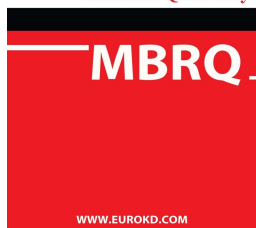




Management and Business
Research Quarterly



Management and Business Research Quarterly

2021(19)1–13



Analysis-Diagnosis and Performance of a National System of Technological Innovation (NSTI): The Case of the Moroccan NSTI

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Received 11 March 2021 **Accepted** 7 July 2021

ABSTRACT

At the current stage of development of the world economy, innovative development has become a priority in terms of the economic policy conducted by many countries. In the same perspective, Morocco has undertaken many reforms in order to develop its economy and strengthen its competitive potential in terms of exports. Since 2000, the country has initiated a process that aims at setting up a national ecosystem that favours the development of national scientific research in general and innovation and valorization of research results in particular. In order to consider the implementation of an efficient NSTI, the so-called “learning” approach would represent a very interesting avenue for the Moroccan NSTI. The NSTI is undeniably a complex system whose performance is highly dependent not only on the intrinsic quality of the subsystems that make it up but also on the quality of the interactions and exchanges that take place between all the subsystems. Before making proposals for the evolution of any NSTI, we must first diagnose its situation, its strengths and weaknesses. To do this, we have analyzed the different approaches related to the performance of NSTI. Then we have established a diagnostic analysis of the Moroccan NSTI in order to detect avenues of improvement.

Keywords: *National System of Technological Innovation, Performance, Diagnosis, Performance Indicators, Morocco*

Introduction

At the current stage of development of the world economy, innovative development has become a priority in terms of the economic policy conducted by many countries. In this

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doi:10.32038/mbmq.2021.19.01



perspective, Morocco has undertaken many reforms with the aim of successfully integrating into the world economy in general, and the African economy in particular, in order to diversify its economy and strengthen its competitive potential in terms of exports. Until 2000, innovation was not a priority for the government, and the links between public research and the socio-economic fabric were very weak (Elyoussoufi Attou, 2019; Elyoussoufi Attou et al., 2019; Taouaf et al. 2021). However, Morocco began a process 20 years ago that aimed to establish a national ecosystem that favoured the development of national scientific research in general and innovation and valorization of research results in particular (MESRSFC, 1999 & 2000). In 2011, the actual implementation of a Moroccan National System of Technological Innovation (NSTI) was initiated by the elaboration and adoption of the “Morocco Innovation Strategy” (Elyoussoufi Attou, 2019).

The concept of NSTI has been widely disseminated among academics and policymakers at the regional and national levels and has become a framework for innovation studies in several international organizations. The concept of innovation systems has been used to analyze the actors, institutions and networks that contribute to the emergence of innovations (e.g., products, processes and organizations) (Wandera, 2020). It is undeniably a complex system whose performance is highly dependent not only on the intrinsic quality of the subsystems that make it up but also, and above all, on the quality of the interactions and exchanges that occur between all the subsystems. It is for this reason that the interface and intermediation structures whose role is to facilitate these interactions are very important. The more efficient and fluid these interactions are, the more efficient the NSTI is (Chaabouni, 2007).

In this work, we have first analyzed the NSTI by focusing on the different approaches related to their performance in order to better understand them. We then zoomed in on the Moroccan NSTI by carrying out a diagnostic analysis of this system in order to better understand the problems and aspects related to the majority of its components.

Performance of an NSTI

A nation's innovation performance is truly multifaceted and is a complex phenomenon that stipulates more than a single criterion to describe it (Pan et al., 2010). According to Bartels et al. (2012) and Gurova (2015), the importance of NSTI in relation to economic performance has been widely recognized. In principle, some researchers argue that multifactor performance measurement models are needed to evaluate NSTI, and for example, one way to measure performance is to evaluate the conversion of “inputs” and “outputs” resources (Pan et al., 2010). As Bartels et al. (2012) point out, there are relatively few theoretical frameworks and models that analyze the dynamic nature of NSTIs. In addition to this statement, Groenewegen and Van der Steen (2006) agree that the central challenge of National Systems of Technological Innovation is its dynamic nature and complexity. Thus, one way to explore this is through incremental innovation, knowledge and learning (Groenewegen & Van der Steen, 2006).

As explained by Freeman (1995) and Groenewegen & Van der Steen (2006), NSTI should be viewed from a more systemic approach to innovation, where the interaction between organizations, institutions, and technologies becomes increasingly influential in determining the rate of innovation diffusion. Overall, the NSTI is influenced by a number of factors, which reflect its innovation performance, such as knowledge infrastructure, institutional setup, learning and innovation policies (Gregersen & Johnson, 1997). Indeed, the NSTI allows a state

to occupy a certain niche in the global economy and gain weight and status in terms of international relations (Gurova, 2015).

It is undeniably, a complex system whose performance is highly dependent not only on the intrinsic quality of the subsystems that make it up but also and above all, on the quality of the interactions and exchanges that occur between all its subsystems. It is for this reason that the interface and intermediation structures whose role is to facilitate these interactions are very important. The more efficient and fluid these interactions are, the more efficient the NSTI is (Chaabouni, 2007). Indeed, the NSTI as such is extremely broad and covers a number of different actors, and the behaviour of an individual actor impacts all other actors in the system (Samara et al., 2012).

Dodgson (2009) and Guan and Chen (2012) highlight the importance of government intervention. In principle, governments allow incentives for innovative activities, which impact all institutions and actors in the NSTI (universities, firms, etc.). Indeed, building an effective NSTI model is only possible when there is a mutually beneficial partnership between government and business, combining national and commercial interests and ensuring an innovation-friendly business environment. The support and promotion of the processes of creation and commercialization of new technologies are officially recognized in most countries as the basis of national competitiveness strategies and implies a priority for national economic policy. (Gurova, 2015).

Indeed, the positive impact of innovation on the competitiveness of the economy is manifested in the growth of productivity and value-added as well as in the structural modernization of the economy, increasing the share of high-tech and R&D-intensive industries in production and export, but also in the improvement of product quality. However, the problems of innovation systems that need to be solved or mitigated through innovation policy can only be identified by comparing existing innovation systems with each other over time and space (Edquist, 2011). Furthermore, the failure of the NSTI is thought to be an inability of the system to fully perform its main functions (creation, storage, dissemination, and economic use of knowledge) through the interaction of actors. The main factors of these dysfunctions are the following (Golichenko & Samovoleva, 2013):

- insufficient incentives for activities in NSTI;
- lack of absorptive and innovative capacity and lack of competence of actors;
- a lack of resources and partners ensuring the performance of NSTI processes;
- disruption of the coherence of interactions and weak linkage between stakeholders;
- complexity and failure of the legal framework.

Nevertheless, one of the most common ways to improve innovation effectiveness is to improve existing innovation policies (Guan & Chen, 2012). Therefore, countries aspire to improve their policies for learning from other nations, in other words, to identify “best practices” of NSTIs. In the innovation environment, governments, in particular, emerge as one of the most powerful facilitators of effective innovation policies (Guan & Chen, 2012).

A thorough understanding of the factors affecting the performance of an innovation system is likely to improve government and business decisions. Innovation indicators provide information on the state of the system, including bottlenecks, deficiencies, and weaknesses, and help monitor its evolution over time. But this is not enough: policymakers also need to know about the influential relationships among the system’s components and the workings of the system to produce meaningful outcomes, including the effects of policy interventions

(OECD/Eurostat, 2018). Another way to proceed is to divide innovations into different categories. Indeed, taxonomies of innovations are important, as are performance indicators in an innovation system. Taxonomies and indicators are essential as a basis for innovation policy design and implementation (Edquist, 2011).

Measuring the performance of an NSTI

It has been determined that at the current stage of development of the world economy, factors such as science, technology and innovation play an important role in the formation of a competitive economy. It was established that the overall level of funding in relation to science proves one of the key characteristics of an innovative country, and therefore, the analysis of NSTI performance was carried out on the basis of the national R & D expenditure indicator as well as the country's position in the Global Innovation Index (GII) (Edquist, 2011). Indeed, the state of innovation in a country, in a research centre or in a company is measured by the "inputs" dedicated to this activity, with the importance given to the number and quality of human resources involved in the R&D and innovation process. It is also characterized by the quantity and quality of the "outputs" offered, including the scientific and technical productions made by these human resources. These characterization processes encompass the entire chain and pass through patents and the R&D of innovative companies (IRES, 2015).

The performance of an innovation system can be measured by the propensity to innovate (or innovation intensity). Innovation surveys measure, among other things, the propensity to innovate for specific categories of innovations in various innovation systems (national, sectoral and regional). To be useful to the NSTI, these measures and descriptions must be comparative and comparable across systems. This is because it is not possible to tell whether innovation intensity is high or low in a certain system if there is no comparison with innovation intensities in other systems. This is because we cannot identify "optimal or ideal" innovation intensities (just as we cannot specify an optimal innovation system) (Edquist, 2011).

Also, monitoring and evaluation aspects must be incorporated, and the results must necessarily allow for continuous learning and change in innovation policy. It is also necessary to design a battery of performance indicators that can address the concerns and questions of government authorities and behind them the taxpayer, namely: measuring the actual and potential outcomes and impacts of public spending on innovation and science activities, including effects on GDP, knowledge generation and transfer; new firm creation; and access to seed, development and growth capital (Elyoussoufi Attou, 2019; El Ganich et al., 2019).

In addition, a diagnostic analysis related to the performance of an innovation system is needed. Edquist (2011) highlights the value of pointing out the types of innovations with which the system malfunctions. This is defined as a failure. It is also necessary that innovation policy goals be specified in terms of the types of innovations that should be influenced, i.e., policy goals should be expressed in terms of innovation intensity.

Performance indicators

Quantification is important and necessary to develop a more sophisticated systemic and interactive view of innovation processes. However, this is not an easy task. It will be necessary to identify the central elements of the NSTI, estimate their relative importance and study the relationships between them. In particular, it will be necessary to know more about the

interdependence and connectivity of systems. It is also important to know more about the division of labour among the NSTI elements; who is responsible for what kind of knowledge and why?

Already used in the science and technology research community over a much longer period of time, NSTI performance indicators have now become an essential ingredient in research on the ways in which the science-technology-innovation subsystem operates and its relationship with the economic system. In societies that allocate significant amounts of public and private sector money to activities such as (experimental) R&D, new software tools and programs, technical support services, and the design and development of new products and processes, it is inevitable that policymakers, private firms and financial investors, and researchers will want quantitative statistical tools to monitor the extent of the commitment and to learn more about the effectiveness of these activities. It is also entirely understandable that they will want to make comparisons across countries, organizations (public and/or private), and industries in the direction, scale, and effectiveness of their engagements (Freeman & Soete, 2009).

Indeed, the choice of innovation indicators reflects a hierarchy of different types of information. While the possibility of developing indicators from microdata broadens the horizon, specialists or organizations still need to have access to this microdata. The alternative is to rely on aggregate data, usually at the country, sector, or regional level (OECD/Eurostat, 2018). In addition, reports based on several innovation indicators for international comparisons typically share a number of common characteristics (Arundel & Hollanders, 2008; Hollanders & Janz, 2013):

- Innovation indicators used at the country, sector, or regional level have generally been selected in accordance with innovation systems theory;
- Their selection was also motivated by considerations of construct and face validity, despite the constraint of data availability;
- The indicators are presented by thematic area, with themes grouped in a hierarchical structure (e.g., inputs and contributions, capabilities and outputs);
- These reports provide, at a variable level, contextual and qualitative information useful for policy-making, as well as methodological information.

Compared to simple indicators, the development of composite innovation indicators involves two additional steps:

- The standardization, to a single scale, of indicators covering different scales (nominal value, counts, percentages, expenditures, etc.): for this purpose, several solutions are possible, such as the standard deviation and the minimax method ;
- Aggregation of standardized indicators into one or more composite indicators: this can be done by assigning the same or separate weights to each indicator, depending on its contribution to the composite indicator.

Composite innovation indicators have been developed and presented in comparative scorecards of countries and regions. These composite indicators are most often compiled by consultants, research institutions, think tanks, and institutions that, lacking access to microdata, aggregate existing indicators (OECD/Eurostat, 2018).

Thus, more advanced benchmarking tools are needed. Highly advanced indicators and data help to better understand the innovative activities of NSTI, leading to more cross-national comparison studies (Castellacci et al., 2005). By using advanced indicators generated by international benchmarks, more reliable assessments can be provided.

The taxonomy of innovations

Since innovation changes the characteristics of products or business processes, usage tends to define it in terms of its purpose. Having information about the purpose of innovation allows for a better assessment of its purpose, general characteristics and potential impact on the business, or to determine the types of innovation activities associated with its development and implementation. It is very important to divide innovations into different categories. Therefore, taxonomies of innovations are important, as are indicators of the intensity of different types of innovations in an innovation system. Taxonomies and indicators are essential as a basis for innovation policy design and implementation. (Edquist, 2011). Often it is important to know the consequences of various categories of innovations on productivity growth, employment, environmental balance, etc. Indeed, there is a difference between innovations per se and the consequences of innovations on economic growth, the environment, etc. (OECD, 2015), hence the need to classify innovations according to their taxonomies.

Analysis-Diagnosis of the Moroccan NSTI

In an increasingly complex global context, Morocco has undertaken numerous reforms with the aim of successfully integrating into the global economy in general, and Africa in particular, in order to diversify its economy and strengthen its competitive potential in terms of exports. Twenty years ago, innovation was not a priority for the public authorities, and the links between public research and the socio-economic fabric were very weak due to the absence of a structure whose mission was the economic valorization of research results. (Elyoussoufi Attou, 2019).

From the year 2000, the country began a process that aimed at the establishment of a national ecosystem promoting the development of national scientific research in general and innovation and valorization of research results in particular (MESRSFC, 1999; 2000). Indeed, in 1999, Morocco undertook the first survey on R&D in enterprises under the aegis of the Ministry of Industry and Trade. At that time, the country only had a survey on the mechanical and machine tool industry. After this first R&D survey, a survey on innovation was entrusted, in 2005, to the professional association “R&D Maroc Association”, an organization that brings together the R&D managers of large Moroccan companies and carries out activities to promote innovation (trade fairs, workshops, innovation awards, communication and information). This second survey was very close to the rules set out in the Oslo Manual, which established some principles and methodology for innovation surveys (IRES, 2015).

In 2011, the implementation, properly speaking, of a Moroccan NSTI was initiated by the development and adoption of the “Morocco Innovation Strategy”, which was validated, during the second Innovation Summit, by the two Ministries (MESRSFC, 1999; MICIEN, 2012) following a broad public-private consultation (Elyoussoufi Attou, 2019). The strategy aims firstly to define concrete measures to foster an innovation environment in line with the imperatives of competitiveness and market needs, and secondly to set a common action plan for all actors involved in the R&D and innovation process in Morocco (MICIEN, 2012).

The NSTI Actors in Morocco

The concept of the NSTI is described as the set of national institutions that contribute to the generation and diffusion of new technologies and provide the framework within which

government and business negotiate policies to influence the innovation process (Metcalf, 1997).

The NSTI is composed of all institutions that are concerned with innovation: i.e., the companies that can be considered as forming a subsystem, the research centres and laboratories, which generate and disseminate new knowledge that can also be grouped into another subsystem, the universities and all the training structures that form a third subsystem, the organizations in charge of financing innovation, in particular, venture capital companies, organizations that protect intellectual property, those that establish standards, those that provide support to companies, which can also be grouped together in another subsystem, those that interface between these different subsystems and, of course, the structures in charge of defining research and innovation policies (Chaabouni, 2007)

In Morocco, the stakeholders of the NSTI are shared between:

- Strategic actors who have the role of establishing innovation policies as well as strategic analyses and visions: the State, the Ministry of National Education, Higher Education, Executive Training and Scientific Research, the Ministry of Trade, Industry and New Technologies, the Hassan II Academy of Sciences and Technics;
- Executive actors who have a role in knowledge transfer and networking at the level of the NSTI: universities, higher education institutions, companies, research centres, technical centres, NGOs, etc.

Systems and mechanisms for promoting innovation in Morocco

Aware of the imperative of integration into the knowledge economy and the primordial role of innovation as a driver of economic competitiveness, the public authorities in Morocco, in coordination with several private and civil society actors, have been working for more than 20 years to set up a national system of technological innovation (Elyoussoufi Attou, 2019; Elyoussoufi Attou et al., 2019; Taouaf et al., 2021). Indeed, the Moroccan state has put in place several mechanisms to encourage scientific research, technological development and innovation. Since 1996, significant efforts have been made. A subsidy has been allocated to research and is included in the state budget (IRES, 2015). This subsidy is reinforced by funds from the five-year plans. Many programs have been established:

- Research infrastructure development program: Technical Support Units for Scientific Research; Center for Studies and Research on Water and Energy; Center for Studies and Research on the Sahara ;
- International Forum of Moroccan Skills Abroad (FINCOME);
- Program for the development of thematic research networks (Pôles de compétences);
- Program for the promotion of excellence (Grand prix de la Science et la Technologie);
- International cooperation program;
- Law 08-00 relating to the creation of Public Interest Groups (GIP);
- Setting up in 2002-2003 of the program “Priority Solidarity Fund (PSF)- Valorization of the Research to the Industry and Upgrading of the Moroccan Enterprise”. This program is the result of triangular cooperation between the Ministry in charge of research, the Ministry in charge of industry and the French Embassy in Rabat (MESRSFC, 2002) ;
- National Innovation Summits initiated in 2009 by the Ministry of Commerce, Industry and New Technologies in partnership with the Ministry of National Education, Higher

Education, Scientific Research and Executive Training and the General Confederation of Moroccan Enterprises (CGEM) and the launch in 2009 of the “Moroccan Innovation Initiative” between these three partners.

- The PRD (Provision for Research and Development). This is a tax incentive designed to encourage companies to carry out R&D programs. The provision can go up to 20% of the taxable result, within the limit of 30% of the amount of the investment. The PRD was abolished in 2009, but the principle of tax incentive is retained in the government statement (2012-2016);

A public innovation support fund also offers financing programs through the Moroccan Innovation Center (MIC). “Maroc PME” (formerly National Agency for the Promotion of Small and Medium Enterprises) also has a financing tool for startups.

The Moroccan government has also put in place a series of measures and strategies to develop higher education and strengthen the missions of Moroccan universities (MESRSFC, 2006), including:

- Program for the development of scientific and technical information: MARWAN (MARoc Wide Area Network), a national computer network for teaching and research created in 1998 with high-speed connections between universities and with similar networks, particularly in Europe;
- Moroccan Institute for Scientific and Technical Information (IMIST) was created in 2000 to meet the needs of the scientific community in Scientific and Technical Information (STI), and with the objective of sensitizing Moroccan companies to the role of STI in the process of innovation, IMIST has created a technology watch unit that is dedicated to producing publications and studies in technology watch, thus contributing to the sensitization of the importance of technology watch to meet the challenge of international competitiveness;
- National Fund of Support to Scientific Research and Technological Development (NFSSRTD) was created within the framework of the law of finances 2001 to ensure to the research a critical mass allowing him, a qualitative and quantitative evolution as regards achievements.
- Program evaluation of research activities;
- Program of organization and structuring of research (accreditation of research structures by the universities);
- Program of innovation, technological transfer and valorization of research (interfaces, network of technological diffusion, network of industrial engineering, Network Morocco Incubation Essaimage (RMIE), development centres...);
- National programs to support scientific research (Scientific Research Support Program, Thematic Program to support scientific research, support for publishing, support for scientific events, research grants, sectoral research...);
- Implementation in 2000 of law 01-00 which allows universities to provide services, create incubators for innovative companies, create subsidiaries or take participations in order to exploit patents and licenses and to market them (MESRSFC, 2000) ;
- Launching in 2004 of the national program of University-Enterprise interfaces ;
- Implementation in 2006 of the scientific research strategy for 2025, which takes into account the major development projects launched by Morocco (Emergence Plan, Azure Plan, INDH, Offshoring, etc.) ;

- Perennialization in 2007-2008 of the programs and networks of the FSP (Priority Solidarity Fund) “Valorization” under the Program of Support to Innovation and Technological Development (PAIDT). The PAIDT is the subject of an agreement signed in 2008 by the Ministry of Higher Education and Scientific Research and the Ministry of Industry, Trade and New Technologies;
- Implementation in 2009-2012 of Project 14 within the framework of the Emergency Program, which focuses, among other things, on university patents, R&D contracts in partnership with companies.

Diagnosis of the Moroccan NSTI

The NSTI of countries with a remarkable experience in the field of innovation has the following characteristics: world-class universities; developed venture capital; a high proportion of the population with a higher education degree; develop “university-industry” links; develop a proactive policy to attract qualified personnel, and have favourable conditions for business in general.

Scientific research and technical innovation play little part in Morocco’s technological development, while the global economy is undergoing profound change due to the evolution and proliferation of technologies in almost all areas. There is a strong concern that scientific and technical research in Morocco is lagging behind, which hinders the country’s development in a globalized world, characterized by an exacerbated competition, whose winners are inevitably the countries that base their economy on scientific and technological knowledge and know-how, and on their innovation capacities (AH2ST, 2019).

The Moroccan State has been making a real effort on the technological development front for nearly two decades: especially concerning the filing of patents by academics, in this case, the work program, started in 2008, which was carried out by the Ministry in charge of scientific research in collaboration with the Moroccan Office of Industrial and Commercial Property (OMPIC) and which resulted in the granting of a 50% reduction in the corresponding fees to university patent applicants. Also, from 2009 a heading was introduced in the budget of the universities for the assumption of responsibility of the expenses of deposit of the patent and the annuities relating to it. This has resulted in an improvement in the number of patent filings by universities (138 patents in 2013, 58 patents in 2012, 41 patents in 2010 and 11 in 2009). However, the majority of patent filings in Morocco is of foreign origin (80% of filings), which shows the general weakness of the national effort in this field and that the share of companies in terms of filing patents does not exceed 7%, which reflects the weakness of inventive activities and technological development within the national economic fabric (MESRSFC, 2013; OMPIC, 2013).

On the human resources side, it should also be noted that the Kingdom is seriously lagging behind comparable countries in terms of research staff numbers, student and young researcher supervision rates, the number of doctoral degrees awarded per year, and the resources devoted to R&D. A weakness is also noted in innovation activities that can accompany the efforts undertaken by the country in the success of its various sectoral plans, including industrialization, and in improving the competitiveness of its products (AH2ST, 2019). Indeed, a survey conducted by the R&D Maroc Association in 2010, on a sample of 300 Moroccan companies representative of companies in industrial sectors, shows the weakness of R&D and innovation activities within Moroccan companies (R&D Maroc, 2010):

- 29% of companies declare having an R&D and Innovation activity
- 0.21% of the total workforce is assigned to R&D, i.e. 1,053 people
- 0.13% of the turnover, or about 42.81 €, is the budget devoted to R&D/Innovation work.

Also, the involvement of the private sector in the financing of the national R&D effort remains very low compared to the public effort despite its significant progression over the last ten years. Indeed, Morocco's R&D expenditures did not exceed 0.79% of GDP in 2010, and the private share has increased from 7% in 1999 to almost 30% in 2010 with an amount of 1 678.46 million dirhams and a ratio to GDP of 0.22%. However, in countries where R&D is more developed, private funding represents a larger share (AH2ST, 2012).

In addition, several weaknesses and problems have been identified during the period 2011-2015 in relation to the implementation of various mechanisms of support and support for innovation launched as part of the Strategy Morocco Innovation (Elyoussoufi Attou 2019), it is mainly :

Some funding mechanisms have not been put in place (Innovation Seed Fund and Support for R&D in advanced technologies).

- Non-adequacy of the modalities of the instrument "INTILAK" with the expectations and the needs of the holders of projects of creation of Startups.
- Non-adequacy of the launching approach of the three instruments (INTILAK, TATWIR and PTR) with the nature and the reality of innovation projects in the Moroccan context. Indeed, the three instruments were launched in the form of calls for projects once or twice a year instead of being open throughout the year.

Analysis of the results of innovation support programs and mechanisms, and more specifically, activities related to technology transfer in Moroccan universities, shows, among other things, the weakness of collaborative research projects with economic partners and the provision of technological services by universities (Elyoussoufi Attou & Arouch, 2016; Elyoussoufi Attou et al., 2019; Taouaf et al., 2021).

In addition, there is a weakness or even the non-existence of adequate financing mechanisms for the creation of innovative companies (seed funds, venture capital funds, business angles, etc.). The regulatory and fiscal environment hinders the development of venture capital in Morocco. And for there to be an operational and efficient venture capital ready to invest in innovative projects, it will be necessary for the State to put in place a real policy of support to this instrument to overcome this deficiency.

The efforts made so far through the implementation of a policy promoting innovation, the creation of innovative companies and attempts to bring the university closer to the business world, as well as other achievements in this context, have not allowed Morocco to achieve its maximum potential. Indeed, the situation of innovation in a country is the result of several factors that interact in a complex way in addition to the basic factors that characterize this country as the economic environment and culture (Elyoussoufi Attou, 2019). Hence the need to implement a performance measurement tool that will unpack these different factors to improve the innovation situation in Morocco.

Conclusion

In an NSTI, there is usually a process of "institutional learning and borrowing," which means adapting institutions and economic policies that have proven successful in other countries.

Borrowing as such poses certain challenges, as a foreign institution can never be fully transferred to a different environment. Thus, this process refers more to an institutional learning process (OECD/Eurostat, 2018). A nation's innovation performance is truly multifaceted and is a complex phenomenon that can be measured through propensity to innovate (or innovation intensity). Innovation surveys measure, among other things, the propensity to innovate for specific categories of innovations in various Innovation Systems (national, sectoral and regional). To be useful to the NSTI, these measures and descriptions must be comparative and comparable across systems. Certainly, the performance of some subsystems of the Moroccan NSTI is measured by a number of international benchmarks via their comparative NSTI scoreboards. However, most of the microdata collected lack precision.

In this context, as the next step in our study on the NSTI model, we plan to conduct a comparative study of several Innovation Systems Scoreboards in order to identify the most relevant indicators and identify the best practices to be adapted to the Moroccan context. To do this and to have comparable indicators, it will be necessary to adopt indicators that are recognized, harmonized and standardized by international reference systems and reports.

The efforts made to date through the implementation of a policy favouring the promotion of innovation, the creation of innovative companies and attempts to bring the university closer to the business world as well as other achievements in this framework have not allowed Morocco to achieve its maximum potential. Indeed, the situation of innovation in a country is the result of several factors that interact in a complex way in addition to the basic factors that characterize the country, such as the economic environment and culture. It should be noted that the few studies that have looked at NSTI in a developing country context have noted the lack of institutional capacity for innovation, in particular the absence of informative linkages between government and industry and the lack of mastery of innovation policy tools that allow for reporting on the determinants of innovation. Indeed, our article is a basis for reflection in order to make our Moroccan National System of Technological Innovation evolve and perform better. During our diagnosis, we noticed a serious lack of communication between its stakeholders despite the progressive opening of the Moroccan economy. Indeed, the latter lacks informative instruments with a real agentivity capable of effectively orienting the activities of all the NSTI stakeholders. In this perspective, our next article, through a Benchmarking that we plan to carry out, we will propose a customized performance scoreboard with a set of performance indicators that will serve as a decision-making tool for the various stakeholders of the Moroccan NSTI to help them better assess the effectiveness of their policies, expenditures and/or activities and actions, as well as the contribution of innovation to the achievement of their socio-economic objectives.

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Acknowledgements

Not applicable.

Funding

Not applicable.

Conflict of Interests

No, there are no conflicting interests.

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