

Role of Government in the Economic Valorization of Innovation and University Research: The Case of Morocco

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Abstract

The development of university researches and the economic valorization of innovation for industries and companies are still nourishing a scientific debate. It is perceived today as a priority and as an axis of investment of the States. They were involved in the ecosystem to ensure a "win-win" cooperation between the two partners and explore a triptych "model²" linking the State, the university, and companies. This paper focuses on working on the Moroccan experience and the role of the national government in the implementation of this model of cooperation. After an exhaustive review of all organizations related to innovation in Morocco, three models illustrate the cooperation of the three stakeholders (Industry, State and University) as a Triple Helix models. This involves innovation centers, clusters, and incubators. Following the results of the theoretical part, a quantitative study was conducted based on targeted survey. The objective is to demonstrate, through the answers, the level of involvement and the role of the Moroccan government in the realization of the triple helix model. Findings of this review revealed that the Triple Helix model is highly elucidated in the "Centers of Innovation" since the budget including the governance, and this model implies the three stakeholders. The clusters are more linked to the industries while the incubators are more linked to the universities.

Keywords: Innovation, government, Innovation center, Incubator, cluster, triple helix

² The triple helix: a concept for modeling transformations in the relationships between universities, industries, and governance.

Introduction

For decades, the dichotomy was notorious between the work done by theoreticians / academicians and managers within companies. University research could bifurcate towards new models and inventive innovations which are useful for the entrepreneurial world but unfortunately not communicated. The transitional link does not exist and the lack of communication constituted an opaque dam.

Fritz Machlup, Kenneth Arrow, Daniel Bell, and Alvin Toffler marked the 1960s by highlighting the importance of knowledge-related activities in the contemporary economy. The work of the OECD (Organization of Economic Cooperation and Development), and particularly the European Union, has given rise to the "knowledge-based economy". In the same conception, it is very needful to raise the entrepreneurial paradigm within the university sphere, as well as the role that must be assumed by universities and government in the development and promotion of innovations targeting companies. A review of the literature focusing on these important paradigms will open up the possibilities, especially according to studies that raise the creation and development of spin-off companies through university research and innovations.

Therefore, this article is divided into two main parts. The first one is dedicated to a theoretical analysis and the state of art. The second part is dedicated to an empirical study that aims to validate hypothesis emanating from theoretical conclusions.

Part 1: Theoretical Framework

The framework of this study aims to present, at first, the description of the Triple Helix model developed by Etzkowitz and Leydesdorff (2000). In a second step, the focus will be on the emergence of an entrepreneurial paradigm within the university sphere. A general portrait of the phenomenon of university spin-offs will then be drawn up in order to have a concrete overview about the studied field.

Several models have been developed over time by theorists to understand the reality associated to the production of innovations. These models and approaches can be categorized into two main clusters, namely neo-classical theories and institutional ones. Both are seeking to understand and explain relations between the various actors under the influence of multiple variables.

Therefore, three theories can be highlighted in the review of major theoretical approaches associated with the question of innovation and new modes of socio-economic organization in the knowledge economy.

1. The Neoclassic Theory of Innovation

From neo-classics to contemporary authors, innovation remains at the heart of the economic policies of all major countries.

Adam Smith considers that technological innovation is induced by the know-how of the workers and the work of “scientists or theorists”.

David Ricardo distinguishes several configurations of inventions such as manufacturing new goods, introduction of a new production method, opening of a new outlet, and realization of a new organization. The innovation, according to him, concerns the mechanization of work. However, it increases the profit of the entrepreneur by decreasing the wage fund, and it causes more technological unemployment.

Joseph Alois Schumpeter believes that the foundation and resilience of the dynamics of the economy is innovation and technical progress. The history of capitalism is a permanent technology that evolves and transforms. This leads to the entire sections of economic activity to wither and then disappear after being dominant. Schumpeter attests that the setting in the movement of the economy is under the action of the entrepreneur. This was a thesis that he developed in particular in the “Theory of the Economic Evolution” in 1913. Innovation is at the same time the source of growth and a factor of crisis. This is what Schumpeter summarizes in the sentence as “creative destruction”. Crises are not mere failures of the economic machine, they are inherent to the internal logic of capitalism. They are beneficial and necessary for economic progress. Innovation clusters almost occur in the depressionist wave.

Massaki IMAI, in his book “Kaizen: The Key for Japanese Business Success, 1986”, focused on internal enterprise innovations. It is not a work tool, but it is first a state of mind that brings us step by step to excellence through innovations. Also, on a smaller scale, slight improvements are made every day in his workstation. These are simple and inexpensive improvements made by all relevant stakeholders of the company. The whole philosophy of Kaizen lies to this sentence: “Do it better, improve it even if it is not broken, because if we do not do it, we cannot compete with those who do”.

Peter Drucker in 2006 took up the foundations of J. Schumpeter's theory. In his book “Innovation and Entrepreneurship”, he made a detailed analysis of the sources of innovation and how the change can be inducted in the company. He emphasizes on the importance of the entrepreneurial spirit and confirms that innovation and leadership are correlated in small and large companies.

Neoclassical theories have focused innovation on a linear model where the entrepreneur or leader is the only player. However, this unique dimension has been criticized by the institutionalist theory of innovation.

2. The Institutional Theory of Innovation

The institutional approach, popularized by John R. Commons in the early 20th century (1934), has thus made it possible to highlight the interactive nature of the innovation process.

Rosenberg and Kline's in 1986 developed "The Chain Linked Model" which is an interactive model of innovation in opposition to the linear model defended by traditional economists.

Using the basic premise of this approach, contemporary institutionalists perceive the value. Also, it has a more accurate understanding of the phenomena associated with the centrality of knowledge in today's economic growth, primarily the networking of firms and collaboration among the various institutional actors to create new knowledge.

According to the proponents of the institutional school, there is no doubt that the production of innovations is part of an interactive system built by all the actors belonging to the institutional spheres. All the models inspired by the institutionalism school have the particularity of attaching a central importance to the institutions set up by the actors to ensure the regulation of the system. Example includes the State, the university institution, the various legislations, the market, the syndics, etc.

Moreover, the quality and the density of the relations between these actors and institutions, and essential factors for the production of innovations, are based on the nature of the coordination mechanisms or the institutional arrangements that are implemented. In this respect, the knowledge economy would promote the development of the network form in the interactions between actors. Thus, this is a configuration that would be much more appropriate in the current economic context, as it would allow dynamic interaction between the actors and the public. The exchange on a complex and tacit knowledge are the two fundamental characteristics of any innovation process (Castells, 1998; 2001).

3. The Theory of the National System of Innovation (SNI)

One of the approaches belonging to the institutionalism perspective is that of the "national system of innovation". This is a term first introduced in the literature by the author Christopher Freeman (1987), when he published his study on innovation in Japan.

Subsequently, the theoretical approach was further developed by Bengt-Åke Lundvall to take into consideration the differences in the performance of each country in terms of innovation (CST, 1997).

In order to explain the logic of the interactions between the actors of the innovation, the authors of the SNI within their theoretical model include not only the industrial sectors and the companies, but also the State, academics, suppliers, clients, etc.

According to the followers of this model, a system would be emerging at the national level around science and technology. Innovation would be first the business of companies, but they would not innovate independently. They would interact with other companies, universities, government agencies, and so on. It would therefore be all of these actors and their interactions that would constitute the "national system of innovation" (CST, 1997).

In the same vein, we see that the SNI makes the company the center of the innovation process and the state is the main actor that facilitates the process. In fact, it seems clear that the SNI model relegates the role played by academic institutions in the production of knowledge to the back burner at a time when the economy is essentially based on knowledge. However, we believe that the university should occupy the central position it deserves within a conceptual framework by highlighting the relationship that the university sphere now has with other institutional spheres. The university is indeed the institutional player with the faculty and the potential to provide the most socially useful knowledge within the configurations that unify all socio-economic actors. In this vision, it is very important to use a dynamic model that highlights the potentially predominant role of universities in the current socio-economic development. The Triple Helix model, developed by the sociologists Henry Etzkowitz and Loet Leydesdorff (2000), is complying more because the analysis of the dynamics is surrounding the creation of spin-off companies within the biopharmaceutical sector, domain of authors. This model also has the advantage of illustrating brilliantly the ideological and structural transformations at work for each actor involved in innovation.

4. The Triple Helix

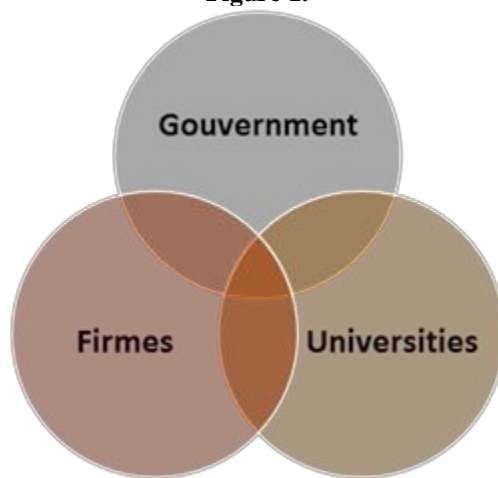
Several theorists have been interested in the interactions between scientific research, companies and government, and have suggested conceptual frameworks to explain transformations. The triple-helix model is a perfect example of this dynamic.

The "Triple Helix", primary founders were sociologists Loet Leydesdorff and Henry Etzkowicz (2000), insists on historical continuity (previous relations that persist between university, industry and government). It is a continuous interdependence of a tripod, which create a new stratum of knowledge. Also, it identifies a new world in full economic, industrial, and intellectual change.

In 2000, the authors of the "Triple Helix" published an article under the name: "Mode Two and the Globalization of National Innovation Systems: The Triple Helix Model of Relations between University, Industry and Government: Science: new environment, new practices" to highlight the evolution of their model by following the quick development of ICTs. Innovative approaches have led to a transversal reorganization of the triad. In

this way, university research becomes a place to explore the evolution of these knowledge-based triads.

Figure 1.



Source : Etzkowitz (2002 ; 2004), Etzkowitz and Leydesdorff (1998 ; 2000)

Therefore, the model involves three stakeholders which are:

Government: Guarantor of societal rules, regulations, and can be a source of subsidies,

Firms: Seek to improve their productivity on a continuous basis,

Universities: Generators and disseminators of knowledge.

The combination of these three actors can induce several forms of collaboration, mainly: Clusters, incubators, and innovation centers.

Clusters

The concept of cluster was developed by the economist Alfred Marshall who had identified in 1890 the benefits of the concentration of economic activities in "industrial districts composed of small similar specialized institutions to achieve a particular stage of the production process."

The concept was designed by Michael Porter (1990), who defined it as "a geographic concentration of related businesses, specialized suppliers, service providers, related industries and associated institutions (universities, standard-setting agencies or professional organizations, for example) in a particular area, which clash and cooperate."

It represents a triple advantage:

- Increased business productivity following access to a local labor market well adapted to the needs of the cluster, the accumulation of knowledge, and the transfer of information within the cluster caused by the complementarity of the actors.

- Increased innovation capacity of clusters. The perception of customer needs and the technologies to be solicited is indeed more easily perceived with less risk taking.
- Accelerate the creation of new businesses within the cluster to benefit from these benefits.

In Morocco, there are already a dozen labeled clusters covering several domains, such as: Solar (solar cluster), Morocco Numerical Cluster (MNC), valorization of seafood products (The Tan Tan Oceanopole Cluster), and electronics, Mechanics and Mechatronics (CE3M).

The main contribution of the cluster comes from the synergies that are created between actors. The resulting benefit is greater than the sum of the parts that make it up because there are synergies. The cluster therefore aims to reach a critical size from which its competitiveness and attractiveness are strongly correlated.

Innovation Centers

The Innovation Centers are places of creativity where training is provided. A multiple fields are opened to research and promotion of innovation federating different actors with multidisciplinary skills. The centers can provide workplaces, technology platforms and advanced equipment, and can become incubators for project leaders. It is a nursery of new ideas where the major objective is to encourage inventions, to make them evolved into innovations, and to support their implementation.

There is a big international innovation centers that are supporting a technology or specific brand, e.g., “Accenture innovation centers” which is a management-consulting firm dedicated to SAP technologies. Here the most advanced SAP technologies cross the vast functional and sectorial experience of Accenture.

Several centers have emerged in Morocco from a variety of backgrounds, such as:

- Mohammed V University Innovation Center in Rabat (CU2I). It is a structure of the University Mohammed V - Souissi created following the resolution n ° 13/39 adopted by the Council of the University at its session of December 11, 2013.
- The Moroccan Center for Innovation and Social Entrepreneurship is a non-profit organization dedicated to finding innovative and entrepreneurial solutions to every social challenge in Morocco. It was founded in 2012 by a group of seventeen people enthusiastic about social change in Morocco.

- TAMAYUZ Supply Chain Center of Excellence and Innovation, which was launched by SNTL. It is a center whose mission is to contribute to the construction of resilient and efficient supply chains through research, consulting, and certification.

In addition to clusters and centers of innovation, the Triple Helix concept is the underpinning of new contemporary practices directly inculcated in the entrepreneurial life, namely incubators.

Incubators

It is a new concept that appears in USA in 2000. It is a consequence of clusters and innovation centers. The main objective is to promote innovation and to encourage launching of small businesses. A business incubator is a place to meet the creators of companies. It can be financed by a public authority or private funds. However, some incubators are integrated with business schools or universities.

Companies who welcomed incubators are very young, even in the process of creation. These are often innovative companies in the new technology sector known as “Start-ups”.

The incubators have grown around the world with a large number of installations in the United States, Europe, and several emerging countries.

Most science parks are concentrated in the United States and Western Europe. This rapid increase in the number of incubation mechanisms has gone hand in hand with a proliferation of different incubator models that have spawned a diverse industry of incubation.

Part 2: Empirical Results

This empirical research has an objective to explore the status of Triple Helix Model in the Moroccan context.

1. Research Problem

The first objective of this paper is to highlight the role of the government in promoting innovation and university research. However, we took the triple helix model as the basic conceptual framework. The research problem to address is: **“what is the role of the government in promoting innovation and research in an industrial environment?”**

In this study, we have proposed as a theoretical underpinning the triple helix model due to its role in linking three essential components: the university, the companies, and the government.

As a result, we have assumed as a basic assumption that: the financial contribution of the State and the universities is referring to the creation and valorization of the research as an essential factor to the valorization of the

innovation within the companies. Therefore, this is aimed to achieve the objectives of the triple helix model.

The particularity that can be noted in Morocco is that the majority of universities that operate in research and innovation are public universities, which automatically means that the government is implicated. After an exhaustive review of all organizations related to innovation in Morocco, “Innovation centers”, “Clusters” and “Incubators” models were the only models linking the three stakeholders: Industry, State, and University. On this basis, a sample was taken out of three structures for each model.

2. Research Methodology

Following the results of the theoretical part, we conducted a quantitative study using a survey. They were administered face to face or by phoning the top managers of the structures. The administration of all the questionnaires were done with senior executives who are responsible for projects within the defined structure. The choice of this kind of study is to quantify the correlation between the three stakeholders according to the studied models.

The target aims to find several forms of the Triple Helix model that are deployed on ground. The objective is to demonstrate, through the answers, the level of involvement and the role of the government in Morocco in the realization of the triple helix model. For incubators, we limit ourselves to incubators launched in the public sector, since private incubators do not involve the government.

Consequently, the study was conducted with three innovation centers, three incubators, and three clusters.

A. Innovation Centers

Following the different characteristics of our sample, there are three innovation centers hosted by Moroccan public universities.

1. The first one is attached to Hassan 1st University of Settat. It is considered the youngest Moroccan university with more than seven establishments of different disciplines. It is a public university whose operational and investment funds are basically provided by the Ministry of Higher Education, especially the budget of the Moroccan government.
2. The second innovation center is hosted in the Caddy Ayyad University of Marrakech. It is the oldest university in Morocco after the University of Fes. It is also under the supervision of the Ministry of Higher Education and financed for its operating needs. Also, the majority of its investments are from the budget of the Moroccan government.

3. The third sample of innovation center is rather a technical center known as the National School of Electrical and Mechanical Sciences. This establishment also belongs to the Public University of Casablanca and is under the supervision of the government for financing and management. The particularity of this innovation center is that it is hosted in the economic capital of Morocco. As a result, it is close to more than 70% of Moroccan companies operating mainly in industry and trade. Thus, this makes it the largest public innovation center in Morocco.

B. Clusters

For the studied clusters, we chose three different domains such as: The field of new technologies (Morocco Numerical Cluster), the field of chemistry and paracheical (the chemical and paracheical cluster), and finally the field of management research (University Hassan 1st Cluster).

1. Morocco Numeric Cluster

It is a public/private mixed governance structure implicating several actors: State, Large companies, SMEs, education, and research operators. It aims to finance organizations with the ultimate goal of bringing innovative projects for launching, especially high value added projects in the following four niches of ICT:

- Mobile services
- Security, electronic banking, digital rights
- Multimedia
- Software packages

2. Chemical and Paracheical Cluster

The chemical and paracheical industries occupy an important place in the national economy by the diversity of their products and their organic link with other economic activities upstream or downstream.

Chemical and Paracheical cluster is hosted at the headquarters of the office of the Cherifian Phosphate (OCP). This structure is financed in partnership with the companies of the sector and by the national Hassan 2 fund which belongs to the government.

3. University Hassan 1st Cluster

This cluster is a public cluster and is hosted at the Hassan 1er university of Settat. It is responsible for the promotion of the results of scientific research to companies in the region. Settat is mostly recognized by the ecological industry and is committed to CSR (Company Social Responsibility). It is close to Casablanca, the economic city.

C. Incubators

The interviewed incubators represent different forms. There are public incubators whose management is assumed by public institutions. In addition, we visited two structures at the university institutions such as:

- TADBIR Incubator of ISCAE (Higher Institute of Commerce and Business Administration): It is a performance incubator that has a leverage effect on the development of applied research in Morocco, putting it at the same level as ranked business schools worldwide. The school has been accredited by the AMBA (Association of Masters of Business Administration).
- Hassan 1st University Incubator: It is responsible for the development of University research and innovation in the Settat Region (Chaouia Ouardigha). The link is established between project leaders and companies who wish to invest in new ideas and innovations.

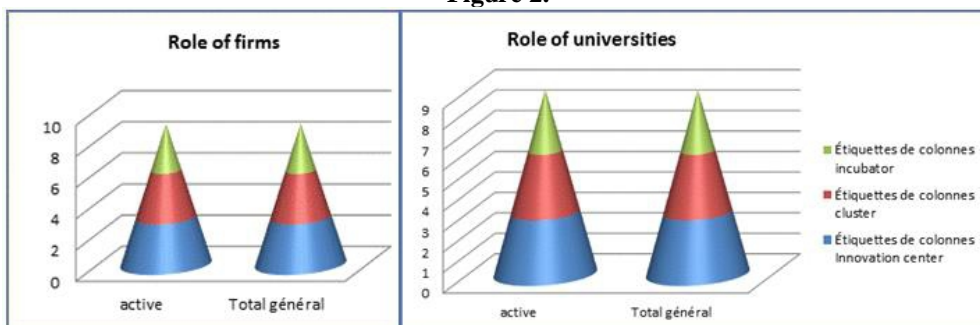
The third structure we visited is not university but involves academic researchers. It is the incubator of the OCP (Cherifian Phosphate Office).

- The OCP incubator called Innovation Fund For Agriculture is an investment fund that aims to support and sponsor innovative projects in the field of agriculture and agribusiness. This, thus, contributes to the sustainable development of national agriculture. It gives invitation to entrepreneurs, researchers, and engineers with innovative projects in the field of agriculture to create their businesses by benefiting from investment funds and benefiting from the sponsorship and the partnership of experts.

4. The Results of the Study

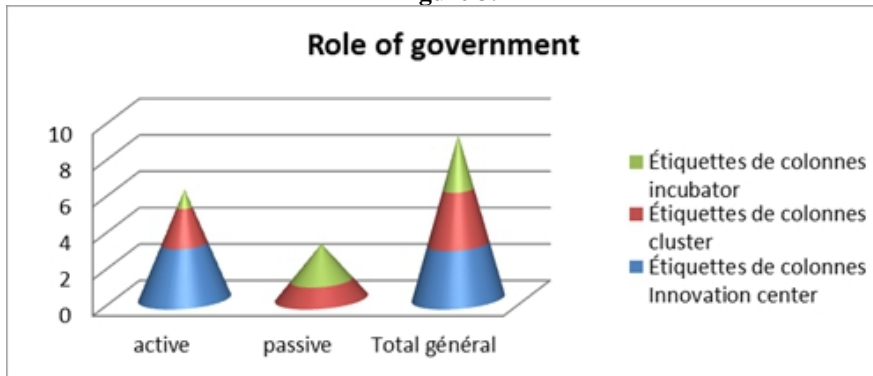
The main results are as follows:

Figure 2.



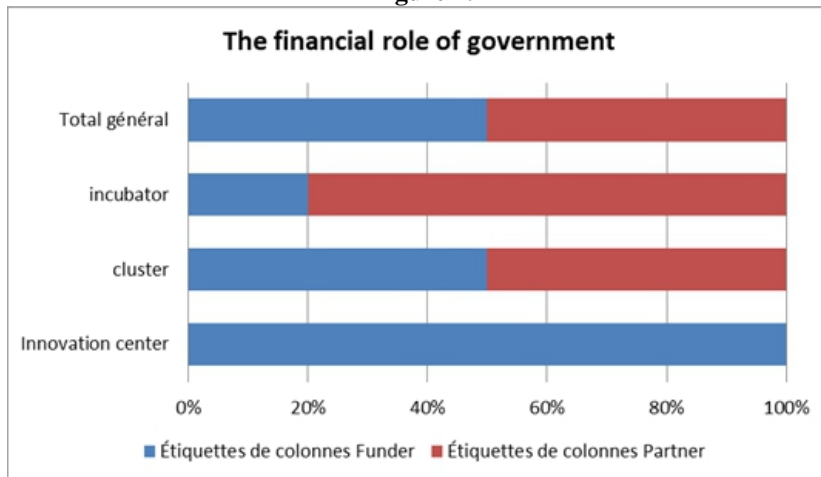
All the firms and universities are concerned with the innovation in the three chosen models.

Figure 3.



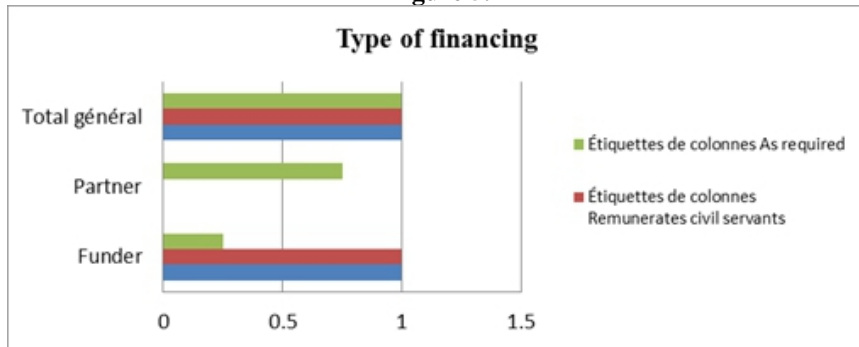
The government is concerned with the innovation in the three chosen models. Mostly in “Innovation Centers” at the second position, we can notice “Clusters” and finally “Incubators”.

Figure 4.



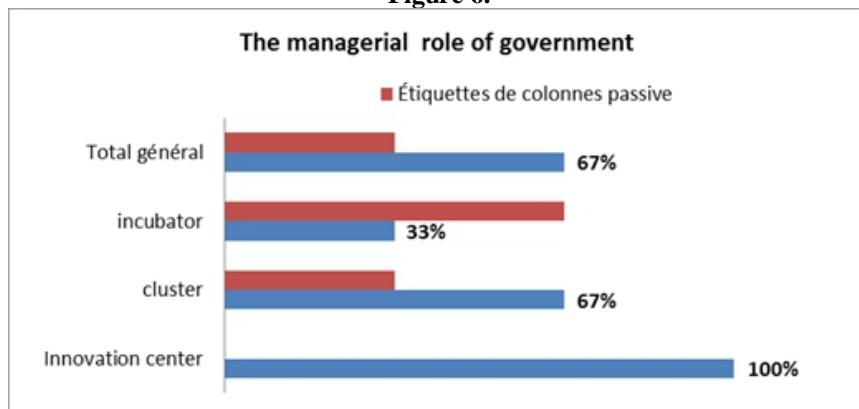
The government often finances the three chosen models. The biggest contribution is for the “Innovation Centers”, after that “Clusters”, and finally “Incubators”.

Figure 5.



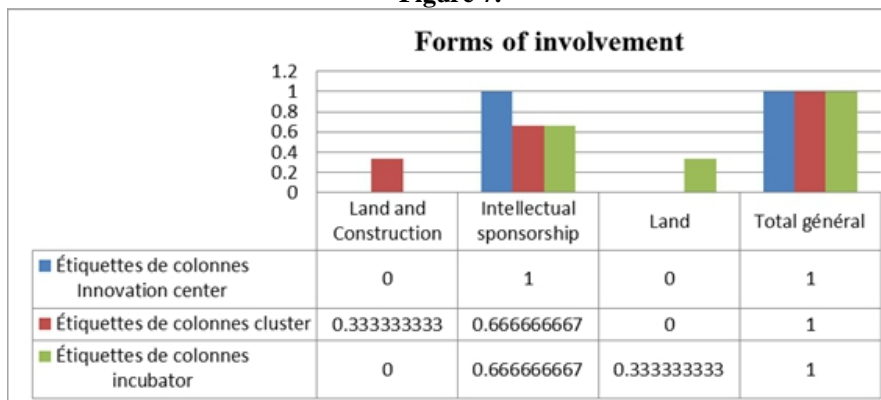
In the two cases, “Center of Innovation” and “Clusters”, the government is regarded as a founder while “Incubators” is acting as a partner.

Figure 6.



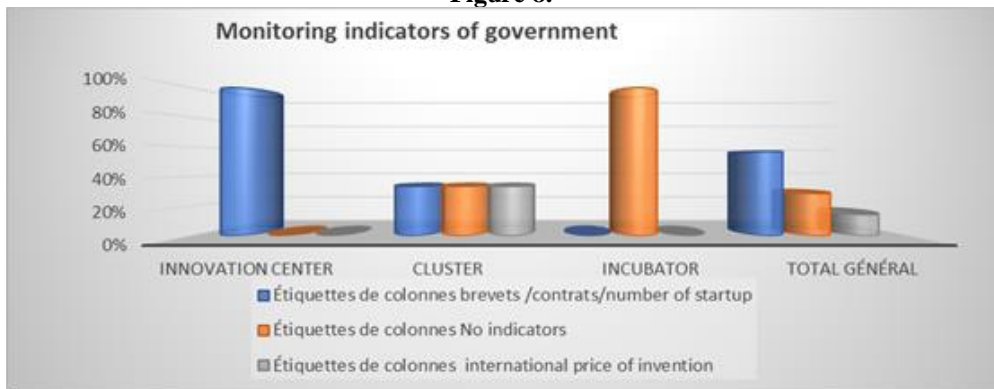
The government finances totally the managerial role of innovation centers at 67% clusters and at 33% incubators.

Figure 7.



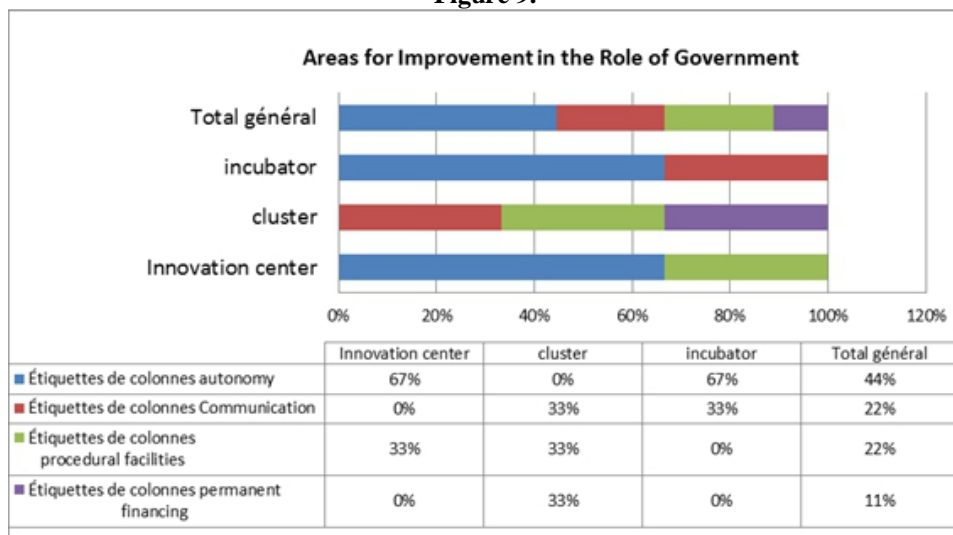
The government implication is mostly about intellectual sponsorship. Thus, this is dependent on the case land for clusters and incubators.

Figure 8.



The monitoring indicators concern mostly “Centers of Innovation”. However, the clusters can report some details but incubators are not followed by government at all.

Figure 9.



Areas of Improvement

- For “Innovation Centers”, Managers are claiming autonomy and more procedural facilities.
- For “Clusters”, Managers are claiming more communication, procedural facilities, and permanent financing.
- For “Incubators”, Managers are claiming more autonomy and improvement in communication.

Conclusion

The Triple Helix model reaches its peak in the "Cities of Innovation" since the budget even the launch and the operational management is distributed among the three stakeholders. This model is managed by the President of the University. The Cluster is mainly in the form of an association legally managed by an industry professional. Incubators do not have dedicated budgets, but it draws on the University's research and development budget.

For the past 5 years, innovation has been a core strategy in Morocco and was the essence of its economic development. Therefore, this was how the Moroccan government was forced to invest financially and intellectually to create entities and accompany them, resulting to the origin of the Triple Helix models. Thus, thanks to these efforts, the ranking of Morocco has changed significantly. It rose from 88th position in 2010 to 76th position in 2016 and to 72nd place in 2017. This was out of 127 economies evaluated in the "Global Innovation Index" ranking.

These results are only the culmination of persevering and continuous work, especially the involvement of the three stakeholders: State, Industry, and the university.

As a practical implication, it is very interesting to create an ecosystem around innovation so as to ensure that the continuity of the projects will be supported by committed stakeholders.

The state can have the role of regulatory and the supportive entity, the industry can be the customers of innovation and can even finance the inventions, and universities can bring creativity and motivation of students to work on real immersive projects.

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