

Financial Governance in the Nanotechnology Segment: The Brazilian Experience

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Rec date: Jun 30, 2014, Acc date: Jul 2, 2014, Pub date: Jul 9, 2014

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Introduction

Brazil is the world's fifth largest country by both geographical area (about 8.5 million km²) and population (about 200 millions) [1-2]. Interestingly, Brazil is the largest economy of the Latin American nations and is the world's seventh largest economy [3]. Brazil is also one of the World's fastest-growing economies with an average annual GDP (i.e. Gross Domestic Product or purchasing power parity) growth rate of 3.09% (Range: -3.15 to 10.10% from 1991 and 2014) [3]. However, the tendency is not beating the market expectations (1.90% only in the first trimester 2014), and the Brazilian economy seems to be instable these 3 last years with a GDP oscillating between 0.5 to 3.5% quarterly. The slowing GDP growth can be explained by the fact that higher government spending offset a drop in investment. Indeed, in spite of a strong economy based on GDP alone, Brazil is suffering from politico-economical divergences the human life's quality is much heterogeneous (e.g. Human Demographic Index (HDI) value growth is still slow [4]), and the lack of investments in some key market segments such nanotechnology is questionable in terms of global competitiveness.

Indeed, nanotechnology has a special meaning for industrial innovation and so, is getting a large impact on a national's economy. Nanotechnology, a multidisciplinary field that requires expertise in chemistry, physics, biotechnology, electronics and medicine, represents an alternative to the study of phenomena and manipulation of materials at atomic, molecular and macromolecular scale [5-7]. "In Brazil, it is the inter-ministerial committee of Nanotechnology (CNN or CINano) that strives to define aims in the nano-field, inform the population about advancements in this field, and develop international cooperation to further promote nanotechnology". According to the Brazilian Agency for Industrial Development (ABDI), the new generation of nanotechnology-based products would represent 15% of global production of manufactured goods by 2014, which corresponds to \$ 2.6 trillion.

Since nanotechnology is a fast emerging and an important field of innovation to overcome many problems of our societies [5-7], Brazil is paradoxically investing too little in such field and worsened in 2008

compared to many developed (e.g. US, Italy, Germany, France) and other fast emerging ones (e.g. China, Russia, India and South Africa). Although the investments were triplicated between 2004 and 2007 (equivalent to US\$ 30 billion in 2007), Brazil invested about 6 times less money than USA in nanotechnology when values are compared to 2009. Since 2012, Brazil has financed a limited number of projects in nanotechnology "(equivalent to US\$ 3 million in 2012, i.e. only ~5.9% allocated from the total financing demand) while, in USA, the financial resources in the same year reached approximately 2 billion. Considering the U.S. GDP (\$ 15685 billion), which was about 7.2 times the Brazilian GDP in 2012 and about 6.4 times to date [2], Brazil needs to take the initiative to invest about \$ 300 million/year (i.e. about 100 times more).

Hopefully, a better Brazilian financial management allied to a strong strategic planning and execution in nanotechnology and education (e.g. establishment of adequate policy guidelines for active research, development, innovation and trade [6]), shall lead to more productive and globally competitive results. In turn, a higher Return Into Investment (ROI) could be expected which should be destined to technological re-investments and innovations in order to stabilize the development of the Brazilian economy.

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