

**Evaluation of ST&I programs: a methodological approach to the Brazilian small business program and some comparisons with the SBIR program**

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**Abstract**

Evaluation of research results and impacts is a topic of growing interest to public and private organizations worldwide. Indeed, it can be said that evaluation initiatives are a top priority for many research and development institutions if they are to assure social legitimation.

The following general principles are important to an understanding of the evaluation universe:

- there is no single definition of evaluation in a general, comprehensive sense, but it can be considered a set of analytical approaches designed to identify and interpret expected and/or actual results and/or consequences, creating qualified information;
- evaluation is useful in general because it creates information on which to base a value judgment and, at a later stage, to take a decision;
- the aim of evaluation is not to seek absolute truth but to present a properly grounded analysis in support of decision making and as such it is not an end in itself;
- its results do not include decision making, which is logically separate from the evaluation process;
- in sum, evaluation verifies – using a specific method – and informs;
- and lastly, it is the link in the chain that feeds into systematic planning.

Application of these general principles to different fields (in our case, to evaluation in science, technology and innovation) presupposes a number of additional considerations relating to an understanding of the aims of evaluation, the specificity of the object to be evaluated, and consequently the choice of methods and tools for use in the evaluation process.

The different aims of ST&I evaluations necessarily produce a wide range of differing kinds of focus and study: measurement of research performance (bibliometrics, peer review), measurement of resource use efficiency and effective achievement of planned results (accountability), and evaluation of the impact of technological innovations on society (impact assessment), among others. More recently, in the search for a new institutional framework for research activities known as S&T networking, new relations between social change and technological change have gained in importance in evaluation exercises, alongside the need to extend the participation of the different actors involved in the universe evaluated in these processes. This entails prioritizing the use of approaches that seek to capture the complexity of the scientific and technological research system and its relations with other systems, be they economic, social, environmental etc.

Assuming that the innovation process is uncertain, complex, linked to social and technical imponderables and capable of taking a different course from what is planned, the goals of evaluation almost always become moving targets.

The objective of this paper is twofold: a) to present a methodological proposal for the evaluation of ST&I programs, particularly to allow multidimensional approaches in order to evaluate the efficiency, efficacy and effectiveness of ST&I programs; and b) to present an application of this methodology to a Brazilian public program that aims to foster the emergence of innovative small firms, comparing it with some findings related to a similar U.S. program.

The Brazilian program is known as PIPE (small business innovation program) and is run by FAPESP, the State of Sao Paulo Research Foundation. It was created in 1997 and strongly inspired by the U.S. program Small Business Innovation Research (SBIR). The main aim of PIPE is to supply grants for the development of innovative research into important problems in S&T by small enterprises with a significant potential for commercial or social returns.

The specific goals of PIPE are as follows:

- Using technological innovation as an instrument to enhance business competitiveness;
- Creating conditions to increase the contribution of the research system to economic and social development;
- Fostering significant growth in private investment in technological research;
- Offering incentives and opportunities for small high-tech firms to develop research in science, engineering or S&T education with a commercial or social impact;
- Enabling small business to associate with academic researchers in technological innovation projects;
- Stimulating the development of technological innovations while at the same time assuring the feasibility of increased practical application of research conducted with support from FAPESP;
- Contributing to the creation of a culture that values research activities in business environments, leading to an improvement in the professional effectiveness of researchers.

The methodology was developed and applied to an evaluation of this program between 2007 and 2008. The paper describes the methodology and results of the evaluation, comparing the main findings with similar evaluations applied to the SBIR program.

The results show an impressive parallel with the SBIR program as well as some important differences that confirm a structural disparity between the Brazilian and U.S. innovation systems.