutional framework such that

more favorable conditions are in place for small firms to expand through innovation (Quatraro and Vivarelli, 2014).

Lessons learned

A key challenge in many developing countries is that SMEs show little interest in requesting innovation grants, either because they do not feel the need to invest in innovation, or they are not ready to match the funds with internal resources, and/or they find the grant application process too complex. Promotion efforts are necessary to encourage firms to apply and ensure a sufficient volume of applications. This was evidenced by the low application rate during the first years of the PROPYME program and the more recent changes following active promotion.

The quality of the early proposed projects was also relatively poor, with a lack of clear objectives and inadequate budgets. This suggests that programs to provide grants for innovation by SMEs in developing countries need to dedicate more attention to providing support to assist firms in preparing proposals. In addition to providing support services, it is also advisable to establish close communication lines with managers of beneficiary firms, especially in developing countries where SMEs are not accustomed to managing innovation in a structured way and have little experience in applying for public funding. Indeed, public support should not be limited to a financial contribution, but should extend further to provide guidance and support throughout the entire life cycle of the grant. The public agency managing the program should build strong linkages with SMEs, and provide technical assistance not only to prepare proposals, as suggested above, but also to manage projects better.

Finally, this case study illustrates well the importance of monitoring and evaluation systems not only to justify ongoing public support, but also as a learning instrument to guide program management and reform decisions. It can also help to map the innovative activity of SMEs and to identify opportunities for increased collaboration and cluster development. A feedback loop from the firms is important for continuous improvement of the program's design and results. It is likely that the criteria for evaluating proposals will change over time, and this may require changes in the application forms and processes. The program must provide sufficient flexibility to allow this as the fund evolves.

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